UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

NANOBEBE US INC.) Case IPR2023-00465
Petitioner) Patent 11,207,244
v.)
MAYBORN (UK) LIMITED) Case IPR2023-00467
Patent Owner) Patent 10,952,930

*** CONFIDENTIAL UNDER PROTECTIVE ORDER ***

DEPOSITION OF
BRIAN SILVER
Baker Botts LLP
30 Rockefeller Plaza
New York, New York 10012
10/12/2023
9:08 a.m. (EDT)

REPORTED BY: AMANDA GORRONO, CLR
CLR NO. 052005-01

DIGITAL EVIDENCE GROUP
1730 M Street, NW, Suite 812
Washington, D.C. 20036
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10/12/2023
9:08 a.m. (EDT)

DEPOSITION OF BRIAN SILVER, held at Baker Botts, LLP, 30 Rockefeller Plaza, New York, New York 10012, before Amanda Gorrono, Certified Live Note Reporter, and Notary Public of the State of New York.

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BRIAN SILVER, called as a witness, having been first duly sworn by a Notary Public of the State of New York, was examined and testified as follows: 09:08:50

THE WITNESS: I do. 09:08:50

THE COURT REPORTER: Can you state your appearances for the record. 09:08:50 09:08:54

MR. GOETZ: John Goetz and Kenneth Darby of Fish & Richardson on behalf of Mayborn. 09:08:54 09:08:58 09:09:01

And with us on the Zoom is Dennis Jaskoviak, in-house counsel at Mayborn; and Anthony Hulse, the GC of Mayborn, may join today if he's not on yet via Zoom. 09:09:02 09:09:06 09:09:09 09:09:13

MR. WILLIAMS: Eliot Williams and Matthew Engel for the petitioner are here. 09:09:16 09:09:19

EXAMINATION 09:09:19

BY MR. GOETZ: 09:09:19

Q. Good morning, sir. 09:09:28

A. Good morning. 09:09:29

Q. What is your full name? 09:09:30

A. Brian Silver. 09:09:31

Q. Okay. And what do you do for a living? 09:09:33 09:09:36

A. I design medical products. 09:09:37

Q. Who is your current employer? 09:09:39

A. Fluid Technology Solutions. 09:09:41

Q. Okay. And what is your current job title? 09:09:44 09:09:46

A. CTO for medical. 09:09:47

Q. Okay. You understand, sir, that you're under oath? 09:09:49 09:09:51

A. Yes. 09:09:54

Q. Have you ever been deposed before? 09:09:54

A. Yes. 09:09:56

Q. Okay. So you understand that you have to tell the truth, the whole truth, and nothing but the truth? 09:09:56 09:09:58 09:10:01

A. Yes. 09:10:02

Q. And you will do that today, right, sir? 09:10:02 09:10:04

A. Yes. 09:10:04

Q. Okay. And do you understand that the testimony that you're giving today is just as 09:10:04 09:10:07

important as if you were in a courtroom, for example, before a judge and a jury? Is that your understanding? 09:10:10 09:10:12 09:10:15

A. Yes. 09:10:15

Q. Okay. And so it's important to give truthful, accurate, and complete testimony today; and you'll do that, right? 09:10:16 09:10:18 09:10:21

A. Yes. 09:10:23

Q. Okay. If you don't understand a question, will you please let me know? 09:10:23 09:10:25

A. Yes. 09:10:29

Q. Okay. And if you do answer my question, it will be fair to assume that you understood it. 09:10:30 09:10:33 09:10:36

Is that okay? 09:10:36

A. Yes. 09:10:37

Q. Okay. If you ever want to change, modify, or take back on answer that you've already given, just let me know and we'll do that. 09:10:37 09:10:40 09:10:42 09:10:45

Okay? 09:10:46

A. Yes. 09:10:46

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Q. Okay. We'll try to take a break every hour, but if you ever feel like you need a break, you just let me know. 09:10:46 09:10:50 09:10:53

My only request is that if there is a question pending, that you answer the question before we take a break; is that fair? 09:10:55 09:10:58 09:11:00

A. Yes. 09:11:03

Q. Okay. And do you know that you're going to get a transcript of the deposition that you'll be able to make changes to your testimony? 09:11:03 09:11:04 09:11:06

A. I didn't know that. 09:11:11

Q. You did not know that? 09:11:12

A. No. 09:11:13

Q. I think that's right. But I just want you to know so we're on the same page if you do make changes to your testimony, we'll be able to tell the board that you changed your answer. 09:11:14 09:11:15 09:11:20 09:11:22

Do you understand? 09:11:26

A. Yes. 09:11:26

Q. Is there any reason, medical or otherwise, that would prevent you from giving truthful, complete, and accurate testimony here 09:11:27 09:11:28 09:11:30

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today? 09:11:32

A. No. 09:11:32

Q. Okay. If that changes during the day, please let me know. 09:11:33 09:11:36

Did you bring some papers with you today, sir? 09:11:38 09:11:40

A. I did. 09:11:41

Q. What are those? 09:11:41

A. This is the exhibit list. 09:11:42

Q. Okay. From what? From your declaration? 09:11:43 09:11:45

MR. WILLIAMS: I'll represent that's from the Petition. 09:11:49 09:11:50

MR. GOETZ: The Petition. Okay. Fine. 09:11:55 09:11:56

BY MR. GOETZ: 09:11:56

Q. And what is the other paper? 09:11:56

A. Just a few notes I made to myself. 09:11:58

(Handing.) 09:12:02

BY MR. GOETZ: 09:12:04

Q. Okay. Fine. 09:12:05

MR. GOETZ: I think we're going to mark this notes page as Exhibit 2016, please. 09:12:09 09:12:11

And I may ask you about that later. 09:12:16

(Whereupon, Exhibit 2016, Notes Page, was marked for identification.) 09:12:16 09:12:34

BY MR. GOETZ: 09:12:34

Q. Okay. So, let's start by talking about your background. And I have a copy of your CV, which I'm going to mark as the next exhibit, 2017. 09:12:36 09:12:38 09:12:46 09:13:08

(Whereupon, Exhibit 2017, Curriculum Vitae, was marked for identification.) 09:13:08 09:13:10

MR. GOETZ: Copy for you guys. 09:13:10

BY MR. GOETZ: 09:13:12

Q. Do you have Exhibit 2017 in front of you, sir? 09:13:13 09:13:16

A. I do. 09:13:16

Q. And do you recognize that document? 09:13:18

A. I recognize the first page, the second page, and the third page. I did not attach this list of selected search results documents. 09:13:20 09:13:44 09:13:52 09:13:57

Q. Okay. The first two pages -- or I guess three pages are -- is what? What do you recognize those pages to be? 09:13:57 09:14:00 09:14:04

A. First two pages are my r sum . 09:14:05

Q. Well, you're saying two pages, but of course there is a front and a back. So if you count just the first, second -- I count three pages that say "Brian H. Silver" at the top? 09:14:07 09:14:10 09:14:13 09:14:15

A. Correct. 09:14:19

Q. Okay. You recognize those to be your CV? 09:14:19 09:14:21

A. Yes. 09:14:22

Q. Okay. And is it accurate and complete as of today? 09:14:22 09:14:24

A. Yes. 09:14:25

Q. And I mean, I'll just represent that I think I got this from an exhibit to your declaration that you filed and then -- in the litigation matter, not the IPR. I didn't find it attached in the IPR exhibits. 09:14:35 09:14:40 09:14:43 09:14:46 09:14:51

But you don't know what this list of selected search results documents is starting on the fourth page; is that correct? 09:14:54 09:14:56 09:15:01

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A. You asked if -- I understood you to 09:15:14
say that it was part of my r sum . 09:15:18
Q. Well, I don't know what this is. 09:15:21
That's why I'm trying -- 09:15:23
A. I didn't include this as part of my 09:15:25
r sum . 09:15:27
Q. I understand. 09:15:27
So it's not a part of your r sum ? 09:15:28
A. No. 09:15:29
Q. What is it? 09:15:30
A. It's a list of -- it appears to be a 09:15:31
list of patents that had been assigned -- that I 09:15:33
had been an inventor on. 09:15:36
Q. Did you create this list? 09:15:38
A. No. 09:15:39
Q. Do you know why it was created? 09:15:40
A. It was -- I could -- no. 09:15:47
Q. Okay. I mean, there's 62 US patents 09:15:51
listed on this list. Oh, 70 US patents, utility 09:15:55
and design. 09:15:59
Do you agree with that? 09:16:00
A. Yes. 09:16:10

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Q. And do you think that you have -- or 09:16:11
you're an inventor on more than 70 US patents, 09:16:14
such that this list is not a complete list of 09:16:18
your patents? 09:16:21
MR. WILLIAMS: Objection to form. 09:16:22
A. I do not see a patent that was 09:16:52
issued for work that I did at Fluid Technology 09:17:23
Solutions. 09:17:30
BY MR. GOETZ: 09:17:30
Q. Okay. So this is a partial list of 09:17:30
your patents; is that fair? 09:17:33
A. Yes. 09:17:34
Q. Okay. I want to start with your 09:17:35
educational background and your experience. 09:17:39
And I see -- and you can feel free 09:17:43
to refer to your CV -- but I understand that you 09:17:46
graduated with the bachelor of science degree in 09:17:49
1981; is that correct? 09:17:54
A. Yes. 09:17:55
Q. And what was your degree in? 09:17:56
A. Bachelor of science in general 09:17:58
engineering. 09:18:03

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Q. Is it fair to say you were not 09:18:04
working in the baby bottle industry or art at 09:18:11
that time? 09:18:15
A. Yes. 09:18:16
Q. What did you do after you 09:18:17
graduated -- sorry. Where did you get your 09:18:28
degree? 09:18:31
A. University of Illinois at 09:18:31
Urbana-Champaign. 09:18:37
Q. And what did you do after you 09:18:37
graduated? 09:18:39
A. Can you be more specific? 09:18:41
Q. Well, did you get a job? 09:18:43
A. Yes. 09:18:45
Q. Where? 09:18:45
A. Kendall, Incorporated. 09:18:46
Q. And what is -- what was the nature 09:18:50
of that company's business? 09:18:52
A. Medical products. 09:18:55
Q. Which type? 09:18:56
A. Many different types. 09:18:59
Q. How would you characterize the 09:19:06

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industry -- the medical device industry that 09:19:11
Kendall was in at the time when you started? 09:19:14
MR. WILLIAMS: Objection to form. 09:19:17
A. I'm not clear what your question is. 09:19:18
BY MR. GOETZ: 09:19:20
Q. Do you agree that in the medical 09:19:20
device field there is a lot of different 09:19:23
industries? 09:19:25
A. Yes. 09:19:26
Q. Okay. And so what are some of the 09:19:27
categories of industries that you have 09:19:30
experience, you know, just from your perspective? 09:19:33
A. For Kendall, urological products, 09:19:35
anesthesia products, sequential compression 09:19:41
devices. 09:19:48
Q. Okay. Any others at the time? 09:19:54
A. Stockings. 09:19:55
Q. Anything else? 09:20:05
A. Drapes. That's all I recollect at 09:20:06
this time. 09:20:14
Q. Is it fair to say that during the 09:20:14
time you were working at Kendall, you were not in 09:20:17

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the baby bottle industry? **09:20:21**
A. Yes. 09:20:25
Q. And when did you leave Kendall? **09:20:25**
A. In 1987. 09:20:28
Q. And what did you do from 1987 to **09:20:39**
1989? **09:20:44**
A. I worked at a company called Hudson 09:20:45
Respiratory Care. 09:20:52
Q. Well -- oh, I see. I see. I had **09:20:52**
wrote down -- I see. **09:21:02**
You had two different positions at **09:21:03**
Hudson; is that correct? **09:21:05**
A. That's correct. 09:21:06
Q. I understand. **09:21:07**
And it looks like from your CV that **09:21:10**
from '87 to '89, you were a development engineer; **09:21:12**
is that correct? **09:21:16**
A. Correct. 09:21:17
Q. And then from '89 to '91, you were a **09:21:18**
manager of research and development; is that **09:21:22**
correct? **09:21:25**
A. Yes. 09:21:25

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Q. Okay. Is it fair to say that Hudson **09:21:25**
Respiratory Care was not in the baby bottle **09:21:31**
industry? **09:21:32**
A. Yes. 09:21:33
Q. And what industry was it in? **09:21:34**
A. Respiratory care. 09:21:48
Q. So what types of products would that **09:21:53**
involve or did that involve at the time? **09:21:55**
A. Heated humidification systems for 09:21:57
intubated and nonintubated patients. And 09:22:02
breathing circuits. 09:22:12
Q. Anything else? **09:22:14**
A. Not that I recollect at this time. 09:22:25
Q. Okay. And it looks like you left **09:22:28**
Hudson and went to Medela? **09:22:31**
A. Yes. 09:22:38
Q. In 1991? **09:22:39**
A. Yes. 09:22:41
Q. And why did you make the switch? **09:22:42**
A. Hudson Respiratory Care moved their 09:22:46
R&D department to California. 09:22:52
Q. And you didn't want to move? **09:22:54**

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A. Correct. 09:22:56
Q. Okay. When you started -- is it **09:22:57**
Medela? Am I saying that correctly? **09:23:21**
A. Yes. 09:23:24
Q. When you started at Medela in 1991, **09:23:25**
you were director of product development; is that **09:23:34**
correct? **09:23:36**
A. Yes. 09:23:37
Q. And what products were you working **09:23:59**
on in the period of -- while you were the **09:24:01**
director of product development? **09:24:06**
A. Breast pump products, baby care 09:24:09
products, mom and baby products. But also had 09:24:17
feeding products. 09:24:42
Q. Other than the breast pump products, **09:24:44**
what other baby feeding products were you working **09:24:47**
on during that period, 1991 to 1999? **09:24:50**
A. Bottles, collars. 09:24:55
Q. Well, let's start with just the **09:25:05**
feeding products themselves, and we can talk **09:25:07**
about the components. **09:25:11**
So bottles, anything else? **09:25:13**

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MR. WILLIAMS: Objection to form. 09:25:21
A. Specialty feeding devices for 09:25:24
infants. 09:25:56
BY MR. GOETZ: 09:25:58
Q. Anything else? **09:26:01**
MR. WILLIAMS: Same objection. 09:26:06
A. Not that I recollect at this time. 09:26:09
BY MR. GOETZ: 09:26:26
Q. What's an example of a specialty **09:26:27**
feeding device for infants? **09:26:29**
A. We had a supplemental nutrition 09:26:36
device where milk was fed to an infant through a 09:26:40
tube attached to a mom's breast. 09:26:47
Q. I think I have your patent on that. **09:26:51**
We're going to talk about that later. That's **09:26:53**
what I thought you were referring to. **09:26:56**
Are there any other types of **09:26:59**
specialty feeding devices for infants that you **09:27:00**
have in mind other than that one? **09:27:03**
A. Yes. 09:27:04
Q. What other ones do you have in mind? **09:27:04**
A. A product called SoftCup feeder. 09:27:06

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Q. Okay. And what was that? 09:27:11
A. It was a soft silicone nipple 09:27:13
attached to the end of a bottle, that if you 09:27:23
squeeze on it, milk will come out into a soft 09:27:30
feeding area and could be then fed to the infant. 09:27:34
Q. The feeding area was a cup, or it 09:27:37
was inside the bottle? 09:27:40
A. It was attached to the teat. 09:27:42
Q. So did the baby put the teat in the 09:27:47
baby's mouth? 09:27:51
A. No. 09:27:52
Q. I see. So what went in the baby's 09:27:52
mouth? 09:27:56
A. Nothing. The spoon -- it was spoon 09:27:56
feeding. 09:27:59
Q. Okay, that's helpful. 09:27:59
Any other special feeding devices 09:28:00
for infants? 09:28:02
A. Yes. 09:28:04
Q. What else? 09:28:04
A. Mini Haberman feeder -- what we 09:28:05
called the mini Haberman feeder. 09:28:13

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Q. And what was that? 09:28:16
A. It was a nipple. 09:28:27
Q. Had to be more than just a nipple, 09:28:28
right? 09:28:30
A. It was a nipple. 09:28:30
Q. Okay. 09:28:34
A. What would you like to know? 09:28:35
Q. I'm just trying to understand 09:28:37
specialty feeding devices. I got your '167 09:28:39
patent. We're going to talk about that. I got 09:28:42
the SoftCup feeder and the mini Haberman feeder. 09:28:44
That was just a nipple? 09:28:50
A. It was a -- it was a special 09:28:51
designed nipple. 09:28:53
Q. Okay. Any others? 09:28:55
A. Not that I recollect at this time. 09:29:01
Q. Okay. During that period, was it 09:29:05
fair to say that the focus of your work was on 09:29:11
breast pumps as opposed to bottles and specialty 09:29:14
feeding devices? Is that a fair characterization 09:29:17
of your time during this period? 09:29:22
A. No. 09:29:29

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Q. Why not? 09:29:30
A. There were multiple feeding products 09:29:31
I was working on at the same time I was working 09:29:36
on breast pumps. 09:29:39
Q. During that -- which is the most 09:29:41
successful product that sort of came out of this 09:29:44
period that we're talking about, which is 1991 to 09:29:46
1999? 09:29:49
A. Breast pump. 09:29:50
Q. Okay. Did any of the bottles you 09:29:51
were working on at that time make it to market? 09:30:04
MR. WILLIAMS: Objection to form. 09:30:10
A. Yes. 09:30:11
BY MR. GOETZ: 09:30:16
Q. Do you remember -- did they have 09:30:16
a -- what was the name of the product when it was 09:30:18
launched? 09:30:21
A. I don't believe there was a special 09:30:21
name. 09:30:29
Q. That was just sort of the Medela 09:30:30
bottle kind of thing? 09:30:34
A. Yes. 09:30:36

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Q. And did it have a silicone nipple or 09:30:37
TPE or what? 09:30:46
A. I don't recall. 09:30:49
Q. Okay. It looks like your next 09:30:51
position at Medela was the group director of 09:31:07
innovation and research from 1999 to 2002; is 09:31:10
that correct? 09:31:22
A. Yes. 09:31:22
Q. And did you work on the same sorts 09:31:22
of products during that period or different 09:31:29
products? 09:31:30
A. Similar types of products. 09:32:02
Q. How did your roles and 09:32:05
responsibilities change when you got the 09:32:06
different title? 09:32:09
A. It was more collaborative with our 09:32:15
Swiss counterparts. 09:32:18
Q. And what do you mean by "Swiss 09:32:20
counterparts"? 09:32:26
A. Medela was and is based in 09:32:28
Switzerland. 09:32:35
Q. And so who were your Swiss 09:32:38

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counterparts at that time? 09:32:40
A. It was the R&D team as well as 09:32:43
marketing team. 09:32:46
Q. Okay. And then 2002, you became the 09:32:49
vice president of innovation and research at 09:32:56
Medela; is that correct? 09:32:59
A. Correct. 09:33:02
Q. And how did your roles and 09:33:07
responsibilities change when you took that 09:33:09
position, if you remember? 09:33:10
A. They were similar with additional 09:34:26
responsibilities. 09:34:28
Q. Management, more management 09:34:31
responsibilities? 09:34:33
A. More high level leadership team 09:34:34
responsibilities. 09:34:38
Q. They weren't doing as much sort of 09:34:38
designing of products but supervising the 09:34:42
designers; is that fair? 09:34:45
A. No. 09:34:47
Q. That's not fair? 09:34:47
A. No. 09:34:48

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Q. Why is that not fair? 09:34:48
A. I still remained heavily involved in 09:34:52
designing products. 09:34:54
Q. Through 2015? 09:34:55
A. Yes. 09:34:57
Q. Okay. And were you aware of the 09:34:57
baby bottle market during this period you were 09:35:03
vice president from 2002 to 2015? 09:35:06
A. Yes. 09:35:10
Q. And had you heard of Mayborn or 09:35:11
Jackel, as they were known? 09:35:14
A. Yes. 09:35:19
Q. And do you remember when the Closer 09:35:19
to Nature product came out? 09:35:23
A. No. 09:35:25
Q. Have you ever heard of the Closer to 09:35:25
Nature product? 09:35:29
A. I'm uncertain. 09:35:32
Q. Okay. And then in 2015, your title 09:35:45
changed to vice president of innovation scouting; 09:35:48
is that correct? 09:35:56
A. Correct. 09:35:56

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Q. And how did your roles and 09:35:57
responsibilities change when you took that role? 09:36:03
A. I was predominantly looking for 09:36:09
opportunities outside of Medela. 09:36:17
Q. And did you find any? 09:36:29
A. Yes. 09:36:33
Q. And did that lead to any 09:36:34
acquisitions by Medela after that? 09:36:36
A. Yes. 09:36:38
Q. Can you tell me what those were? 09:36:39
A. I don't know if it's confidential to 09:36:42
Medela. 09:36:51
Q. Okay. That's fine. I'm not 09:36:51
really -- I'm more interested in sort of the 09:36:54
types of products. 09:36:56
Were they baby bottle products? 09:36:56
A. There was a baby bottle. 09:37:00
Q. You acquired a company that 09:37:05
manufactured a baby bottle; is that what you're 09:37:07
saying? 09:37:10
A. Yes. 09:37:10
Q. Can you tell me what baby bottle it 09:37:11

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was? 09:37:14
A. [redacted] 09:37:14
Q. [redacted] 09:37:19
[redacted] **09:37:23**
[redacted] **09:37:34**
A. No. 09:37:34
Q. Okay. Why is that not correct? 09:37:35
A. The product wasn't on the market. 09:37:37
Q. I understand. 09:37:39
Did the product ever go on the 09:37:40
market? 09:37:42
A. No. 09:37:45
Q. Why not? 09:37:45
A. I don't know. It was after I left 09:37:55
the company. 09:37:57
Q. Okay. Did any other of the 09:37:58
acquisitions that you scouted involve baby 09:38:04
bottles? 09:38:09
A. Can you repeat that? 09:38:14
Q. Did any other of the potential 09:38:16
acquisitions that you were scouting during this 09:38:19
period you were the head of innovation scouting 09:38:24

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involve baby bottles? 09:38:28
A. Yes. 09:38:30
Q. Okay. What was the other one? 09:38:31
A. [redacted] 09:38:32
Q. [redacted] 09:38:34
[redacted] 09:38:37
A. [redacted] 09:39:07
[redacted] 09:39:10
Q. What was the nature of the business 09:39:14
opportunities that you were looking at, if not 09:39:15
acquisition? 09:39:18
A. It was one of the possibilities, 09:39:20
others would be distribution. 09:39:30
Q. [redacted] 09:39:44
[redacted] 09:39:46
[redacted] 09:39:49
A. I don't know the exact date. 09:39:56
Q. Roughly the year. 09:39:58
A. 2018, roughly. 09:40:02
Q. [redacted] 09:40:07
[redacted] 09:40:11
A. [redacted] 09:40:14

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Q. [redacted] 09:40:15
[redacted] 09:40:17
A. [redacted] 09:40:19
Q. [redacted] 09:40:22
A. [redacted] 09:40:25
Q. [redacted] 09:40:26
[redacted] 09:40:29
[redacted] 09:40:31
A. [redacted] 09:40:34
Q. [redacted] 09:40:34
[redacted] 09:40:42
A. [redacted] 09:40:44
Q. [redacted] 09:40:50
[redacted] 09:40:54
[redacted] 09:40:59
MR. WILLIAMS: Objection to form and 09:41:01
scope. 09:41:04
A. [redacted] 09:41:06
BY MR. GOETZ: 09:41:08
Q. Cologne trade show or what trade 09:41:09
show? 09:41:14
A. Yes. 09:41:14

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Q. The Cologne trade show? 09:41:14
A. Yes. 09:41:16
Q. What's the name of that in the 09:41:17
industry? 09:41:19
A. Kind + Jugend. 09:41:19
Q. [redacted] 09:41:26
A. [redacted] 09:41:28
Q. It would have been either the 2017 09:41:33
or 2018 show, it sounds like, though, is that 09:41:36
fair? Seems like that's fair, right? 09:41:40
A. It -- it -- its -- 09:41:48
Q. There's only one show a year? 09:41:50
A. Correct. 09:41:52
Q. It's usually in the fall? 09:41:52
A. Correct. 09:41:54
Q. Yeah, so it would have been either 09:41:55
2017 or 2018; is that fair? 09:41:57
A. Or possibly 2016. I'm not sure. 09:42:00
Q. Oh, it could have been 2016. Okay. 09:42:04
Fine. 09:42:07
[redacted] **09:42:08**
[redacted] **09:42:10**

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MR. WILLIAMS: Objection to form and 09:42:14
scope. 09:42:16
A. [redacted] 09:42:16
[redacted] 09:42:28
BY MR. GOETZ: 09:42:29
Q. [redacted] 09:42:33
[redacted] 09:42:36
A. [redacted] 09:42:39
Q. [redacted] 09:42:41
[redacted] 09:42:44
A. [redacted] 09:42:54
Q. [redacted] 09:42:57
A. [redacted] 09:42:58
Q. [redacted] 09:42:59
[redacted] 09:43:01
MR. WILLIAMS: Objection to form. 09:43:05
A. [redacted] 09:43:06
BY MR. GOETZ: 09:43:19
Q. [redacted] 09:43:19
[redacted] 09:43:21
A. [redacted] 09:43:24
Q. [redacted] 09:43:31

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[redacted] 09:43:33
[redacted] 09:43:36
MR. WILLIAMS: Objection to form. 09:43:41
A. [redacted] 09:43:42
BY MR. GOETZ: 09:43:43
Q. [redacted] **09:43:43**
[redacted] **09:43:46**
A. I met with Ayal Lanternari, after I 09:43:47
was re- -- after I left Medela. 09:44:07
Q. For what purpose did you meet with 09:44:12
him after you left Medela? 09:44:14
A. To see their facility and see if 09:44:33
there were any opportunities for potential 09:44:38
employment. 09:44:40
Q. Okay. And what facility did you 09:44:40
see? 09:44:43
A. In Charleston, South Carolina. 09:44:49
Q. What was the nature of the facility? 09:44:52
Was it manufacturing? Distribution? 09:44:54
A. It was their US facility for the 09:44:57
president of marketing, just office staff. I 09:45:08
don't know about the rest. 09:45:11

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Q. Okay. It was just an office 09:45:12
building? 09:45:14
A. It was an office building I believe, 09:45:14
but I'm not sure if there was anything else. 09:45:17
Q. I understand. 09:45:19
But you didn't see any manufacturing 09:45:20
capabilities; is that fair? 09:45:23
A. Correct. 09:45:26
Q. Okay. And approximately when was 09:45:27
this? It was after you -- after you left Medela? 09:45:33
A. Yes. 09:45:41
Q. So that would have been -- I'm going 09:45:41
to look at your r sum . Look at your CV. When 09:45:46
approximately when -- 09:45:53
A. 2018. 09:45:54
Q. And did Ayal offer you a job? 09:45:55
A. No. 09:45:59
Q. Why not? 09:46:00
A. Just didn't seem to be an 09:46:04
opportunity. 09:46:06
Q. Okay. Other than this one meeting, 09:46:08
[redacted] **09:46:11**

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[redacted] **09:46:14**
[redacted] **were there any other meetings that you 09:46:16**
had with Nanob b ? 09:46:18
MR. WILLIAMS: Objection to form. 09:46:26
A. Only related to this -- 09:46:31
BY MR. GOETZ: 09:46:36
Q. The dispute. 09:46:37
A. -- dispute. 09:46:38
Q. I understand. 09:46:40
Did you say you were released from 09:46:42
Medela? 09:46:44
A. There was a reduction in staff, 09:46:53
including myself. 09:46:55
Q. And what's your understanding of why 09:46:56
there was a reduction in staff? 09:47:00
A. [redacted] 09:47:05
[redacted] 09:47:10
Q. [redacted] **09:47:10**
A. [redacted] 09:47:16
Q. [redacted] **09:47:17**
[redacted] **09:47:20**
A. [redacted] 09:47:20

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[redacted] 09:47:24
[redacted] 09:47:28
Q. [redacted] **09:47:28**
[redacted] **09:47:31**
A. [redacted] 09:47:33
[redacted] 09:47:37
Q. [redacted] **09:47:39**
[redacted] **09:47:42**
[redacted] **09:47:44**
A. [redacted] 09:47:45
[redacted] 09:47:51
Q. [redacted] **09:47:54**
A. [redacted] 09:47:58
[redacted] 09:48:00
[redacted] 09:48:08
Q. And so why did that result in your 09:48:16
release? I still don't understand. 09:48:18
A. It was an overall reduction in the 09:48:27
workforce [redacted] 09:48:30
[redacted] 09:48:37
Q. Okay. And when you left Medela, 09:48:38
what did you do next? I know you talked with 09:48:42

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Ayal. What else did you do? **09:48:45**
A. I looked for a new job. 09:48:49
Q. Did you speak with any other baby **09:48:55**
bottle companies other than Nanob b ? **09:48:58**
A. Yes. 09:49:11
Q. What companies? **09:49:12**
A. Ameda. 09:49:15
Q. Okay. What else? **09:49:22**
A. ALoo. 09:49:33
Q. Any others? **09:49:40**
A. Those are all I recall. 09:50:01
Q. And you're looking at Page 3 of your **09:50:02**
CV? **09:50:04**
A. Yes. 09:50:05
Q. Is that correct? **09:50:05**
A. Correct. 09:50:08
Q. And what was the nature of your work **09:50:08**
for aLoo? **09:50:16**
A. Consulting. 09:50:19
Q. On what products? **09:50:20**
A. Bottle nipple. 09:50:27
Q. In what context? **09:50:32**

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MR. WILLIAMS: Objection to form. 09:50:35
A. Overall evaluation of product, 09:50:37
packaging, instructions. 09:50:49
BY MR. GOETZ: 09:50:54
Q. And what about with Ameda, what **09:50:54**
products did you consult on? **09:50:59**
A. Breast pump development. 09:51:02
Q. But Ameda, I guess, also had a **09:51:04**
bottle product; is that right? **09:51:16**
A. Yes. 09:51:18
Q. But you didn't -- you weren't **09:51:18**
consulting on that; is that correct? **09:51:21**
A. Correct. 09:51:23
Q. Okay. Did you ask any of these **09:51:24**
other companies for employment, or were these all **09:51:29**
just strictly as a consultant? **09:51:32**
A. Strictly as a consultant. 09:51:36
Q. Did you have your own consulting **09:51:44**
firm during this time, or how did you do it? **09:51:46**
Just sort of with your own -- in your personal **09:51:48**
capacity? **09:51:52**
A. Yes. 09:51:53

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Q. Personal capacity? **09:51:53**
A. Yes. 09:51:55
Q. Okay. And then in 2019, you took a **09:51:56**
position at Fluid Technology Solutions; is that **09:52:00**
correct? **09:52:02**
A. Correct. 09:52:05
Q. And you came in as the CTO? **09:52:09**
A. CTO of medical. 09:52:13
Q. CTO of medical. **09:52:17**
And does that company -- is that **09:52:19**
company in the baby bottle industry? **09:52:22**
A. No. 09:52:27
Q. [redacted] **09:52:28**
[redacted] **09:52:33**
A. [redacted] 09:52:37
Q. [redacted] **09:52:39**
A. [redacted] 09:52:41
[redacted] 09:52:50
Q. [redacted] **09:52:52**
A. [redacted] 09:52:55
Q. [redacted] **09:52:55**
A. [redacted] 09:52:58

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[redacted] 09:53:04
[redacted] 09:53:18
Q. Is it a pharmaceutical or a medical **09:53:20**
device product? **09:53:22**
A. Outside the United States, it's 09:53:27
considered a pharmaceutical. In the United 09:53:29
States, it's pseudo medical. 09:53:34
Q. Is it a Class III medical device **09:53:40**
under FDA guidelines? **09:53:43**
A. No. 09:53:45
Q. [redacted] **09:53:46**
[redacted] **09:53:49**
[redacted] **09:53:52**
[redacted] **09:54:02**
MR. WILLIAMS: Objection to scope. 09:54:08
A. [redacted] 09:54:16
[redacted] 09:54:20
BY MR. GOETZ: 09:54:22
Q. [redacted] **09:54:23**
A. [redacted] 09:54:24
Q. [redacted] **09:54:25**
[redacted] **09:54:33**

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MR. WILLIAMS: Objection to scope. 09:54:35
A. [redacted] 09:54:37
[redacted] 09:54:44
BY MR. GOETZ: 09:54:54
Q. [redacted] **09:54:55**
[redacted] **09:54:57**
A. [redacted] 09:54:58
Q. And you're talking about the 09:54:59
chairman of your board, is that correct, the 09:55:00
Medela board? 09:55:03
A. The chairman of the Medela board. 09:55:04
Q. And who was that at the time? 09:55:06
A. Michael Larsson. 09:55:07
Q. [redacted] **09:55:10**
[redacted] **09:55:17**
[redacted] **09:55:21**
A. [redacted] 09:55:33
[redacted] 09:55:55
Q. [redacted] **09:55:56**
[redacted] **09:55:59**
A. [redacted]. 09:56:03
Q. [redacted] **09:56:04**

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A. [redacted] 09:56:06
Q. [redacted] **09:56:07**
A. [redacted] 09:56:09
[redacted] 09:56:36
Q. [redacted] **09:56:36**
A. [redacted] 09:56:38
Q. [redacted] **09:56:42**
[redacted] **09:56:44**
A. [redacted] 09:56:45
Q. [redacted] **09:56:47**
A. [redacted]. 09:56:48
Q. [redacted] **09:56:51**
[redacted] **09:56:53**
A. [redacted] 09:57:00
Q. [redacted] **09:57:04**
[redacted] **09:57:06**
A. [redacted] 09:57:15
[redacted] 09:57:17
Q. [redacted] **09:57:28**
[redacted] **09:57:40**
A. [redacted] 09:57:43
Q. [redacted] **09:57:43**

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[redacted] **09:57:45**
A. [redacted] 09:57:47
Q. [redacted] **09:57:54**
A. [redacted] 09:58:06
Q. That's okay. If it comes to you 09:58:07
later today, just let us know. That's fine. 09:58:09
A. Yeah. 09:58:14
Q. [redacted] **09:58:14**
A. [redacted] 09:58:16
Q. [redacted] **09:58:20**
[redacted] **09:58:23**
[redacted] **09:58:25**
A. [redacted] 09:58:28
Q. [redacted] **09:58:29**
[redacted] **09:58:30**
A. [redacted] 09:58:38
Q. [redacted] **09:58:38**
[redacted] **09:59:00**
[redacted] **09:59:02**
MR. WILLIAMS: Objection to form and 09:59:04
scope. 09:59:06
A. [redacted] 09:59:08

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BY MR. GOETZ: 09:59:22
Q. [redacted] **09:59:26**
[redacted] **09:59:29**
A. [redacted] 09:59:31
Q. [redacted] **09:59:31**
A. [redacted] 09:59:37
[redacted] 09:59:51
Q. [redacted] **09:59:53**
[redacted] **09:59:55**
A. [redacted] 10:00:00
[redacted] 10:00:09
[redacted] 10:00:24
[redacted] 10:00:29
[redacted] 10:00:34
Q. [redacted] **10:00:35**
A. [redacted] 10:00:40
Q. [redacted] **10:00:42**
A. [redacted] 10:00:44
Q. [redacted] **10:00:48**
[redacted] **10:00:50**
A. [redacted] 10:00:53
[redacted] 10:00:57

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Q. [redacted] **10:00:59**
[redacted] **10:01:01**
A. [redacted] 10:01:04
[redacted] 10:01:06
Q. [redacted] **10:01:06**
[redacted] **10:01:08**
[redacted] **10:01:11**
MR. WILLIAMS: Objection to scope. 10:01:13
A. [redacted] 10:01:21
BY MR. GOETZ: 10:01:23
Q. [redacted] **10:01:27**
[redacted] **10:01:29**
A. [redacted] 10:01:32
Q. [redacted] **10:01:33**
A. [redacted] 10:01:41
[redacted] 10:01:46
Q. [redacted] **10:01:48**
[redacted] **10:01:50**
A. [redacted] 10:01:54
[redacted] 10:02:09
[redacted] 10:02:19
Q. [redacted] **10:02:21**

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MR. WILLIAMS: Objection to form. 10:02:23
A. [redacted] 10:02:24
[redacted] 10:02:39
BY MR. GOETZ: 10:02:40
Q. [redacted] **10:02:41**
A. [redacted] 10:02:42
Q. [redacted] **10:02:45**
[redacted] **se** **10:02:49**
[redacted] **10:02:52**
MR. WILLIAMS: Objection to form and scope. 10:02:53
10:02:54
A. [redacted] 10:02:55
BY MR. GOETZ: 10:02:56
Q. [redacted] **10:02:58**
[redacted] **10:03:03**
MR. WILLIAMS: Objection to form and scope. 10:03:05
10:03:06
A. [redacted] 10:03:06
MR. GOETZ: Okay. We've been going about an hour. Let's take a break. 10:03:17
10:03:19
MR. WILLIAMS: Sure. 10:03:21
THE COURT REPORTER: Off the record. 10:03:22

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(Recess taken.) 10:03:25
THE COURT REPORTER: Back on the record. 10:13:05
10:13:06
MR. GOETZ: This will be 2018. 10:13:07
(Whereupon, Exhibit 2018, Photographs, was marked for identification.) 10:13:07
10:13:58
MR. WILLIAMS: I have something to report before we get started. 10:13:58
10:14:01
MR. GOETZ: Go ahead. 10:14:02
MR. WILLIAMS: I was asking the witness some -- about his answers prior to the break and whether they may be confidential to Medela. And based on his answer, I'm going to make a motion to enter the default protective order and designate the last -- first section of the deposition as protected material under the default protective order. 10:14:04
10:14:05
10:14:08
10:14:10
10:14:12
10:14:14
10:14:15
10:14:18
10:14:23
And I can give you after the deposition a more granular breakdown of that, but. 10:14:24
10:14:26
10:14:30
(Whereupon, a request for Mark section of deposition confidential under protective order, was made.) 10:14:30
10:14:30
10:14:31

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MR. GOETZ: Okay. That's fine. We'll reserve all of our rights to the extent there are any. Okay. Fine. 10:14:31
10:14:38
10:14:42
BY MR. GOETZ: 10:14:44
Q. Okay, sir, can you take a look at the Exhibit 2018 that I put in front of you? **10:14:47**
10:14:49
A. Yes. 10:14:52
Q. And do you agree that these are pictures of babies' drinking bottles? **10:14:52**
10:14:55
A. Yes. 10:15:00
Q. And do you agree that these are sort of the conventional shape of the bottle? **10:15:01**
10:15:04
MR. WILLIAMS: Objection to form. Scope. 10:15:06
10:15:09
A. Yes. 10:15:10
BY MR. GOETZ: 10:15:15
Q. And do you agree that the shape of the bottle is not representative of a woman's breast? **10:15:15**
10:15:18
10:15:21
MR. WILLIAMS: Objection to form. 10:15:23

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A. No. 10:15:26
BY MR. GOETZ: 10:15:56
Q. Why not? 10:15:56
A. A portion of the bottle has a curved 10:16:02
surface that could be viewed as similar to the 10:16:13
breast. 10:16:17
Q. The collar or the nipple? 10:16:18
MR. WILLIAMS: Objection to form. 10:16:22
A. Can you say that again? 10:16:23
BY MR. GOETZ: 10:16:36
Q. You said a portion of the bottle has 10:16:36
a curved surface that could be viewed similar to 10:16:38
the breast. 10:16:44
What portion are you referring to? 10:16:45
A. The curved portion at the top of the 10:16:46
bottle. 10:16:49
Q. At the top of the collar or at the 10:16:50
top of the bottle vessel? 10:16:53
A. Bottle. 10:16:57
Q. Okay. Do you see the top of the 10:16:58
bottle in these pictures? 10:17:01
A. I was referring to the top that you 10:17:26

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could see of the bottle. 10:17:27
Q. Okay. Just so it's clear, could you 10:17:32
just take a pen and circle what you're referring 10:17:34
to so I can understand what you're referring to, 10:17:37
please? 10:17:39
Do you have a pen? Yeah. 10:17:43
A. (Indicating.) (Handing.) 10:17:50
Q. Okay. And do you agree that these 10:18:00
images appear to show a conventional nipple? 10:18:04
MR. WILLIAMS: Objection to form and 10:18:08
scope. 10:18:09
A. No. 10:18:14
BY MR. GOETZ: 10:18:17
Q. Why not? 10:18:17
A. The nipple is not visible. 10:18:21
Q. Is it fair to say that in 10:18:23
conventional nipples, the infant often puts all 10:18:25
or nearly all of the nipple into his or her 10:18:28
mouth? 10:18:33
MR. WILLIAMS: Objection to form and 10:18:34
scope. 10:18:36
A. No. 10:18:38

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BY MR. GOETZ: 10:18:39
Q. And why is that not true? 10:18:40
A. There's no definition I'm aware of 10:18:45
of a conventional nipple. 10:18:53
Q. As opposed -- setting aside that 10:18:59
there's no definition, do you have in mind an 10:19:31
understanding of what a conventional nipple is or 10:19:33
no? 10:19:36
MR. WILLIAMS: Objection to form. 10:19:38
A. No. 10:19:42
BY MR. GOETZ: 10:19:43
Q. Do you agree that in the 1990s -- 10:19:55
MR. GOETZ: Well, withdrawn. 10:20:12
BY MR. GOETZ: 10:20:13
Q. Do you agree that before 2000 there 10:20:14
was a fairly conventional shape for a bottle 10:20:17
nipple? 10:20:20
MR. WILLIAMS: Objection to form and 10:20:21
scope. 10:20:22
A. No. 10:20:22
BY MR. GOETZ: 10:20:23
Q. And why not? 10:20:23

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A. There were different kinds of bottle 10:20:32
nipples available. 10:20:34
Q. Available for sale? Is that what 10:20:38
you mean? 10:20:43
A. Available for sale or in the patent 10:20:44
literature. 10:20:47
Q. Okay. 10:20:48
MR. GOETZ: Let's mark as the next 10:20:56
exhibit, which I think is 2019, US Patent 10:20:57
5,474,193. 10:21:06
(Whereupon, Exhibit 2019, US Patent 10:21:06
5,474,193, was marked for identification.) 10:21:30
BY MR. GOETZ: 10:21:30
Q. Do you have that document in front 10:21:32
of you, sir? 10:21:34
A. Yes. 10:21:35
Q. Do you recognize it? 10:21:36
A. Yes. 10:21:39
Q. And what do you recognize it to be? 10:21:54
A. It's a patent for breastfeeding 10:21:56
assistance device. 10:22:04
Q. And you're an inventor on that 10:22:05

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patent; is that correct? 10:22:08
A. Yes. 10:22:11
Q. Is Mr. Larsson, the first named inventor, the same Mr. Larsson you mentioned earlier that was the chairman of Medela? 10:22:16 10:22:19 10:22:25
A. No. 10:22:27
Q. Is it a related guy? 10:22:28
A. Yes. 10:22:32
Q. How? 10:22:32
A. His father. 10:22:35
Q. And then who was the other gentleman, Mr. Weniger? 10:22:38 10:22:41
A. President of Medela in the United States. 10:22:44 10:22:48
Q. And is this patent, the '193 patent, the patent for the specialty feeding device that we -- you mentioned earlier? 10:22:48 10:22:52 10:22:59
A. One of the specialty feeding devices, yes. 10:23:02 10:23:04
Q. There were several. Well, right, the one that has the supplemental tube for the breastfeeding? 10:23:05 10:23:07 10:23:10

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A. Yes. 10:23:11
Q. Got you. Do you agree that this patent is in the same art as the art of the challenged claims in these IPRs? 10:23:11 10:23:17 10:23:19 10:23:23
MR. WILLIAMS: Objection to form. 10:23:25
A. As far as feeding babies, yes. 10:23:26
BY MR. GOETZ: 10:23:39
Q. Okay. But for some other reason, no? What do you mean? 10:23:41 10:23:44
MR. WILLIAMS: Objection to form. 10:23:45
A. There's not a teat that goes into the baby's mouth. 10:23:51 10:23:54
BY MR. GOETZ: 10:23:57
Q. But generally it's in the same art? 10:23:57
A. Generally. 10:23:59
Q. Okay. If you want to look at Figure 1 just to make sure I'm understanding what's happening here. It looks like there's a -- basically an upsidedown bottle, sort of hanging on the woman's chest. And there is a tube that leads 10:24:00 10:24:14 10:24:18 10:24:20 10:24:22 10:24:25

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from the end of the nipple portion all the way sort of resting near to the woman's actual nipple within the purposes so that the baby can put the woman's nipple and the tube into the baby's mouth at the same time and get supplemental food or medicine; is that fair? 10:24:31 10:24:34 10:24:38 10:24:43 10:24:46 10:24:49
A. Yes. 10:24:50
Q. Okay. And this -- this device has a vent to equalize the pressure; is that correct? And I'm actually -- just to help you -- if you look at the top of Column 4 that refers to the "small channel (23)" -- and please read as much as you would like. And then I'll reask the question when you're ready. 10:24:51 10:25:02 10:25:27 10:25:29 10:25:31 10:25:34 10:25:40
A. (Witness reading document.) 10:25:43
Okay. 10:26:35
Q. Okay. And this device has a vent to equalize the pressure; is that -- is that fair? 10:26:35 10:26:39
A. Yes. 10:26:42
Q. And that's done through the small channel (23)? 10:26:43 10:26:45
MR. WILLIAMS: Objection to form. 10:26:52

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A. Yes. 10:26:55
BY MR. GOETZ: 10:26:55
Q. And if you look at Figure 2, you can see reference numeral 23? 10:26:56 10:26:58
A. Yes. 10:27:05
Q. And could you just explain to me, sort of, how that works, please? 10:27:06 10:27:11
A. How 23 works? 10:27:16
Q. Yeah. Just in operation, you know, what happens with respect to 23? 10:27:18 10:27:21
A. When there is a vacuum created in the bottle, air comes in through the vent to relieve the vacuum in the bottle. 10:27:23 10:27:34 10:27:42
Q. And how does the air arrive at 23, the vent 23? 10:27:49 10:27:52
A. I have to -- 10:27:58
Q. Yeah. 10:28:04
A. According to the patent it says the threaded engagement between the attachment ring and bottle is loose enough to permit air to reach this channel. 10:28:57 10:28:59 10:29:02 10:29:05
Q. And what does that mean? 10:29:06

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A. Alternatively the threads can be broken to ensure an air path.
Q. Okay. And what does that mean?
A. It means that air comes up through the threaded area and air goes to the channel.
Q. Okay. And the threaded area, just looking at Figure 2, it's your understanding that it's sort of 16a are the threads with 11b, I guess; is that -- is that correct?
A. That appears to be correct.
Q. Okay. And this -- did this vent work at the time?
A. Yes.
Q. Did -- this was a commercial product at some point?
A. Yes.
Q. Is it still?
A. I believe it is.
Q. Was it a good product? A bad product?
It seems like it's a good product. It's been on the market for so long.

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MR. WILLIAMS: Objection.
BY MR. GOETZ:
Q. How would you characterize the product?
MR. WILLIAMS: Objection to form and scope.
A. I would characterize it as useful.
BY MR. GOETZ:
Q. Was it a successful product within the sort of Medela line of products; is that fair?
MR. WILLIAMS: Objection to form and scope.
A. It depends on the definition of "success."
BY MR. GOETZ:
Q. Doesn't it always.
How would you -- would you say it's a successful product?
A. Yes.
Q. Okay. Does it have a name, like a marketplace name?

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A. I'm not sure of the current name, but it used to be called SNS.
Q. S-N-S like the letters?
A. Yes, Supplemental Nursing System.
Q. Okay. [redacted]
[redacted]
[redacted]
MR. WILLIAMS: Objection to scope.
A. [redacted]
BY MR. GOETZ:
Q. Okay. Did the product, the SNS product or later versions, ever receive any awards, to your knowledge?
A. No.
Q. Did you -- are you aware of any complaints about the product?
A. Not that I recall.
Q. Is it fair to say it worked pretty well; is that fair?
MR. WILLIAMS: Objection to form and scope.
A. Yes.

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BY MR. GOETZ:
Q. And which of the two sort of designs of the vent was in the implemented product?
MR. WILLIAMS: Objection to form and scope.
A. I'm not clear on the question.
BY MR. GOETZ:
Q. So you referred me to the top of Column 4 which talks about the channel 23, and I asked you how it worked. And you read to me the last two sentences of that top paragraph, and I understand that to be sort of two different alternatives about how the air can get from the outside of the bottle through the channel and then into the inside of the bottle.
So the first question is: Do you agree those are two different ways to do that?
A. Two different ways being with a broken threads and unbroken threads?
Q. Yeah.
A. To that, I agree.
Q. And which one of those ways was used

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in the bottle that you sold in the marketplace? 10:33:49
MR. WILLIAMS: Objection to form and scope. 10:33:53 10:33:54
A. Unbroken threads. 10:33:59
BY MR. GOETZ: 10:34:01
Q. Okay. What was the most successful product that Medela had had, in your view, in terms of sort of revenue and sales numbers? 10:34:01 10:34:35 10:34:38
MR. WILLIAMS: Objection to form and scope. 10:34:41 10:34:42
THE WITNESS: Is this also confidential? 10:34:57 10:34:58
MR. WILLIAMS: We can designate that as confidential. 10:35:01 10:35:03
MR. GOETZ: Yeah, sure. 10:35:07
(Whereupon, a request for Designating the Following Portion As Confidential was made.) 10:35:07 10:35:07
A. [redacted] 10:35:07
BY MR. GOETZ: 10:35:10
Q. Is that the colloquial name or the brand name? 10:35:10 10:35:15

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A. It's the brand name. [redacted] 10:35:16
[redacted] 10:35:18
Q. [redacted] 10:35:18
A. [redacted] 10:35:19
Q. Okay. And that's different than the product that's the patent that we're looking at? 10:35:21 10:35:22
A. Yes. 10:35:25
Q. Okay. What makes you say that was the most successful product, just because it was sort of sold the most? 10:35:25 10:35:34 10:35:37
A. Yes. 10:35:39
Q. And generally speaking, what was that product? 10:35:39 10:35:41
A. [redacted] 10:35:42
[redacted] 10:35:49
Q. And what do you think made that the most successful product? 10:35:51 10:35:53
MR. WILLIAMS: Objection to form and scope. 10:35:55 10:35:56
A. [redacted] 10:36:07
[redacted] 10:36:08
[redacted] 10:36:14

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MR. GOETZ: Okay. Let's mark as the next exhibit, which is 2020, US patent 7,712,617. 10:36:40 10:36:41 10:36:47
(Whereupon, Exhibit 2020, US Patent No. 7,712,617, was marked for identification.) 10:36:47 10:36:47 10:37:09
BY MR. GOETZ: 10:37:09
Q. Do you have that in front of you, sir? 10:37:17 10:37:21
A. Yes. 10:38:09
Q. Okay. And what do you recognize that to be? 10:38:10 10:38:11
A. Patent for an artificial nipple. 10:38:13
Q. And who's the inventor? 10:38:19
A. Brian Silver. 10:38:22
Q. Is that you? 10:38:23
A. Yes. 10:38:25
Q. Okay. And what was the period of work that led to the document that we have here in front of us? 10:38:25 10:38:37 10:38:40
MR. WILLIAMS: Objection to form and scope. 10:38:42 10:38:43

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A. Can you clarify "the period of work"? 10:38:55 10:39:12
BY MR. GOETZ: 10:39:13
Q. Well, I'm just trying to get an understanding of sort of when -- when was the work done for this application, roughly? If it seems like it probably would have been -- well, you tell me, if you know. 10:39:13 10:39:16 10:39:19 10:39:23 10:39:26
A. For the -- provisional application was filed in 2002. And so work began before that. 10:39:29 10:40:15 10:40:23
Q. Okay. Do you agree at that period that a demand existed for an artificial nipple that more closely mimics that of a natural breast? 10:40:25 10:40:29 10:40:33 10:40:37
A. Yes. 10:40:41
Q. And do you agree that at that time a demand existed for an artificial nipple that reduced or eliminates the impact of bottle feeding with respect to oral development? 10:40:41 10:40:44 10:40:48 10:40:52
MR. WILLIAMS: Objection to form. 10:40:55
A. Can you repeat this question? 10:40:58

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BY MR. GOETZ: 10:41:00
Q. Yeah. 10:41:00
Do you agree that at that time a 10:41:00
demand existed for an artificial nipple that 10:41:02
eliminates the impact of bottle feeding with 10:41:07
respect to oral development? 10:41:10
MR. WILLIAMS: Objection to form. 10:41:12
A. Can you qualify "demand"? 10:41:14
BY MR. GOETZ: 10:41:22
Q. Take a look at Column 2, Lines 1 10:41:23
through 5 of this patent, and read that to 10:41:26
yourself. And then I'll follow up, and we'll get 10:41:29
some clarity. 10:41:31
A. Column 2 Lines -- 10:41:32
Q. The first five lines in Column 2. 10:41:34
A. (Witness reading document.) 10:41:38
Q. Do you see those words? 10:41:52
A. Yes. 10:41:53
Q. Do you agree with them? 10:41:53
A. Yes. 10:41:55
Q. And so what do you mean by "the 10:41:55
impact of bottle-feeding with respect to oral 10:41:58

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development"? 10:42:00
A. (Witness reading document.) 10:42:04
Okay. Your question? 10:45:01
MR. GOETZ: Can you read it back, 10:45:11
please, ma'am? 10:45:12
THE COURT REPORTER: Yes, sir. 10:45:15
(Record read.) 10:45:18
A. So as stated in the patent, it talks 10:45:18
about -- in the background of the invention, it 10:45:20
talks about how babies feed different from 10:45:23
artificial nipples compared to the mom's breast 10:45:30
and how that can result in malocclusions in the 10:45:34
development of the oral cavity. 10:45:39
Q. And what is a malocclusion? 10:45:41
A. You have to, I think, need to -- to 10:45:45
look in a dictionary to get a good definition for 10:45:54
it. 10:45:57
Q. That's fine. Just what's your 10:45:58
understanding of it, just generally? 10:46:01
A. It's just how the -- how the teeth 10:46:02
and other aspects of the mouth are formed. 10:46:06
Q. Okay. So this is a different 10:46:16

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problem than nipple confusion. 10:46:18
Do you agree with that? 10:46:20
MR. WILLIAMS: Objection to form and 10:46:21
scope. 10:46:23
A. No, I don't agree with that. 10:46:23
BY MR. GOETZ: 10:46:25
Q. You think it's the same problem as 10:46:26
nipple confusion? 10:46:28
A. I think there is relationships 10:46:29
between them. 10:46:31
Q. Okay. And in what way did the prior 10:46:33
nipples not, quote, mimic that of a natural 10:46:56
breast, end quote? 10:47:02
MR. WILLIAMS: Objection to form and 10:47:05
scope. 10:47:06
A. One way is that the mother's nipple 10:47:07
is more malleable than bottle nipples. 10:47:30
BY MR. GOETZ: 10:47:45
Q. Any others? 10:47:45
A. The nipple stays -- the mother's 10:47:47
nipple stays elongated in the baby's mouth and is 10:47:52
positioned close to the hard/soft palate junction 10:48:02

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where often that -- strike that -- where 10:48:10
sometimes the artificial nipple is not. 10:48:14
Q. Okay. Anything else? 10:48:25
A. Milk can be elicited from the 10:48:39
mother's breast predominantly through vacuum, and 10:48:45
some say stripping from the baby's tongue. In an 10:48:49
artificial nipple, sometimes the baby has to 10:49:00
prevent flow out of the nipple by plugging the 10:49:08
nipple or can elicit milk just by squeezing the 10:49:11
nipple. 10:49:17
Q. Okay. Anything else? 10:49:21
A. When the baby feeds from the mom's 10:49:23
breast, when the tongue goes down, there is a 10:49:25
vacuum. And when the tongue comes up, the baby 10:49:34
closes off the ducts in the mother's nipple and 10:49:39
stops flow. 10:49:52
Q. Whereas... 10:49:53
A. Whereas for a hollow baby nipple, 10:49:57
that's not the case. 10:50:00
Q. Okay. Anything else? 10:50:01
A. Baby nipple -- artificial nipples 10:50:03
are hollow and a mother's nipple is not hollow. 10:50:08

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Q. That seems like the same point. Is that another -- is that a separate point?
A. I think it's a separate statement.
Q. Okay. Any others?
A. Mother's nipple has multiple ducts through which the milk comes out, which many artificial nipples -- where many artificial nipples only have a single hole.
Q. Okay. Anything else?
A. Moms do not have to vent their breast. It's what comes to mind.
Q. Nothing else comes to mind; is that fair?
A. Not immediately.
Q. Not immediately fair or nothing else comes to mind? Sorry. I just want to be clear.
A. Nothing else immediately comes to mind.
Q. Okay. Fine.
How does a baby prevent liquid from coming out of an artificial nipple? You mentioned that earlier. So I just want to understand what you meant by that.
A. So on Line 40, Column 1: In order to stop the abundant flow of milk from a bottle with an artificial nipple having a large hole in the end, infants may be forced to hold the tongue up against the hole of the nipple to prevent the formula from gushing forth.
Q. I see that statement. Have you seen that in practice? What is your evidence of that? How do you know that?
A. This is from my experience -- from -- I'm sorry -- from information I get from lactation consultants, and other medical professionals that have evaluated many babies, both at breast and at bottle.
Q. Okay. You mentioned one of the differences was the positioning, you said -- I think you said that the mom's breast is often positioned close to the hard soft palate junction; is that right?
A. Correct.
Q. And the point is that with artificial nipples, it's not typically there; is that correct?
A. It can vary substantially.
Q. And does that have to do, on the artificial nipple side, with the nipple shape?
A. Yes.
Q. In what way?
A. How long the teat portion of the nipple is and where the baby can put their lips and -- and manage the nipple without gagging.
Q. And does your patent here, the '617 patent, Exhibit 2020, does your patent attempt to solve that problem?
MR. GOETZ: Mark the time. Can you mark the time on the transcript please? Is that timestamp going to be on the final transcript?
THE COURT REPORTER: Yes.
(Time noted: 10:55.)
(Whereupon, a request for Mark the time was made.)
THE COURT REPORTER: Sure. Fine.

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MR. GOETZ: Okay.
A. (Witness reading document.)
Do you have a specific space in the patent place that you'd like to point me to?
Q. No. I'd just like to know if you had that in mind.
Was that one of the problems that you were trying to solve?
A. We were -- we were trying to position the nipple in the oral cavity similar to how a mother's nipple would be positioned in the oral cavity.
Q. Is it fair to say that the nipple shape can be important to how a nipple functions; is that fair?
A. Yes.
Q. Okay. And you mentioned earlier that -- you -- you said: Some people say stripping -- is that because you don't necessarily believe that stripping is one of the mechanism by which a baby extracts the milk from the mother's breast? Or why do you say "some

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people"? 10:57:55
A. There was a controversy in the work 10:57:56
done by different researchers. Research that 10:58:02
Medela did in cooperation with the University of 10:58:15
Western Australia showed that milk came out of 10:58:20
the breast when the tongue was pulled down and 10:58:30
the vacuum was created. And that milk stopped 10:58:35
flowing when the tongue was in the up position. 10:58:42
Q. That would have been the stripping 10:58:56
action that some people said led to milk. Is 10:58:58
that what your point is? 10:59:02
A. No, that's not stripping action. 10:59:04
Q. When the tongue is in the up 10:59:06
position, that's not part of the stripping? 10:59:08
A. No milk flows at that time, whereas 10:59:10
when the stripping is when the tongue comes up, 10:59:13
that's when you pull milk -- that is out -- the 10:59:16
tongue coming up strips milk out of the nipple is 10:59:20
the competing theory. 10:59:23
Q. Right. It sounded to me like the 10:59:24
Medela research showed that during the stripping 10:59:26
action of the baby, milk actually doesn't come 10:59:29

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out of the breast? 10:59:33
A. We don't see a stripping action at 10:59:34
all. 10:59:45
Q. I see. I see. 10:59:45
And when was this sort of academic 10:59:46
debate happening roughly? 10:59:48
A. Roughly around 2000, roughly. 10:59:57
Q. And has there been any other 10:59:59
evidence that you're aware of in the art or in 11:00:01
the industry since then to sort of settle the 11:00:03
debate on one side or the other? 11:00:07
A. There are articles published to 11:00:10
demonstrate that the vacuum is the preferred -- 11:00:15
is the predominant approach of how milk is 11:00:21
removed from the mother's breast. However, there 11:00:25
are still some that have questioned that. But 11:00:32
I'm not sure if there's any proof of stripping. 11:00:38
Q. Understand. 11:00:47
So in any event, based on the Medela 11:00:49
research and the other literature that you've 11:00:51
read, it is your view that it's not actually the 11:00:54
stripping action? 11:00:58

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A. Yes. 11:01:00
Q. I understand. 11:01:00
Was that your view at the time of 11:01:04
the inventions that are disclosed and claimed in 11:01:06
this -- in your patent that we're looking at, 11:01:10
Exhibit 2020? Or was that -- was that not your 11:01:12
view at the time? 11:01:19
A. That was my view at the time. 11:01:19
Q. Now do you think that's because that 11:01:23
initial Medela study was done before that? 11:01:25
A. Yes. 11:01:33
Q. Okay. Okay. You're aware of the 11:01:33
notion of secondary considerations of 11:01:41
nonobviousness, correct? 11:01:43
MR. WILLIAMS: Objection to form and 11:01:47
scope. 11:01:49
A. Can you inform me of those? 11:01:51
BY MR. GOETZ: 11:01:54
Q. Well, I just want to know have you 11:01:54
ever heard of that before? 11:01:56
A. Secondary -- 11:01:57
Q. Secondary considerations of 11:02:00

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nonobviousness. 11:02:02
A. I may have, but I don't recall what 11:02:06
that is. 11:02:09
Q. Sometimes they are called objective 11:02:09
indicia. Have you ever heard of that turn of 11:02:11
phrase? 11:02:16
A. Again, I'm not clear on the exact 11:02:16
wording. 11:02:20
Q. The question is have you heard that 11:02:21
turn of phrase before to your recollection 11:02:24
sitting here today? 11:02:26
A. Not to my recollection. 11:02:27
Q. Okay. I'm just going to hand to you 11:02:29
what's been marked as 1005. 11:02:50
(Whereupon, Exhibit 1005, 11:02:50
Declaration of Brian Silver, was marked for 11:02:50
identification.) 11:02:55
MR. GOETZ: That's his declaration, 11:02:55
which I only have one extra copy of. 11:02:56
BY MR. GOETZ: 11:03:00
Q. Can you just confirm that's your 11:03:00
declaration in these two IPRs? 11:03:02

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Really just -- I mean, you don't have to look at every page. I just want to see if it looks to be that way. I mean, I'll represent to you that I think it is, but I just want to make sure that that's your signature at the end. And generally it appears to be your very long declaration? 11:03:05 11:03:07 11:03:10 11:03:13 11:03:16 11:03:18 11:03:21

A. Yes, it appears to be my declaration. 11:04:01 11:04:03

Q. Okay. Just to refresh your recollection, in Paragraph 20, you refer to "objective considerations of non-obviousness." 11:04:06 11:04:08 11:04:12

Can you just read Paragraph 20. And let me know when you're done. 11:04:17 11:04:19

A. (Witness reading document.) 11:04:21

Q. You haven't considered any secondary considerations in this case; is that correct? 11:06:13 11:06:15

A. Can you repeat that? 11:06:18

Q. You haven't considered any secondary considerations in this case; is that correct? 11:06:21 11:06:24

A. I'd say correct. 11:07:07

Q. And you'd agree that if you had 11:07:10

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secondary considerations to consider, they could change your ultimate opinion in this case; is that fair? 11:07:13 11:07:15 11:07:19

A. Yes. 11:07:24

Q. Okay. Have you ever had occasion to consider secondary considerations before? 11:07:28 11:07:34

MR. WILLIAMS: Objection to form. 11:07:42

A. I'm not sure. 11:07:52

MR. GOETZ: Okay. I'll just mark as the next exhibit, which is 2021. 11:08:02 11:08:03

(Whereupon, Exhibit 2021, Declaration of Brian Silver United States Patent Application Serial No. 10/413463, was marked for identification.) 11:08:03 11:08:03 11:08:03 11:08:33

BY MR. GOETZ: 11:08:33

Q. Okay. Do you have Exhibit 2021 in front of you, sir? 11:08:34 11:08:36

A. Yes. 11:08:37

Q. And if you can turn to Page 7 of the document. Is that your signature? 11:08:37 11:08:40

A. Yes. 11:09:15

Q. Okay. And do you agree this appears 11:09:16

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to be a declaration that you submitted in connection with United States Patent Application Serial No. 10/413463? 11:09:21 11:09:23 11:09:27

A. Yes. 11:09:35

Q. And do you remember the purpose of this declaration? 11:09:35 11:09:38

A. Can you repeat your question? 11:11:08

Q. What's the purpose of this declaration, sir? 11:11:10 11:11:12

Let me try to help. Isn't the purpose of this declaration, as seen in Paragraph 8, to demonstrate nonobviousness based on a long-felt existing -- a long-felt need existing in the art, as you say in Paragraph 8? 11:11:32 11:11:34 11:11:36 11:11:40 11:11:45

A. (Witness reading document.) 11:13:26

Okay. And your question one more time? 11:14:19 11:14:21

MR. GOETZ: Please read it back. 11:14:21

(Record read.) 11:14:23

A. Yes. 11:15:04

BY MR. GOETZ: 11:15:05

Q. Okay. And the evidence that you're 11:15:18

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presenting in this declaration is evidence of acknowledgments of the innovation by the mothers who use it; is that fair? 11:15:21 11:15:29 11:15:33

MR. WILLIAMS: Objection to form and scope. 11:15:37 11:15:38

A. That the mothers reduce pumping time and also received higher milk production, yes. 11:15:56 11:15:58

BY MR. GOETZ: 11:16:05

Q. Well, in Paragraph 7, you're talking about the testimonials? 11:16:05 11:16:06

A. The testimonials based on the outcomes of their use of the product. 11:16:09 11:16:11

Q. Right. And so it's fair to say that the evidence that you're presenting in this declaration are the testimonials of the mothers after using the product? 11:16:13 11:16:16 11:16:18 11:16:24

A. Yes. 11:16:25

Q. And can we agree then that if there were testimonials of users of the Mayborn product that's covered by the patents and the claims that are at issue in this IPR, that those testimonials would be evidence of a long-felt need in the art 11:16:26 11:16:28 11:16:31 11:16:33 11:16:38

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in our IPRs; is that fair? 11:16:40
MR. WILLIAMS: Objection to form. 11:16:43
A. (Witness reading document.) 11:16:47
Can you repeat it? 11:17:20
BY MR. GOETZ: 11:17:21
Q. Yeah. 11:17:21
My question is just: Isn't it true 11:17:21
that if you considered in this case testimonials 11:17:23
from users of Mayborn's product that practices 11:17:27
the claims, that those testimonials like the 11:17:31
testimonials in this declaration would be 11:17:35
evidence of a long-felt need? 11:17:37
MR. WILLIAMS: Objection to form. 11:17:39
BY MR. GOETZ: 11:17:45
Q. Is that fair? 11:17:46
A. I'm not sure. 11:17:46
Q. Why not? 11:17:47
A. It depends what the testimonials 11:17:49
said. 11:17:52
Q. Would it depend on anything else? 11:17:54
MR. WILLIAMS: Objection to form. 11:17:57
A. I would say it's potential evidence 11:18:44

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of nonobviousness. But I don't know without 11:18:46
reading the testimonials. 11:18:55
BY MR. GOETZ: 11:18:58
Q. Okay. In Paragraph 3 in the last 11:18:59
sentence you say -- of this declaration, you say, 11:19:02
quote, I was involved in generating the remarks 11:19:04
and arguments in the response to the examiner's 11:19:08
rejections, end quote. 11:19:11
Do you see that? 11:19:13
A. Yes. 11:19:14
Q. Were you often involved in arguments 11:19:14
with the patent office, in terms of, you know, as 11:19:18
an inventor on your applications? 11:19:20
MR. WILLIAMS: Objection to form. 11:19:25
BY MR. GOETZ: 11:19:28
Q. Or was it just this application? 11:19:29
A. I would -- I tended to review 11:19:32
rejections from the patent office that our 11:19:45
attorneys didn't feel they can address on their 11:19:51
own. 11:19:53
Q. And you would draft the responsive 11:19:53
arguments? 11:19:56

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A. I would not draft. I would probably 11:20:03
be involved in drafting or generating them. 11:20:11
Q. Okay. I mean, it's fair to say 11:20:16
you've got a pretty long history of dealing with 11:20:19
patents; is that fair? 11:20:22
A. Yes -- yes. 11:20:23
Q. Okay. 11:20:25
MR. WILLIAMS: When you reach a 11:20:34
point for a break, I'd like to request one. 11:20:35
MR. GOETZ: Yeah, we can take a 11:20:52
break. Let's take a break. 11:20:53
THE COURT REPORTER: Off the record. 11:20:56
(Recess taken.) 11:21:01
MR. GOETZ: On the record. 11:34:59
BY MR. GOETZ: 11:35:01
Q. Go ahead, sir. 11:35:02
A. I believe the name of the marketing 11:35:03
person at Medela we talked about -- 11:35:04
Q. Yep. 11:35:06
A. His name was Jurg [phonetic] is the 11:35:08
first name and I think it's Richter is the last 11:35:11
name. 11:35:14

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Q. Okay. That's fine. The court 11:35:17
reporter can get estimated spellings after we're 11:35:19
done here. 11:35:23
Okay, sir. Do you agree that it is 11:35:24
not a trivial matter to design a machine that 11:35:26
emulates some aspect of a human being? 11:35:30
MR. WILLIAMS: Objection to form. 11:35:42
A. It depends which function. 11:35:43
BY MR. GOETZ: 11:35:45
Q. Okay. Well, let's start with just 11:35:45
Paragraph 17 of your declaration, the 11:35:47
third-to-last sentence. 11:35:53
You see that, right? 11:35:54
A. Of which declaration? 11:35:55
Q. The declaration we were talking 11:36:00
about before the break, Exhibit 2021. 11:36:02
A. Which paragraph? 11:36:10
Q. Yeah, sorry, Paragraph 17. 11:36:11
And about one, two, three, four, 11:36:19
five lines up from the bottom, there is a 11:36:21
sentence says, quote, It is not a trivial matter 11:36:24
to design a machine that emulates some aspect of 11:36:28

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a human being, end quote. **11:36:31**
Do you see that? **11:36:34**
A. I do. 11:36:34
Q. And do you agree with that? **11:36:35**
MR. WILLIAMS: Objection to form. 11:36:57
A. While this is a general statement, 11:36:58
it was specifically tied to the breast. And 11:37:23
"some aspect" is not all aspects. It's -- this 11:37:31
is the aspect of breast -- of how the breast 11:37:36
works. 11:37:40
Q. So the first question is: Do you **11:37:41**
agree with that statement or not? **11:37:43**
A. I agree with it in context. 11:37:48
Q. And so -- and what is the context? **11:37:52**
A. That it's how breast pump can segue 11:38:05
down and then segue into an expression mode. 11:38:12
Q. Well, you just say "some aspect of a **11:38:16**
human being." You're not talking about this **11:38:19**
aspect. **11:38:21**
What did you mean by "some aspect"? **11:38:22**
A. Well, it's not every aspect, so it's 11:38:29
some aspect. 11:38:32

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Q. Yeah. Wasn't your point that it's **11:38:36**
hard to emulate aspects of human beings with a **11:38:38**
machine? Wasn't that your point? **11:38:43**
A. Certain aspects, yes. 11:38:44
Q. Well, you didn't articulate what **11:38:45**
aspects those were, right? **11:38:48**
MR. WILLIAMS: Objection to form. 11:38:50
A. In particular, I think letdown and 11:38:51
expression of breast milk from the breast is 11:39:00
the -- is the intention of what's read there. 11:39:09
BY MR. GOETZ: 11:39:13
Q. Do you agree it's not a trivial **11:39:13**
matter to design a machine that emulates the **11:39:16**
aspects of a human being involved in **11:39:19**
breastfeeding assistance devices such as your **11:39:21**
'193 patent? **11:39:25**
MR. WILLIAMS: Objection to form and 11:39:28
scope. 11:39:29
A. Such as the '193 patent? I'm sorry. 11:39:29
Can you say that again, the '193 patent -- 11:39:34
BY MR. GOETZ: 11:39:40
Q. Do you agree that the work that you **11:39:41**

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did there was not a trivial matter? **11:39:43**
A. No. 11:39:50
Q. No, you don't agree? **11:39:52**
A. I don't agree. 11:39:54
Q. You think it was a trivial matter? **11:39:54**
A. Can you give me a definition of 11:40:02
"trivial"? 11:40:28
Q. You used the word "trivial" in your **11:40:28**
declaration in Paragraph 17, sir. It's whatever **11:40:31**
you meant when you said it under oath. **11:40:33**
A. In this particular meaning, the 11:40:38
intention is to say that it's -- that it's a 11:41:00
challenging matter, a difficult matter to do, and 11:41:10
relative to the letdown and expression of -- that 11:41:17
'193 patent is substantially -- well, I would say 11:41:32
the pump is substantially more difficult and 11:41:41
challenging than the breastfeeding assistance 11:41:49
device. 11:41:52
Q. Can we agree that it's not a trivial **11:41:53**
matter to develop a breast pump with a letdown **11:41:56**
feature? **11:41:59**
A. Yes. 11:42:04

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Q. Can we agree it's not a trivial **11:42:05**
matter to develop a breastfeeding assistance **11:42:07**
device? **11:42:11**
MR. WILLIAMS: Objection to form and 11:42:14
scope. 11:42:16
A. This is -- this is not -- the 11:42:24
breastfeeding assistance device is not some 11:42:49
aspect of a human being. It's not emulating some 11:42:52
aspect of a human being, so it's not a 11:42:56
straightforward answer. It's neither trivial nor 11:43:01
nontrivial. 11:43:09
BY MR. GOETZ: 11:43:10
Q. Can we agree that it's not a trivial **11:43:10**
matter to develop an artificial nipple? **11:43:13**
MR. WILLIAMS: Objection to form. 11:43:20
A. No. 11:43:21
BY MR. GOETZ: 11:43:22
Q. You think it is a trivial matter? **11:43:22**
A. Depends on the nipple. 11:43:25
Q. So you didn't file for a patent and **11:43:26**
get a patent on something that was a trivial **11:43:35**
matter, though; is that right, because **11:43:37**

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Exhibit 2020 is your patent to an artificial nipple? 11:43:41 11:43:44

MR. WILLIAMS: Objection to form. 11:43:46

A. Which patent? 11:43:48

BY MR. GOETZ: 11:43:50

Q. The '617 patent, sir. Exhibit 2020. 11:43:52

A. Yes. That's not trivial. 11:43:58

Q. And do you think the claimed inventions in this case were a trivial matter? 11:44:02 11:44:03

MR. WILLIAMS: Objection to form. 11:44:07

A. No. 11:44:08

BY MR. GOETZ: 11:44:09

Q. Okay. Okay. Let's take a look at the patents in this case, which I'm sure have been marked. I'll just give them both to you. 11:44:09 11:44:15 11:44:21

MR. GOETZ: For the record US Patent 10,952,930 has been premarked as Exhibit 0 -- I'm sorry -- 1001 that's the '930. 11:44:37 11:44:41 11:44:47

(Whereupon, Exhibit 1001, US Patent 10,952,930, was marked for identification.) 11:44:47 11:44:47

MR. GOETZ: Sorry. And US Patent 11,207,244 has been premarked as 11:45:00 11:45:02

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Exhibit 1003. 11:45:06

(Whereupon, Exhibit 1003, US Patent 11,207,244, was marked for identification.) 11:45:06 11:45:40

MR. GOETZ: And for some reason I have three copies of the "244 patent and no extra copy of the '930. 11:45:40 11:45:42 11:45:47

MR. WILLIAMS: Okay. 11:45:50

MR. GOETZ: Sorry about that. 11:45:51

(Witness reviewing documents.) 11:46:07

BY MR. GOETZ: 11:46:17

Q. Okay. Sir, these are the two patents at issue in this IPR -- in these IPRs; is that correct? 11:46:18 11:46:20 11:46:25

A. Yes. 11:46:25

Q. Okay. Let's take a look at the '930 patent. 11:46:27 11:46:33

Well, it's your understanding that the substance of the specifications and the figures is the same in both of these patents? 11:46:33 11:46:35 11:46:37

A. Yes. 11:46:40

Q. Okay. So let's just look at the '930 patent, for ease of reference, and can we 11:46:40 11:46:43

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agree that Figure 2, a person of skill in the art would understand in -- that Figure 2 shows sort of a classic baby bottle nipple shape. Do you agree with that? 11:46:50 11:46:59 11:47:01 11:47:07

MR. WILLIAMS: Objection to form. 11:47:09

A. No. 11:47:10

BY MR. GOETZ: 11:47:26

Q. Why not? 11:47:27

A. Figure 2 shows an elongated nipple inside the baby's mouth. It's hard to tell exactly where, but... 11:47:27 11:47:31 11:47:39

Figure 2b is -- shows the nipple stretched much farther than 2a, which is not a normal situation with a baby bottle to nipple. 11:47:42 11:47:51 11:47:57

Q. The prior art baby bottle nipples didn't stretch in that way? 11:48:04 11:48:08

MR. WILLIAMS: Objection to form. 11:48:10

A. There may be prior art nipples that did, but there's many that don't. 11:48:16 11:48:19

BY MR. GOETZ: 11:48:21

Q. I understand. 11:48:21

Can we agree that a person of skill 11:48:22

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in the art would understand that the nipple shape depicted in Figure 4 is a different nipple shape than that depicted in Figures 1 and 2a and b? 11:48:27 11:48:28 11:48:34

A. The nipple shape in Figure 4 is -- can you say that again? 11:48:42 11:48:47

Q. Yeah. It's a different shape than the nipple shape in Figures 2a and 2b, which I think is the same shape as the Figure 1. 11:48:49 11:48:51 11:48:55

MR. WILLIAMS: Objection to form. 11:49:01

A. Yes. 11:49:06

BY MR. GOETZ: 11:49:06

Q. Okay. And can we agree that the skilled person will understand Figure 4 is disclosing a wide domed configuration? 11:49:06 11:49:10 11:49:12

MR. WILLIAMS: Objection to form. 11:49:19

A. Yes. 11:49:21

BY MR. GOETZ: 11:49:46

Q. Okay. And part of the reason for that is the way it looks; is that fair? 11:49:46 11:49:47

A. I think it's based on the definition of "domed." 11:50:00 11:50:02

Q. Okay. What do you mean by that? 11:50:05

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A. I think I have to go to the -- to 11:50:07
the Markman hearing and how that was defined. 11:50:15
Q. Okay. Well, I'm just asking right 11:50:21
now a question about what a skilled artisan would 11:50:23
understand from looking at this patent. 11:50:26
And so with that context, why do you 11:50:28
need to go to Markman? 11:50:30
A. It depends on which part you're 11:50:32
talking about as being domed. I mean, the teat 11:50:35
part is not domed. 11:50:41
Q. Right. Let's take a look at '930 11:50:46
patent in Column 3, the paragraph that starts at 11:50:48
Line 57. 11:50:52
A. Column 3 you said? 11:51:07
Q. Column 3. Yes, sir. Starting at 11:51:09
Line 57 at the bottom. It's a paragraph that 11:51:11
begins "Referring to FIG. 4..." 11:51:14
A. Yep. 11:51:16
Q. Just read that to yourself, please. 11:51:16
A. (Witness reading document.) 11:51:19
So this is specific to the base 11:51:51
portion being domed. 11:51:53

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Q. Are you done reading it? 11:51:59
A. Yes. 11:52:01
Q. Do you agree that a skilled artisan 11:52:02
would understand from that description that in 11:52:05
Figure 4, the shape of the teat is similar to the 11:52:07
human breast in the base portion 116 being shaped 11:52:09
like a breast and having a wide domed 11:52:13
configuration? 11:52:18
A. Please repeat that. 11:52:23
Q. Sure. 11:52:26
Do you agree that a skilled artisan 11:52:27
would understand from that description, that in 11:52:29
Figure 4, the shape of the teat is similar to the 11:52:32
human breast, the base portion 116 being shaped 11:52:36
like a breast and having a wide domed 11:52:41
configuration? 11:52:44
A. Yes. 11:52:53
Q. And that description does not apply 11:52:54
to Figure 1. 11:52:56
Do you agree with that? 11:52:57
MR. WILLIAMS: Objection to form. 11:53:00
A. I do not. 11:53:00

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BY MR. GOETZ: 11:53:13
Q. Okay. Well, why not? 11:53:13
A. Figure 1 is the shape of the teat is 11:53:34
similar to the human breast. The base portion is 11:53:35
shaped like a breast and having a wide domed 11:53:42
configuration. 11:53:46
Q. So even though that part of the spec 11:53:47
that we reference as referring to Figure 4, you 11:53:49
are applying that description of wide domed 11:53:56
configuration also to Figure 1; is that correct? 11:53:59
MR. WILLIAMS: Objection to form. 11:54:03
A. I didn't think that was your 11:54:05
question, so... 11:54:07
Q. I mean, you see that paragraph says 11:54:09
"Referring to FIG. 4," right? 11:54:11
A. Correct. 11:54:13
Q. Yeah. 11:54:14
A. But that's not what you asked me. 11:54:14
Q. Okay. Let's try it again. 11:54:16
Do you see the paragraph that we 11:54:18
just read -- that you just read that begins 11:54:20
"Referring to FIG. 4..." 11:54:22

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A. Yes. 11:54:24
Q. Do you agree that the following 11:54:24
description in that paragraph is referring to 11:54:28
Figure 4? 11:54:30
A. Yes. 11:54:30
Q. And do you agree that's not 11:54:30
referring to Figure 1? 11:54:32
MR. WILLIAMS: Objection to form. 11:54:33
A. That paragraph says it's referring 11:54:35
to Figure 4. 11:54:53
BY MR. GOETZ: 11:54:55
Q. And that's how you read it? 11:54:55
A. That's how I read it. 11:54:57
Q. Okay. And so can we agree that the 11:54:59
skilled artisan would understand of the two 11:55:06
embodiments disclosed in the patent, the one in 11:55:08
Figure 4 is the wide domed configuration. 11:55:12
Can we agree -- can you agree with 11:55:14
me on that point? 11:55:16
MR. WILLIAMS: Objection to form. 11:55:18
A. All right. I'm sorry. Can you 11:55:30
repeat your question? 11:56:36

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BY MR. GOETZ: 11:56:37
Q. Yeah. The question is: Can we agree the skilled artisan would understand the two embodiments disclosed in the patent in the figures, the one in Figure 4 is the wide domed configuration? 11:56:37 11:56:38 11:56:42 11:56:44 11:56:47
MR. WILLIAMS: Objection to form. 11:56:48
BY MR. GOETZ: 11:56:50
Q. Do you agree with that? 11:56:51
A. I agree that Figure 4 is, is -- the -- the base portion is a wide dome configuration. 11:56:52 11:57:03 11:57:06
Q. And do you agree that in Figure 1 it's not? 11:57:07 11:57:10
A. No. 11:57:11
Q. You think it is? 11:57:12
A. I -- that's a wide dome configuration. Base is a wide dome. I don't agree with that. 11:57:13 11:57:29 11:57:33
Q. I'm trying to understand why is it that you don't think a skilled artisan would distinguish between those two shapes? You 11:57:34 11:57:37 11:57:39

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think -- 11:57:42
A. I think he could distinguish between the two shapes. I just think both show a base portion shaped like a breast, having a wide domed configuration. 11:57:43 11:57:46 11:57:50 11:57:54
Q. And so why do you think Figure 4 is just referenced as a wide domed configuration and not Figure 1? 11:57:55 11:57:58 11:58:02
A. I have no idea. 11:58:02
Q. Yeah. In your mind, they are both a wide domed configuration; is that correct? 11:58:03 11:58:04 11:58:06
A. In my mind, the base portion is a wide domed configuration. 11:58:08 11:58:12
Q. In both Figure 1 and Figure 4? 11:58:15
A. Yes. 11:58:17
Q. And what is the basis for that view, given that the patent says Figure 4 is the wide domed configuration? 11:58:17 11:58:20 11:58:26
A. Doesn't mean the other can't be. 11:58:26
Q. Okay. Anything else? 11:58:29
MR. WILLIAMS: Objection to form. 11:58:31

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A. I mean, no. 11:58:34
MR. GOETZ: Okay. I'll mark as the next Exhibit 2022. 11:59:08 11:59:09
(Whereupon, Exhibit 2022, Priority document, was marked for identification.) 11:59:09 11:59:15
MR. GOETZ: One of the priority documents in this case but we can talk about it. 11:59:15 11:59:23 11:59:28
BY MR. GOETZ: 11:59:42
Q. Okay. Sir, do you have Exhibit 2022 in front of you? 11:59:43 11:59:46
A. Yes. 11:59:46
Q. Have you looked at this document before? 11:59:47 11:59:52
A. Not to my recollection. 11:59:53
Q. Okay. Can we agree that this document is one of the priority documents for the patents that we're talking about in these IPRs? And just to help you, if you look at, for example, the '930 patent on the face -- 12:00:57 12:00:59 12:01:01 12:01:05 12:01:09
A. Yes. 12:01:13
Q. -- you see a date under foreign 12:01:13

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application priority data of February 8, 2005. Do you see that? 12:01:15 12:01:19
A. Yes. 12:01:23
Q. And do you see the number? The last digits are 02599.4. 12:01:24 12:01:26
A. Yes. 12:01:31
Q. And do you see the number on the face of Exhibit 22 and the date are the same? 12:01:32 12:01:35
A. I see that the date is the same. 12:01:41
Q. Yeah. And do you see that the last few digits 02599.4 are the same for the number? 12:01:44 12:01:45
A. I'm not sure where that is. 12:02:03
Q. It's just on the face of 2022 under document details, it says: Number, colon. Now it says: 05 and then it says: 02599.4? 12:02:04 12:02:06 12:02:15
A. Yes, it has the 0.5 in front of it. Yes, I see that. 12:02:15 12:02:18
Q. I mean, this is the priority document. Do we agree? 12:02:18 12:02:19 12:02:21
A. Yes. 12:02:21
Q. Okay. Okay. So -- but you haven't 12:02:22

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looked at this before; is that fair? 12:02:24
A. I don't recall seeing this before. 12:02:27
Q. Okay. And you can look at whatever 12:02:29
you want, but I just -- you know, if you look at 12:02:30
the figures, you can kind of see that this 12:02:34
particular priority document was sort of with 12:02:37
respect to the Figure 4 embodiment. And the 12:02:39
other priority document which I have is for the 12:02:44
Figure 1 embodiment. 12:02:47
And my question is: Do you agree 12:02:48
with that? 12:02:49
MR. WILLIAMS: Objection to form. 12:02:50
(Whereupon, Exhibit 2023, 2004 12:02:50
Priority application, was marked for 12:02:50
identification.) 12:03:13
BY MR. GOETZ: 12:03:13
Q. And while you're looking at it, I'm 12:03:13
going to hand you Exhibit 2023 which is the other 12:03:15
priority document. 12:03:18
A. Okay. So what is your question? 12:05:38
Q. The question is: Can we agree that 12:05:39
the 2004 priority application which is 12:05:41

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Exhibit 2023 -- 12:05:45
A. Wait, I thought we were on 2022. 12:05:47
Q. The point is just these two 12:05:50
applications are the priority applications to the 12:05:52
Patents-in-Suit. And one of them covers Figure 4 12:05:54
embodiment, and one of them covers Figure 1. 12:06:00
Do you agree with that? 12:06:03
A. Okay. Based on the drawings, I 12:06:05
would agree with them. 12:06:21
Q. Okay. Fair enough. 12:06:22
You haven't done this analysis, 12:06:23
though? 12:06:25
A. No. 12:06:25
Q. Okay. I understand. 12:06:25
And I'll just -- I'll just take you 12:06:29
to Exhibit 2022. That's the Figure 4 embodiment. 12:06:32
And if you go to Page 3, Line 5, it 12:06:36
says, quote, the shape of the teat is also 12:06:44
similar to the human breast, the base portion 16 12:06:46
being shaped like a breast and having a wide 12:06:49
domed configuration. 12:06:49
Do you see that? 12:06:52

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A. Yes. 12:06:54
Q. I mean, that's the language from the 12:06:54
specification that we were talking about before, 12:06:57
correct? 12:06:59
A. It appears to be. 12:06:59
Q. And it's only associated with the 12:07:00
2005 priority document which is Figure 4. 12:07:04
I mean, do you agree with that? 12:07:06
A. I don't know about "only," but it's 12:07:08
in this one. 12:07:10
Q. Fair enough. I'll represent to you 12:07:11
that that language is not in the other 12:07:13
application. 12:07:16
But you didn't know that before 12:07:16
today; is that right? 12:07:18
A. That's right. 12:07:20
Q. Okay. Do you agree that a person of 12:07:21
skill in the art that is familiar with the 12:07:28
landscape of preexisting nipples would have 12:07:31
appreciated that Figure 4 embodiment matches the 12:07:34
description of having a wide domed configuration? 12:07:38
MR. WILLIAMS: Objection to form. 12:07:40

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A. Yes. 12:07:42
BY MR. GOETZ: 12:08:01
Q. Okay. And can we agree that Figure 12:08:01
1, because it's not stretching, but that shows a 12:08:03
conventional nipple shape -- 12:08:08
A. Figure 1 -- 12:08:10
MR. WILLIAMS: Objection to form. 12:08:11
BY MR. GOETZ: 12:08:13
Q. -- of the patent. Sorry. I'm back 12:08:14
in the patent, either one of the patents, '930 or 12:08:16
'244. 12:08:18
A. '930 and '244, Figure 1. 12:08:21
Q. Yeah, sorry. You still have the 12:08:25
priority application. If you can pull up the 12:08:27
patent, either the '930 patent or the '244 12:08:31
patent. 12:08:35
A. Okay. 12:08:36
Q. Figure 1 is a conventional nipple 12:08:37
shape. 12:08:39
Do you agree? 12:08:39
MR. WILLIAMS: Objection to form. 12:08:40
A. Can you repeat your question, 12:08:42

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please. 12:08:58
BY MR. GOETZ: 12:08:58
Q. Figure 1 is a conventional nipple shape. 12:08:59 12:09:01
Do you agree? 12:09:01
MR. WILLIAMS: Same objection. 12:09:02
A. So there are many shapes that would be considered conventional nipple shapes. 12:09:03 12:09:07
BY MR. GOETZ: 12:09:09
Q. Do you think that's a prior art shape? In other words, you've seen that before in the prior art prior to these patents in this invention. 12:09:10 12:09:12 12:09:16 12:09:20
Do you agree with that or no? 12:09:20
A. This exact shape? 12:09:23
Q. The overall shape. 12:09:32
A. It's -- there are so many configurations. 12:09:33 12:09:35
Q. So you just don't know one way or another? 12:09:36 12:09:39
A. I just wouldn't call it -- I just don't know what a conventional nipple is in terms 12:09:42 12:09:44

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of shape. 12:09:47
Q. You don't have in mind a conventional shape for a nipple. That's just not a thing in your mind; is that fair? 12:09:48 12:09:52 12:09:54
A. That's fair. 12:09:56
Q. Okay. Yeah. So let me just ask you again. 12:09:58 12:11:06
Do you think that the overall shape that you see in Figure 4 of the nipple is in the prior art or no? 12:11:07 12:11:08 12:11:11
MR. WILLIAMS: Objection to form. 12:11:12
A. I think there are aspects of it that are in the prior art. 12:11:23 12:11:25
BY MR. GOETZ: 12:11:27
Q. And there's novel aspects as well? 12:11:27
MR. WILLIAMS: Objection to form. 12:11:30
MR. GOETZ: Yeah, let me -- I've messed it up. 12:11:44 12:11:46
BY MR. GOETZ: 12:11:48
Q. Are you looking at Figure 1 or 4? You're looking at Figure 4? 12:11:48 12:11:50
A. Now I am. 12:11:52

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Q. Okay. And there are novel aspects as well, right? 12:11:53 12:11:56
MR. WILLIAMS: Objection to form. 12:11:57
A. I would say I haven't seen a nipple shaped exactly like this one. 12:11:59 12:12:23
BY MR. GOETZ: 12:12:25
Q. Okay. Anything else? 12:12:25
A. I'm not sure what the novel aspects are. 12:12:26 12:12:31
Q. Okay. Anything else? 12:12:34
A. No. 12:12:37
Q. Okay. And go back into Figure 1 now. 12:12:38 12:12:41
A. Okay. 12:12:53
Q. Okay. Do you think that the overall shape that you see in Figure 1 of the nipple is in the prior art? 12:12:53 12:12:55 12:12:57
MR. WILLIAMS: Objection to form. 12:12:59
A. I'd say there's aspects of it that are in the prior art. 12:13:05 12:13:07
BY MR. GOETZ: 12:13:09
Q. And so there's novel aspects as well, right? 12:13:09 12:13:11
MR. WILLIAMS: Objection to form. 12:13:12
A. I don't see any novel aspects either. 12:13:13 12:13:22
BY MR. GOETZ: 12:13:23
Q. Okay. Well, what aspects do you see that are not in the prior art? 12:13:23 12:13:25
MR. WILLIAMS: Objection to form. 12:13:27
Scope. 12:13:29
A. And so the exact -- we're talking about the shape. So the exact shape of the nipple varies from manufacturer to manufacturer. They are not all the same. But I don't know that that makes them novel. It just makes them different, slightly different shapes. 12:13:34 12:13:50 12:13:53 12:14:04 12:14:11 12:14:18
BY MR. GOETZ: 12:14:35
Q. Anything else? 12:14:35
A. No. 12:14:36
Q. If you take a look at paragraph -- go to your declaration which is Exhibit 1005 -- Paragraph 118. 12:15:02 12:15:04 12:15:12
A. Okay. 12:15:23

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Q. And you have no opinion for purposes of this proceeding on the meaning of, quote, a dome configuration/or a base portion having a dome configuration, end quote. Is that true? 12:15:24 12:15:31 12:15:38 12:15:42 12:15:45

A. Yes. 12:15:58

Q. And is it also true that you have no opinion for purposes of this proceeding with regard to the correct construction of flex region? 12:16:03 12:16:07 12:16:10 12:16:13

A. Where are you? 12:16:23

Q. I just skipped ahead to Paragraph 134. 12:16:24 12:16:27

A. 134. Correct. 12:16:29

Q. So you're not going to offer the board an opinion on the meaning of those two terms; is that fair? 12:16:44 12:16:45 12:16:48

A. Yes. 12:16:50

Q. Okay. And I guess it sort of follows from that, that you don't have any opinion as to whether the board's construction is correct for those two terms? 12:16:51 12:16:58 12:17:00 12:17:03

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A. Correct. 12:17:11

Q. And you don't have an opinion as to whether the district court's construction is correct for those two terms? 12:17:12 12:17:14 12:17:17

MR. WILLIAMS: Objection to form and scope. 12:17:24 12:17:29

BY MR. GOETZ: 12:17:31

Q. Is that fair? 12:17:31

A. Can you repeat that question? 12:17:35

Q. It's the same question except with respect to the district court's Markman order. That's what I said. 12:17:38 12:17:40 12:17:43

A. Right. Right. That's why I didn't quite get it. 12:17:43 12:17:47

Q. You don't have any opinion in this proceeding right now for purposes of these IPRs? 12:17:48 12:17:49

A. For purposes of today? 12:17:52

Q. For purposes of these IPRs, you have no opinion as to whether the district court's construction is correct or not; is that fair? 12:17:53 12:17:56 12:17:59

MR. WILLIAMS: Objection to form and scope. 12:18:01 12:18:03

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A. I would say not at this time. 12:18:03

BY MR. GOETZ: 12:18:05

Q. And what do you mean by that? 12:18:05

A. I haven't been asked to offer up an opinion. 12:18:07 12:18:09

Q. Do you have an opinion? 12:18:09

A. Not at this time. 12:18:12

Q. Okay. 12:18:14

MR. WILLIAMS: We've been going about an hour. 12:18:39 12:18:40

MR. GOETZ: This is a good time. I was going to switch topics. 12:18:41 12:18:43

MR. WILLIAMS: Maybe break for lunch. 12:18:50 12:18:52

MR. GOETZ: We can go off the record. 12:18:56 12:18:57

(Whereupon, a lunch recess was taken at 12:18.)

* * *

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AFTERNOON SESSION

(Time noted: 12:53 p.m.)

* * * 13:37:14

13:37:14

MR. GOETZ: Back on the record. 12:53:00

BY MR. GOETZ: 12:53:02

Q. Welcome back, sir. I was just looking -- earlier we had discussed Jackel and Mayborn and the Closer to Nature product, and I was a little unclear on the record and so I just want to go back to that. 12:53:02 12:53:04 12:53:09 12:53:13 12:53:16

I mean, did you know during the time period of, you know, sort of 2002 to 2007 that Mayborn or Jackel was an industry player in the bottle industry? 12:53:23 12:53:26 12:53:33 12:53:37

A. Yes. 12:53:41

Q. You did know that? 12:53:42

A. I knew the names, yeah. 12:53:44

Q. At the time? 12:53:47

A. At the -- at the time. 12:53:48

Q. And at the time, was it fair to say 12:53:49

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that it wasn't your job, though, to sort of keep tabs on the market -- in the baby bottle market; is that fair?

A. I mean, I wouldn't say that, that's totally correct.

Q. Okay. Tell me why.

A. Well, we would typically go to -- excuse me -- so the breast pumps and bottles and teats -- it's always teating and Medela's interest in feeding and so we would go to Babies "R" Us or stores like that and try and understand what was out there --

Q. Okay.

A. -- in the marketplace, as part of developing nipples. You know, I studied competitive nipples as well, but I don't recall which ones in particular.

Q. Do you recall studying any of the Mayborn or Jackel intellectual property?

A. I don't, no.

Q. Okay. And then in terms of the products that were on sale, in the sort of mid

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2000s, do you remember that there was a -- Mayborn had a -- or Jackel at the time had a Closer to Nature product that was -- sort of looked kind of like Figure 4 in the patents?

MR. WILLIAMS: Objection to form.

A. The name sounds familiar, but I don't have recollection of that.

MR. GOETZ: I understand. Okay.

Let's mark as the next exhibit, 2024, US Patent 6,161,710.

(Whereupon, Exhibit 2024, US Patent 6,161,710, was marked for identification.)

MR. WILLIAMS: You only have one of these, right?

MR. GOETZ: I only have one of those. Sorry.

BY MR. GOETZ:

Q. Okay. Have you looked at this patent before, sir?

A. Yes.

Q. And in what context?

A. That's one of the referenced patents on the '930 patent.

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Q. It's on the face of the Patents-in-Suit or the patents in the IPR; is that right? It's listed on the face.

A. It's listed on this, yes.

Q. It's on both the '244 and the '930, right, sir?

A. I know it's on the '930, so -- let me check. Yes.

Q. Okay. And so you agree that this reference is relevant to understanding the '930 and the '244 patents?

MR. WILLIAMS: Objection to form.

A. I actually haven't reviewed the details of the patent so I would have to do that to give you a response.

Q. Yeah, that's fine. I understand. Just in general you understand the prior art on the face of a patent is informative in terms of the meaning of the claim terms. You know that, right?

A. I actually didn't know that it was

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for the meaning of the claims.

Q. You didn't know that?

A. No.

Q. Okay. And you agree that this '710 patent discloses a wide nipple design? You would agree with that?

MR. WILLIAMS: Objection to form.

A. Yes.

BY MR. GOETZ:

Q. And if you look at Column 1 in the "TECHNICAL FIELD" you agree this is in the same technical field as the challenged claims in these IPRs, fair?

MR. WILLIAMS: Objection to form.

BY MR. GOETZ:

Q. I thought that would be an easier one.

A. Sorry. I was reading through the TECHNICAL FIELD to make sure. Yes.

Q. Okay. You agree?

A. Yes.

Q. Do you agree that a skilled artisan

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would understand sort of a wide nipple as one, 13:01:26
quote, having a width approximately double to 13:01:29
that of the height of a nipple apparatus, end 13:01:34
quote? 13:01:37
MR. WILLIAMS: Objection to form and 13:01:37
scope. 13:01:39
A. Please repeat that. 13:01:44
BY MR. GOETZ: 13:01:46
Q. Yeah. 13:01:47
Do you agree that skilled artisans 13:01:47
would understand a wide nipple is one having a 13:01:49
width approximately double the height of the 13:01:53
nipple apparatus? 13:01:56
A. Height of the nipple apparatus -- 13:01:58
MR. WILLIAMS: Objection to form and 13:02:01
scope. 13:02:03
A. I don't know that, no. 13:02:10
BY MR. GOETZ: 13:02:11
Q. Okay. You don't know or you 13:02:11
disagree with that? 13:02:13
A. I -- I disagree with that. 13:02:14
Q. And why do you disagree with that? 13:02:27

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A. It depends how high the nipple is 13:02:30
and what its general shape to begin with. 13:02:36
Q. For the notion of a wide nipple? 13:02:39
A. Yeah. 13:02:42
Q. Okay. Can we agree -- 13:02:43
MR. GOETZ: Withdrawn. 13:02:48
BY MR. GOETZ: 13:03:10
Q. And so what's your understanding of 13:03:10
what it means when your -- when skilled artisans 13:03:12
are talking about a wide base of a nipple? 13:03:15
MR. WILLIAMS: Objection to form. 13:03:17
A. This is a term that was construed in 13:04:29
the digital court -- in the district court, 13:04:33
correct? 13:04:36
BY MR. GOETZ: 13:04:38
Q. I think the word "wide" is a part of 13:04:38
the construction of "domed." 13:04:42
And my question to you is: What's 13:04:43
your understanding of "wide" in this context? 13:04:45
MR. WILLIAMS: Objection to form and 13:04:49
scope. 13:04:51
A. Yeah. I mean, there's not a set 13:04:51

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definition of "wide." 13:04:57
BY MR. GOETZ: 13:04:59
Q. Right. 13:04:59
To me it sounds like you don't have 13:04:59
any definition of "wide." It has no meaning to 13:05:02
you because ones that appear wide, you would say 13:05:05
are wide, but ones that don't appear wide, you 13:05:07
would also say are wide. I want to get that 13:05:10
clear on the record. Is that what is happening? 13:05:13
A. No. 13:05:16
Q. Can we agree -- 13:05:17
A. I'm trying to find a definition 13:05:18
without -- 13:05:20
Q. It doesn't have to be a definition. 13:05:21
I just -- how do you think of a notion of a wide 13:05:23
nipple as a skilled artisan and how do you 13:05:25
distinguish that from a nipple that's not wide? 13:05:28
MR. WILLIAMS: Objection to form. 13:05:31
A. I'm trying to give a definitive 13:07:19
answer here, and I'm not sure there is a 13:07:22
definitive response in terms of what wide is. 13:07:24
But, you know, it's -- it's something where it 13:07:28

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widens out at the base of the nipple at the -- 13:07:37
yeah -- it's wider than the teat portion. It -- 13:07:43
BY MR. GOETZ: 13:08:12
Q. Anything else? 13:08:12
A. Yeah, it doesn't have an exact 13:09:33
dimension in terms of wide. 13:09:36
Q. Okay. Anything else? 13:09:44
A. No, maybe I'll come back to it. I 13:09:48
don't know. 13:09:51
Q. Okay. We're talking about the 13:09:52
nipple with a wide base, and you said it widens 13:09:58
out at the base of the nipple. I take that to 13:10:03
mean it's widing -- it's becoming wider as you go 13:10:06
from the teat and areola down to the base. 13:10:11
Is that what you meant? 13:10:20
A. The base is wider than the teat part 13:10:20
of the nipple, I'm not sure. Say what you said 13:10:23
again. 13:10:28
Q. Yeah. 13:10:31
You said one of the aspects of a 13:10:31
nipple with a wide base is that it widens out at 13:10:34
the base of the nipple. And I took that to mean, 13:10:37

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you know, as you go down the nipple from the teat at the top to the areola and you go down, it gets wider. 13:10:40 13:10:42 13:10:46

Is that what you meant? 13:10:46

A. It is, but I'm not sure it's, you know -- I mean, you can have a wide one that isn't tapered down. It could be straight across. It would still be wide. 13:10:59 13:11:03 13:11:05 13:11:12

Q. Right. But without understanding Figure 1 of the patents that are at issue wouldn't be wide because -- 13:11:14 13:11:15 13:11:19

A. Why is that? 13:11:21

Q. Because it doesn't -- it doesn't continue to widen as you go down. It curves back on itself. 13:11:23 13:11:25 13:11:32

A. Yeah, I didn't say that, though. 13:11:33

Q. I'm trying to just get it clear. So this Figure 1 of the patent is still wide, in your view? 13:11:36 13:11:37 13:11:41

A. It -- there's no dimensions, but it appears to be wide, yes. 13:11:41 13:11:46

Q. And why does it appear to be wide? 13:11:48

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A. Because when the baby latched onto it, it's still -- it's a broad base. 13:11:51 13:11:56

Q. Broad base. The latching is by the nipple, though. We're talking about the base of the nipple? 13:12:05 13:12:08 13:12:10

A. Yeah -- 13:12:11

Q. So what is the latching -- 13:12:11

A. Well, show me what the base of the nipple is. 13:12:12 13:12:14

Q. Well, what's your -- whatever your understanding of the base is. 13:12:15 13:12:17

A. I think it's called out as the -- let me look at it. 13:12:18 13:12:20

Q. Okay. That's fine. It's either patent. 13:12:22 13:12:24

A. So region 24 separates -- (reading to self.) 13:13:00 13:13:06

So this calls out the base portion as 14 which is wider than the areola portion. 13:13:08 13:13:11

Q. Okay. So you think 14 is just right there at that one point where the reference line ends, and that's it. No other parts are of the 13:13:18 13:13:23 13:13:27

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base? 13:13:31

MR. WILLIAMS: Objection to form. 13:13:32

A. No. 13:13:33

BY MR. GOETZ: 13:13:36

Q. Okay. So where is -- where is the base? Take the highlighter here and highlight for me where you think the base is. 13:13:36 13:13:38 13:13:42

A. Well, I don't -- it's undefined as exactly where everything is. It just says that it's -- that there is a transition area 24 between the base and the areola, and that transition area is 24. And it doesn't show where that begins and ends, and so it doesn't show where 14 begins and ends. So it's kind of -- you know, kind of could be any of that portion of it. 13:13:44 13:13:47 13:13:50 13:13:54 13:14:00 13:14:09 13:14:12 13:14:22

Q. And so one question is sort of what's your understanding of what's being disclosed in this patent as a skilled artisan as it relates to the base in Figure 1? 13:14:27 13:14:33 13:14:36 13:14:42

MR. WILLIAMS: Objection to form. 13:14:45

BY MR. GOETZ: 13:14:48

Q. And I'm going to hand you this

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orange highlighter and ask you to highlight it. And if you can't, you can't. Just say it on the record. 13:14:50 13:14:54 13:14:57

A. So I would say according to the detailed description of that, where it says that the -- so where the base is, it says the base portion 14, and areola portion there between -- feeding bottle -- (reading to self.) 13:16:00 13:16:02 13:16:06 13:16:13 13:16:51

(Witness marking with orange highlighter.) 13:17:02 13:17:42

(Handing.) 13:18:01

BY MR. GOETZ: 13:18:01

Q. Okay. And so you've handed me your copy of Exhibit 1003. And in Figure 1, what have you marked in orange highlighter? 13:18:02 13:18:05 13:18:10

A. The base portion. 13:18:13

Q. Just on one side? 13:18:14

A. Yes. 13:18:16

Q. Okay. And so is it your view that if -- if the base of the nipple is wider than the teat, then it has a wide base? Is that your understanding? 13:18:17 13:18:24 13:18:28 13:18:32

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MR. WILLIAMS: Objection to form. 13:18:34
A. It's not that -- that's one of the 13:18:35
things that it would have. 13:18:45
BY MR. GOETZ: 13:18:50
Q. Well, in other words, that's a 13:18:51
sufficient test. If you're faced with a question 13:18:52
of does this nipple have a wide base, you would 13:18:58
say yes if the base is wider than the teat; is 13:19:01
that fair? 13:19:05
A. No. 13:19:06
Q. Why is that not fair? 13:19:07
A. Because it could just be immediately 13:19:12
-- because if it was just wider than the teat, it 13:19:24
could be right here, (indicating) and that 13:19:28
wouldn't be a wide teat. 13:19:30
Q. Right where? The record is not 13:19:32
going to reflect what you did when you said that. 13:19:33
Do that in a different color, if you 13:19:35
would. Here's a blue one, blue highlighter. 13:19:37
A. (Witness highlighting in blue 13:19:42
highlighter.) 13:19:46
So that would be wider. 13:19:48

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Q. That would be wider, but that 13:19:49
wouldn't be -- but that wouldn't be a nipple with 13:19:51
a wide base? 13:19:53
A. Right. 13:20:02
Q. Is that right? 13:20:02
A. (Nods.) 13:20:04
Q. Okay. And so if you take a look at 13:20:12
Figure 4 of that -- of that exhibit that you 13:20:25
have, which is our -- one of the Patents-in-Suit, 13:20:27
either the '244 or the '930, doesn't matter -- 13:20:31
and I want you to look at in the Patents-in-Suit, 13:20:43
Figure 4 and Figure 1. 13:20:46
And the question is: Which one of 13:20:48
those looks the most similar to Figure 7 in the 13:20:50
'710 patent, which is Exhibit 2024? 13:20:56
A. Figure 7, did you say? 13:21:12
Q. Figure 7, yeah. The top of it where 13:21:14
you can see the teat portion. 13:21:16
MR. WILLIAMS: Objection to form. 13:21:18
Scope. 13:21:20
A. Which one looks closer -- 13:21:52
BY MR. GOETZ: 13:21:54

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Q. Yes. 13:21:54
A. -- to that? 13:21:55
Q. Yes. 13:21:56
A. I would say Figure 4. 13:21:57
Q. Okay. Now, some people might say 13:21:59
the reason for that is that Figure 4 and Figure 7 13:22:01
show nipples with a wide base and Figure 1 in the 13:22:04
patents at issue does not. 13:22:11
Do you think that's an unreasonable 13:22:13
way to look at the art? 13:22:14
A. It's not unreasonable to say that 13:22:30
they're both wide. But it doesn't mean to me 13:22:35
that the other one in Figure 1 can't be wide. 13:22:38
That's just -- you asked me which one looked 13:22:43
closer to that. And I think the difference is 13:22:46
because one has a return that comes back in and 13:22:51
the other doesn't, but that doesn't mean that 13:23:00
they're not both wide. 13:23:03
Q. Yeah, so let me -- 13:23:05
A. So I don't know -- I don't know that 13:23:07
I would say what you said. 13:23:10
Q. Okay. Let me just try it a 13:23:11

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different way. 13:23:17
Some skilled artisans would 13:23:17
distinguish between a nipple with a wide base as 13:23:19
seen in Figure 4 of the patents at issue and 13:23:22
Figure 7 of the '710 patent and distinguish those 13:23:26
sorts of shapes from nipples that don't have a 13:23:29
wide base like Figure 1 in our patent. 13:23:33
And the question for me is -- 13:23:36
A. I don't know which artisans would do 13:23:37
that. 13:23:40
Q. You think that's an unreasonable 13:23:40
position? 13:23:42
A. I do, yes. 13:23:42
Q. You do. And why do you? 13:23:43
A. Because I think that the Figure 1 in 13:23:46
the '244 patent is a wide base just as much as 13:23:50
the others are a wide base. 13:23:59
So is one wider than the other? I'm 13:24:03
not even sure of that just based on the way it 13:24:09
looks, but it doesn't make it not a wide base. 13:24:14
MR. GOETZ: Okay. Okay. I'll ask 13:25:14
the court reporter to mark as Exhibit 2025 a 13:24:59

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patent, Patent No. 438,937. 13:25:06
(Whereupon, Exhibit 2025, US Patent 13:25:06
No. 438,937, was marked for identification.) 13:25:30
BY MR. GOETZ: 13:25:30
Q. Okay. This is an old patent. 13:25:32
Do you agree with that? 13:25:34
A. Yes. 13:25:37
Q. Can you agree that -- can you agree 13:25:50
that this Exhibit 2025 is about bottles for 13:25:52
feeding infants? 13:25:57
A. The title says that it's about a 13:25:59
nursing bottle. 13:26:04
Q. Okay. Do you agree that Figures 1 13:26:05
through 3 show an infant feeding bottle? 13:26:09
A. Yes. 13:26:31
Q. And do you agree the nipple is 13:26:32
marked Element 13a in Figures 1 through 3? 13:26:39
A. Yes. 13:27:00
Q. And where does the base of this 13:27:00
nipple marked as Element 13a begin in your view? 13:27:02
MR. WILLIAMS: Objection to form and 13:27:05
scope. 13:27:07

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BY MR. GOETZ: 13:27:10
Q. And if you want to use the same 13:27:11
orange highlighter, that's fine. However you 13:27:12
want to do it. 13:27:15
A. Well, if the base is the bottommost 13:28:27
portion of the nipple, excluding the flange -- 13:28:30
and I'm not sure there is a flange here or not. 13:28:41
And it's hard to tell if there is an areola 13:28:52
region or not. So I don't know if it's below the 13:28:56
areola. 13:28:59
But the bottommost portion would be 13:28:59
here. 13:29:02
(Witness marking with orange 13:29:04
highlighter.) 13:29:06
Q. Okay. Just for the record, what 13:29:07
have you marked on this exhibit? 13:29:10
A. I marked the bottommost portion of 13:29:13
the nipple. 13:29:16
Q. In an orange highlighter? 13:29:16
A. In fact, I'm not sure that that's a 13:29:20
flange or not. (Indicating.) I don't know. So 13:29:24
if I exclude the flange, yes. 13:29:29

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Q. In an orange highlighter? 13:29:32
A. In an orange highlighter. 13:29:34
Q. On one side? 13:29:37
A. Yes, on one side. 13:29:38
Q. In which figure? 13:29:40
A. Figure 1. 13:29:41
Q. Okay. And is the base of this 13:29:42
nipple domed in your opinion? 13:29:44
MR. WILLIAMS: Objection to form and 13:29:48
scope. 13:29:50
A. It's hard to tell because it's so 13:30:07
small, but it does not appear to be domed. 13:30:10
BY MR. GOETZ: 13:30:12
Q. Is the base of this nipple wide, in 13:30:12
your opinion? 13:30:16
A. No. 13:30:16
Q. And why do you say that? 13:30:17
A. It looks like the -- except for the 13:30:24
bump there, it's almost a continuation of the 13:30:28
diameter of the nipple. 13:30:30
Q. So but you would agree that the base 13:30:52
is wider than the teat, right? 13:30:55

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A. Not all of it. It looks like 13:31:05
it's -- it's almost identical at the bottom of 13:31:14
the base. (Indicating.) It's hard to tell from 13:31:19
the drawing, but... 13:31:23
Q. Okay. And so it sounds like -- I'm 13:31:25
trying to understand here -- it sounds like if 13:31:40
any portion of the base is as narrow as the 13:31:44
nipple, then it's not wide in your view. Is that 13:31:54
a fair characterization of your thinking on this 13:31:56
issue? 13:32:00
A. If you mean the top portion of the 13:32:03
teat that goes into the baby's mouth -- 13:32:08
Q. That's what I meant, yeah, when I 13:32:12
said nipple. 13:32:14
A. That's what you mean? 13:32:14
Q. Yeah. 13:32:16
A. Then I would say correct. 13:32:17
Q. Okay. Well, let me reask the 13:32:22
question. 13:32:25
Okay. So just so it's clear, if you 13:33:22
look at the narrowest portion of the base, and 13:33:36
that portion is the same or narrower than the 13:33:53

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nipple, then it's not wide in your view; is that correct? 13:33:56 13:34:00

MR. WILLIAMS: Objection to form and scope. 13:34:00 13:34:02

A. I would say that this base is not wide as it is close to the same diameter as the nipple portion, as you said at the teat portion. 13:34:06 13:34:10 13:34:32

BY MR. GOETZ: 13:34:35

Q. Yeah. Well, I'm just trying to understand how -- what is the standard in your mind for determining whether it's wide or not? I mean, is it you just know it when you see it or are you actually thinking about it in a scientific way? 13:34:36 13:34:39 13:34:40 13:34:46 13:34:49 13:34:53

A. I'm thinking that in this particular case, you know, it's difficult to even define a base because there's hardly anything there. 13:34:56 13:35:00 13:35:10

Q. I understand. 13:35:15

A. It's -- so I'm saying if it's the lowest part of the nipple and that's not the flange -- I'm assuming the part below it is the flange -- then that's what it is and it's about 13:35:15 13:35:18 13:35:26 13:35:30

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the same shape as the -- the same size as the nipple. So it's certainly not wide. 13:35:34 13:35:38

Q. And so how far, sort of, outside the shape of the teat does it need to be for it to be wide? 13:35:47 13:35:52 13:35:56

MR. WILLIAMS: Objection to form and scope. 13:35:58 13:35:59

A. I don't have an exact dimension to give you. 13:36:00 13:36:11

MR. GOETZ: Okay. Let's try another one then. I'll ask the court reporter to mark US Patent 535,550 as 2026. 13:36:12 13:36:14 13:36:16

(Whereupon, Exhibit 2026, US Patent 535,550, was marked for identification.) 13:36:16 13:36:56

BY MR. GOETZ: 13:36:56

Q. This is an old patent too. Is the base of the nipple in this patent domed? 13:36:56 13:36:59

MR. WILLIAMS: Objection to form and scope. 13:37:02 13:37:03

A. It's difficult for me to tell exactly where the nipple is, but I don't know that I can identify a base here. 13:38:50 13:38:53 13:39:07

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BY MR. GOETZ: 13:39:13

Q. Okay. 13:39:14

A. It looks like there -- if it's the very bottom part and there's no flange, I don't even understand how it's attached to the bottle. 13:39:15 13:39:18 13:39:22

Q. Okay. Is the base of this nipple wide in your opinion? 13:39:25 13:39:26

MR. WILLIAMS: Objection to form and scope. 13:39:28 13:39:29

A. No. 13:39:30

BY MR. GOETZ: 13:39:30

Q. Why not? 13:39:31

A. First, I'm not sure there is a base. And if there is a base, then it's the very bottom part, it's -- it actually goes in towards the inside of the bottle. 13:39:31 13:39:36 13:39:39 13:39:44

Q. Okay. But it's still wider than the teat, isn't it? 13:39:52 13:39:55

MR. WILLIAMS: Objection to form and scope. 13:39:59 13:40:01

A. I don't see that it's wider than the teat. I'm not sure that there's a -- it's 13:40:05 13:40:08

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hard -- it's -- there's no defining line to identify where the end of the teat is. It may be at the very top of the bottle. 13:40:35 13:40:40 13:40:43

BY MR. GOETZ: 13:40:45

Q. Okay. 13:40:46

A. It's just -- 13:40:47

Q. Okay. This one is not wide, right? 13:40:59

A. Correct. 13:41:05

MR. GOETZ: Okay. Let's try another one. Exhibit 2027 is US Patent 139,958. 13:41:07 13:41:09

(Whereupon, Exhibit 2027, US Patent 139,958, was marked for identification.) 13:41:09 13:41:43

BY MR. GOETZ: 13:41:43

Q. Okay. Exhibit 2027. Again, this is another nursing bottle patent. You agree? 13:41:44 13:41:47

A. Yes. 13:41:52

Q. Okay. And it's got a nipple, right? 13:41:53

A. Yes. 13:42:01

Q. And where is the base of this nipple? 13:42:01 13:42:07

MR. WILLIAMS: Objection to form and scope. 13:42:08 13:42:10

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A. Again, it's difficult to conjecture 13:42:31
that there is a base other than it being the very 13:42:33
bottom of the -- of the nipple, if that's the 13:42:36
definition. 13:42:47
BY MR. GOETZ: 13:42:49
Q. Okay. 13:42:50
A. And I don't know if that part inside 13:42:51
is a flange or not. (Indicating.) But I would 13:42:53
say it's at the -- 13:42:59
Q. You can just mark it with the 13:43:04
highlighter, if you want. 13:43:06
A. If anywhere, it would be right 13:43:08
there. Very tiny little base. (Indicating.) 13:43:10
(Witness marking document orange 13:43:18
highlighter.) 13:43:19
Q. Say what you've done. "I've marked 13:43:20
in orange highlighter in Figure" whatever. 13:43:23
A. I marked in orange highlighter in 13:43:23
Figure 2 the lowest portion of the nipple, 13:43:28
assuming that's the base. 13:43:42
Q. Is the base of the nipple domed in 13:43:43
your opinion? 13:43:46

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MR. WILLIAMS: Objection to form and 13:43:47
scope. 13:43:48
A. In my opinion, yes. 13:43:53
BY MR. GOETZ: 13:43:55
Q. And is the base of this nipple wide 13:43:55
in your opinion? 13:43:57
A. No. 13:43:57
Q. Why? 13:43:58
MR. WILLIAMS: Objection to form and 13:44:00
scope. 13:44:02
A. It's just barely wider than the base 13:44:02
of the teat portion of the nipple. 13:44:07
BY MR. GOETZ: 13:44:12
Q. And how much wider -- I'm sorry. 13:44:14
A. If you want to -- 13:44:21
Go ahead. 13:44:23
Q. I just didn't understand your 13:44:24
question, you said -- 13:44:25
A. I didn't ask a question. 13:44:27
Q. I'm sorry. I didn't understand your 13:44:29
answer. 13:44:29
You said, quote, It's just barely 13:44:31

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wider than the base of the teat portion of the 13:44:34
nipple. 13:44:36
What is "it"? 13:44:36
A. The -- the base. 13:44:38
Q. Okay. And so how much wider does 13:44:41
the base need to be from the teat portion for it 13:44:43
to be a nipple with a wide base in your opinion? 13:44:46
MR. WILLIAMS: Objection to form and 13:44:49
scope. 13:44:50
A. I don't have any -- 13:44:51
BY MR. GOETZ: 13:44:53
Q. Go ahead. 13:44:54
A. I don't have an exact dimension to 13:44:54
give you. 13:44:58
Q. Do you have any sort of metric at 13:44:59
all by which we could understand how to make that 13:45:04
determination in your view? 13:45:05
MR. WILLIAMS: Objection to form and 13:45:09
scope. 13:45:10
A. I don't have a definitive answer to 13:45:11
give you. 13:45:21
BY MR. GOETZ: 13:45:22

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Q. I'm not asking for a definitive 13:45:22
answer. I'm asking for anything. 13:45:25
Do you have any other words to say 13:45:26
that would help someone understand how you make 13:45:28
that determination? 13:45:31
MR. WILLIAMS: Same objection. 13:45:32
A. Not at this time. 13:45:35
BY MR. GOETZ: 13:45:36
Q. Okay. Okay. Can you look at 13:45:37
Exhibit 2016 which is your notes that you 13:46:14
brought? 13:46:16
A. Yes. 13:46:16
Q. And what are those? 13:46:36
A. Pardon me? 13:46:37
Q. What are those? What is that 13:46:39
document? 13:46:41
A. Those are just -- it's just 13:46:41
information identifying who's in the room here 13:46:50
from Baker Botts, from Fish & Richardson, both in 13:46:53
the room and possibly online. It has the address 13:47:03
of where we are today, as well as just the two -- 13:47:08
reference to the two patents, the '930 and the 13:47:15

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'244, who the inventor of those are, the relevant claims for the IPR, and then the grounds of the IPR with the associated references. 13:47:21 13:47:28 13:47:34

Q. Okay. And what's the purpose of the document, just to refresh your recollection? 13:47:39 13:47:40

A. Just to make it easy for me to -- without looking at Ground 1 or Ground 2 or Ground 3 to know what it is or the people that are here, to know their names and not just for today but in the future. 13:47:44 13:47:50 13:47:55 13:47:57 13:48:01

Q. Okay. I understand. Thank you. 13:48:01

Okay. We're going to talk about Ground 1 on the '930 patent which is the Meyers-Sepehr combination. You can look at whatever you want there. You have it in your -- you have your expert report, expert declaration. 13:48:03 13:48:05 13:48:08 13:48:13 13:48:15

By the way, how have you been saying Sepehr? 13:48:20 13:48:22

A. I think I say Sepehr. 13:48:25

Q. Sepehr? 13:48:27

A. I don't know the correct way to say it. 13:48:28 13:48:29

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Q. Sepehr, yeah. We've been debating it too. No one really knows. 13:48:30 13:48:33

Okay. And this ground, Meyers is the primary reference; is that fair? 13:49:02 13:49:05

MR. WILLIAMS: Objection to form. 13:49:09

A. Yes. 13:49:16

BY MR. GOETZ: 13:49:16

A. And I have it here. It's been premarked as Exhibit 1006. Handing that to you. 13:49:17 13:49:19

MR. GOETZ: Oh, you can put the sticker on. 13:49:38 13:49:39

(Whereupon, Exhibit 1006, Meyers reference, was marked for identification.) 13:49:39 13:49:41

BY MR. GOETZ: 13:49:41

Q. Okay. Do you have the Meyers reference in front of you, sir? 13:49:43 13:49:44

A. Yes. 13:49:47

Q. And you studied this for purposes of your opinions in this case? 13:49:48 13:49:51

A. Yes. 13:49:56

Q. Okay. And the basic invention in this patent is a one-piece nipple collar sort of 13:49:56 13:50:00

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combination, right? 13:50:07

A. Yes. 13:50:09

Q. And in Paragraph 1 -- sorry -- Column 1, Lines, say, 7 through 32, the patent describes the problems that it was trying to solve. 13:50:10 13:50:12 13:50:19 13:50:21

Do you agree? 13:50:21

A. Column 1, Lines -- which lines? 13:50:25

Q. It's like roughly 7 through 32. 13:50:29

A. Okay. (Witness reading the document.) 13:50:33 13:51:23

Yes. 13:51:50

Q. Okay. I mean, most of the bottles on the market today, you can separate the nipple and the collar. 13:51:53 13:51:56 13:51:58

Do you agree with that statement? 13:51:59

MR. WILLIAMS: Objection to form and scope. 13:52:01 13:52:02

A. I haven't looked at that in several years. 13:52:07 13:52:09

BY MR. GOETZ: 13:52:09

Q. When you were looking at it in your 13:52:09

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last few years at Medela, was that true? 13:52:12

A. Yes. 13:52:15

Q. Do you agree that these are, you know, actual pressing problems in the art? 13:52:15 13:52:18

A. Cleaning and reassembly? They are problems in the art. 13:52:27 13:52:33

Q. And you think they're solved by having the overmolding? 13:52:34 13:52:42

A. I think they are partially addressed by having the overmolding. 13:52:44 13:52:47

Q. And just to understand how this Meyers system works, it has a vent, right? 13:53:00 13:53:03

A. Correct. 13:53:10

Q. And that vent permits ambient air to be drawn back into the nurser bottle around the collar threads 5, right? 13:53:14 13:53:20 13:53:23

A. Correct. 13:53:50

Q. Okay. And that's similar to the vent in your design of the supplemental feeder, right? 13:53:53 13:53:54 13:53:58

A. Similar. 13:54:00

Q. Yeah. And if you look at Figure 9, 13:54:00

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reference numeral 15 is part of the collar, right? 13:54:19 13:54:30
A. It's the collar lower edge. 13:54:48
Q. The lower edge, right, but that structure that it's pointing to is the collar. That's your understanding of this reference; is that correct? 13:54:50 13:54:53 13:54:55 13:55:01
MR. WILLIAMS: Objection to form. 13:55:01
A. Correct. 13:55:01
BY MR. GOETZ: 13:55:02
Q. Okay. And then it's probably easiest for me to just highlight this. Could I have your copy? 13:55:02 13:55:05 13:55:08
A. (Handing.) 13:55:10
Q. (Indicating.) And I'm handing it back to you. I've highlighted in Figures 9 where -- reference numeral 15 where I think the collar sort of goes up along the side of the opening. And I think I've highlighted the same structure in Figure 7. 13:55:30 13:55:36 13:55:41 13:55:46 13:55:48 13:55:51
And my question is: Do you agree with that understanding of what's being disclosed 13:55:52 13:55:54

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here? 13:55:57
MR. WILLIAMS: Objection to form and scope. 13:55:57 13:55:59
A. (Witness reading document.) 13:55:59
BY MR. GOETZ: 14:02:04
Q. It's a tricky one, huh? 14:02:04
A. Yes, I'm trying to see the difference between the two figures. Figure 9 is a straight cross-section, and I think the two are not highlighting the same things. 14:02:08 14:02:10 14:02:16 14:02:25
Q. I'm trying to highlight the collar in each picture. 14:02:29 14:02:31
A. I don't think Figure 7 shows the collar, but I'm not sure. 14:02:32 14:02:35
Q. Okay. 14:02:37
A. (Reading to self). 14:02:46
I just don't know how to answer if it's the same or not. 14:03:30 14:03:33
Q. You just don't know? 14:03:34
A. I just don't know. 14:03:36
Q. Okay. Fine. I'm just going to take it back. 14:03:38 14:03:38

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Actually, I'm highlighting a little bit more. I actually think the collar goes up a little bit too in both. The exhibit reflects in pink, I'm highlighting where I think is the collar in Figure 5, Figure 7, and Figure 9. 14:03:38 14:03:40 14:03:42 14:03:49 14:03:50
You just don't know whether that's true or not; is that fair? 14:03:53 14:03:56
MR. WILLIAMS: Objection to form. 14:03:58
BY MR. GOETZ: 14:04:05
Q. I don't want to spend another 20 minutes waiting for you to look, sir. I'm just confirming what you said under oath a few seconds ago; is that true? 14:04:05 14:04:08 14:04:10 14:04:13
A. In Figure 9, I believe that is the collar. 14:04:14 14:04:18
Q. In Figure 9? 14:04:18
A. In Figure 7. I'm just not sure. 14:04:20
Q. You're not sure. Okay? 14:04:37
And I guess to be fair, one of the reasons maybe you haven't thought about it is your proposed combination doesn't impact that area of the structure in Meyers; is that fair? 14:04:42 14:04:44 14:04:48 14:04:50

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MR. WILLIAMS: Objection to form. 14:04:55
A. No, just looking at the description in the patent and looking at the drawing itself, where it doesn't look like a cross-hatched area and it says it's fragmentary and it doesn't actually point to Collar 2 in that figure. 14:04:57 14:05:01 14:05:03 14:05:07 14:05:11
BY MR. GOETZ: 14:05:18
Q. You just don't know? 14:05:18
A. I just don't know. 14:05:19
Q. And so how does that sort of generally impact, you know, your thinking when using a piece of prior art and then obviousness combination, you know, in the aspect that you just don't know sort of what it's disclosing? How does it impact your thinking? 14:05:20 14:05:23 14:05:26 14:05:30 14:05:32 14:05:35
A. I think it's disclosed elsewhere. 14:05:38
Q. What's disclosed elsewhere? 14:05:40
A. The collar. 14:05:43
Q. Okay. But you're not -- in general, you're not concerned with not understanding all the aspects of a reference when rendering an opinion on obviousness; is that a fair statement? 14:05:44 14:05:47 14:05:49 14:05:53

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MR. WILLIAMS: Objection to form. 14:05:57
A. No, it's not a fair statement. 14:05:57
BY MR. GOETZ: 14:05:59
Q. Okay. Well, then how could you have rendered an opinion on obviousness in this case on an aspect of the reference you don't understand? 14:05:59 14:06:01 14:06:05 14:06:06
MR. WILLIAMS: Objection to form. 14:06:07
BY MR. GOETZ: 14:06:07
Q. Maybe I'm misunderstanding what you're saying. Help me understand. 14:06:08 14:06:10
MR. WILLIAMS: Objection to form. 14:06:13
A. I think the figures are clear. This aspect of Figure 7, you're asking me if 9 and 7 are the same and pointing to the same structure, and Figure 9 is clear that that structure where it has 15 pointing to it, is indeed the -- the collar cross-section. In Figure 7, there's no markings on it that make it look like the collar cross-section. It looks as if it's the collar missing from that area as -- so you asked me if they were the same, and I'm just saying they do 14:06:14 14:06:20 14:06:30 14:06:32 14:06:38 14:06:49 14:06:54 14:06:59 14:07:02 14:07:10

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not look the same. 14:07:17
BY MR. GOETZ: 14:07:19
Q. Okay. Okay. If you turn to your declaration on Page 82, you have a picture of Figure 5 of Meyers that -- you have two, a top and a bottom, of Page 82; is that correct? 14:07:22 14:07:34 14:07:38 14:07:42
A. That's correct. 14:07:49
Q. Okay. And those are your designations as to which -- how you're mapping the teat portion, areola portion, and base portion onto Meyers; is that correct? 14:07:51 14:07:53 14:07:56 14:07:59
A. It's showing the base portion on Meyers, the areola portion, and the teat portion. 14:08:14 14:08:16
The bottom one shows our construction; and the top one shows Patent Owner's construction. 14:08:20 14:08:24 14:08:27
Q. So the areola portion is not domed in Meyers. 14:09:10 14:09:13
Do you agree with that? 14:09:13
MR. WILLIAMS: Objection scope. 14:09:18
A. I agree with that. 14:09:26
BY MR. GOETZ: 14:09:29

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Q. And in Meyers the lowest convex section of the base you're pointing to at least in part to satisfy the arch-shaped cross-sectional profile aspect of the domed configuration construction; is that fair? 14:09:30 14:09:33 14:09:35 14:09:38 14:09:43
MR. WILLIAMS: Objection to form. 14:09:46
A. There is a domed configuration on the base portion. 14:09:48 14:09:54
BY MR. GOETZ: 14:09:55
Q. Right. 14:10:01
With respect to, say, for example, the Mayborn's proposed construction which I think the board adopted is the arch-shaped cross-sectional profile that that portion is shown on Page 82 at the top satisfies Patent Owner's construction in your opinion, correct? 14:10:02 14:10:03 14:10:07 14:10:10 14:10:14 14:10:17
A. You're saying the Patent Owner's construction satisfies the Patent Owner's construction. 14:10:24 14:10:27 14:10:30
Q. Huh? 14:10:32
A. You said the top figure, which is the Patent Owner's construction matches the 14:10:34 14:10:36

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Patent Owner's construction. 14:10:39
Did I not hear that correctly? 14:10:42
Q. Maybe I said it wrong. I'm sorry. 14:10:45
The top of the Figure 5 on Page 82 shows your mapping based on the Patent Owner's construction; is that fair? 14:10:46 14:10:49 14:10:54
A. Yes. 14:10:59
Q. Okay. Okay. And then ultimately you combine the Meyers or Meyers disclosure with Sepehr; is that right? 14:10:59 14:11:29 14:11:36
A. Yes. 14:11:41
Q. My understanding is that Figure 1 of Page 98 in your declaration is your -- is that combination; is that right? 14:11:46 14:11:49 14:11:52
A. That's Ground 2. 14:12:17
Q. Okay. Ground 2 is still Meyers in view of Sepehr? 14:12:19 14:12:36
A. And Ishimaru. 14:12:37
Q. I see. 14:12:40
Do you have a depiction of your combination of Ground 1 -- let's go back. I think you did. Yeah, it's Figure 1 on Page 61. 14:12:41 14:12:44 14:12:49

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My fault. **14:12:58**
A. Figure 1 and Figure 2. 14:13:25
Q. And is the idea here that Figure 1 14:13:26
is a cross-section of Figure 2? 14:13:29
A. Yes. 14:13:36
Q. Along Line 1-1 in Figure 2? Is that 14:13:36
right? It's along that line? 14:15:06
A. I'm looking for the reference to 14:15:07
ensure that that is the case. 14:15:09
Q. Oh, I see. Okay. 14:15:11
A. If you have that reference, it would 14:15:12
be nice to see. 14:15:15
Q. I don't have it. No. Just it seems 14:15:16
like that's what is happening there given the 14:15:17
figure. But if you don't know, you don't know. 14:15:19
A. It appears to be. 14:15:22
Q. Okay. And the idea here is that 14:15:23
these two figures are -- represent the 14:15:25
combination of Meyers in view of Sepehr; is that 14:15:30
right? 14:15:34
A. Yes. 14:15:38
MR. WILLIAMS: Just, Counsel, we've 14:15:42

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been going like an hour and 20-something 14:15:43
minutes. 14:15:45
MR. GOETZ: Yeah. I'm just getting 14:15:46
lost in the fun here. Let's take a break. 14:15:50
THE COURT REPORTER: Off the record. 14:15:57
(Recess taken.) 14:16:00
MR. GOETZ: Let's go back on the 14:35:17
record. 14:35:19
And, yes, sir. You have some 14:35:19
comment. Go right ahead. 14:35:20
A. So Figure 7 and Figure 9 -- 14:35:27
Q. Of? 14:35:32
A. -- of the '810 patent -- 14:35:32
Q. Okay. 14:35:35
A. -- so the difference between those 14:35:35
two where you asked me if they were the same is 14:35:37
that if we look at the description of 7, it says 14:35:40
it's a fragmentary and large view of an upper 14:35:47
portion of the base area of the nipple portion. 14:35:52
And Figure 9 says a fragmentary and 14:35:54
large longitudinal cross-section of the nipple 14:36:02
collar. 14:36:05

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So I believe the collar is left out 14:36:06
of Figure 7, which is shown. Which is why they 14:36:09
are not the same. 14:36:12
Q. There's no cross-hatching there 14:36:13
because it's without the collar? 14:36:16
A. Correct. 14:36:18
Q. Okay. 14:36:18
MR. GOETZ: I'm going to mark as the 14:36:23
next exhibit, 2028. 14:36:26
(Whereupon, Exhibit 2028, Single 14:36:26
page out of Petition, was marked for 14:36:26
identification.) 14:36:37
BY MR. GOETZ: 14:36:37
Q. This page from the Petition, 14:36:37
whatever page number is at the bottom -- and the 14:36:39
only reason I did that is because I wanted a 14:36:42
bigger picture of the picture we were talking 14:36:44
about, which I think is Figure 1, your Figure 1 14:36:47
on Page 61 of your declaration. 14:36:49
A. Okay. 14:36:52
Q. And so the first question is: Do 14:36:52
you -- can we agree that the two figures on the 14:36:54

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exhibit that I just marked, 2028, are, in fact, 14:36:57
your Figure 1 and Figure 2 of Ground 1? 14:37:06
A. Yes. 14:37:14
Q. Okay. And what I'd like to do is 14:37:14
I'd like for you to indicate for me where the 14:37:24
three portions begin and end in your opinion. 14:37:27
I brought you a ruler. If you want 14:37:30
to use a ruler to draw a straight line. And you 14:37:34
can use a blue pen. And you can look at whatever 14:37:37
you want. I just want to try to understand where 14:37:39
the base portion, the areola portion, and the 14:37:41
teat portion -- where the dividing lines are for 14:37:44
purposes of your opinion. 14:37:49
And you can use a ruler, if you 14:38:10
want. You don't have to... 14:38:13
A. It's okay. 14:38:17
Q. Okay. 14:38:19
A. (Witness reviewing document.) 14:40:44
Q. Can I help you find something, sir? 14:40:46
A. The drawing that shows -- 14:40:50
Q. The one that we were looking at 14:40:51
earlier? 14:40:55

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A. Not the one we were looking at 14:40:55
earlier, but there's another one. 14:40:57
Q. There's 82. Page 82. 14:40:59
Did you find something? 14:41:16
A. (Witness drawing in blue pen on 14:41:19
Exhibit 2028.) 14:41:38
Q. 82 is where we were talking about 14:42:32
before, right, and that's where you separated the 14:42:34
teat portion, the areola portion, and the base 14:42:37
portion? 14:42:39
A. Yeah. Okay. 14:42:39
Q. Okay. Sir, what have you -- can I 14:43:00
just look at it, please? 14:43:03
Okay. So the top line is what? 14:43:07
A. Above the top line is the teat. 14:43:10
Q. Okay. 14:43:13
A. Then the areola. 14:43:14
Q. Is in between the two lines? 14:43:16
A. Is in between. And then the base. 14:43:18
Q. And then the base is below it? 14:43:20
A. Yes. 14:43:22
Q. And that's Exhibit 2028. 14:43:22

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Okay. So let's take a look at the 14:43:41
other reference in the combination, which is 14:43:43
Sepehr reference, which has been premarked as 14:43:47
Exhibit 1007. 14:43:52
(Whereupon, Exhibit 1007, Sepehr 14:43:52
reference, was marked for identification.) 14:43:52
BY MR. GOETZ: 14:43:52
Q. And what is the Sepehr reference 14:44:29
about? 14:44:32
A. It's a nipple showing a one-way air 14:44:37
valve with a slit. 14:44:46
Q. There's two embodiments. Is that 14:44:47
your understanding? 14:44:51
A. Yes. 14:44:58
Q. And would you say that the bottle 14:44:58
shown in Figure 3 are conventional bottles? 14:45:03
MR. WILLIAMS: Objection to form. 14:45:08
A. Again, there's no definition for a 14:45:18
conventional bottle, but it's a bottle that would 14:45:21
not be unusual to be seen with a feeding system. 14:45:24
BY MR. GOETZ: 14:45:33
Q. Let me go back to Exhibit 1006, 14:45:34

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which is the Meyers reference. 14:45:38
Do you have that, sir? Could you 14:45:39
fish that out of your stack there, please. 14:45:43
Column 3? 14:45:53
A. Wait. Wait. Which one? 14:45:54
Q. Meyers. 14:45:56
A. Oh, 1006. Meyers. Yes. 14:45:56
Q. Column 3 -- 14:45:58
A. Okay. 14:46:00
Q. -- Line 15. 14:46:00
Do you see how it says "conventional 14:46:04
bottles" right there on that line? 14:46:06
A. Line 15, Column 3, yes. 14:46:17
Q. Okay. You don't know what that 14:46:19
means, though, right? 14:46:21
MR. WILLIAMS: Objection to form. 14:46:22
A. I assume -- well, in context of what 14:46:26
is being said in the patent, this -- I would 14:46:34
interpret "conventional bottles" to mean bottles 14:46:48
that are available -- generally available at the 14:46:53
time of the patent. 14:46:58
BY MR. GOETZ: 14:47:02

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Q. So conventional nipples means the 14:47:02
same thing, I guess? 14:47:07
MR. WILLIAMS: Objection to form and 14:47:08
scope. 14:47:09
A. Yes. 14:47:10
BY MR. GOETZ: 14:47:15
Q. Okay. Okay. Back to Sepehr. On 14:47:16
Page 2, Line 13, it talks about that the valve -- 14:47:37
you know what a valve is, right, sir? 14:47:47
A. Yes. 14:47:53
Q. Can we agree that a valve is 14:47:53
something that opens and closes to allow fluid 14:47:56
flow? Is that a fair understanding of what a 14:47:59
valve is? 14:48:01
MR. WILLIAMS: Objection to form. 14:48:04
Scope. 14:48:08
A. I don't -- I'm not sure it has to 14:48:09
open and close to be an effective valve. 14:48:30
BY MR. GOETZ: 14:48:34
Q. So you think you can have a valve 14:48:34
without opening and closing? 14:48:38
A. Yes. 14:48:44

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Q. How could you have that? 14:48:44
A. It could -- it could be something 14:48:49
where, for example, you allow resistance to flow 14:48:56
in one direction and no resistance to flow in 14:49:08
another direction without it necessarily opening 14:49:13
and closing. 14:49:17
Q. And so in your hypothetical, the 14:49:19
valve doesn't actually stop the flow of the 14:49:22
fluid, it just slows it down? 14:49:24
MR. WILLIAMS: Objection to form. 14:49:27
BY MR. GOETZ: 14:49:29
Q. It's a valve you can't turn off? 14:49:30
A. It depends how much is going through 14:49:32
it and how fast and how often the direction 14:49:34
changes of flow and -- 14:49:38
Q. Okay. Well, a valve isn't the same 14:49:40
as a vent. You agree with that, don't you? 14:49:43
A. I agree they are not the same. 14:49:49
Q. Okay. Have you ever dealt with 14:49:52
creating a slit valve in silicone material, in 14:49:54
terms of manufacturing or design? 14:50:00
A. Yes. 14:50:01

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Q. Was there any problems with that, in 14:50:02
your experience? 14:50:05
MR. WILLIAMS: Objection to scope. 14:50:09
A. There can be. 14:50:11
BY MR. GOETZ: 14:50:13
Q. Like what? 14:50:13
A. If you don't slit it far enough, the 14:50:15
valve may not open or it may require more force 14:50:24
to open. And usual -- 14:50:29
Q. What do you mean "slit it far 14:50:35
enough"? 14:50:38
A. The length of the slit and how far 14:50:41
it goes up the sidewalls. 14:50:43
Q. Okay. Any other problems? 14:50:47
A. The material can have variations in 14:50:50
the amount of force required to open it. 14:50:57
Q. Okay. Fair enough. Any other 14:51:00
issues? 14:51:02
A. If a lot of force is applied to the 14:51:06
valve, it could tear. 14:51:10
Q. Okay. Any other issues? 14:51:12
A. The two sides could potentially 14:51:23

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stick together. 14:51:26
Q. That happens sometimes, you've seen 14:51:28
that? 14:51:30
A. I've seen it in parts that have been 14:51:33
sitting for exceptionally long periods of time. 14:51:35
Q. Roughly, like how -- are you talking 14:51:40
about months or years or what, just in terms of 14:51:43
what context? 14:51:46
A. Yeah, like, for months or years, 14:51:47
yeah. 14:51:51
Q. Does the temperature that they're 14:51:51
stored at matter for that; do you know? 14:51:54
A. I do not know. 14:51:57
Q. Okay. Any other problems that you 14:51:57
have in making slit valves in silicone? 14:52:01
MR. WILLIAMS: Objection; scope. 14:52:06
A. Not that I recall at this time. 14:52:07
BY MR. GOETZ: 14:52:09
Q. Okay. And so based on my reading of 14:52:11
your Ground 1, you are relying on Figure 1 14:52:15
essentially of the Sepehr reference; is that 14:52:20
fair? 14:52:26

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A. Yes. 14:52:30
Q. Okay. And you're not -- you're not 14:52:31
relying on the other figures or any bits of the 14:52:36
description, are you? 14:52:43
MR. WILLIAMS: Objection to form. 14:52:45
A. Well, Figure 3 is -- shows the 14:52:48
bottle. 14:52:51
BY MR. GOETZ: 14:52:53
Q. Oh, fair enough. Yeah. 14:52:53
So let me try it this way. So for 14:52:57
purposes of your ground -- well, for purposes of 14:53:00
your ground -- for purposes of your reliance on 14:53:05
Sepehr in this IPR, you're relying on Figure 1 14:53:08
and Figure 3 and its descriptions and nothing 14:53:12
else. Is that fair to say it like that? 14:53:16
A. Sorry, I'm just -- 14:53:46
Q. It's fine. 14:53:49
A. Yes. 14:55:28
Q. Okay. And if you look at Figure 1 14:55:29
of the Sepehr reference, I don't know what he 14:55:41
calls it. Baby feeding teat, it has uniform 14:55:58
thickness except for the aperture and the valve. 14:56:06

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I mean, does that -- do you agree with that? MR. WILLIAMS: Objection to form. A. The aperture in the valve or the aperture and the valve? BY MR. GOETZ: **Q. Setting aside the valve and the aperture at the top, a skilled artisan would consider this reference as disclosing a teat with the same thickness throughout. Do you agree with that?** MR. WILLIAMS: Objection to form. A. It appears so. BY MR. GOETZ: **Q. Okay. And can we agree that the Sepehr valve is projecting inwardly?** A. Inwardly and downwardly. **Q. Okay. Can we agree that it's more inwardly than downwardly?** MR. WILLIAMS: Objection to form and scope. A. It appears that way.

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BY MR. GOETZ: **Q. Okay. And the flanges on either side of Figure 1, are you reading that as the flange? Is that your understanding?** MR. WILLIAMS: Objection to form. A. Yes. BY MR. GOETZ: **Q. There is a discussion of colic in this reference, if you look at column or Page 1, the second full paragraph. Could you just read that to yourself?** A. Page 1 -- starting with "Conventional baby bottle feeder..."? **Q. Yeah.** A. Yeah. (Witness reading document.) Okay. **Q. Okay. Do you agree with that description?** MR. WILLIAMS: Objection to form. A. No. BY MR. GOETZ:

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Q. Okay. What don't you agree about? What don't you agree with in the context of this description Column 1, Lines 9 through 16 of Exhibit 1007? A. It generalizes that conventional baby bottles don't have valves or a way to remove the vacuum. **Q. Right. And is the objection that you don't know what a conventional baby bottle is?** A. Assuming that baby bottles are conventional, being that they're available on the market is that many had venting systems in them. **Q. Okay. Do you agree with the description of the basic cause of colic?** MR. WILLIAMS: Objection to scope. A. There is a controversy around what causes colic. BY MR. GOETZ: **Q. Okay. This is like the other controversy we had. So let's talk about this. What is -- what's your understanding of the colic**

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controversy? A. The question is what causes colic and what the definition of colic actually is. **Q. Okay.** A. And a lot of baby bottles and nipples where the baby does get air and air gets into the baby's stomach and causes discomfort, you would say that -- you know, people interpret that as the baby having colic. **Q. Okay.** A. But that's not necessarily the basic cause of colic. **Q. Okay. What's the debate?** A. There could be other causes. **Q. Okay.** A. People just didn't know. Why does a baby cry? It's excessive crying is what most people define colic as, not that it's a stomach problem caused by air. And some may assume that. Others just assume that it's a crying baby. **Q. Well, what's your view? Does air get into the stomach of babies and make it cry?**

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A. Yes. 15:02:57
Q. And can that be a result of a 15:02:57
breastfeeding on a women's breast? 15:03:00
A. It can actually. 15:03:03
Q. Can it be the result of feeding from 15:03:04
a nipple, a bottle and a nipple? 15:03:07
A. In my opinion, yes. 15:03:09
Q. Okay. And when we're talking about 15:03:11
colic that is resulting from the feeding of a 15:03:16
baby from a bottle and a nipple, what is the 15:03:20
cause of it? Is it that air, like as described 15:03:24
in this patent, is coming in around the nipple 15:03:28
and coming in with the milk? 15:03:30
A. My understanding is that the vacuum 15:03:34
in the bottle needs to be relieved and the infant 15:03:41
lets air in through their mouth, some of which 15:03:47
they swallow, and causing their stomach to be 15:03:50
filled with air. Some of it gets entrained 15:03:55
within the milk, causing the baby to swallow the 15:03:58
air. 15:04:05
Q. So if I understand you correctly, 15:04:06
there's two sort of ways that air could get into 15:04:08

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the baby's stomach. One is sort of outside the 15:04:10
nipple because there's some suction and the baby 15:04:15
has to sort of breathe with it. And another is 15:04:18
that there could be air in the bottle in the milk 15:04:21
and that goes in. And that would also get air in 15:04:26
the stomach. 15:04:28
Do I understand you correctly? 15:04:29
A. What I said is or intended to say is 15:04:31
is that air comes in to the baby to relieve the 15:04:33
pressure in the bottle. 15:04:37
Q. I see. 15:04:38
A. Some of that can also mix with milk 15:04:38
that's in the baby's mouth, foam of the milk and 15:04:43
the like and be swallowed. 15:04:50
Q. I see. 15:04:52
So is it true that air outside the 15:04:53
bottle can cause colic -- well, can cause colic? 15:04:55
A. I don't know what you mean by 15:05:04
"outside the bottle." 15:05:05
Q. Well, it's not -- it's air that's 15:05:06
not gone through the bottle at all. It's just 15:05:09
sort of outside air that's being sucked in 15:05:12

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because the baby is trying to negate the 15:05:16
pressure. 15:05:19
So let me ask it again. 15:05:20
Let me ask that. 15:05:23
So can foam in the milk cause colic? 15:05:25
A. Foam is the air within the bubble of 15:05:30
the foam that is entering into this infant's 15:05:33
stomach -- 15:05:37
Q. Could cause colic? 15:05:38
A. -- that may cause colic, yeah. 15:05:39
Q. Okay. So that's fine. 15:05:42
And then there's air that never 15:05:43
enters the bottle at all that ends up in a baby's 15:05:45
stomach during drinking, and that can cause 15:05:49
colic; is that right? 15:05:52
A. I thought that's what you just 15:05:56
asked. 15:05:58
Q. That was about foam. It could be 15:05:58
foam or could not be foam, it's just air that is 15:06:02
outside the bottle that could cause colic? 15:06:02
A. The baby breaking vacuum and 15:06:04
allowing air to enter in, whether inside directly 15:06:08

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or through the bottle. 15:06:12
Q. Either way? 15:06:13
A. Either way. 15:06:14
Q. And so given that, would it be 15:06:15
important to have the vent not vent the air 15:06:24
inside the bottle right into the liquid, but some 15:06:28
other location? Or does that not matter in your 15:06:31
opinion? 15:06:34
MR. WILLIAMS: Objection to form and 15:06:34
scope. 15:06:38
A. There are products on the market 15:06:39
that -- that use that as a marketing tool. 15:06:43
Whether it's true or not, I don't know. 15:06:53
BY MR. GOETZ: 15:06:56
Q. Well, if you were designing a 15:06:56
bottle, is that something you would take into 15:06:59
account, sort of where that vent is going to end 15:07:01
up as it relates to the liquid? 15:07:04
A. You would consider it. 15:07:07
Q. And all things being equal, would 15:07:08
you choose a vent that is not going to vent into 15:07:11
the liquid as much of the time as possible? 15:07:13

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A. No. There's different considerations going both ways.
Q. Okay. Like what?
A. One of the ways people do it is they put the vent at the bottom of the bottle, which can leak out, creates a more expensive bottle, has liquid that's just sitting there when the bottle is upright.
If you do it up from the top, there is a lot of extra pieces and parts and you have issues with residual milk, how do you get rid of it, how do you not get rid of it. Is there a valve in there that's sitting in the milk and, again, does it open in the right way. Just different considerations.
Q. Fair enough.
If you were more limited in your design and you were trying to put a valve in the nipple of the bottle not on the base, not in the collar, but in the nipple all things being equal, would you rather that the nipple not be in the liquid for as much time as you can or no?

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MR. WILLIAMS: Objection to form. Form and scope.
BY MR. GOETZ:
Q. Yeah, the valve. I meant the valve not be in the liquid. Thank you. Do you want me to ask again?
A. Please.
Q. I was just responding to your point. There is a lot of consideration, so I'm trying to take a hypothetical where you're narrowing the considerations. And those narrowed considerations are, you know, the design says, listen, put the valve in the nipple --
Are you with me?
A. Valve's in the nipple.
Q. Okay.
And now all things being equal, wouldn't you rather the valve not inject air into the liquid for -- wouldn't that be the preference to not do that versus to do that?
MR. WILLIAMS: Objection to form and scope.

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A. There's different considerations for where you put it in the nipple.
Putting it below that area has other issues with it. So would you -- and it's also dependent on the placement of the valve.
BY MR. GOETZ:
Q. So it's just one factor?
A. It's just one of many factors.
Q. I understand.
But if the only difference between two designs was one basically ends in the milk liquid more of the time than the other one, you would -- you would rather have the other one, because you -- all things being equal, you don't want it in the liquid; is that fair?
MR. WILLIAMS: Objection to form and scope.
A. Yeah. It's probably a minor consideration.
BY MR. GOETZ:
Q. Okay. Let's go back to your declaration, Exhibit 1005, which is the largest,

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thickest document in front of you there.
And let's take a look at Page 24.
A. (Witness reviewing document.)
Q. Do you see that?
A. Yes.
Q. And that's a nipple, right?
A. Yes.
Q. And is the base of this nipple domed in your opinion?
MR. WILLIAMS: Objection to form.
A. It appears to be.
Q. And is the base of this nipple wide in your opinion?
A. I'm not sure.
Q. And why not?
A. I'm not sure how big the -- how truly big it is.
Q. Why does that matter?
A. Like I said, there's no set width for how wide wide is.
Q. So that doesn't matter?
A. So why doesn't it matter?

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Q. You said: I'm not sure how truly big it is. I said why does that matter?

A. Sorry.

Q. The question I have for you now is: Does it matter how big it is, how truly big it is? Does that matter to you, sir?

A. I would say in comparison to other nipples it has a wide base; and in comparison to some other ones, it's not as wide.

Q. Well, for purposes of the challenged claims in this case and in your declaration, does this nipple have a wide base?

MR. WILLIAMS: Objection to form and scope.

A. I would say it has a wide base.

BY MR. GOETZ:

Q. And what is the basis for your saying that?

A. That it's substantially bigger than the nipple portion that's going into the baby's mouth, bigger than the areola portion by what

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appears to be a fairly good amount.

Q. These things are all sort of round, circular, right? In other words, if you took a top-down view, you could draw a circle that was the outside circumference of the teat portion and probably a couple of circles for the circumference of the areola and then you could draw one circle for the base. Is that a fair understanding of what's happening here?

MR. WILLIAMS: Objection to form and scope.

A. I'm not sure you can -- it depends where you define where the areola is. But all of that is going to form -- there won't be definitive lines even in a top view.

BY MR. GOETZ:

Q. I understand. But you'll be able to draw circles, right?

A. You would be able to draw a circle at the top of the nipple and a circle at the bottom of the base.

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Q. And if --

A. The two circles.

Q. And if the biggest circle is in the base, it's wide in your view?

A. Yes.

Q. And you're not clear about how much it needs to be bigger, that circumference, but if it's bigger, it's wider, fair?

A. Well, this one seems to be quite a bit bigger.

Q. Right. Again, you're not sure how much bigger it needs to be for it to be wide. You just don't have --

A. There's just not a definitive number.

Q. Okay. Take a look at the next figure you have in your declaration on the page, Page 25.

A. Yes. I'm looking at it.

Q. Okay. And is the base of this nipple domed in your opinion?

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MR. WILLIAMS: Objection to form and scope.

A. Again, it depends where you define the areola portion to be, where you define the base portion to be. If you define the base portion to be more the vertical, where the bottom portion is mostly vertical, then there's still a portion that may be considered. But if it's just a little higher up than -- yes, then it is.

BY MR. GOETZ:

Q. And does the base --

A. And then there is an arc right there.

Q. Is the base of the nipple wide, in your opinion?

MR. WILLIAMS: Objection to form and scope.

A. No.

BY MR. GOETZ:

Q. Why not?

A. It's just slightly bigger than the nipple portion, the teat portion of the nipple.

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Q. Is it fair to say that you didn't do any computer modeling of the Sepehr valve, in terms of how it would function in the real world?

A. Yes.

Q. Okay. And then is it fair to say that you didn't do any modeling of any kind to sort of try to scientifically assess the advantages or not of the Sepehr valve; is that fair?

MR. WILLIAMS: Objection to form and scope.

A. I didn't have the Sepehr valve to do any tests or evaluation with.

BY MR. GOETZ:

Q. Okay. So by definition, you didn't do any modeling of it then; is that your point?

A. I didn't do any modeling --

Q. Okay.

A. -- and then, yeah.

Q. Okay. I guess you're saying one of the reasons you didn't do any is because you didn't have it?

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A. I didn't do any tests on it, yes.

Q. Okay. Fine. Have you done tests on nipples before?

A. Yes.

Q. What sorts of tests have you done on nipples before?

A. Dimensional measurements, flow rates, size of the hole.

Did I say flow rates?

Q. You did, yeah, flow rates.

A. Yep, that's what comes to mind.

Q. You didn't do any of those kinds of measurements with respect to the Sepehr valve, fair?

A. Yes.

Q. You didn't do any sort of evaluation of the Sepehr valve at all, I guess; is that fair?

MR. WILLIAMS: Objection to form.

A. I didn't do any testing of the valve or modeling of the valve.

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BY MR. GOETZ:

Q. Okay. Let me say it another way. The only thing you did with respect to the Sepehr valve is look at the reference itself; is that fair?

MR. WILLIAMS: Objection to form.

A. And additionally, I considered my history of working with valves, including slit valves.

Q. Fine -- but nothing else, fair?

A. Correct.

Q. Okay. I mean, you agree that Sepehr is a valve, right?

A. I agree that Sepehr contains a valve.

Q. Not a vent, correct?

MR. WILLIAMS: Objection to form.

A. Correct.

BY MR. GOETZ:

Q. Okay. In the '930 patent, you read the background of the invention in the Patents-in-Suit, correct, sir?

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A. I have read it.

Q. Okay. And it talks about some of the problems in the art that it was trying to address; is that right?

A. I need to review that.

Q. Okay.

A. (Witness reviewing document.)

Do you want to point me to the specific place?

Q. Yeah, it's just the background that starts in Column 1, Line 25 and goes to Column 2, Line 5.

A. Do you have Patent 64 -- 6,645,228 and 6,745,912?

Q. Probably we could get them, but why do you ask?

A. They are referenced here in the background of the invention.

Q. Okay.

A. You asked me to read that.

Q. Yeah, so let me just fast-forward to the end here.

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At the very end of the background, it's talking about the EP151862. Do you see that? 15:27:15 15:27:19 15:27:25

A. Yes. 15:27:25

Q. And it says, "Such arrangements -- I'm starting at the very last line of Column 1. "Such arrangements rely on the correct amount of screw pressure being applied by the user on fixing the teat which can give rise to varied levels of valving between uses." Do you see that? 15:27:26 15:27:33 15:27:36 15:27:39 15:27:42 15:27:46 15:27:49

A. Yes. 15:27:50

Q. This is a problem that the inventors in the '930 patent recognized. Do you agree that that is a problem that they first recognized? 15:27:50 15:27:54 15:28:00 15:28:03

MR. WILLIAMS: Objection to form. 15:28:06

A. "They" being the first people to recognize? 15:28:16 15:28:18

BY MR. GOETZ: 15:28:19

Q. Yeah. 15:28:20

A. No. 15:28:20

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Q. What evidence do you have to disagree with that statement? 15:28:21 15:28:22

A. First I'd like to see what EP151862 is so I know which valve they are talking about. 15:28:23 15:28:26

Q. Okay. 15:28:29

A. And so on my last answer is that the pressure from tightening the teat can affect valves in the area. And I think that was known at the time, but I don't have -- I'd like to see this. 15:28:32 15:28:47 15:28:57 15:29:01 15:29:04

Q. Your counsel can ask you questions at the end, and he can show it to you, I'm sure. I don't have the ability to print it. I don't have it with me. Other than that document, though, do you have in mind any other document or bits of evidence that would show that this was a known problem in the art and not a problem that was first recognized by the inventors in the '930? 15:29:05 15:29:07 15:29:10 15:29:13 15:29:14 15:29:16 15:29:19 15:29:22 15:29:25

A. I need to know what this valve is to actually answer that question. 15:29:29 15:29:32

Q. Okay. Let me broaden it out. 15:29:33

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Sitting here today, are you aware of any documents that would indicate that the correct amount of screw pressure applied by the user in fixing the teat would have impact on any valve? Not just the one here. 15:29:35 15:29:37 15:29:42 15:29:45 15:29:48

MR. WILLIAMS: Objection to form and scope. 15:29:52 15:29:55

A. I personally knew it -- 15:29:56

BY MR. GOETZ: 15:30:08

Q. How did you know it -- 15:30:08

A. -- at that time -- actually testing product and building our own product. 15:30:10 15:30:13

Q. Okay. 15:30:15

A. And it's certainly an issue with collars that as you screw onto a rubber collar, different amounts of pressure move things in different ways. And with vents and the like certainly affect the vent. And the vent, you know, is essentially a valve. And that particular case where it's letting air in but not letting milk out. 15:30:16 15:30:25 15:30:33 15:30:35 15:30:40 15:30:44 15:30:48 15:30:57

Q. So just to follow up, you don't have any documents in mind, though, right? That's my question. 15:31:03 15:31:05 15:31:10

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MR. WILLIAMS: Same objection -- objection to form and scope. 15:31:10 15:31:12

MR. GOETZ: Yep. 15:31:13

A. No documents that I have off of top of my head. 15:31:14 15:31:44

BY MR. GOETZ: 15:31:45

Q. Okay. And did you just say a vent is essentially a valve? Is that your -- is that your opinion? 15:31:45 15:31:48 15:31:51

A. I said the vent can act as a valve. 15:31:52

Q. And how can it act as a valve? 15:31:55

A. Lets air in and does not let milk out. 15:31:57 15:32:00

Q. And how does it do that? 15:32:00

A. By restricting the size of the vent, it's easier for air to flow through the vent than it is for milk. 15:32:02 15:32:08 15:32:12

Q. Because of the surface tension of the liquid, is that what you're saying? 15:32:13 15:32:17

A. Because of the viscosity and surface 15:32:18

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tension of the liquid. 15:32:22
Q. Okay. And is it your opinion that a 15:32:23
vent and a valve are equivalent? 15:32:25
MR. WILLIAMS: Objection to form and 15:32:32
scope. 15:32:33
A. Depends on the design of the vent 15:32:34
and the design of the valve. Vents could leak 15:32:35
like crazy, and I mean, valves could leak like 15:32:39
crazy. And vents could not allow. 15:32:44
BY MR. GOETZ: 15:32:48
Q. Vents could leak even worse? 15:32:49
A. They do. That's why I said it 15:32:51
depends. 15:32:54
Q. Okay. The Sepehr reference doesn't 15:32:55
just disclose the silicone, right? It's not like 15:34:00
some new new material? 15:34:03
A. It says silicone or any similar 15:34:05
material. 15:34:08
Q. But it's not like it's like here's a 15:34:08
new material for making nipples, right? 15:34:10
A. There's no material disclosed that 15:34:16
is new. 15:34:20

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Q. Right. What is your experience with 15:34:20
manufacturing nipples with silicone? 15:34:39
MR. WILLIAMS: Objection to form. 15:34:44
A. I've worked with manufacturers on a 15:34:50
silicone nipple and prototyping and one larger 15:34:59
tool. 15:35:12
BY MR. GOETZ: 15:35:12
Q. Mass production tool or not quite 15:35:12
there yet? 15:35:15
A. The product never went to market. 15:35:16
Q. Okay. So just prototyping? 15:35:18
A. Yep. 15:35:22
Q. And how many -- tell me more about 15:35:22
that. So was it one project? Was it a bottle 15:35:26
nipple? Is that what we're talking about? 15:35:34
A. Yes. 15:35:36
Q. When was that approximately? 15:35:36
A. During development of the -- of 15:35:38
Exhibit 2020, which is Patent 771,617 [sic]. 15:36:07
Q. Okay. This product went to market? 15:36:31
A. No. 15:36:33
Q. You were ramping it up to go to 15:36:33

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market; is that right? 15:36:37
A. We were developing the product and 15:36:37
testing the product. 15:36:40
Q. And so this was, you know, looking 15:36:42
at the provisionals, 2002, approximately when was 15:36:44
this manufacturing work? 15:36:49
A. Through -- 15:36:51
MR. WILLIAMS: I'm sorry. I'm going 15:36:52
to designate this next section and 15:36:57
confidential. 15:36:59
Go ahead. 15:37:00
(Whereupon, a request for To 15:37:01
Designate the Following Section of the 15:37:01
Transcript As Confidential, was made.) 15:37:02
THE WITNESS: Yes. Thank you. 15:37:02
A. (Continuing) [redacted] 15:37:04
[redacted] 15:37:07
Q. And ultimately why didn't it go to 15:37:09
market? 15:37:11
A. [redacted] 15:37:11
Q. Yeah. I understand. If it didn't 15:37:13
work, technically I need to know that. 15:37:16

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Is that what happened? 15:37:19
A. [redacted] 15:37:20
Q. [redacted] 15:37:21
A. It functioned well. There was a 15:37:21
written piece of information that said that baby 15:37:26
might be able to bite through it. 15:37:30
Q. I understand. 15:37:32
A. [redacted] 15:37:33
[redacted] 15:37:36
[redacted] 15:37:38
[redacted] 15:37:41
Q. Fair enough. 15:37:45
How long did you spend working with 15:37:47
the manufacturing folks trying to manufacture the 15:37:48
silicone nipple that's disclosed in this 15:37:52
document, approximately? 15:37:55
A. [redacted] 15:37:58
Q. And where is the valve? I just 15:38:00
don't see the valve. Could you show me where the 15:38:03
valve is? 15:38:07
MR. WILLIAMS: Objection to form. 15:38:11
BY MR. GOETZ: 15:38:12

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Q. Oh, maybe there is no valve. 15:38:13
Is there a valve? 15:38:14
A. There -- I have to look at this one 15:38:17
in particular to show you. 15:38:19
Q. Oh, it looks like it's a vent 166. 15:38:47
Is that what that is? A vent 164 -- I'm in 15:38:49
Figure 7. 15:38:53
A. Figure 7. Yeah. That's one 15:38:54
potential venting mechanism. 15:39:00
Q. Okay. Well, does this document 15:39:02
refresh your recollection about how much time you 15:39:04
spent working on manufacturing issues with 15:39:07
respect to the silicone nipple? 15:39:11
A. [redacted] 15:39:14
[redacted] 15:39:23
Q. Do you agree that slit valve is 15:39:37
harder to manufacture in silicone than a vent or 15:39:40
you don't know? 15:39:44
MR. WILLIAMS: Objection to form. 15:39:45
A. It depends on the considerations of 15:39:58
the requirements for the product. 15:40:00
BY MR. GOETZ: 15:40:01

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Q. Like what? 15:40:18
A. How precise the vents have to be to 15:40:19
ensure proper function so that you minimize any 15:40:27
milk leakage through a vent and any changes in 15:40:34
performance. 15:40:41
Q. Anything else? 15:40:50
A. No. 15:40:52
MR. WILLIAMS: Counsel, it's been an 15:41:07
hour and five minutes. Take a break? 15:41:08
MR. GOETZ: Okay. We're getting 15:41:10
there. 15:41:13
Let's go off the record. 15:41:13
THE COURT REPORTER: Off the record. 15:41:14
(Recess taken.) 16:06:50
(Whereupon, Exhibit 1008, Ishimaru 16:06:50
reference, was marked for identification.) 16:06:52
MR. GOETZ: We'll go back on the 16:06:53
record. 16:06:54
BY MR. GOETZ: 16:06:55
Q. Okay. Sir, I've put in front of you 16:06:55
Exhibit 1008, which is the Ishimaru reference you 16:06:58
used in this case; is that correct? 16:07:10

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A. Yes. 16:07:11
Q. Okay. I just want to have that for 16:07:12
reference. I'm going to go to your declaration 16:07:14
on Page 189. Okay. You say right above the 16:07:18
figure you say "Figure 1 of Ishimaru shows this 16:07:36
flange depends from the lower portion of the 16:07:40
nipple and defines the circumference of the 16:07:42
nipple at a point furthest from the teat opening 16:07:45
121." 16:07:49
Do you see that? 16:07:50
A. Yes. 16:07:50
Q. And so when you're thinking about 16:07:50
the furthest circumference, where are you 16:08:07
referring to and where are you thinking about? 16:08:12
What's the starting point and the ending point in 16:08:18
your mind? 16:08:21
A. The circumference -- if the 16:08:23
diameters cross here, it would be around there. 16:08:29
From this point to the edge of the flange. 16:08:37
(Indicating.) 16:08:44
Q. And so furthest from the teat 16:08:53
opening -- again, I'm sorry. I just 16:08:56

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misunderstood. 16:08:59
So where do I -- where is the 16:08:59
measurement being taken? In between which two 16:09:04
points? 16:09:07
MR. WILLIAMS: Objection to form. 16:09:11
A. Okay. Let me read this part. 16:09:15
BY MR. GOETZ: 16:09:20
Q. Okay. 16:09:20
A. (Witness reading document.) 16:10:16
So the widest circumference of the 16:12:30
nipple at the point furthest from the teat 16:12:35
opening from the flange would be that diameter. 16:12:44
Q. The diameter of the flange? 16:12:49
A. The diameter of the flange. 16:12:54
Q. Is that because that's the farthest 16:12:57
bit away from the center axis of the nipple? Or 16:12:59
because that's furthest bit from the tip of the 16:13:04
nipple in your view? 16:13:10
A. I think it's -- I think it's both. 16:13:11
Q. Why do you think that? 16:13:30
MR. WILLIAMS: Objection to form. 16:13:36
A. So, it's the circumference that's 16:13:54

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furthest of the nipple at a point furthest from the teat opening. So if that's -- your question was was it a straight line or was it the distance from here to here? Projecting that up (indicating.) 16:13:57 16:14:03 16:14:06 16:14:10 16:14:15

Was that your question? 16:14:16

Q. "Here to here" is a meaningless things in the context of a written record. 16:14:16 16:14:19

What was your question? 16:14:23

A. It was actually trying to understand your question. Sorry. 16:14:24 16:14:25

Q. Okay. The question is: You think it's both. That's what you said. 16:14:27 16:14:35

And my question is: Why do you think it's both? 16:14:37 16:14:39

A. The question that I said that I think it's both? 16:14:42 16:14:46

Q. You said I think it's both to the question -- 16:14:48 16:14:50

You said it's both to the question that I asked which is: Is that because that's the furthest bit away from the center axis of the 16:15:27 16:15:30 16:15:32

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nipple or because it's the furthest bit from the tip of the nipple in your view? 16:15:37 16:15:41

A. Yes. So it is the furthest point from the center axis and it is the furthest point from -- from the tip. 16:15:42 16:15:46 16:15:51

Q. Okay. And what in your view does the claim actually require? 16:15:54 16:15:57

MR. WILLIAMS: Objection to form and scope. 16:15:59 16:16:01

A. Specifically which claim? 16:16:02

BY MR. GOETZ: 16:16:09

Q. Whatever claim element you're mapping to. My understanding of your report is that you've got these little headings -- 16:16:11 16:16:12 16:16:20

A. Yep. 16:16:22

Q. -- and these headings are the actual claim language. And then underneath that is your explanation. 16:16:22 16:16:25 16:16:27

Is that your understanding of your declaration? 16:16:27 16:16:29

A. Yes. 16:16:29

Q. Okay. So whatever element you're 16:16:29

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dealing with on Page 199 of your declaration. 16:16:32

A. So the claim portion is a flange depending from the lower portion of the nipple defining the nipple circumference furthest from the aperture. 16:16:51 16:16:56 16:17:00 16:17:04

Q. Uh-huh. 16:17:08

And what does that require in your -- in your understanding? Does it require both or just one? 16:17:08 16:17:10 16:17:13

MR. WILLIAMS: Objection to form. 16:17:15

A. I don't think it's clear. 16:17:25

BY MR. GOETZ: 16:17:28

Q. So you don't know? 16:17:28

A. I don't know. 16:17:29

Q. Okay. And Figure 1 that you have on Page 189, that's Figure 1 of the nipple in Ishimaru; is that right? 16:17:30 16:18:10 16:18:15

A. Yes. 16:18:17

Q. Okay. I mean, we can agree that the claim limitation that we're talking about, which you have on Page 188 of your declaration, that doesn't mean both, right? It means one or the 16:18:17 16:20:24 16:20:29 16:20:39

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other? 16:20:44

Do you agree with that? 16:20:46

MR. WILLIAMS: Objection to form. 16:20:48

BY MR. GOETZ: 16:20:52

Q. You're just uncertain about which one it is; is that right? 16:20:52 16:20:55

MR. WILLIAMS: Same objection. 16:20:57

A. I'm saying it's unclear in that the flange depending from the lower portion of the nipple defining the nipple circumference farthest from the aperture, I would take a diameter to be the circumference, to be the circumference of the flange. 16:20:59 16:21:17 16:21:19 16:21:23 16:21:27 16:21:34

And how you -- how do you define "furthest" can be along the path of the nipple. It could be from the centerline and could be from the tip of the nipple directly to the edge. All three of which would be furthest from the aperture. 16:21:35 16:21:38 16:21:47 16:21:51 16:21:57 16:22:01

BY MR. GOETZ: 16:22:03

Q. Okay. So there's three in your mind. And what are the three? Just so I'm 16:22:03 16:22:05

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clear. 16:22:07
A. Along the surface of the nipple. 16:22:08
Q. Along the surface like following the contour? 16:22:12 16:22:17
A. Yes. 16:22:18
Q. Following the contour. Okay. That's one. 16:22:20 16:22:22
A. From the centerline -- to the centerline to the edge of the flange. 16:22:23 16:22:25
Q. From centerline to the edge like in the same plain kind of deal? 16:22:30 16:22:34
A. Correct. 16:22:36
Q. Yep. 16:22:37
A. And then a direct line from the hole at the top of the nipple to the edge of the flange. 16:22:38 16:22:43 16:22:50
Q. Okay. Of those three, which do you think is how a skilled artisan would understand this claim term -- this claim term here? 16:22:53 16:22:56 16:23:00
MR. WILLIAMS: Objection to form and scope. 16:23:03 16:23:04
A. I think a skilled artisan wouldn't 16:23:04

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know. 16:23:07
BY MR. GOETZ: 16:23:08
Q. Okay. Why do you think that? 16:23:09
A. Just reading the claim itself. 16:23:11
Q. Any other reasons? 16:23:22
A. It says "a flange depending from lower portion of the nipple defining the nipple circumference furthest from the aperture." 16:23:23 16:23:27 16:23:30
So all three of them would seem to be reasonable explanations. 16:23:33 16:23:36
Q. Okay. Any other reason besides the claim term or claim language? 16:23:38 16:23:40
A. No. 16:24:00
Q. What did you have in mind when you wrote your declaration at Pages 188 and 189? 16:24:00 16:24:02
MR. WILLIAMS: Objection to form. 16:24:08
A. I don't recall which one of the three I was thinking of at the time. 16:24:17 16:24:18
BY MR. GOETZ: 16:24:20
Q. Well, you remember it was just one of them, though? 16:24:24 16:24:28
A. I don't recall. 16:24:28

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Q. In any event, we can agree that you didn't explain which one you were using in your declaration; is that fair? 16:24:30 16:25:23 16:25:26
A. Yes. 16:25:35
Q. Okay. Let's take a look at Exhibit 1009. 16:25:36 16:26:17
(Whereupon, Exhibit 1009, Kurkjian reference, was marked for identification.) 16:26:17 16:26:33
BY MR. GOETZ: 16:26:33
Q. And that's -- and this is the Kurkjian reference, sir, is that right? 16:26:33 16:26:44
A. Yes. 16:26:48
Q. Okay. And my understanding is that there's basically three embodiments disclosed here. The first one is Figures 1, 2, 3, 4, and 5. And then Figure 6 is a modified form, and Figure 7 is a further modified form. And I'm just -- based on what the spec says in the drawings on Column 1. 16:26:48 16:26:54 16:26:56 16:27:05 16:27:08 16:27:15 16:27:17
So my question is: Do you agree with that, first? 16:27:19 16:27:22
MR. WILLIAMS: Objection to form. 16:27:35

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A. Yes. 16:27:55
BY MR. GOETZ: 16:27:55
Q. Okay. And it's my understanding that for purposes of this proceeding, you are relying only on figures -- the sort of the last two embodiments which are on Figures 6, 7, and 8; is that correct? 16:27:55 16:27:58 16:28:01 16:28:05 16:28:12
MR. WILLIAMS: Objection to form. 16:28:14
A. (Witness reviewing document.) 16:30:05
I believe that Figure 1 is also part for -- Page 171 and 172 says Figures 1, 3, 6, and 7. 16:30:54 16:30:56 16:31:14
BY MR. GOETZ: 16:31:55
Q. Okay. Thank you. 16:31:55
Okay. Could you turn to Page 164 of your declaration, I mean, which is Exhibit 1005. 16:32:26 16:32:33
A. Okay. 16:32:44
Q. Okay. And that figure, what is that figure? 16:32:45 16:32:47
A. So that's a design using Ishimaru in view of Kurkjian. 16:33:54 16:34:02
Q. You made that design? 16:34:33

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MR. WILLIAMS: Objection to form. 16:34:38
A. I did not. 16:34:40
BY MR. GOETZ: 16:34:48
Q. Who made that design? 16:34:49
A. I believe an outside draftsman did 16:34:50
the drawing based on input from -- from Baker 16:35:16
Botts and with my review. 16:35:31
Q. You approved it, though, correct? 16:35:32
A. Yes, fair. 16:35:34
Q. And so of the folks that were 16:35:35
involved in this drawing, sir, whose idea was it, 16:36:19
would you say? 16:36:26
MR. WILLIAMS: Objection to form. 16:36:27
A. I'm uncertain. 16:36:31
BY MR. GOETZ: 16:36:32
Q. Okay. So at the point in the figure 16:36:32
where the -- the nipple edge meets the collar, 16:37:52
it's sort of -- it's like a pointy sort of 16:38:03
triangle area on each side. 16:38:06
Do you see that? 16:38:08
A. It's kind of in the sun. 16:38:08
Q. Let me mark it on yours. If you 16:38:15

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could hand me your exhibit number -- 16:38:18
(Handing document.) 16:38:24
A. Thank you. 16:38:28
Q. Thank you, sir. 16:38:29
Can I have my orange highlighter, 16:38:32
please? 16:38:35
A. (Handing.) 16:38:44
Q. Thank you, sir. 16:38:51
Okay. So I'm handing this exhibit 16:39:38
back to you, and I've tried to mark the end of 16:39:40
the nipple sort of where it starts to meet the 16:39:44
collar. Do you see that? 16:39:47
A. Yes. 16:39:48
Q. Okay. And the -- what you see in 16:39:48
the figure, what you have there is that there's a 16:39:56
very sort of narrowing dovetailing between the 16:39:58
nipple and the collar. 16:40:01
Do you see that? 16:40:03
A. I believe so. 16:40:06
Q. How would you -- what would you -- 16:40:07
how would you call that? I said "dovetailing." 16:40:09
How would you describe to me the interaction of 16:40:12

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the sort of very end of the -- of the nipple as 16:40:15
it approaches and lays next to the collar? 16:40:19
A. You're talking about the very tip 16:40:28
here? 16:40:30
Q. I'm talking about what I 16:40:30
highlighted, yeah, the very tip of what I 16:40:32
highlighted. 16:40:34
A. The tip of what you highlighted. I 16:40:35
don't know. Feathered edge. 16:40:38
Q. Okay. The feathered edge, that's 16:40:41
good. 16:40:44
So the question I have for you is: 16:40:44
Whose idea was the feathered edge amongst the 16:40:45
people that came up with the idea of the drawing? 16:40:51
A. I'm uncertain. 16:40:53
Q. Okay. What is the basis that you 16:40:54
have for having a feathered edge like that in 16:40:56
this drawing? 16:40:58
A. (Witness reviewing document.) 16:45:25
So can you repeat your question, 16:45:29
please? 16:45:31
Q. Yeah. 16:45:31

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What's the basis that you have, you 16:45:32
know, for having a feathered edge like that in 16:45:34
the drawing? 16:45:38
A. It goes to Kurkjian describing that 16:45:39
the -- how the face "conforms to the contour of 16:45:46
the nipple and constitutes a continuation thereof 16:46:00
to provide a streamline type connection between 16:46:02
the nipple and the bottle." 16:46:05
Q. Okay. Anything else? 16:46:14
A. Again at -- (reading to self.) 16:47:13
(Witness reviewing document.) 16:48:18
I think it's that streamline 16:49:33
connection. 16:49:36
Q. Okay. And that streamline 16:49:39
disclosure or streamline is referring to Figure 16:49:41
6, correct? 16:49:45
MR. WILLIAMS: Objection to form. 16:49:45
BY MR. GOETZ: 16:50:21
Q. I mean, I'm looking at the actual 16:50:21
Kurkjian patent. 16:50:24
A. Yep. 16:50:25
Q. And the streamline quote is at Line 16:50:27

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45 column -- I guess maybe it's Page 2. I guess 16:50:31
it would be Column 3. And it's referring to 16:50:34
Figure 6. 16:50:36
That's my -- that's my -- is that 16:50:37
your understanding as well? 16:50:41
A. Column? 16:50:42
Q. Well, I mean, my version of the 16:50:43
patent is a little weird because on the top of 16:50:45
Column 3, it has a big Number 2. So I'm going to 16:50:48
count the columns 1, 2, 3, so doing that, it's 16:50:51
the third column. Line 45 is where the word 16:50:55
"streamline" appears. 16:50:58
Do you see that? 16:50:59
A. Yes, Line 45. 16:51:04
Q. 45, yes. Sorry. 16:51:05
That's the quote that you were 16:51:07
referring to, correct, sir? 16:51:09
A. That is. 16:51:11
Q. And that's discussing Figure 6, 16:51:15
correct? 16:51:16
A. Correct. 16:51:17
Q. Okay. And if you look at Figure 6, 16:51:17

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I mean, it's fair to say that the -- where the 16:51:19
collar and the nipple meet, there's sort of a -- 16:51:28
there's a horizontal line below which there's no 16:51:33
overhanging nipple material. I mean, is that a 16:51:37
fair way to describe it? 16:51:40
A. It's still kind of a pointy edge. 16:51:46
Q. Where do you see a pointy edge? 16:51:53
A. In Figure 6. 16:51:55
Q. I guess I'll say it this way. If 16:52:01
you draw -- you see the little tiny gap you can 16:52:04
see between the top of the collar and the nipple 16:52:07
material. 16:52:10
Do you see that? 16:52:10
A. Yes. 16:52:10
Q. You could draw a line right through 16:52:11
that, right? 16:52:13
A. A horizontal line. 16:52:14
Q. A horizontal line right through 16:52:16
those two lines in that plain? 16:52:19
A. Yes. 16:52:21
Q. And I would say there's no nipple 16:52:21
material hanging below that line. 16:52:23

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Do you agree with that? 16:52:25
A. Yes. 16:52:29
Q. Okay. But if you do that same line 16:52:29
in your figure in 164, there is a substantial 16:52:32
amount of nipple overhang. 16:52:38
Do you agree? 16:52:40
A. There's nipple overhang. 16:52:46
Q. Right. Yeah. 16:52:48
A. I wouldn't quantify it as 16:52:50
substantial. It's approximately the thickness of 16:52:52
the top edge of the collar. 16:53:05
Q. Okay. That sort of overhang isn't 16:53:08
contemplated by Kurkjian, fair? 16:53:16
A. Kurkjian doesn't show an overhang in 16:53:27
Figure 6. 16:53:36
Q. It doesn't show it in Figure 7 16:53:36
either, right? 16:53:39
A. Or in Figure 7. 16:53:46
Q. Right. In fact, it isn't in any of 16:53:48
the figures, isn't that fair, sir? 16:53:52
A. Yes. 16:54:02
Q. Okay. Okay. So let's go back to 16:54:02

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the other drawing that we talked about that is I 16:56:27
think the one on your declaration on Page 61. 16:56:33
Oh, sorry. No. I'm sorry. 209. I'm sorry. 16:56:49
Let's go to Page 209. 16:57:13
So are you on Page 209? 16:57:25
A. I am. 16:57:27
Q. And that drawing at the top there is 16:57:27
a similar drawing to the one we talked about. 16:57:29
This is the one showing the combination of 16:57:32
Ishimaru and Atkin; is that correct? 16:57:37
A. Yes. 16:57:56
Q. And is it -- same sort of questions 16:57:56
on this design. 16:58:00
Was it created and drafted by the 16:58:00
same design firm? 16:58:03
A. As far as I know, yes. 16:58:04
Q. And it was a combination of you and 16:58:07
the design firm and the lawyers; is that right? 16:58:15
A. I did not design it. I reviewed it. 16:58:23
Q. And you don't know who had the idea 16:58:26
for any particular elements of it; is that right? 16:58:28
A. Right. 16:58:31

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Q. You approved it? 16:58:34
A. I approved it. 16:58:35
Q. Yeah. 16:58:37
MR. GOETZ: Okay. Let's go off the record for a minute. I just want to take a minute here and wrap stuff up. 16:59:46 16:59:47 16:59:50
Off the record. 16:59:52
(Recess taken.) 16:59:54
MR. GOETZ: We'll go back on the record. 17:11:04 17:11:06
BY MR. GOETZ: 17:11:06
Q. Okay. Sir, during the breaks today, did you discuss the substance of your testimony with your lawyers at all? 17:11:07 17:11:09 17:11:11
A. No. 17:11:13
Q. Okay. And have you been paid for your time on this IPR? 17:11:13 17:11:17
A. Yes. 17:11:18
Q. Approximately how much time have you spent on the IPR? And how much have you been paid? 17:11:19 17:11:22 17:11:26
A. I'm thinking a total of maybe three 17:11:30

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days, maybe 20 hours, 24 hours. 17:11:52
Q. On the whole day -- 17:11:55
A. I'm sorry. No, just 8-hour days, so 17:11:57
24 hours or so. 20, 24 hours. 17:12:01
Q. And just to be clear, I'm talking about the entire IPR process including the declaration, the deposition, and everything. 17:12:04 17:12:06 17:12:09
Is that what you were just thinking of? 17:12:11 17:12:14
A. No, I was just thinking of -- 17:12:14
Q. The depo preparation; is that correct? 17:12:16 17:12:18
A. Right and before. 17:12:18
Q. Let me try again. 17:12:21
For the whole entire IPR, including the preparation of your declaration and everything else, approximately how much time have you spent, and how much money have you been paid? 17:12:23 17:12:25 17:12:30 17:12:32
A. So I'm being paid different amounts 17:12:40
depending on which portion it's doing. 17:12:45
So it's, I believe, $350 an hour. 17:12:48
And then for the deposition itself, I believe 17:12:57

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550. But I'm not sure of those numbers. 17:13:00
Q. Okay. 17:13:04
A. And the number of hours is maybe -- 17:13:04
maybe 40 hours. 17:13:36
Q. Total? 17:13:37
A. Yes. 17:13:41
Q. You're just guessing? 17:13:41
A. Yeah. Wild guess. 17:13:43
Q. And except for today, have you been paid current with what you've spent or are you still waiting for some money? 17:13:44 17:13:48 17:13:54
A. I have been paid 100 percent for 17:13:54
what was done earlier, and I haven't sent a bill 17:13:56
yet for the remainder. 17:13:59
MR. GOETZ: Okay. Thank you. 17:14:06
I don't have any further questions. 17:14:06
MR. WILLIAMS: Let's go off the record for a minute. 17:14:09 17:14:11
(Recess taken.) 17:14:15
MR. WILLIAMS: We can go back on. 17:21:06
We have no further questions. We can go off. 17:21:09
(Time noted: 5:21 p.m. EDT) 17:21:13

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CERTIFICATE OF SHORTHAND REPORTER-NOTARY PUBLIC
I, Amanda Gorrono, the officer before whom the foregoing deposition was taken, do hereby certify that the foregoing transcript is a true and correct record of the testimony given; that said testimony was taken by me stenographically and thereafter reduced to typewriting under my direction; and that I am neither counsel for, related to, nor employed by any of the parties to this case and have no interest, financial or otherwise, in its outcome.
IN WITNESS WHEREOF, I have hereunto set my hand this 12th day of October, 2023.

_____
AMANDA GORRONO, CLR
CLR NO: 052005 - 01
Notary Public in and for the State of New York
County of Suffolk
My Commission No. 01G06041701
Expires: 01/07/2027

Brian Silver, c/o
Baker Botts LLP
700 K Street, N.W.
Washington, D.C. 20001-5692

Case: Nanobebe US Inc. v. Mayborn (UK) Limited
Date of deposition: October 12, 2023
Deponent: Brian Silver

Please be advised that the transcript in the above referenced matter is now complete and ready for signature. The deponent may come to this office to sign the transcript, a copy may be purchased for the witness to review and sign, or the deponent and/or counsel may waive the option of signing. Please advise us of the option selected. Please forward the errata sheet and the original signed signature page to counsel noticing the deposition, noting the applicable time period allowed for such by the governing Rules of Procedure. If you have any questions, please do not hesitate to call our office at (202)-232-0646.

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Witness Name: Brian Silver
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Page No. Line No. Change

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Signature Date

EXHIBIT 1001

US010952930B2

(12) **United States Patent**
Rees et al.

(10) **Patent No.: US 10,952,930 B2**
(45) **Date of Patent: *Mar. 23, 2021**

(54) **BABY BOTTLE WITH FLEXIBLE NIPPLE REGIONS**

(71) Applicant: **Mayborn (UK) Limited**, New Castle Upon Tyne (GB)

(72) Inventors: **Arnold Rees**, Newcastle Upon Tyne (GB); **Ian Webb**, London (GB); **Mark Armstrong**, Wales (GB); **Tom Cotton**, London (GB)

(73) Assignee: **Maybom (UK) Limited**, New Castle Upon Tyne (GB)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/551,783**

(22) Filed: **Nov. 24, 2014**

(65) **Prior Publication Data**

US 2015/0083685 A1 Mar. 26, 2015

Related U.S. Application Data

(63) Continuation of application No. 13/364,557, filed on Feb. 2, 2012, now Pat. No. 8,910,810, which is a (Continued)

(30) **Foreign Application Priority Data**

Jun. 29, 2004 (GB) 2004/14560.3
Feb. 8, 2005 (GB) 2005/02599.4

(51) **Int. Cl.**
A61J 11/04 (2006.01)
A61J 11/02 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61J 11/006*** (2013.01); ***A61J 11/02*** (2013.01); ***A61J 11/045*** (2013.01); *A61J 17/001* (2015.05)

(58) **Field of Classification Search**
CPC ... A61J 11/04; A61J 9/00; A61J 11/002; A61J 11/0035; A61J 11/005; A61J 11/006;
(Continued)

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Primary Examiner — Andrew T Kirsch
(74) *Attorney, Agent, or Firm* — Fish & Richardson P.C.

(57) **ABSTRACT**

According to a first embodiment, a feeding bottle comprises a vessel, collar, and nipple. The nipple comprises a base portion, a teat portion, an areola portion allowing movement of the teat portion towards and away from the base portion. According to a second embodiment, a feeding bottle comprises a vessel, collar, nipple and handle portion removeably secured to the vessel by the collar. The invention includes a flexible region or regions to provide a more natural feeding by closely mimicking the human breast.

20 Claims, 6 Drawing Sheets

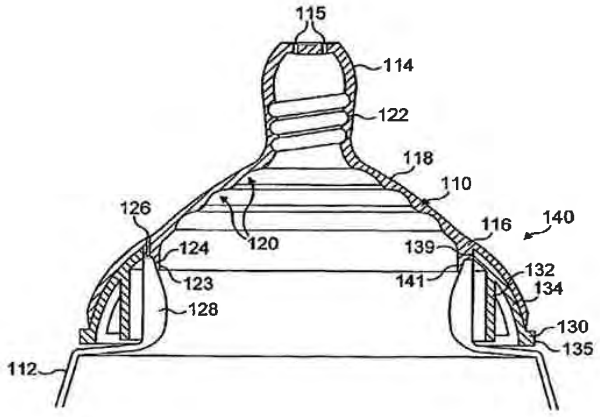


EXHIBIT 1001 10/12/22
PENGAD 800-631-6989

Related U.S. Application Data

continuation of application No. 11/630,864, filed as application No. PCT/GB2005/002532 on Jun. 29, 2005, now Pat. No. 8,181,800.

(51) **Int. Cl.**
A61J 11/00 (2006.01)
A61J 17/00 (2006.01)

(58) **Field of Classification Search**
CPC . A61J 9/04; A61J 11/02; A61J 11/045; A47G 19/2272
USPC 215/11.5, 11.1, 396, 398, 11.6, 276, 11.4
See application file for complete search history.

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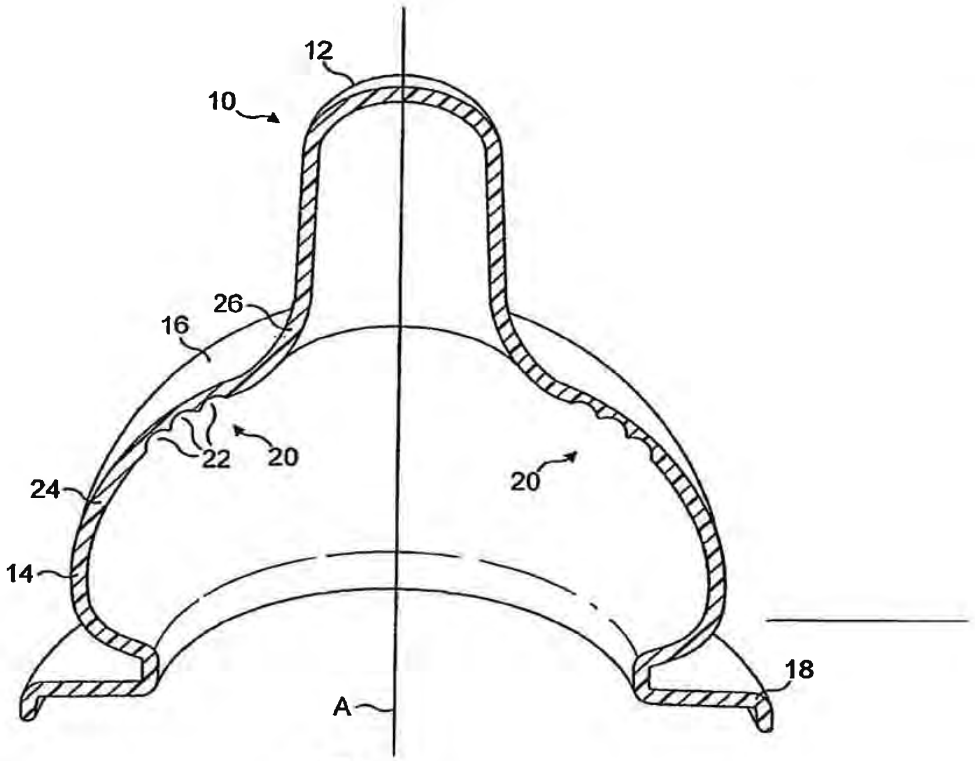


FIG. 1

Nanobebe US Inc., Ex. 1001, Page 4
Nanobebe US Inc. v. Mayborn (UK) Limited et al

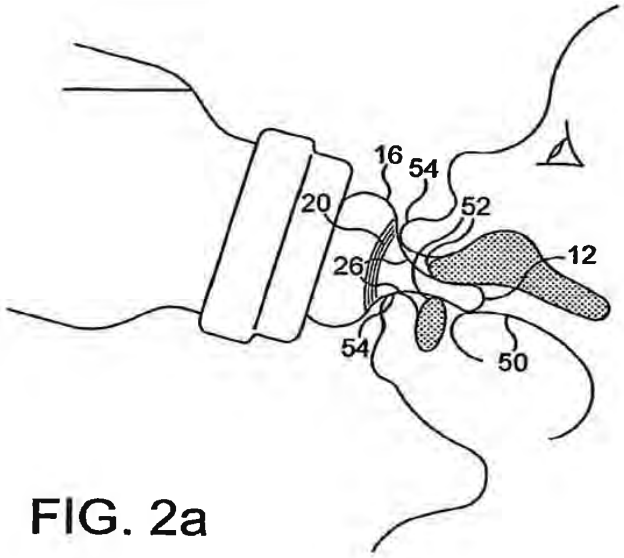


FIG. 2a

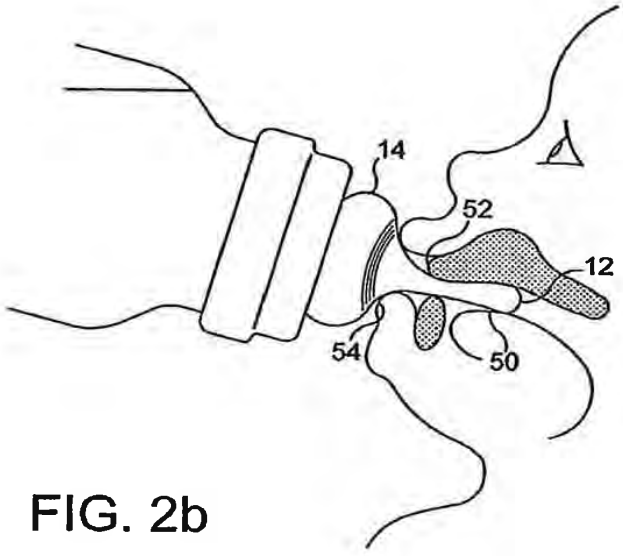


FIG. 2b

Nanobebe US Inc., Ex. 1001, Page 5
Nanobebe US Inc. v. Mayborn (UK) Limited et al

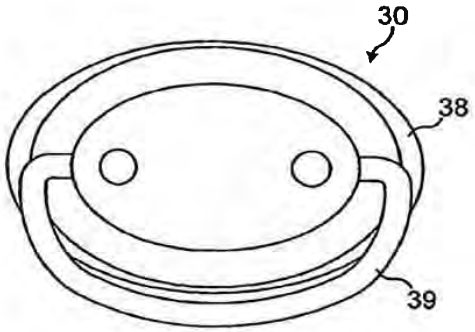


FIG. 3a

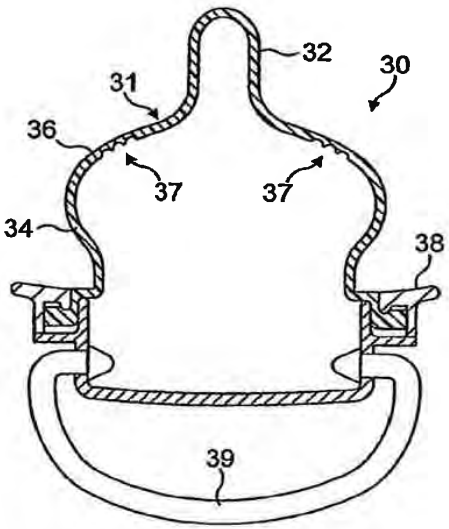


FIG. 3b

Nanobebe US Inc., Ex. 1001, Page 6
Nanobebe US Inc. v. Mayborn (UK) Limited et al

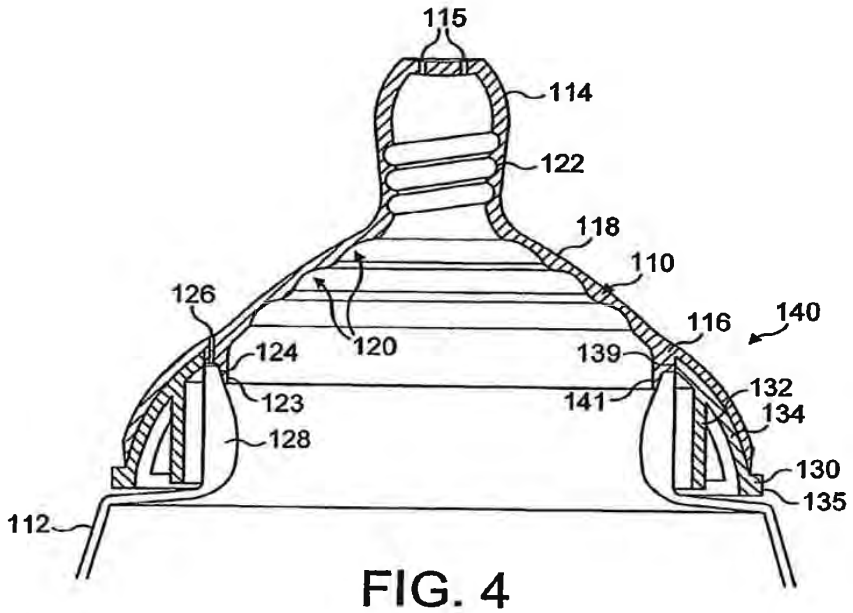


FIG. 4

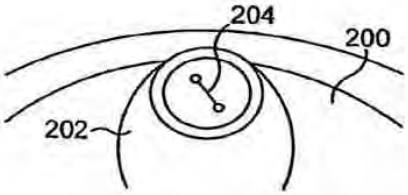


FIG. 5a

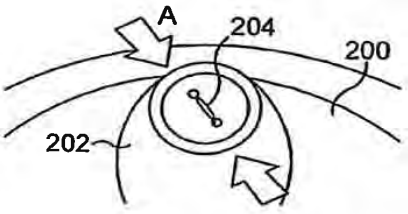


FIG. 5b

Nanobebe US Inc., Ex. 1001, Page 7
Nanobebe US Inc. v. Mayborn (UK) Limited et al

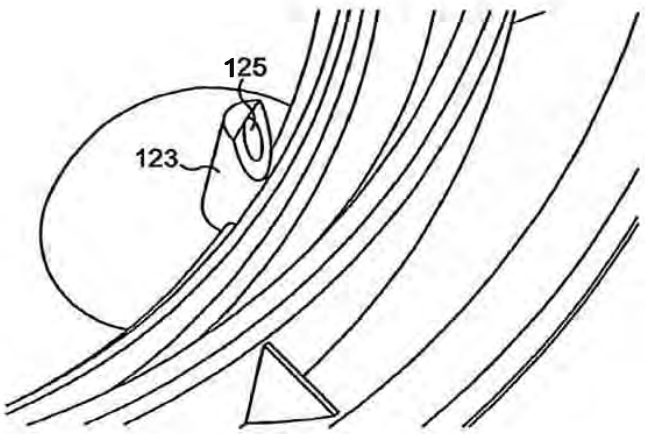


FIG. 6

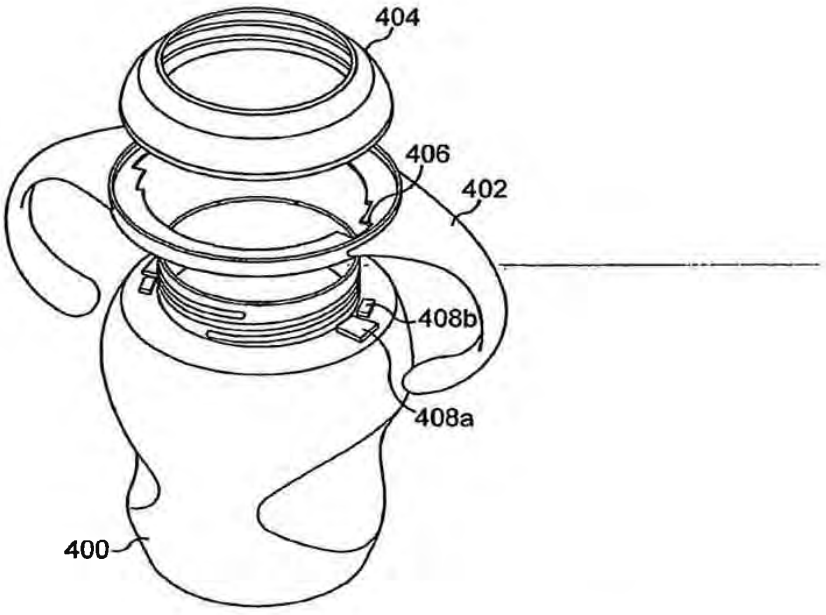


FIG. 7a

Nanobebe US Inc., Ex. 1001, Page 8
Nanobebe US Inc. v. Mayborn (UK) Limited et al

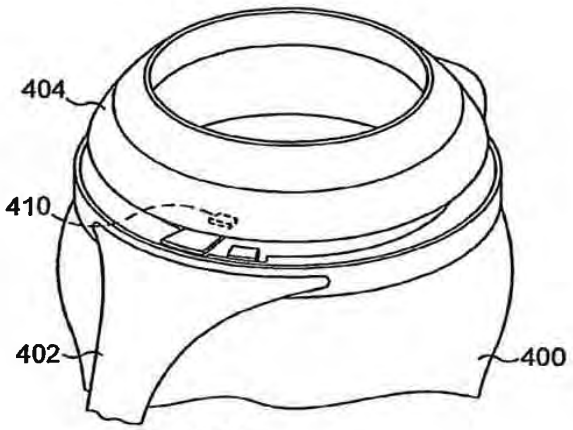


FIG. 7b

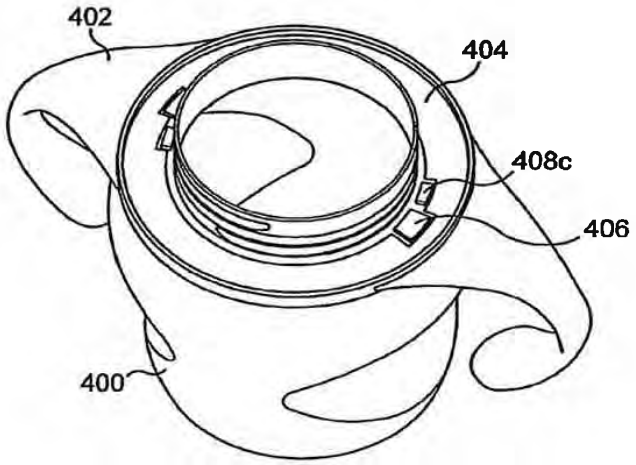


FIG. 7c

BABY BOTTLE WITH FLEXIBLE NIPPLE REGIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of pending U.S. application Ser. No. 13/364,557 filed on Feb. 2, 2012, which was a continuation of U.S. application Ser. No. 11/630,864 which was a national filing under § 371 of International Application PCT/GB2005/002532, with an international filing date of Jun. 29, 2005, claiming priority from Great Britain Application No. GB2004/14560.3, with a filing date of Jun. 29, 2004, now abandoned, and Great Britain Application No. GB2005/02599.4, with a filing date of Feb. 8, 2005, now abandoned, all of which are herein incorporated by reference.

TECHNICAL FIELD

The invention relates to a drinking vessel with a nipple, in particular a baby bottle having a nipple of increased flexibility and functionality.

BACKGROUND OF THE INVENTION

Various known teats have been designed to mimic the human breast in operation. One known teat is described in U.S. Pat. No. 6,645,228 and includes a stem and a base. The base has a bulbous region and an areola region from which the stem projects. The bulbous region has an upper region with a progressively thinning wall which acts as a spring element such that as an infant sucks on the teat the areola and stem move back and forth relative to the bulbous region.

Various problems arise with this arrangement. Movement of the areola region and stem relative to the bulbous region does not closely mimic the movement of the human breast during sucking. Furthermore because flexibility is provided upon a progressively thinning wall region, the amount of flexing and the point at which flexing takes place is undefined and unpredictable.

A second known teat is described in U.S. Pat. No. 6,745,912 B2 (Pigeon) including a series of parallel annular grooves on the inner surface of the nipple which allows stretching of the nipple but only in a constrained direction, and with the risk of flow blockage if the nipple collapses.

In addition, efforts are continuing to provide valved feeding bottles, in particular to allow air ingress to the teat. It is believed that this reduces the risk of colic which can otherwise occur as a result of negative pressure building up in the feeding bottle. Various known arrangements include slit valves of various types, however these are frail and difficult to machine. In another approach described in German patent DE19716535 a teat is provided with an inner annular resilient flange at its base which rests on a bottle rim when screwed down by a collar. Upon a negative pressure building up inside the drinking vessel the flange lifts from the vessel rim and air passes up through the collar and between the flange and the vessel rim.

In a similar arrangement described in European patent application EP151862 a teat includes a downwardly depending cylindrical flange at its base which seals against the inner top face of a vessel neck when deformed by being screwed down by a collar. Again a negative pressure inside the vessel lifts the flange away from the vessel neck so that air flows through the collar and between the neck and the flange into the vessel to relieve the pressure differential. Such arrangements rely on the correct amount of screw pressure being applied by the user on fixing the teat which can give rise to varied levels of valving between uses. Furthermore the introduction of a circumferential flange increases material costs.

SUMMARY OF THE INVENTION

The invention is set out in the claims. According to a first embodiment, because the flex region is provided in the areola portion allowing the teat portion and/or areola portion to move towards and away from one another a more natural feeding action is provided. Furthermore, because of the inclusion of a plurality of flex channels the point of flexure is clearly defined. According to a second embodiment, because of the provision of a helical flow formation on the inner face of the teat, continuous flow of liquid is allowed even when the teat collapses via the helical flow path while allowing extension of the teat and in particular a rotational or torsional extension. It will be understood that each of the terms "teat" and "nipple" embraces feeding bottle teats and nipples as well as soother teats and nipples, sometimes known as "baglets".

Embodiments of the invention will now be described by way of example with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional side view of a teat according to the present invention;

FIG. **2***a* is a side view of the teat of FIG. **1** in use in a first flexed position;

FIG. **2***b* is a side view of the teat of FIG. **1** in use in a second flexed position;

FIGS. **3***a* and **3***b* are end and side views respectively of a soother incorporating the teat of the present invention;

FIG. **4** is a cross-sectional side view of a teat and vessel according to another aspect of the present invention;

FIG. **5***a* is a perspective view showing a teat valve in a first, closed configuration;

FIG. **5***b* is a perspective view showing a teat valve in a second, open configuration;

FIG. **6** is a partial perspective view of the underside of the teat, showing a lip valve;

FIG. **7***a* is an exploded perspective view showing assembly steps for a drinking vessel according to the invention;

FIG. **7***b* is a perspective view showing a first detail of an assembled vessel according to the present invention; and

FIG. **7***c* is a perspective view showing a second detail of an assembled vessel according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring firstly to FIG. **1** a teat **10** for use with a feeding bottle includes a teat portion **12**, a base portion **14** and an areola portion **16** therebetween. A flange **18** extends from the base of the base portion to allow fixing to a feeding bottle (not shown) in any appropriate known manner. The base portion may also include a one-way air-inlet valve of any appropriate type for example an integrally moulded duckbill valve (not shown). The teat has circular symmetry around an axis A running through the center of the teat.

The areola portion **16** includes a flex region **20** comprising three grooves or flex channels **22** extending around an inner surface of the areola portion effectively forming circular thinned regions parallel/concentric with each other

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about the axis A and hence surrounding the teat portion. The flex region **20** is generally provided between a transition region **24** separating the base portion **14** and the areola portion **16** and a transition region **26** separating the areola portion **16** and the teat portion **12**. The flex region **20** allows flexing of the teat as described in more detail below.

The teat can be formed in any appropriate manner, for example compression or injection moulding and formed of any appropriate elastic material such as silicone, latex or thermoplastic elastomer (TPE). Injection moulded silicone provides a particularly desirable degree of elasticity in the teat portion. The teat portion **12** is preferably thinner in cross-section than the remainder of the teat or is co-moulded with a more flexible material to allow additional flexing of the teat portion relative to the teat as a whole. The teat can have a texture such as a skin-like texture moulded or otherwise patterned on to its surface.

As shown in FIGS. **2***a* and **2***b*, in operation an infant drinks from the teat mounted on a bottle, the infant's tongue **50** contacting the teat portion **12**, the infant's teeth or gums **52** contacting the transition portion **26** and the infant's lips **54** contacting the areola portion **16** generally at the flex region **20**. As a result, as the infant sucks on the teat, the teat portion and areola portion flex towards and away from one another by virtue of respective collapsing and extending of the flex region around the flexed channels **22**. In particular, as can be seen in FIG. **2***a*, reduced suction on the teat portion **12** towards the base portion **14** relaxes the flexible reduced suction whereas, as shown in FIG. **2***b*, suction on the teat portion **12** away from the base portion **14** collapses the flexible region **20** extending the teat portion and areola portion away from one another.

The back and forth motion of the teat portion **12** mimics very closely the natural movement of the human breast during suckling or sucking of the infant by effectively allowing the teat to move and stretch as skin moves and stretches. The grooves or channels further visually define an areola area and are placed at an area of the teat which is also a non-bite area. The flexible portion also provides a pumping action on liquid in the bottle as the teat portion oscillates or reciprocates back and forth.

FIGS. **3***a* and **3***b* show a soother **30** employing a teat or baglet **31** according to the first embodiment of the present invention. The teat **31** includes a teat portion **32**, a base portion **34** and an areola portion **36** therebetween. The teat **31** is generally hollow and is secured at the base portion **34** to a shield **38**, having a ring or handle **39**, with the areola portion **36** forming a non-bite portion of the teat **31**. A flex region **37**, is situated at the non-bite areola portion **36**, and comprises grooves or channels extending around the inner surface of the teat **31** at the areola portion **36**. As an infant sucks on the teat **31**, the teat portion **32** flexes back and forth as a result of the respective collapsing and extending of the flex region **37** grooves. As before, this back and forth movement mimics the movement of a human breast during suckling, but with the flex region in a non-bite area.

Referring to FIG. **4**, it will be seen that according to another aspect a teat assembly **140** is mounted on an infant drinking vessel **112**. The teat assembly **140** includes a teat **110** having a teat portion **114** forming a nipple having drink apertures **115** at its upper end, a base portion **116** mountable to the drinking vessel and an areola region **118** therebetween. The teat **110** is textured and shaped to mimic the human breast and can, for example have skin-like texture varying between the teat portion, areola region and base portion, similar to the human breast. The teat can indeed be coloured to mirror human skin colour including ethnic skin colours. The shape of the teat is also similar to the human breast, the base portion **116** being shaped like a breast and having a wide, domed configuration. The areola portion **118** rises from the base portion **116** to the teat portion **114** at an angle to the horizontal, that is to say, with a component of inclination parallel to the teat portion **114**, allowing better pursing by the infant so that they can close their lips effectively around the teat, and again mimicking the human breast such that the experience of the infant is as similar as possible to the natural experience of breast feeding.

The teat **110** is formed from an elastomer with walls of decreasing thickness from the base portion **116** through to the teat **114** providing a more realistic flexing characteristic. The areola portion **118** further includes undulating grooves **120** forming, in cross-section, a wavy profile on the inner surface of the areola portion **118** and extending circumferentially. In the embodiments shown three such grooves are formed adjacent one another providing a bellows action as well as flexing in a direction perpendicular to the flow direction and increasing the flexibility especially in conjunction with the decreasing wall thickness providing a more natural stretching characteristic and sensory feedback to the infant. Yet further, the teat can be textured on its outer and/or inner surface to enhance operation or realism of the teat as appropriate.

The teat portion **114** projects generally perpendicular to the mouth of the vessel **112** and is elongate for example of length 20 mm, again to mimic the extension of the human nipple during breast feeding. The teat portion has a generally rectangular cross-section with wall thickness 1.8 mm and diameter 13 mm. A tight pitch helical groove **122** of groove depth 0.9 mm (half the wall thickness) having for example three turns and 3 mm pitch is moulded or otherwise formed around the inner cylindrical vertical surface of the teat portion **114** to form a flow passage even when the teat portion is collapsed, for example under biting pressure from an infant. In addition the helical groove allows rotational or torsional compression and extension of the teat portion in the range of 5-6 mm and flexing parallel perpendicular to the flow direction, again more closely mimicking the human breast.

At the tip of the teat portion the apertures **115** comprise a variable flow valve, where the flow can either be selected by choosing a teat with appropriate apertures or a two or three crossed slit configuration can be provided allowing the infant to regulate flow. For example referring to FIGS. **5***a* and **5***b*, a teat **200** includes a teat portion **202** with a slit valve **204**. As can be seen from FIG. **5***b* when pressure is applied in the longitudinal direction of the slit, for example bite pressure, the slit valve opens allowing fluid flow by application of compression and distortion pressure.

The teat assembly **140** is formed in a two-shot moulding process with elastomer forming the teat **110** and polypropylene forming a screw collar **130** which is integrally formed with the teat **110**. As a result a resilient, cheaply and easily manufactured integral assembly is provided.

The screw collar **130** includes an internally threaded cylindrical portion **132** and a downwardly domed peripheral portion **134** surrounding it and extending from an upper end of the cylindrical portion **132**. The domed portion **134** includes a horizontal outward annular flange **135** of thicker cross-section at its base. The teat **110** is over-moulded onto the screw collar **130** and the domed portion **134** terminates at a central circular orifice corresponding with an outer face of the neck **128** of the vessel **112**, the over-moulded portion

of the teat extending inwardly slightly from this position and terminating in a downwardly depending cylindrical flange **141**.

As a result the screw collar provides structural strength and a strong screw fit, but the resilient material of the teat portion **140** provides sealing. In particular the threaded cylindrical portion **132** of the screw collar screws on to the outwardly threaded neck **128** of the vessel **112** and the top, innermost edge of the domed portion **134** abuts the outer face of the neck **128**. Because the teat material **110** overhangs the inner edge **139** of the domed portion **134**, when the teat assembly **140** is screwed down, the overhanging portion seals against the top rim of the neck **128** and the downward cylindrical flange **141** forms an elastomer sealing ring sealing against the top inner face of the vessel neck **128**. The teat **110** includes a vent passage **126** through the elastomer material and substantially at the periphery. A discontinuous flap or lip valve portion **123** projects down from the flange **141** in a portion of the periphery only in the vicinity of the vent passage **126**.

Because of the resilience of the flange portion, when an infant sucks on the teat, reducing pressure within the vessel, the lip valve **123** will flex away from the neck **128** of the vessel **112**. In the region of the vent **126** in the teat **110**, this allows venting between the interior of the vessel and atmosphere through the teat. Referring to FIG. **6** the lip valve **123** can be seen viewed from the underside. In the embodiment shown it will be seen that a passage **125** actually passes through the lip valve, communicating with the vent passage **126**. In that case the aperture to the passage **125** will seal against the inner face of the vessel in the sealed configuration and unseal to provide a passage.

Alternatively a slit valve **124** can comprise a flap which flexes away from the interior surface to allow communication with a vent passage as described above.

The teat assembly **140** also has a positive engagement stop providing tactile feedback to ensure that the teat assembly is correctly tightened on the vessel and allows the lip valve to seal effectively. Referring to FIGS. **7***a* to **7***c*, for example, it will be seen that a vessel **400** receives a handle portion **402** and a teat screw collar **404**, corresponding to the screw collar **130** described above but with the elastomer teat **10** removed for the purposes of clarity of understanding.

The handle portion **402** includes a cut-out portion **406** which cooperates with projections **408***a*, **408***b* on the vessel to locate the handle portion in a predetermined position. The handle portion is placed over the vessel and located in the desired orientation and then the collar **404**, including an internal thread portion allowing mounting on the vessel **400** is screwed into position as described above, securing the handle portion **402** in place.

As can best be seen in FIG. **7***b*, the collar portion **404** includes an internal lug **410** which projects inwardly from the inner face and engages against a stop feature on the screw threaded portion of the vessel **400** formed by the projections **408***a*, **408***b* such that the teat **110** "clicks" into a desired position. As a result a controlled compression on the lip valve **123** is obtained such that a consistent and repeatable valving action is obtained on each use. In particular the projections **408***a*, **408***b* are separated by a recess, **408***c* best seen in FIG. **7***c*. When the collar **404** is screwed into place the lug **410** passes over the projection **408***b* which has a ramp towards the recess **408***c*. After the lug **410** has ridden up the ramp it drops into the recess **408***c* and is obstructed from further movement by the planar face of the projection **408***a*. The lug **410** further prevents the collar **404** from being unscrewed by virtue of its engagement with the abutting face of the projection **408***b*. However the lug **410** and projection **408***b* have chamfered or radiused abutting faces such that, on application of sufficient unscrewing pressure, the lug **410** rides over the chamfered face of the projection **408***b* and then down the ramp allowing the collar to be fully unscrewed.

In operation the vessel is filled with drinking liquid and the teat assembly **140** is screwed on until positive engagement is detected (for example a discernable "click") meaning that it is correctly fitted. When the infant then drinks from the vessel the pressure difference pulls the lip valve **123** away from the inner face of the neck **128** of the vessel **112** allowing venting through vent passage **126** and hence reducing the risk of colic. Because of the provision of the lip valve there is no requirement for providing slits and a natural, robust and resilient valve assembly is provided. Furthermore, the valve is formed during the moulding operation and requires no secondary operation for its formation providing commercial and manufacturing benefits. Yet further as a single vent passage is provided at one point on the teat, the risk of leakage is reduced, especially as the vent passes through the teat rather than around the vessel neck.

It will be appreciated that the teat can be formed of any material and can be any appropriate shape which may be, for example, non-symmetrical such as a shaped or orthodontic teat or even more closely mimicking the shape of the human breast. Different teat configurations can be provided to grow with different ages of infant. For example the teat portion can be made progressively longer as the age of the infant who will be using the teat increases and/or the texture can be made less prominent, for example ranging from coarse for new-borns through fine to gloss.

In the teat of the first embodiment, the flex channels in the flex region can be of any appropriate profile for example square, semi-circular or triangular in cross-section and can be provided on the inner or outer surface of the teat and in any appropriate number. Instead of providing thinned regions the flexed channels can be formed by a concertina or bellows configurations moulded into the teat or any other appropriate hinge or fold mechanism. Furthermore features of either the first or second embodiment can be interchanged or juxtaposed with one another or implemented in other types of drinking vessel cover as appropriate. For example the lip valve can be implemented in a trainer cup cover, a sports bottle or other vessel closures capable of forming a partial vacuum in a vessel in use.

It will be appreciated that whilst the Figures show a soother comprising a teat of the first embodiment, the invention also encompasses a soother comprising a teat of the second embodiment. The soother comprising the teat and shield/ring components can be formed from any appropriate material. For example, the teat can be formed from silicone, latex or Thermoplastic Elastomer (TPE), whilst the shield and ring can be formed from thermoplastic materials such as polypropylene PP, polycarbonate PC or similar material blends as appropriate. Furthermore, the soother can be manufactured by any appropriate moulding method.

What is claimed is:

1. A feeding bottle comprising:

a) a vessel having:

a cylindrical neck comprising an open top with a first diameter and threads on an outer surface of said neck, and

a body with a second diameter,

the body being connected with said neck, and the first diameter of the open top being less than the second diameter of the body;

b) an internally threaded collar having:

an outermost surface comprising a downwardly domed portion beginning at an upper end of the collar and extending outwardly and downwardly therefrom and disposed at least partially above said internal threads;

c) a nipple having:

a teat portion having a variable wall thickness including an aperture,

a base portion disposed adjacent to said collar and comprising an outermost surface comprising a downwardly sloping portion between said teat portion and the upper end of the collar that, together with said collar, defines a substantially continuous outermost surface between said teat portion and a bottom of said downwardly domed portion of said collar,

an areola portion between the teat portion and the base portion, wherein said areola portion has a flex region on its inner surface comprised of a plurality of thinned regions,

a flange depending from the base portion,

an air valve extending through said nipple and disposed (i) radially inwardly from the collar and (ii) above the flange, and

the flange being arranged to seal with the vessel;

d) the nipple being secured to the collar by sealingly capturing an inner edge of the collar between the base portion and the flange; and,

e) the nipple being secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel.

2. The feeding bottle of claim **1** wherein the vessel has two indentations.

3. The feeding bottle of claim **1** wherein the flange forms an elastomer sealing ring sealing against the top of the vessel.

4. The feeding bottle of claim **1** wherein the teat portion comprises an elastic material.

5. The feeding bottle of claim **1** wherein the teat portion projects perpendicular to the open top of the vessel.

6. The feeding bottle of claim **1** wherein the internally threaded collar is sized to mate with the open top of the vessel.

7. The feeding bottle of claim **1** wherein the collar comprises polypropylene.

8. The feeding bottle of claim **1** wherein the air valve is a one-way air-inlet valve.

9. The feeding bottle of claim **1** wherein an outer surface of the teat portion has a first texture and an outer surface of the areola portion has a second, different texture.

10. The feeding bottle of claim **1** wherein an inner surface of the teat portion includes a helical flow path.

11. The feeding bottle of claim **1** wherein the nipple walls decrease in thickness from the base portion through to the teat portion.

12. The feeding bottle of claim **1** wherein the air valve is located below a top edge of the collar.

13. A feeding bottle comprising:

a) a vessel having:

an open top with a first diameter, and

a body with a second diameter,

the body being connected with the open top, and the first diameter of the open top being less than the second diameter of the body;

b) a collar having:

an internally threaded portion, and

a downwardly extending outer domed portion connected to the internally threaded portion, wherein most of the domed portion extends radially away from an inner edge of the collar;

c) a nipple having:

a teat portion having a variable wall thickness including an aperture,

a base portion having a wall thickness,

an areola portion between the teat portion and the base portion,

a flange depending from the base portion,

a vent passage extending through the base portion and spaced inwardly from the collar, and

a valve portion in communication with the vent passage and projecting from the base portion,

the flange being arranged to seal with the vessel;

wherein an outer surface of the teat portion has a first texture and an outer surface of the areola portion has a second, different texture;

d) the nipple being secured to the collar by sealingly capturing the inner edge of the collar between the base portion and the flange; and,

e) the nipple being secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel.

14. A feeding bottle comprising:

a) a vessel having an open top,

b) a collar having an upper rim and a lower rim comprising:

an internally threaded inner surface,

an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, and

wherein said sloping portion comprises a majority of the collar's outermost surface,

c) a nipple having:

a teat portion having a variable wall thickness including an aperture,

a base portion having a domed configuration,

an areola portion between the teat portion and the base portion,

a flange depending from the base portion,

a one-way air inlet valve (i) extending through said base, (ii) projecting downwardly from the base portion, (iii) having a length that does not extend past the collar's lower rim, and (iv) disposed at least partially inwardly from the collar;

the flange being arranged to seal with the vessel;

d) the nipple being secured to the collar by sealingly capturing an inner edge of the collar between the base portion and the flange; and,

e) the nipple being secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel.

15. The feeding bottle of claim **14** wherein an inner surface of the teat portion has a groove configured to flex in a direction of the liquid flow.

16. The feeding bottle of claim **14** wherein the open top of the vessel comprises an outwardly threaded vessel neck.

17. The feeding bottle of claim **14** wherein the air inlet valve comprises a slit opening.

18. The feeding bottle of claim **14** wherein an inner surface of the areola portion has a groove extending circumferentially.

19. The feeding bottle of claim 14 wherein the vessel comprises an upper body having a first internal diameter and a portion below the upper body having a second, different internal diameter.

20. The feeding bottle of claim 19 wherein the first internal diameter is greater than the second internal diameter.

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EXHIBIT 1003

US011207244B2

(12) **United States Patent**
Rees et al.

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(54) **BABY BOTTLE WITH FLEXIBLE NIPPLE REGIONS**

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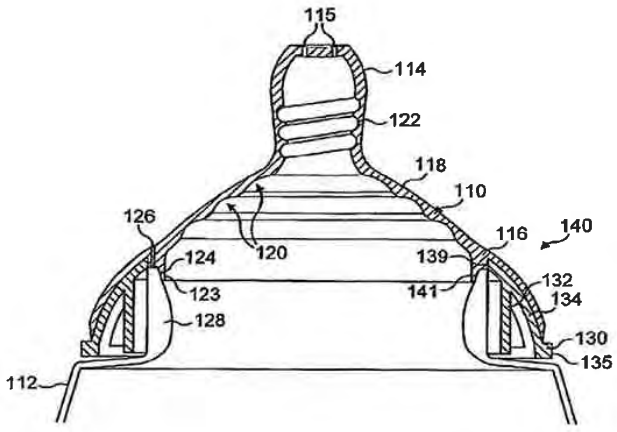
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(57) **ABSTRACT**

According to a first embodiment, a feeding bottle comprises a vessel, collar, and nipple. The nipple comprises a base portion, a teat portion, an areola portion allowing movement of the teat portion towards and away from the base portion. According to a second embodiment, a feeding bottle comprises a vessel, collar, nipple and handle portion removeably secured to the vessel by the collar. The invention includes a flexible region or regions to provide a more natural feeding by closely mimicking the human breast.

31 Claims, 6 Drawing Sheets



Related U.S. Application Data

continuation of application No. 13/364,557, filed on Feb. 2, 2012, now Pat. No. 8,910,810, which is a continuation of application No. 11/630,864, filed as application No. PCT/GB2005/002532 on Jun. 29, 2005, now Pat. No. 8,181,800.

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See application file for complete search history.

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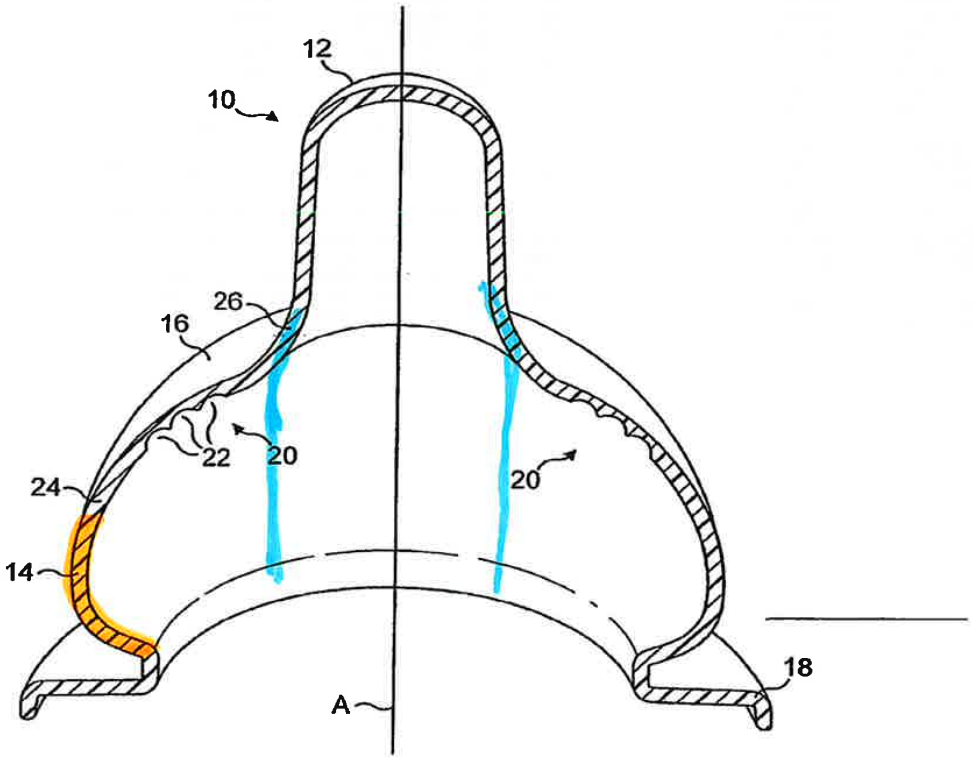


FIG. 1

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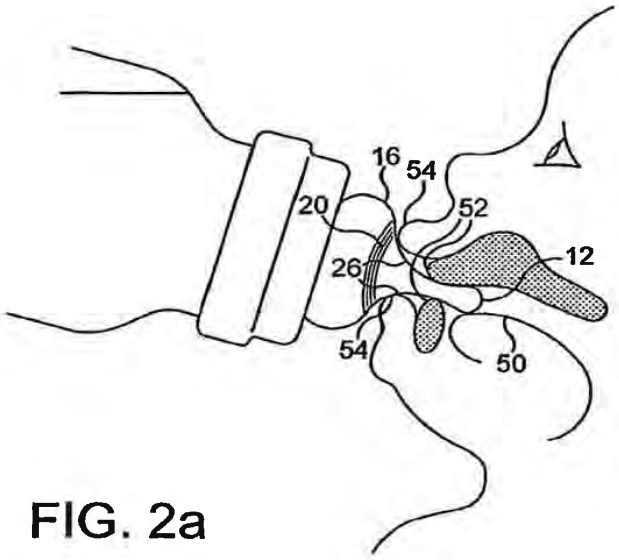


FIG. 2a

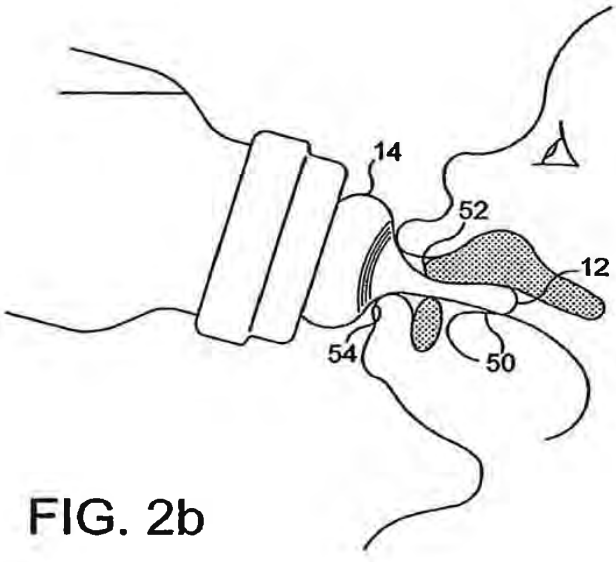


FIG. 2b

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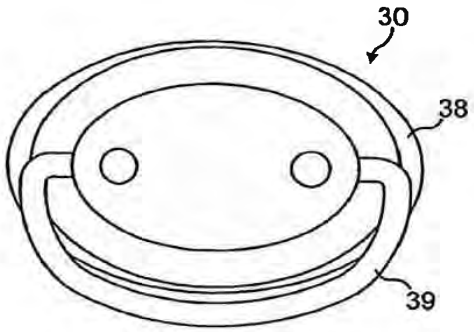


FIG. 3a

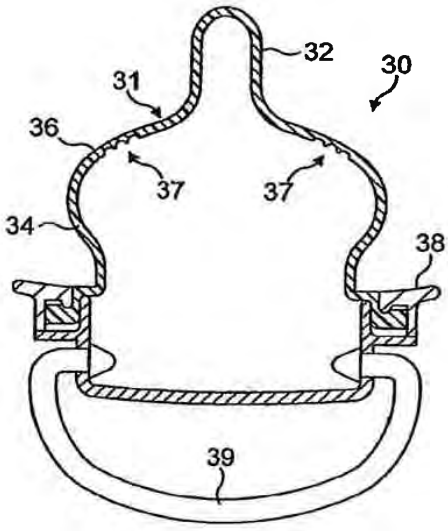


FIG. 3b

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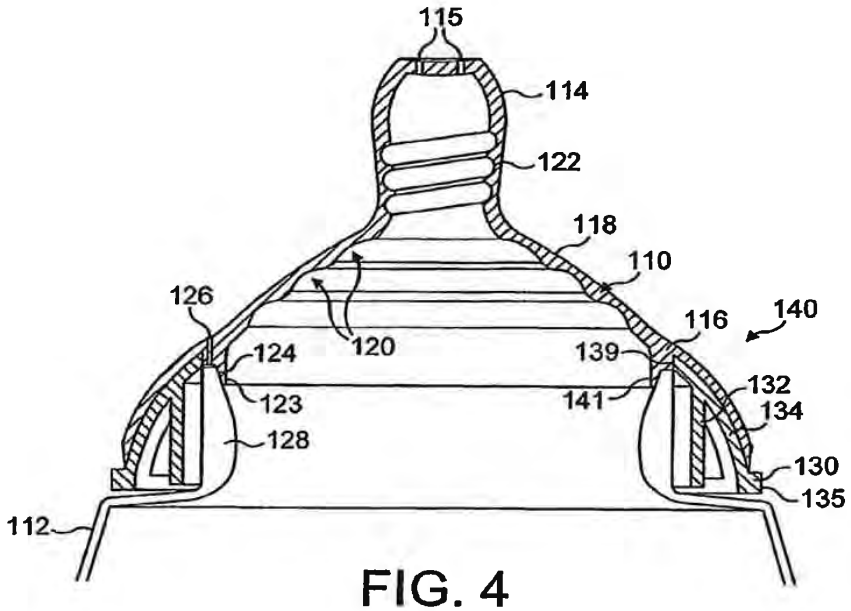


FIG. 4

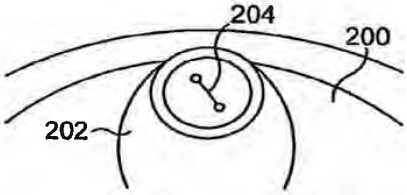


FIG. 5a

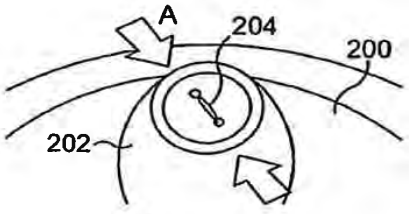


FIG. 5b

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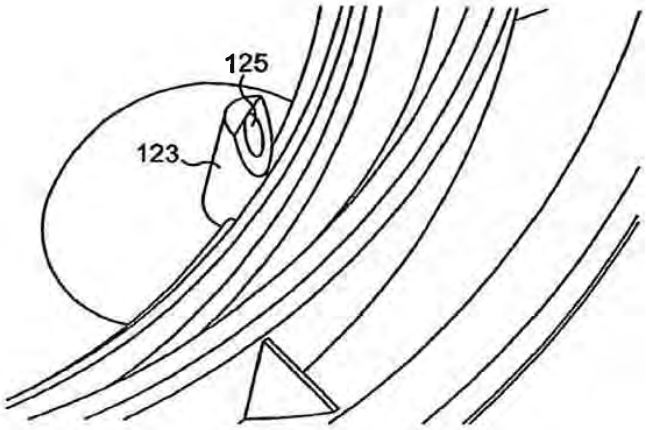


FIG. 6

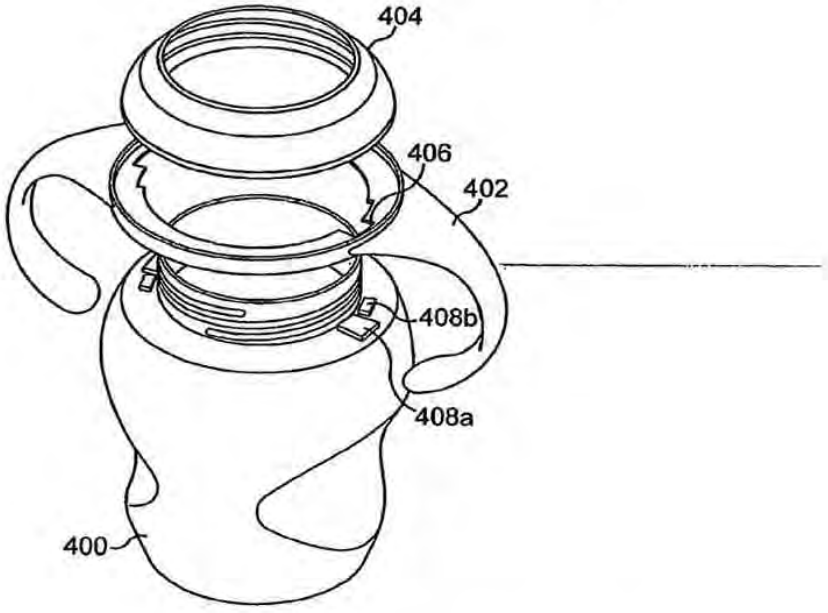


FIG. 7a

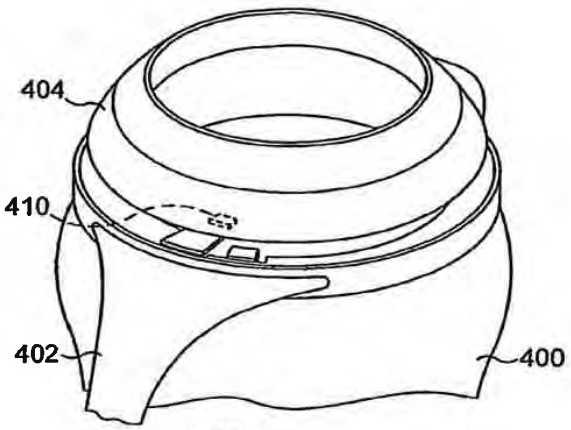


FIG. 7b

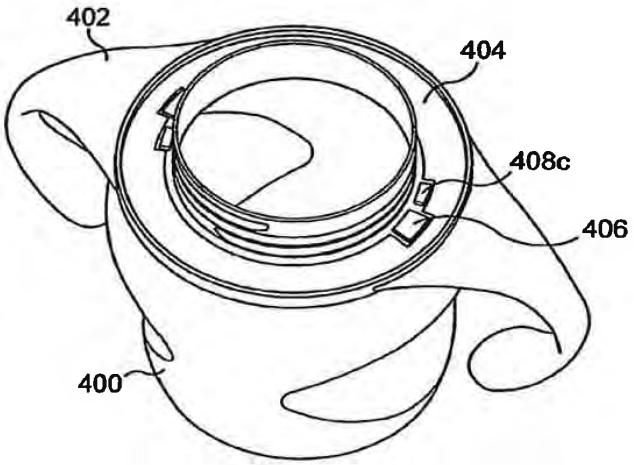


FIG. 7c

BABY BOTTLE WITH FLEXIBLE NIPPLE REGIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of pending U.S. application Ser. No. 14/551,783 filed on Nov. 24, 2014, which is a continuation of pending U.S. application Ser. No. 13/364,557 filed on Feb. 2, 2012, which was a continuation of U.S. application Ser. No. 11/630,864 filed on Dec. 22, 2006, which was a national filing under § 371 of International Application PCT/GB2005/002532, with an international filing date of Jun. 29, 2005, claiming priority from Great Britain Application No. GB2004/14560.3, with a filing date of Jun. 29, 2004, now abandoned, and Great Britain Application No. GB2005/02599.4, with a filing date of Feb. 8, 2005, now abandoned, all of which are herein incorporated by reference.

TECHNICAL FIELD

The invention relates to a drinking vessel with a nipple, in particular a baby bottle having a nipple of increased flexibility and functionality.

BACKGROUND OF THE INVENTION

Various known teats have been designed to mimic the human breast in operation. One known teat is described in U.S. Pat. No. 6,645,228 and includes a stem and a base. The base has a bulbous region and an areola region from which the stem projects. The bulbous region has an upper region with a progressively thinning wall which acts as a spring element such that as an infant sucks on the teat the areola and stem move back and forth relative to the bulbous region.

Various problems arise with this arrangement. Movement of the areola region and stem relative to the bulbous region does not closely mimic the movement of the human breast during sucking. Furthermore because flexibility is provided upon a progressively thinning wall region, the amount of flexing and the point at which flexing takes place is undefined and unpredictable.

A second known teat is described in U.S. Pat. No. 6,745,912 B2 (Pigeon) including a series of parallel annular grooves on the inner surface of the nipple which allows stretching of the nipple but only in a constrained direction, and with the risk of flow blockage if the nipple collapses.

In addition, efforts are continuing to provide valved feeding bottles, in particular to allow air ingress to the teat. It is believed that this reduces the risk of colic which can otherwise occur as a result of negative pressure building up in the feeding bottle. Various known arrangements include slit valves of various types, however these are frail and difficult to machine. In another approach described in German patent DE19716535 a teat is provided with an inner annular resilient flange at its base which rests on a bottle rim when screwed down by a collar. Upon a negative pressure building up inside the drinking vessel the flange lifts from the vessel rim and air passes up through the collar and between the flange and the vessel rim.

In a similar arrangement described in European patent application EP151862 a teat includes a downwardly depending cylindrical flange at its base which seals against the inner top face of a vessel neck when deformed by being screwed down by a collar. Again a negative pressure inside the vessel lifts the flange away from the vessel neck so that air flows through the collar and between the neck and the flange into the vessel to relieve the pressure differential. Such arrangements rely on the correct amount of screw pressure being applied by the user on fixing the teat which can give rise to varied levels of valving between uses. Furthermore the introduction of a circumferential flange increases material costs.

SUMMARY OF THE INVENTION

The invention is set out in the claims. According to a first embodiment, because the flex region is provided in the areola portion allowing the teat portion and/or areola portion to move towards and away from one another a more natural feeding action is provided. Furthermore, because of the inclusion of a plurality of flex channels the point of flexure is clearly defined. According to a second embodiment, because of the provision of a helical flow formation on the inner face of the teat, continuous flow of liquid is allowed even when the teat collapses via the helical flow path while allowing extension of the teat and in particular a rotational or torsional extension. It will be understood that each of the terms "teat" and "nipple" embraces feeding bottle teats and nipples as well as soother teats and nipples, sometimes known as "baglets".

Embodiments of the invention will now be described by way of example with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional side view of a teat according to the present invention;

FIG. **2***a* is a side view of the teat of FIG. **1** in use in a first flexed position;

FIG. **2***b* is a side view of the teat of FIG. **1** in use in a second flexed position;

FIGS. **3***a* and **3***b* are end and side views respectively of a soother incorporating the teat of the present invention;

FIG. **4** is a cross-sectional side view of a teat and vessel according to another aspect of the present invention;

FIG. **5***a* is a perspective view showing a teat valve in a first, closed configuration;

FIG. **5***b* is a perspective view showing a teat valve in a second, open configuration;

FIG. **6** is a partial perspective view of the underside of the teat, showing a lip valve;

FIG. **7***a* is an exploded perspective view showing assembly steps for a drinking vessel according to the invention;

FIG. **7***b* is a perspective view showing a first detail of an assembled vessel according to the present invention; and

FIG. **7***c* is a perspective view showing a second detail of an assembled vessel according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring firstly to FIG. **1** a teat **10** for use with a feeding bottle includes a teat portion **12**, a base portion **14** and an areola portion **16** therebetween. A flange **18** extends from the base of the base portion to allow fixing to a feeding bottle (not shown) in any appropriate known manner. The base portion may also include a one-way air-inlet valve of any appropriate type for example an integrally moulded duckbill valve (not shown). The teat has circular symmetry around an axis A running through the center of the teat.

The areola portion **16** includes a flex region **20** comprising three grooves or flex channels **22** extending around an

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inner surface of the areola portion effectively forming circular thinned regions parallel/concentric with each other about the axis A and hence surrounding the teat portion. The flex region **20** is generally provided between a transition region **24** separating the base portion **14** and the areola portion **16** and a transition region **26** separating the areola portion **16** and the teat portion **12**. The flex region **20** allows flexing of the teat as described in more detail below.

The teat can be formed in any appropriate manner, for example compression or injection moulding and formed of any appropriate elastic material such as silicone, latex or thermoplastic elastomer (TPE). Injection moulded silicone provides a particularly desirable degree of elasticity in the teat portion. The teat portion **12** is preferably thinner in cross-section than the remainder of the teat or is co-moulded with a more flexible material to allow additional flexing of the teat portion relative to the teat as a whole. The teat can have a texture such as a skin-like texture moulded or otherwise patterned on to its surface.

As shown in FIGS. **2***a* and **2***b*, in operation an infant drinks from the teat mounted on a bottle, the infant's tongue **50** contacting the teat portion **12**, the infant's teeth or gums **52** contacting the transition portion **26** and the infant's lips **54** contacting the areola portion **16** generally at the flex region **20**. As a result, as the infant sucks on the teat, the teat portion and areola portion flex towards and away from one another by virtue of respective collapsing and extending of the flex region around the flexed channels **22**. In particular, as can be seen in FIG. **2***a*, reduced suction on the teat portion **12** towards the base portion **14** relaxes the flexible reduced suction whereas, as shown in FIG. **2***b*, suction on the teat portion **12** away from the base portion **14** collapses the flexible region **20** extending the teat portion and areola portion away from one another.

The back and forth motion of the teat portion **12** mimics very closely the natural movement of the human breast during suckling or sucking of the infant by effectively allowing the teat to move and stretch as skin moves and stretches. The grooves or channels further visually define an areola area and are placed at an area of the teat which is also a non-bite area. The flexible portion also provides a pumping action on liquid in the bottle as the teat portion oscillates or reciprocates back and forth.

FIGS. **3***a* and **3***b* show a soother **30** employing a teat or baglet **31** according to the first embodiment of the present invention. The teat **31** includes a teat portion **32**, a base portion **34** and an areola portion **36** therebetween. The teat **31** is generally hollow and is secured at the base portion **34** to a shield **38**, having a ring or handle **39**, with the areola portion **36** forming a non-bite portion of the teat **31**. A flex region **37**, is situated at the non-bite areola portion **36**, and comprises grooves or channels extending around the inner surface of the teat **31** at the areola portion **36**. As an infant sucks on the teat **31**, the teat portion **32** flexes back and forth as a result of the respective collapsing and extending of the flex region **37** grooves. As before, this back and forth movement mimics the movement of a human breast during suckling, but with the flex region in a non-bite area.

Referring to FIG. **4**, it will be seen that according to another aspect a teat assembly **140** is mounted on an infant drinking vessel **112**. The teat assembly **140** includes a teat **110** having a teat portion **114** forming a nipple having drink apertures **115** at its upper end, a base portion **116** mountable to the drinking vessel and an areola region **118** therebetween. The teat **110** is textured and shaped to mimic the human breast and can, for example have skin-like texture varying between the teat portion, areola region and base portion, similar to the human breast. The teat can indeed be coloured to mirror human skin colour including ethnic skin colours. The shape of the teat is also similar to the human breast, the base portion **116** being shaped like a breast and having a wide, domed configuration. The areola portion **118** rises from the base portion **116** to the teat portion **114** at an angle to the horizontal, that is to say, with a component of inclination parallel to the teat portion **114**, allowing better pursing by the infant so that they can close their lips effectively around the teat, and again mimicking the human breast such that the experience of the infant is as similar as possible to the natural experience of breast feeding.

The teat **110** is formed from an elastomer with walls of decreasing thickness from the base portion **116** through to the teat **114** providing a more realistic flexing characteristic. The areola portion **118** further includes undulating grooves **120** forming, in cross-section, a wavy profile on the inner surface of the areola portion **118** and extending circumferentially. In the embodiments shown three such grooves are formed adjacent one another providing a bellows action as well as flexing in a direction perpendicular to the flow direction and increasing the flexibility especially in conjunction with the decreasing wall thickness providing a more natural stretching characteristic and sensory feedback to the infant. Yet further, the teat can be textured on its outer and/or inner surface to enhance operation or realism of the teat as appropriate.

The teat portion **114** projects generally perpendicular to the mouth of the vessel **112** and is elongate for example of length 20 mm, again to mimic the extension of the human nipple during breast feeding. The teat portion has a generally rectangular cross-section with wall thickness 1.8 mm and diameter 13 mm. A tight pitch helical groove **122** of groove depth 0.9 mm (half the wall thickness) having for example three turns and 3 mm pitch is moulded or otherwise formed around the inner cylindrical vertical surface of the teat portion **114** to form a flow passage even when the teat portion is collapsed, for example under biting pressure from an infant. In addition the helical groove allows rotational or torsional compression and extension of the teat portion in the range of 5-6 mm and flexing parallel perpendicular to the flow direction, again more closely mimicking the human breast.

At the tip of the teat portion the apertures **115** comprise a variable flow valve, where the flow can either be selected by choosing a teat with appropriate apertures or a two or three crossed slit configuration can be provided allowing the infant to regulate flow. For example referring to FIGS. **5***a* and **5***b*, a teat **200** includes a teat portion **202** with a slit valve **204**. As can be seen from FIG. **5***b* when pressure is applied in the longitudinal direction of the slit, for example bite pressure, the slit valve opens allowing fluid flow by application of compression and distortion pressure.

The teat assembly **140** is formed in a two-shot moulding process with elastomer forming the teat **110** and polypropylene forming a screw collar **130** which is integrally formed with the teat **110**. As a result a resilient, cheaply and easily manufactured integral assembly is provided.

The screw collar **130** includes an internally threaded cylindrical portion **132** and a downwardly domed peripheral portion **134** surrounding it and extending from an upper end of the cylindrical portion **132**. The domed portion **134** includes a horizontal outward annular flange **135** of thicker cross-section at its base. The teat **110** is over-moulded onto the screw collar **130** and the domed portion **134** terminates at a central circular orifice corresponding with an outer face of the neck **128** of the vessel **112**, the over-moulded portion

of the teat extending inwardly slightly from this position and terminating in a downwardly depending cylindrical flange **141**.

As a result the screw collar provides structural strength and a strong screw fit, but the resilient material of the teat portion **140** provides sealing. In particular the threaded cylindrical portion **132** of the screw collar screws on to the outwardly threaded neck **128** of the vessel **112** and the top, innermost edge of the domed portion **134** abuts the outer face of the neck **128**. Because the teat material **110** overhangs the inner edge **139** of the domed portion **134**, when the teat assembly **140** is screwed down, the overhanging portion seals against the top rim of the neck **128** and the downward cylindrical flange **141** forms an elastomer sealing ring sealing against the top inner face of the vessel neck **128**. The teat **110** includes a vent passage **126** through the elastomer material and substantially at the periphery. A discontinuous flap or lip valve portion **123** projects down from the flange **141** in a portion of the periphery only in the vicinity of the vent passage **126**.

Because of the resilience of the flange portion, when an infant sucks on the teat, reducing pressure within the vessel, the lip valve **123** will flex away from the neck **128** of the vessel **112**. In the region of the vent **126** in the teat **110**, this allows venting between the interior of the vessel and atmosphere through the teat. Referring to FIG. **6** the lip valve **123** can be seen viewed from the underside. In the embodiment shown it will be seen that a passage **125** actually passes through the lip valve, communicating with the vent passage **126**. In that case the aperture to the passage **125** will seal against the inner face of the vessel in the sealed configuration and unseal to provide a passage.

Alternatively a slit valve **124** can comprise a flap which flexes away from the interior surface to allow communication with a vent passage as described above.

The teat assembly **140** also has a positive engagement stop providing tactile feedback to ensure that the teat assembly is correctly tightened on the vessel and allows the lip valve to seal effectively. Referring to FIGS. **7***a* to **7***c*, for example, it will be seen that a vessel **400** receives a handle portion **402** and a teat screw collar **404**, corresponding to the screw collar **130** described above but with the elastomer teat **10** removed for the purposes of clarity of understanding.

The handle portion **402** includes a cut-out portion **406** which cooperates with projections **408***a*, **408***b* on the vessel to locate the handle portion in a predetermined position. The handle portion is placed over the vessel and located in the desired orientation and then the collar **404**, including an internal thread portion allowing mounting on the vessel **400** is screwed into position as described above, securing the handle portion **402** in place.

As can best be seen in FIG. **7***b*, the collar portion **404** includes an internal lug **410** which projects inwardly from the inner face and engages against a stop feature on the screw threaded portion of the vessel **400** formed by the projections **408***a*, **408***b* such that the teat **110** "clicks" into a desired position. As a result a controlled compression on the lip valve **123** is obtained such that a consistent and repeatable valving action is obtained on each use. In particular the projections **408***a*, **408***b* are separated by a recess, **408***c* best seen in FIG. **7***c*. When the collar **404** is screwed into place the lug **410** passes over the projection **408***b* which has a ramp towards the recess **408***c*. After the lug **410** has ridden up the ramp it drops into the recess **408***c* and is obstructed from further movement by the planar face of the projection **408***a*. The lug **410** further prevents the collar **404** from being unscrewed by virtue of its engagement with the abutting face of the projection **408***b*. However the lug **410** and projection **408***b* have chamfered or radiused abutting faces such that, on application of sufficient unscrewing pressure, the lug **410** rides over the chamfered face of the projection **408***b* and then down the ramp allowing the collar to be fully unscrewed.

In operation the vessel is filled with drinking liquid and the teat assembly **140** is screwed on until positive engagement is detected (for example a discernable "click") meaning that it is correctly fitted. When the infant then drinks from the vessel the pressure difference pulls the lip valve **123** away from the inner face of the neck **128** of the vessel **112** allowing venting through vent passage **126** and hence reducing the risk of colic. Because of the provision of the lip valve there is no requirement for providing slits and a natural, robust and resilient valve assembly is provided. Furthermore, the valve is formed during the moulding operation and requires no secondary operation for its formation providing commercial and manufacturing benefits. Yet further as a single vent passage is provided at one point on the teat, the risk of leakage is reduced, especially as the vent passes through the teat rather than around the vessel neck.

It will be appreciated that the teat can be formed of any material and can be any appropriate shape which may be, for example, non-symmetrical such as a shaped or orthodontic teat or even more closely mimicking the shape of the human breast. Different teat configurations can be provided to grow with different ages of infant. For example the teat portion can be made progressively longer as the age of the infant who will be using the teat increases and/or the texture can be made less prominent, for example ranging from coarse for new-borns through fine to gloss.

In the teat of the first embodiment, the flex channels in the flex region can be of any appropriate profile for example square, semi-circular or triangular in cross-section and can be provided on the inner or outer surface of the teat and in any appropriate number. Instead of providing thinned regions the flexed channels can be formed by a concertina or bellows configurations moulded into the teat or any other appropriate hinge or fold mechanism. Furthermore features of either the first or second embodiment can be interchanged or juxtaposed with one another or implemented in other types of drinking vessel cover as appropriate. For example the lip valve can be implemented in a trainer cup cover, a sports bottle or other vessel closures capable of forming a partial vacuum in a vessel in use.

It will be appreciated that whilst the Figures show a soother comprising a teat of the first embodiment, the invention also encompasses a soother comprising a teat of the second embodiment. The soother comprising the teat and shield/ring components can be formed from any appropriate material. For example, the teat can be formed from silicone, latex or Thermoplastic Elastomer (TPE), whilst the shield and ring can be formed from thermoplastic materials such as polypropylene PP, polycarbonate PC or similar material blends as appropriate. Furthermore, the soother can be manufactured by any appropriate moulding method.

What is claimed is:

1. A feeding vessel, comprising:

a container comprising:

i. a threaded upper portion with an opening into the interior of the container,

ii. a middle portion below the upper portion, and

iii. a bottom portion below the middle portion, wherein the middle portion is tapered inward; and

an assembly configured to mount over the opening of the container, the assembly comprising:

i. a nipple having a base, a teat portion with an aperture, an areola portion between the teat portion and the base, and a flange depending from the base defining the nipple circumference furthest from the aperture, wherein the teat portion defines a bite region and the areola portion defines a flex region configured to allow the teat portion to flex towards and away from the areola portion, and

ii. a collar configured to removably couple to the nipple to seal the container; and

wherein the collar and the base of the nipple together define a downward domed shape that extends outwardly and downwardly between the flex region of the nipple and a widest circumferential edge of the collar.

2. The feeding vessel of claim **1**, wherein the container is a baby bottle container.

3. The feeding vessel of claim **1**, wherein the internal circumference of the container below the upper portion increases towards the opening.

4. The feeding vessel of claim **1**, wherein the assembly comprises removable handles.

5. The feeding vessel of claim **1**, wherein the collar comprises threads configured to couple to corresponding threads of the container.

6. The feeding vessel of claim **1**, wherein a largest outer diameter of the domed shape is greater than a diameter of the opening of the container.

7. The feeding vessel of claim **1**, wherein the flex region comprises a plurality of grooves in an inward facing surface of the nipple configured to enable the teat portion and areola portion to flex towards and away from one another by respective collapsing and extending of the flex region in the grooves.

8. The feeding vessel of claim **7**, wherein the grooves are circumferential.

9. The feeding vessel of claim **7**, wherein the flex region further comprises a thinned circumferential region in the inward facing surface of the nipple.

10. The feeding vessel of claim **1**, wherein the nipple comprises an air vent apart from the aperture.

11. The feeding vessel of claim **10**, wherein the air vent is located in the lower portion of the nipple.

12. The feeding vessel of claim **11**, wherein the air vent is located proximate the collar when the collar is coupled to the nipple.

13. The feeding vessel of claim **10**, wherein the air vent is an integrally molded duck-bill valve.

14. The feeding vessel of claim **10**, wherein the air vent projects into the interior of the container.

15. The feeding vessel of claim **1**, wherein teat portion has circular symmetry around a central axis.

16. The feeding vessel of claim **1**, wherein the domed shape is continuous.

17. The feeding vessel of claim **1**, wherein an exterior of the teat portion is textured.

18. The feeding vessel of claim **1**, wherein a circumference of the nipple base is greater than the container opening and configured to overlap the opening and provide an air tight seal.

19. The feeding vessel of claim **1**, wherein the middle portion of the container comprises two indentations.

20. The feeding vessel of claim **1**, wherein the flange comprises a downwardly extending skirt around its circumference.

21. A drinking vessel comprising:

a container comprising a varying internal circumference and an opening into the container; and

a cover assembly configured to couple to the container over the opening, the cover assembly comprising:

i. a nipple comprising a mouthpiece configured to allow liquid flow through the nipple to an aperture, a flex region configured to allow flex of the mouthpiece towards and away from a lower portion of the nipple, the mouthpiece defining a bite region, and a flange depending from the lower portion of the nipple defining the nipple circumference furthest from the aperture; and

ii. a collar configured to removably couple to the nipple to seal over the opening of the container; and

wherein the collar and the lower portion of the nipple together define a downward domed shape that extends outwardly and downwardly from the flex region of the nipple towards a widest circumferential edge of the collar.

22. The drinking vessel of claim **21**, wherein the container is a trainer cup.

23. The drinking vessel of claim **21**, wherein the container comprises a material more rigid than the nipple material.

24. The drinking vessel of claim **21**, wherein the cover assembly further comprises an air vent apart from the mouthpiece.

25. The drinking vessel of claim **21**, wherein the cover assembly further comprises removable handles.

26. The drinking vessel of claim **21**, wherein the mouthpiece is located in the center of the nipple.

27. The drinking vessel of claim **21**, wherein the teat portion comprises a resilient material.

28. The drinking vessel of claim **21**, wherein the bite region comprises a groove in an inward facing surface of the nipple configured to pass fluid through the bite region when the bite region is collapsed.

29. The drinking vessel of claim **21**, wherein the bite region further comprises a thinned region in the inward facing surface of the nipple.

30. A feeding vessel, comprising:

a container comprising:

i. a threaded neck portion with an opening into the interior of the container,

ii. a body portion having

1. an upper body portion,

2. a middle body portion below the upper body portion, and

3. a bottom body portion below the middle body portion, wherein the middle body portion has a smaller horizontal cross-section than a horizontal cross-section of both the upper body portion and the bottom body portion; and

an assembly configured to mount over and surround the threaded neck portion, the assembly comprising:

i. a nipple having a teat portion with an aperture, an areola portion with an outer surface extending downwardly and outwardly from the teat portion, and a flange depending from the base defining the nipple circumference furthest from the aperture, wherein the teat portion defines a bite region and the areola portion defines a flex region configured to allow the teat portion to flex towards and away from the areola portion, and

ii. a base portion positioned below said areola portion and comprising a threaded collar adapted to threadably engage with said threaded neck portion and

removably couple to the nipple to seal over the opening of the container; and

wherein the nipple has an outer surface of elastomeric material that extends from the teat portion to a portion below said areola portion and that is substantially rotationally symmetric about the central vertical axis of said assembly and has a circumference that continuously and smoothly decreases from a position on said outer surface that is below the areola portion and has a substantially vertical slope to at least a position on said teat portion that has a substantially vertical slope.

31. A feeding vessel, comprising:

a container comprising:

i. a threaded neck portion with an opening into the interior of the container,

ii. a body portion having

1. an upper body portion,
2. a middle body portion below the upper body portion, and
3. a bottom body portion below the middle body portion,

wherein the middle body portion has a smaller horizontal cross-section than horizontal cross-section of both the upper body portion and the bottom body portion; and

an assembly configured to mount over and surround the threaded neck portion, the assembly comprising:

i. a nipple having a teat portion with an aperture, and an areola portion with an outer surface extending downwardly and outwardly from the teat portion, and a flange depending from the base defining the nipple circumference furthest from the aperture, wherein the teat portion defines a bite region and the areola portion defines a flex region configured to allow the teat portion to flex towards and away from the areola portion, and

ii. a base portion positioned below said areola portion and comprising a screw collar adapted to threadably engage with said threaded neck portion and removably couple to the nipple to seal over the opening of the container; and

wherein the assembly has an outer surface extending from the teat portion to the base portion that is substantially rotationally symmetric about the central vertical axis of said assembly and has a circumference that continuously and smoothly decreases from a position on said base portion having a substantially vertical slope to a position on said teat portion having a substantially vertical slope.

* * * * *

EXHIBIT 1005



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

In Re:	U.S. Patent 10,952,930 U.S. Patent 11,207,244	:	Attorney Docket No. 092130.0101
Inventor:	Arnold Rees et al	:	
Filed:	'930: November 24, 2014: '244: March 22, 2021		
Issued:	'930: March 23, 2021 '244: December 28, 2021	:	IPR No. Unassigned
Assignee:	Mayborn (UK) Limited.		

Title: Baby Bottle With Flexible Nipple Regions

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Patent Trial and Appeal Board
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Submitted Electronically via the Patent Review Processing System

DECLARATION OF BRIAN H. SILVER

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I, Brian H. Silver, declare as follows:

1. I have been retained by counsel for Nanobebe US Inc. ("Nanobebe"). to provide my opinion about the state of the art of the technology described in U.S. Pat. No. 10,952,930 ("the '930 Patent") and U.S. Pat. No. 11,207,244 ("the '244 Patent").

2. This report contains statements of my opinions formed to date and the bases and reasons for those opinions. I may offer additional opinions based on further review of materials in this case, including opinions and/or testimony of other expert witnesses. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein. For my efforts in connection with the preparation of this declaration I have been compensated at my standard rate for this type of consulting activity. My compensation is in no way contingent on the results of this *inter partes* review proceeding or any other proceedings relating to the above-captioned patent.

3. I have summarized in this section my educational background, career history, publications, and other relevant qualifications. In formulating my opinions, I have relied upon my training, knowledge, and experience in the relevant art.

I. Background and Qualifications

4. I have summarized in this section my educational background, career history, publications, and other relevant qualifications. In formulating my opinions,

I have relied upon my training, knowledge, and experience in the relevant art. A copy of my current curriculum vitae is provided as Appendix A, which provides a comprehensive description of my academic and employment history over the last forty-plus years.

A. Educational Background

5. In 1981, I received a Bachelor of Science degree in General Engineering, from the University of Illinois at Urbana-Champaign.

6. My curriculum vitae contains further details on my education, experience, publications, and other qualifications to render an expert option. Appendix A.

B. Career History

7. My work experience includes 27 years of employment at Medela, LLC, where I held the roles of Director of Product Development, Group Director of Innovation & Research, Vice-president of Innovation & Research, and Vice-president of Innovation Scouting. My responsibilities included creating and developing a continuous pipeline of new products, spearheading US-based research and IP portfolio strategy, identifying companies, products, services, and technologies for acquisition, partnership, integration or organizational learning.

8. During that time, I had many different responsibilities regarding infant feeding products including their design, development, and related research.

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Examples of product development efforts I was involved with prior to June 29, 2004 priority date include:

- Starter SNS (Supplemental Nursing System), a vented baby bottle with teat-tubing assembly to provide additional nutrition or medications while breastfeeding per US Patent No. 5,474,193 Breastfeeding Assistance Device;
- Mini-Haberman Feeder (now named Mini-SpecialNeeds Feeder), a vented baby bottle and valved teat for premature or small for gestational age babies with facial or oral issues that have problems maintaining suction;
- SoftCup, a vented baby bottle with valved feeding soft spoon per US Patent No. 5,556,008 (Soft-Cup Feeder);
- New designs, materials, manufacturing process for clear polypropylene baby bottles;
- New designs for threaded collars;
- Design and development of baby bottle nipple associated with US Patent No. 7,712,617 Artificial Nipple published July 1, 2004 and US Patent No. 7,540,388 Artificial Feeding Nipple Tip with Variable Flow Construction published November 24, 2005;
- Detailed evaluation of competitive nipples; and

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- Direct detailed observation of scores of infants feeding from baby bottle nipples and scores of infants breastfeeding for specific research and product evaluation purposes.

9. I am a named inventor on over sixty United States patents.

10. Further information regarding my education and experience is provided in my curriculum vitae.

C. Materials and Other Information Considered

11. I have considered information from various sources in forming my opinions. I have reviewed and considered each of the exhibits in the Exhibit List above in forming my opinions.

II. Understanding of the Law

12. I have applied the following legal principles provided to me by counsel in arriving at the opinions set forth in this report. I understand that in an inter partes review, invalidity must be shown by a preponderance of the evidence.

A. Legal Standard for Anticipation

13. I understand that, once the claims of a patent have been properly construed, the next step in determining anticipation of a patent claim requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

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14. I understand that a prior art reference anticipates a challenged claim, and thus renders the claim invalid, if all limitations of the claim are disclosed in that prior art reference, either explicitly or inherently (i.e., necessarily present or implied), as arranged or combined in the claim.

15. I understand that a prior art reference can anticipate a claim even if it does not expressly spell out all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would at once envisage the claimed arrangement or combination. A reference need not always include an express discussion of the actual combination to anticipate. Instead, a reference may still anticipate if that reference teaches every claimed limitation in a manner such that a person of ordinary skill in the art ("POSA") would 'at once envisage' the arrangement or combination of limitations as claimed.

16. I understand that a patent is anticipated if, before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it.

B. Legal Standard for Obviousness

17. I understand that even if a patent is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

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18. I understand that a person of ordinary skill in the art provides a reference point at the time of the claimed invention from which the prior art and claimed invention should be viewed. This reference point prevents a person of ordinary skill from using one's insight or hindsight in deciding whether a claim is obvious.

19. I also understand that an obviousness determination includes the consideration of various factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the challenged claims, (3) the level of ordinary skill in the pertinent art, and (4) the existence of secondary considerations, also referred to as objective considerations, of non-obviousness.

20. I am informed that objective considerations of non-obviousness may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) failure of others where the invention succeeds; (3) commercial success or lack of commercial success of processes covered by the patent; (4) unexpected results achieved by the invention; (5) praise of the invention by others skilled in the art; (6) taking of licenses under the patent by others; and (7) deliberate copying of the invention. I also understand that there must be a relationship or nexus between any such objective considerations and the claimed invention. I am aware of no such evidence relevant to this case. If any such evidence is introduced by the Patent Owner, I reserve the right to consider that evidence at

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such time. I further understand that contemporaneous and independent invention by others is an objective consideration supporting an obviousness determination.

21. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but other times the nexus linking two or more prior art references may be the background knowledge of one of ordinary skill or simple common sense. I further understand that an obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

22. I understand that if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

23. I also understand that practical and common-sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a person of ordinary skill in the art looking to overcome a problem will often be able to fit the teachings of multiple publications together like pieces of a puzzle, although the prior art need not be like two puzzle pieces that must fit perfectly together. I understand

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that obviousness analysis therefore considers the inferences and creative steps that a person of ordinary skill in the art would employ under the circumstances.

24. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

25. I understand that the combination of familiar elements according to known methods may be proven obvious when it does no more than yield predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, obviousness likely bars its patentability.

26. It is also my understanding that there are additional considerations that may be used as further guidance as to when a claim is obvious, including the following:

- the claimed invention is a simple substitution of one known element for another to obtain predictable results;

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- the claimed invention uses known techniques to improve similar devices or methods in the same way;
- the claimed invention applies a known technique to a known device or method that is ready for improvement to yield predictable results; and
- there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims.

27. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

28. I understand that a claim can be obvious in light of a single reference, without the need to combine references, if the limitations of the claim that are not found explicitly or inherently in the reference can be supplied by the common sense of one of skill in the art.

29. I understand that a person of ordinary skill would have been motivated to combine two pieces of prior art or substituted one prior art element for another if the substitution can be made with predictable results, even if the swapped-in element is different from the swapped-out element. In other words, the prior art need not be

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like two puzzle pieces that must fit together perfectly. The relevant question is whether prior art techniques are interoperable with respect to one another, such that that a person of skill would view them as a design choice, or whether a person of skill could apply prior art techniques into a new combined system.

30. In sum, my understanding is that prior art teachings are properly combined where a person of ordinary skill in the art having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor, would have been led to make the combination of limitations recited in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the limitations of multiple prior art references in the claimed manner.

31. I have been informed and understand that the obviousness analysis requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

C. Legal Standard for Claim Construction

32. I understand that a patent may include two types of claims, independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend from an independent claim or another dependent claim. I understand that a dependent claim includes all the

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limitations that it recites in addition to all of the limitations recited in the claim or claims from which it depends.

33. I understand that the purpose of claim construction is to understand how one skilled in the art would have understood the claim terms at the time the claimed invention was made. I also understand that claim construction is a matter of law for the Patent Trial and Appeal Board to decide.

34. I understand that a claim construction analysis begins with the plain meaning or the ordinary and customary meaning of the claim term in the context of the patent in which the term is used, according to what is known as the Phillips standard for claim construction, described in the Phillips v. AWH Corp. decision. The ordinary and customary meaning is the meaning that the term would have to a person of ordinary skill in the relevant art at the time of the invention in light of what the patent teaches.

35. I understand that to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood disputed claim language to mean. The available sources may include evidence intrinsic and extrinsic to the patent. Intrinsic evidence includes the words of the claims themselves, the remainder of the patent's specification, including materials incorporated by reference, and the prosecution history of the patent, including materials cited and statements made

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during the prosecution history. The prosecution file history provides evidence of how both the Patent Office and the patentee understood the terms of the patent, particularly in light of what was known in the prior art. Further, where the specification describes a claim term broadly, arguments and amendments made during prosecution may require a narrower interpretation. I understand that claim terms must be construed in a manner consistent with the context of the intrinsic record.

36. I understand that while intrinsic evidence is of primary importance, extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, can also be considered. Extrinsic evidence, which is evidence external to the patent and the prosecution history, may include materials concerning relevant scientific principles, the meaning of technical terms, and the state of the art. For example, technical dictionaries may help one better understand the underlying technology and the way in which one of skill in the art would understand the claim terms. Extrinsic evidence should not be considered, however, divorced from the context of the intrinsic record. Evidence beyond the patent specification, prosecution history, and other claims in the patent should not be relied upon unless the claim language is ambiguous in light of these intrinsic sources.

37. I understand that words or terms, which may include phrases, should be given their ordinary and accepted meaning unless it appears that the inventors were

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using them to mean something else. In making this determination, the claims, the patent specification, and the prosecution history are of paramount importance. Additionally, the specification and prosecution history must be consulted to confirm whether the patentee has acted as its own lexicographer (i.e., provided its own special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope.

38. I understand that the claims of a patent define the scope of the rights conferred by the patent. Patentees are required to particularly point out and distinctly claim the subject matter which they regard as their invention. Because patentees are required to define precisely what they claim their inventions are, it is improper to construe claims in a manner different from the plain import of the terms used consistent with a patent's specification. Accordingly, a claim construction analysis must begin with, and remain centered on, the claim language itself. Additionally, the context in which a term is used in the challenged claim can be highly instructive. Likewise, other claims of the patent in question, both challenged and non-challenged, can inform the meaning of a claim term. For example, because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.

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39. I understand that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification. For this reason, the words of the claim must be interpreted in view of the entire specification. The specification is the primary basis for construing the claims and provides a safeguard such that correct constructions closely align with the specification. Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim as set forth in the patent itself.

40. I understand that it is improper to place too much emphasis on the plain or ordinary meaning of a claim term without adequate grounding of that term within the context of the specification of the challenged patent. Hence, claim terms should not be broadly construed to encompass subject matter that is not supported when the claims are read in light of the invention described in the specification.

41. I understand that the role of the specification is to describe and enable the invention. In turn, the claims cannot be of broader scope than the invention that is set forth in the specification. Care must be taken lest word-by-word definition, removed from the context of the patent, leads to an overall result that departs significantly from the patented invention.

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42. I understand that in general, a term or phrase found in the introductory words of the claim, referred to as the preamble of the claim, should be construed as a limitation if it recites essential structure or steps, or is necessary to give life, meaning, and vitality to the claim. Conversely, a preamble term or phrase is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. In making this distinction, one should review the entire patent to gain an understanding of what the inventors claim they actually invented and intended to encompass by the claims.

43. I understand that language in the preamble may limit claim scope (i) if dependence on a preamble phrase for antecedent basis indicates a reliance on both the preamble and claim body to define the claimed invention; (ii) if reference to the preamble is necessary to understand limitations or terms in the claim body; (iii) if the preamble recites additional structure or steps that the specification identifies as important; or (iv) if the patentee relied on the preamble during prosecution to distinguish the prior art.

44. I understand that claim limitations may be stated in means-plus-function format in which a term is defined by functional language without a defined structure. In particular, I understand that a means-plus-function limitation should be interpreted to cover the recited function, and only the corresponding structure

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described in the specification, and equivalents thereof. I also understand that a limitation will be presumed to be a means-plus-function limitation if (a) the claim limitation uses the phrase "means for"; (b) the "means for" is modified by functional language; and (c) the phrase "means for" is not modified by sufficient structure for achieving the specified function.

45. I understand that a structure will be considered structurally equivalent to the corresponding structure identified in the specification only if the differences between them are insubstantial. For example, a structure may be deemed to be a structural equivalent to the corresponding structure where the structure performs the same function in substantially the same way to achieve substantially the same result. I further understand that a structural equivalent must have been available at the time of the issuance of the claim.

46. I understand that an indefinite article "a" or "an" in patent parlance carries the meaning of "one or more" in open-ended claims containing the transitional phrase "comprising." I understand that, unless the claim is specific as to the number of limitations, the article "a" receives a singular interpretation only in rare circumstances when the patentee evinces a clear intent to so limit the article, and thus, under this conventional rule, the claim limitation "a," without more, requires "at least one."

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III. Level of Skill of One of Ordinary Skill in the Art

47. In determining the characteristics of a hypothetical person of ordinary skill in the art ("POSA") of the '930 and '244 Patents at the time of the claimed invention, I considered various prior art techniques relating to baby bottles and nipple designs and technologies, the type of problems that such techniques gave rise to, and the rapidity with which innovations were made. I also considered the sophistication of the technologies involved, and the educational background and experience of those actively working in the field. I also considered the level of education that would be necessary to understand the '930 and '244 Patents. I also considered the prior art references discussed below that would show the level of skill in the relevant art. I came to the conclusion that the characteristics of a POSA in the field of the '930 and '244 Patents would have been a person with a Bachelor of Science Degree in mechanical engineering, industrial design, or similar technical field, and with 2 or more years of practical experience related to the design of infant feeding products or comparable industry. A person with less education but more relevant practical experience, or more relevant education but less practical experience, may also meet this standard. I was at least a person of ordinary skill in the art at the time of the alleged invention of the '930 and '244 Patents.

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IV. Technology Background

48. I understand that analyzing the state of baby bottles and nipple designs and capabilities in the years prior to the earliest possible priority date of the '930 and '244 Patents can provide valuable insight into what people of ordinary skill in the art were aware of at the time, and in what direction the industry was heading.

49. I understand that the '244 Patent is a continuation of '930 Patent, and therefore is entitled to a priority date no earlier than the priority date of the '930 Patent. I do not take a position regarding the correct priority date(s) of the '930 and '244 Patents. For purposes of my analysis, I assume both the '930 and '244 Patents are entitled to a priority date of June 29, 2004, which is the earliest priority date listed on the face of the patents. *See* Ex[1001] at (63), (30); Ex[1003] at (63), (30) (Related U.S. Application Data and Foreign Application Priority Data).

50. Prior to the June 29, 2004 priority date of the '930 Patent, all of the technology at issue in the '930 and '244 Patents was broadly applied and well-known in the fields of baby bottles and nipple designs. In my opinion, no individual elements of the '930 and '244 Patents claims were novel at the time of the alleged invention, and there was nothing novel or inventive about the manner in which those elements were combined in the claims. Further, there were no technological barriers to combining these elements to form the claimed invention. Indeed, combining these elements would have yielded predictable results.

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51. The '930 and '244 Patents relates to the well-known problem of designing a more natural feeding nipple that closely mimics the human breast. *See, e.g.*, Ex[1001] at Abs. Specifically, the '930 and '244 Patents attempt to address this problem through a "teat assembly" that includes a teat, nipple, base portion, and areola region. *Id.* at 3:57-4:10, Fig.4. Prior to the priority date of the '930 and '244 Patents, numerous breast-like nipples and bottle tops had been well known and commercially available for decades.

52. The '930 and '244 Patents further relates to the well-known problem of reducing colic due to negative pressure building up in the bottle, which may occur as the infant consumes the contents of the bottle. *Id.* at 1:47-51. Specifically, the '930 Patent describes an air passage and lip valve portion in the teat assembly that "projects down from the flange" to allow air ingress as the contents of the bottle are consumed to allow venting between the interior of the vessel and the atmosphere. *Id.* at 5:22-27. Prior to the priority date of the '930 and '244 Patents, these types of valves and venting technologies in bottles and nipples had been well known and commercially available for decades.

A. Bottle and Nipple Designs.

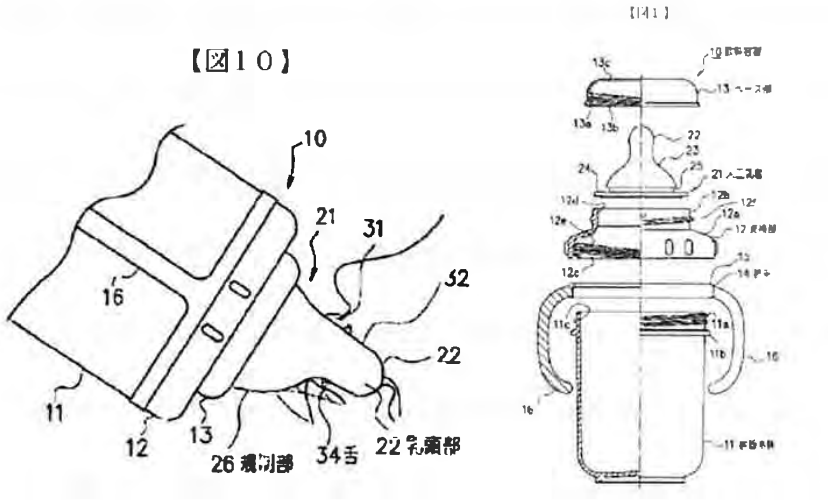
53. Early examples of bottle and nipple designs used rubber nipples that stretched over the lip of a glass bottle to attach the parts together. Over time, this connection was improved to predominantly include the use of a threaded collar to

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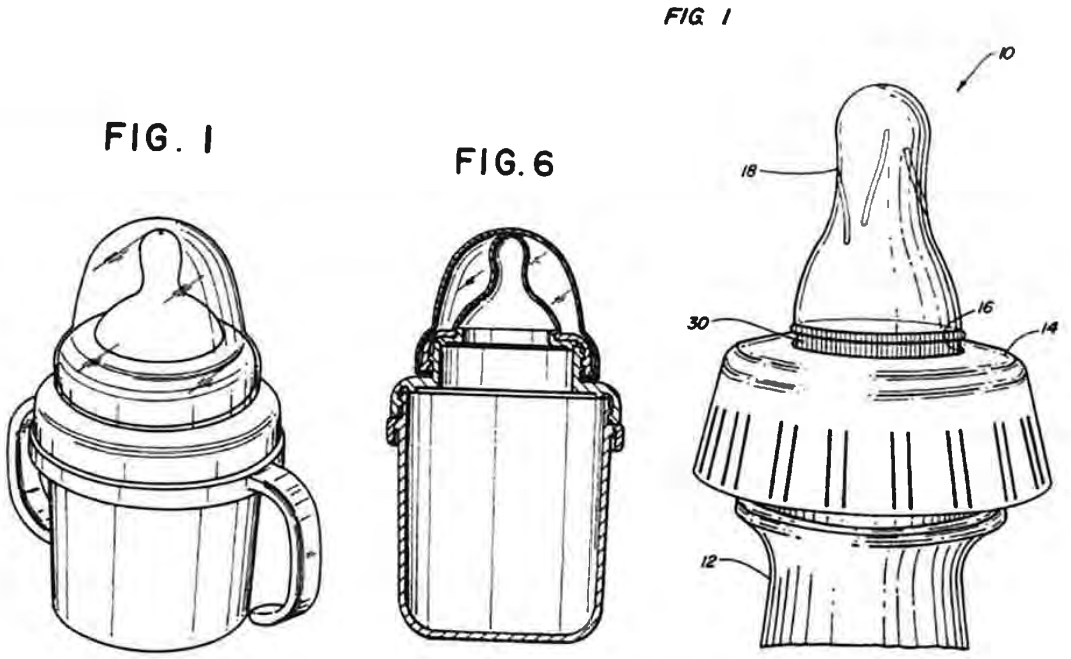
interface with the nipple and mate the bottle and nipple together, which enhanced the security and integrity of the connection. The nipple design for mating to a threaded collar typically contained a mounting flange which was captured between the threaded collar and the top rim of the threaded neck portion of the bottle. In this configuration, the nipple was attachable and removable from the bottle. This was a very common and familiar connection in the infant feeding system market and remains so today. Examples of this evolution, including a nipple stretched over a bottle and examples of a threaded collar securing a nipple to a threaded bottle, are provided throughout the sections below.

54. The prior art shows a great variety in the sizes, shapes, features, and adornments of threaded collars used to secure the nipple to the bottle. A specific collar design choice that was well-known prior to the relevant priority date is one where the outermost surface has a sloping portion that extends outwardly and downwardly relative to said upper rim, wherein the sloping portion comprises a majority of the collar's outermost surface. Indeed, a POSA would have been familiar with such a design at the time of the earliest priority date of the '930 and '244 Patents:

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See e.g., JP2000000288A at (Figs. 1, 10)



See e.g., USD315212S1 at Figs. 1-6; *see also e.g.*, USD440316S1 at Figs. 1-2, US3946888 at Fig. 1, US5542922 at Fig. 1, US5544766 at Fig. 1, US4623068 at Figs. 4, 6, US5544766 at Fig.1.

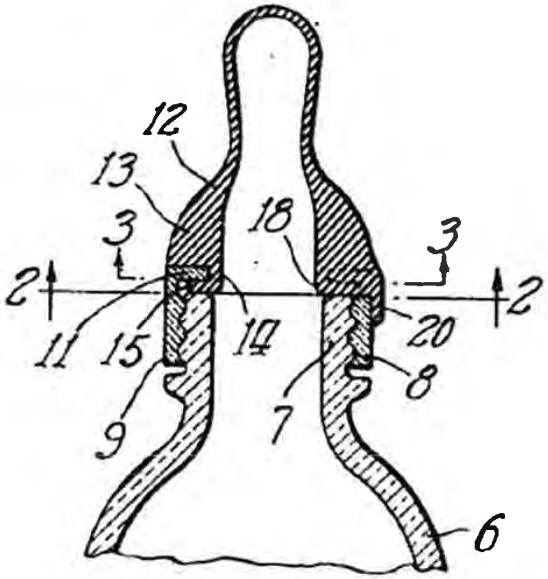
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55. Early examples of bottle designs also include bottles that have a variation in internal and external circumferences. From my experience, I would expect there would be many motivations for varying these circumferences. For example, the variation could have been provided for functional purposes such as making the bottle easier to hold, making the bottle wider below the opening to hold a greater volume, making the bottle wider at the bottom so it is more stable when standing, etc. The variation in circumference could also have been a simple design choice or for specific aesthetic considerations. For example, USD440316S1 Figs. 1-2 and US3946888 Fig. 1 shown above demonstrate such a variation in bottle circumference in the prior art.

56. Prior art examples of baby bottle nipple designs also illustrate a large variety of shapes, sizes, textures, and features with many attempting to be more breast-like like in appearance, feel, and function. It was not uncommon to design a rounded, domed structure distal to the nipple portion of the teat in an attempt to emulate the shape of the breast to better imitate breast-feeding for infants. Some examples include:

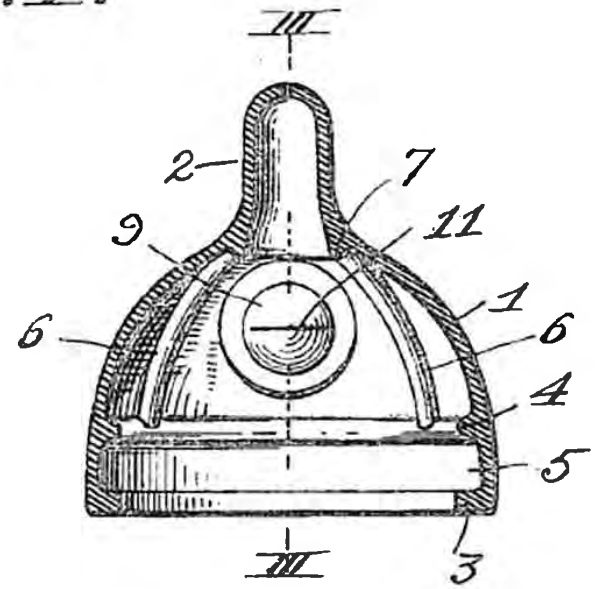
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Fig. 1



See US2060212 at Fig. 1.

Fig. 1.



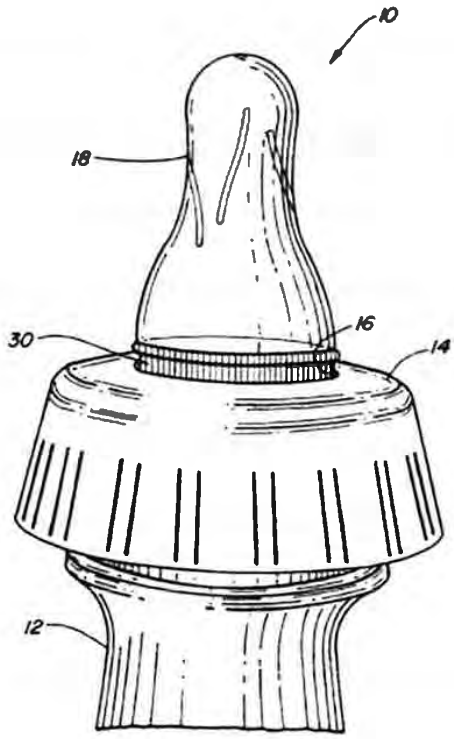
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See US1146639 at Fig. 1; US2060212 at Fig. 1; US1146639 at Fig. 1; USD330938S1 at Figs. 3, 6; US5544766 at Figs. 2, 3; US4993568 at Fig. 1.

57. Support ribs were another feature incorporated into the nipple portion of some baby bottle nipples. In addition to providing support, it would have been well-known to a POSA by the priority date of the '930 and '244 Patents that these ribs could help maintain an open passage through the nipple when opposite side of the nipple portion were moved against each other. Support ribs were also shown distal from the nipple portion and were provided to reinforce to those areas. These support ribs created a variation in wall thickness in the areas they are located. Variation in nipple wall thickness beyond support ribs is also part of the prior art. Some examples include:

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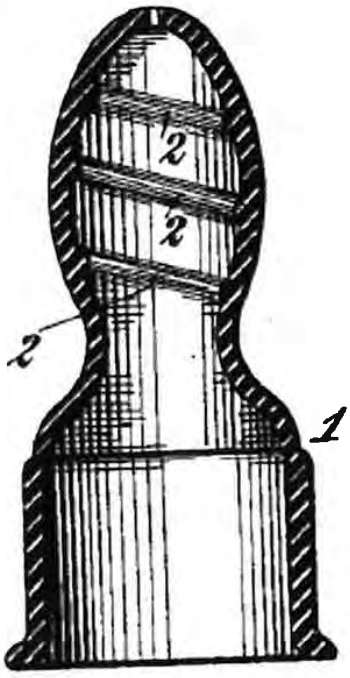
FIG. 1



See US5544766 at Fig. 1

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Fig. 2.



See US589212 at Fig. 2; US3946888 at Fig. 1; US5101991 at Fig. 3; US1146639 at Fig. 1.

58. A mom's areola is the circular dark colored area of skin on her breast surrounding her nipple. The areola contains little raised bumps called Montgomery's glands that secrete a lubricating fluid. As such, the areola typically has a tactile and visually well-defined position and circumference, although it varies in size and color from mom to mom and even for an individual mom. For a good latch, the infant takes the mom's nipple, along with a good portion of areolar tissue, into its mouth and forms a seal. As there are different size areolae and different size babies, the

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amount of areolar tissue remaining beyond the infant's lips will vary. Additionally, a different amount of areolar tissue may be covered by the lower lip compared to the upper lip. Some prior art baby bottle nipples have been designed to delineate their "areola" surface area, which surrounds and extends beyond the bottom of the nipple portion, via a tangible change in shape, texture, material thickness, etc. from the rest of the nipple. Some examples include:

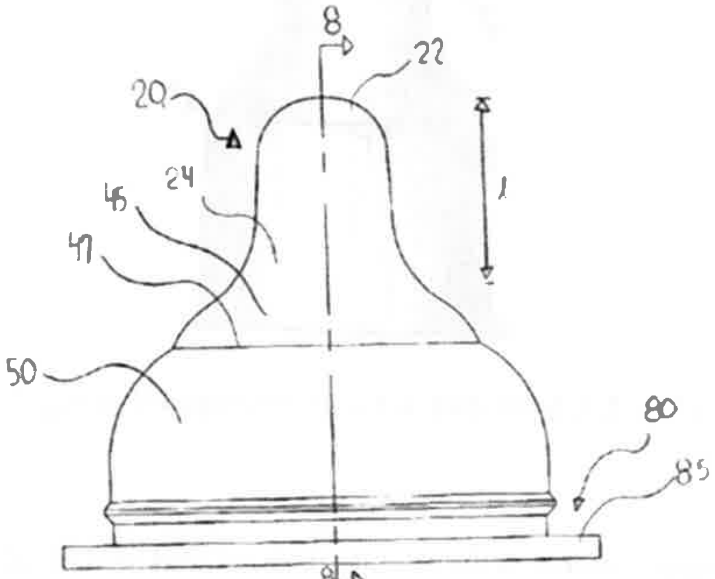
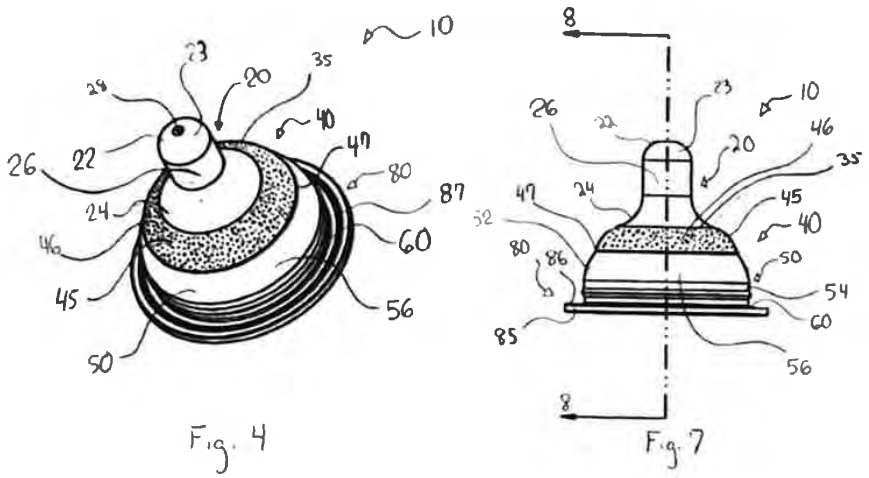


FIG. 7

See US2003/0093120 at Figs. 7, 8.

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US2003/0093121 at Figs. 4, 7

59. These patent references provide illustrative examples of the areola area being defined in different yet specifically tangible and clearly delineated ways. In my opinion, similar to a mom's areola, without some clear physical delineation, there is not a clearly defined location of the bottom circumferential edge of the areola.

60. Baby bottle nipples utilized materials and structures that, for the most part, performed vastly different than the lactating breast during a normal breastfeed. When breastfeeding, the infant substantially elongates the mom's nipple, to about three times as long as the nipple at rest, so the tip is near the junction of the hard-soft palate. The nipple remains extended for the duration of the feed. Mom/baby dyads are typically able to achieve this positioning of the nipple even though different moms have nipples of different length and diameter. Even for an individual mom, her nipples may differ between the two sides as well as over the course of her

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breastfeeding experience. On the other hand, baby bottle nipples were generally made of materials and structures that provided a given "as manufactured" size and shape and pliability. The typical nipple portion of the teat had limited stretch in actual use. Depending on the length of the nipple portion and the size and shape and pliability of the teat below the nipple portion, as well as other factors, the infant's lips would be located differently thus creating uncertainty in locating the distal end of the areola portion as well as the portion below it.

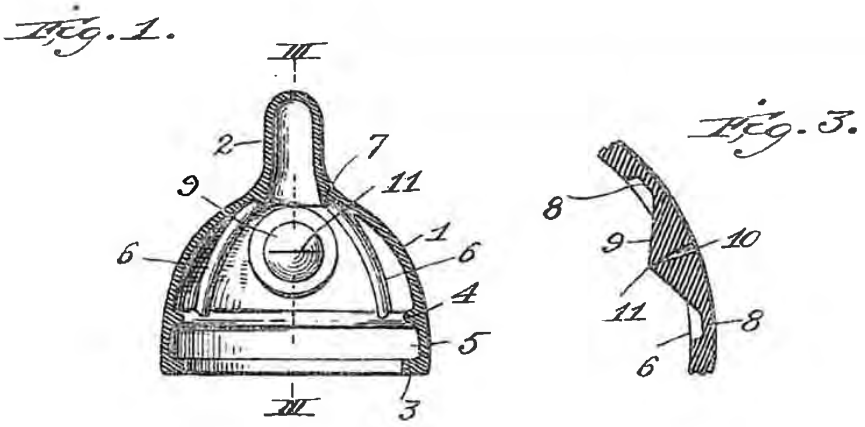
B. Pressure Equalizing Technologies

61. There is a plethora of solutions in the prior art, whether using a vent or a valved vent, to relieve negative pressure in a baby bottle feeding system. The negative pressure results from the infant applying a vacuum to the teat and removing milk. This negative pressure, if not relieved, creates several difficulties. First, it makes it more difficult for the infant to get milk or other liquid out of the bottle due to the added suction required. Second, negative pressure may result in deformation or collapsing of the nipple and restriction of fluid flow through the outlet hole(s) of the nipple. Third, it is believed that air ingress into the teat reduces the risk of colic which can otherwise occur as a result of negative pressure building up in the feeding bottle. This dynamic provided motivation for including vents in feeding systems to relieve the negative pressure. These vents were commonly small passages that connected the interior of the nipple and bottle to outside air. Early vent passages

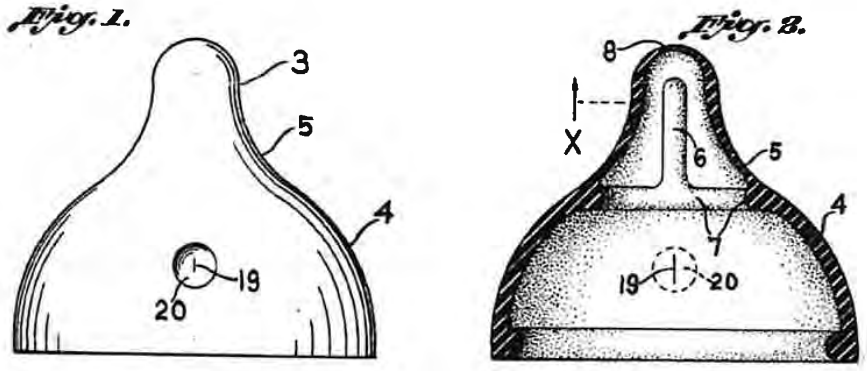
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were commonly located under the threaded collar as a small egress of fluid out of the vent passage would be captured in the threaded area. Another approach to minimize potential egress of fluid through the vent was to include a one way valve with the vent so that air could enter the feeding system through the valve but liquid in the bottle is not able to flow out through the valve. The prior art illustrates that these valves could be of different design and could be in different locations, all with the objective of relieving some or all of the negative pressure created by the baby sucking on the nipple and removing milk or other liquid from the bottle. A single valved vent or multiple valved vents have been employed. An advantage of utilizing multiple valved vents is that if one or more get blocked or have a high cracking vacuum level to open the valve, one or more of the other valves can open to let the air in. Several early designs, as shown below in US1146639, US5544766, and US2321236 included a domed shaped nipple with a downward projecting valve directed radially toward the center axis of the nipple. The first two utilize slit valves. As previously discussed, as the art evolved to utilize threaded collars as the predominant approach to securing bottles and nipples, it would be obvious to substitute that type of connection.

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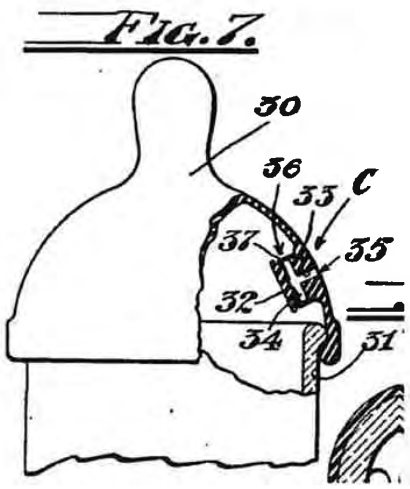


US1146639 at Figs. 1, 3.



US5544766 at Figs., 1, 2, 8.

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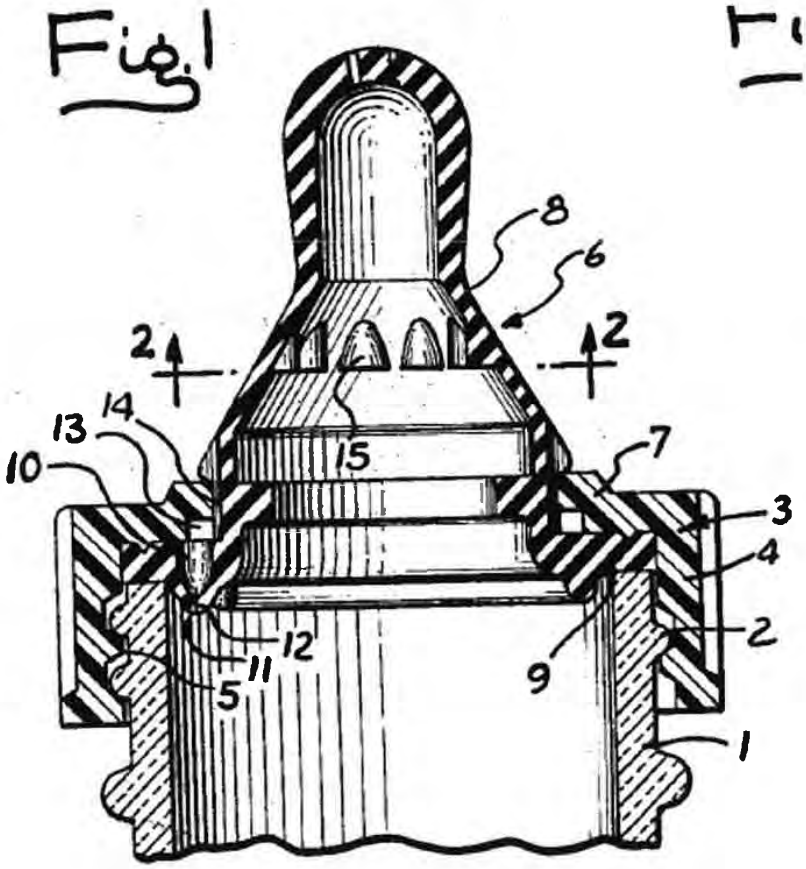
US2321236 at Fig. 7.

62. The bottle for the above patents (not shown for US1146639 and US5544766) is secured in place by the flange at the bottom of the teat. As the art evolved to utilize threaded collars as the predominant approach to securing bottles and nipples, it would be obvious to a POSA well before the priority date of the '930 and '244 Patents to substitute that type of connection in combination with one or more valves. See also, US726122 at Figs. 1-3.

63. The use of one or multiple valves under the flange and the use of indentations near the bottom of the nipple and through flange leading into the valves was also disclosed by this time as shown in the example below. The vent passage is downwardly projecting and leads to the tip of the valve containing a slit. Air comes in through passage which is cut into the wall of the bottom of the nipple above the flange. The nipple portion of the teat has a variable wall thickness. A threaded collar,

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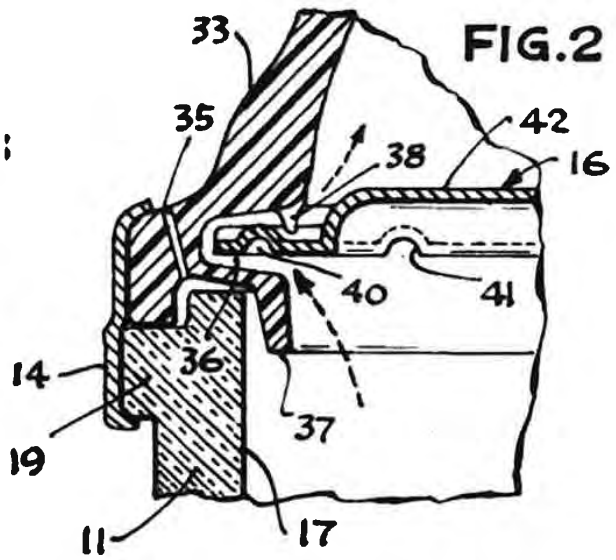
as embodied in many of these prior art designs, captures the flange at the bottom of the nipple and secures the nipple to the threaded bottle.



See US2960088 at Fig. 1; *See* US4993568 at Fig. 1; US4623068 at Figs. 5-6.

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64. Other prior art patents show valves that utilize the top of the bottle as a portion of the valve and require the two parts to work together to form the valve, such as in the example below:



US5544766 at Fig. 2

65. In summary, this review of pertinent prior art illustrates why, in my opinion, no individual elements of the '930 and '244 Patents claims were novel at the time of the alleged invention, and there was nothing novel or inventive about the manner in which those elements were combined in the claims. Further, there were no technological barriers to combining these elements to form the claimed invention. Indeed, and discussed further below, combining these elements would have yielded predictable results.

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V. The '930 Patent

A. Summary of the '930 Patent

66. The '930 Patent, titled "Baby Bottle With Flexible Nipple Region," is directed to addressing the well-known problem of providing an aesthetically suitable and affordable, yet reliable nipple that equalizes the pressure in the bottle to prevent, for example, colic and collapse of the nipple. *See* Ex[1001] at 1:35-2:5.

67. To solve these well-known problems, the '930 Patent discloses various symmetrical teats and vessels that comprise basic, well-known components that seek to alleviate these problems. These well-known components are described below.

68. For example, the '930 Patent generally describes teats that comprise a teat portion, base portion, and an areola portion therebetween. *Id.* at 2:55-57, 3:59-63, 4:12-16, Figs. 1, 4. The teat also includes a flange extending "from the base of the base portion to allow fixing to a feeding bottle[.]" *Id.* at 2:57-59. The teat can optionally include various aesthetic features intended to mimic the shape and color of the human breast. *Id.* at 3:63-4:11. Teats (or nipples) comprising the general shape and features of those disclosed in the '930 Patent were well-known at the time of the earliest priority date of the '930 Patent. *See supra* § IV(A).

69. The '930 Patent also discloses a flex region in the teat, "comprising three grooves or flex channels extending around an inner surface of the areola portion effectively forming circular thinned regions parallel/concentric with each

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other about the axis and hence surrounding the teat portion. *Id.* at 2:64-3:1, 4:14-26. As an infant sucks on the teat, "the teat portion and areola portion flex towards and away from one another by virtue of respective collapsing and extending of the flex region around the flexed channels. *Id.* at 3:23-26. This design is intended to solve the well-known problem of relieving negative pressure in the teat: "reduced suction on the teat portion towards the base portion relaxes the flexible reduced suction whereas, as shown in in Fig. 2b, suction on the teat portion away from the base portion collapses the flexible region extending the teat portion and areola portion away from one another." *Id.* at 3:26-32. The '930 Patent also discloses a vent passage "through the elastomer material and substantially at the periphery" to allow "venting between the interior of the vessel and the atmosphere through the teat." *Id.* at 5:15-17, 5:21-32, 6:11-15. However, flex regions, vents, valves, and other techniques (not disclosed in '930 Patent) intended to reduce the negative pressure in the bottle were well-known at the time of the earliest priority date of the '930 Patent. *See supra* § IV.

70. The '930 Patent also discloses a collar, which includes "an internally threaded cylindrical portion and a downwardly domed peripheral portion surrounding it and extending from an upper end of the cylindrical portion." *Id.* at 4:54-5:3, 5:52-6:6. The screw collar is intended to provide "structural strength and a strong screw fit" to the vessel. *Id.* at 5:4-6. Collars similar to the general shape and

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features of those disclosed in the '930 Patent were well-known at the time of the earliest priority date of the '930 Patent. *See supra* § IV.

71. The '930 Patent does not describe any innovative or novel elements, either alone or in combination, for achieving any of the stated goals and improvements disclosed in the '930 Patent. Instead, the '930 Patent applies a known, routine combination of conventional components for providing an aesthetically suitable and affordable, yet reliable nipple that equalizes the pressure in the bottle to prevent, for example, colic and collapse of the nipple. For example, the '930 Patent admits that each of the components described were individually well known prior to the priority date of the '930 Patent. *Id.* at 1:27-2:24. As previously described, the particular combinations of these components claimed in the '930 Patent were also either known as of the priority date or would have been obvious to a POSA at that time. *See supra* § IV.

B. Summary of the Claimed Subject Matter

72. The '930 Patent does not claim new elements or components but claims conventional arrangements of commonplace features and elements to provide a known baby bottle nipple design. The claims recite only generic feeding bottles comprising a generic vessel, collar, and nipple.

73. The three independent claims are largely repetitive. For example, Claims 1, 13, and 14 each generally recite the same four components: (1) a feeding

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vessel; (2) a collar; (3) a nipple; and (4) an air valve extending through the nipple. *Id.* at 6:61-9:7. The remaining limitations describe particular ornamental or aesthetic features of these components, and further recite a particular arrangement securing the vessel, the collar, and the nipple. *Id.*

74. The feeding bottle (with particular elements) claimed and any benefits they provide are not new and would have been obvious to, and well understood by a POSA by the early 2000s. The '930 Patent claims nothing more than a natural combination of steps known in the art.

C. '930 Patent File History

75. I have reviewed the file history for the '930 Patent. Prosecution encompassed five Non-Final Office Actions and three Final Office Actions, as well as a Pre-Appeal Brief Conference Request filed on December 26, 2018 and a subsequent Appeal Brief filed on April 12, 2019.

76. The originally filed claims in this application included seventeen total claims with three claims being independent. Independent claim 1 as originally filed recited a nipple including "a base portion having a wall thickness in a domed configuration," and "a vent passage extending through the base portion." From the onset of prosecution, the examiner and Applicant disagreed as to whether the claims required the vent passage to actually extended through the "domed configuration"

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of the base portion. Ex[1002] at 621. Independent claims 9 and 13 recited similar language.

77. The First Non-Final Office Action dated May 2, 2015 rejected the independent claims as obvious in view of Morano (US Patent No.6,959,827) in further view if Uehara (US 2003/0089676)." In a Response filed September 18, 2015, Applicant did not amend the originally filed claims. Instead, Applicant argued "[c]laim 1 recites 'a vent passage extending through the base portion.' The base portion is defined in claim 1 as 'having a wall thickness in a domed configuration.' As shown on the left, vent passage 126 extends through the base portion and the base portion has a wall thickness in a domed configuration. As shown in Uehara on the right, the vent does not extend through the base portion having a domed configuration…Uehara does not disclose a vent passage extending through the base portion as a base portion is defined in claim 1." *Id.* at 516.

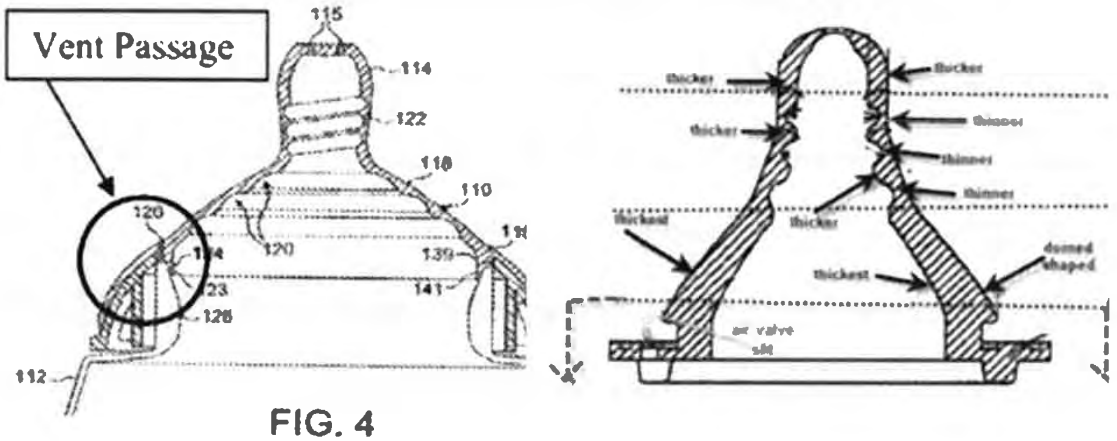


FIG. 4

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78. The Examiner disagreed with this Argument. In a subsequent Final Office Action the Examiner maintained that "Uehara discloses an elastic teat portion having…a vent passage extending through the base portion" according to the figure shown above. *Id.* at 466.

79. In response, Applicant canceled all the existing independent claims and added one new independent claim 18 (which subsequently issued as claim 1) (*Id.*, at 445-445). Claim 18 was amended on April 13, 2017 to recite "at least one vent passage extending through the domed base portion" (*Id.* at 387-388). In corresponding Remarks, Applicant explained "[i]n an effort to clarify the arrangement and location of the 'vent passage' as called for by the present claims, claim 18 has been amended to require that the nipple include 'at least one vent passage' that is 'extending through the domed base portion [of the nipple].'" *Id.* at 391. On September 22, 2017, Applicant further amended claim 18 to recite "at least one vent passage extending through the domed portion of the base portion." *Id.* at 355. "[C]laim 18 has been further amended to call for 'at least one vent passage' which specifically extends 'through the domed portion of the base portion.'…and not on the flange portion" *Id.* at 360-361.

80. On March 20, 2018, Applicant added second independent claim 19 (which issued as claim 13) directed to similar features of independent claim 18, but further included "wherein an outer surface of the teat portion has a first texture and

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an outer surface of the areola portion has a second texture." *Id.* at 309-310. The Examiner maintained his rejections of Claims 18 and 19 in view of Morano in further view of Uehera in further view of Ware.

81. The rejection of claims 18 and 19 were appealed, during which Applicant's arguments centered on whether the prior art disclosed a "vent passage…with a length not to extend past the collar" as recited by claim 18, and "an outer surface of the teat portion has a first texture and an outer surface of the areola portion has a second texture" as recited by claim 19. *Id.* at 259-262.

82. In the Pre-Appeal Brief Request of December 26, 2018, regarding claim 18, Applicant stated "[f]or example, Applicant's 'vent passage 126' is shown in FIG. 4…Unlike Ware, Applicant's claimed 'vent passage' has a 'length not to extend past the collar.' This keeps it out of the milk as can happen in Ware." *Id.* at 259-260. In the Appeal Brief, Applicant alleged "Morano does not teach 'a vent passage extending through the base portion, a valve portion in communication with the vent passage and projecting downwardly from the flange and Ware does not have a collar." *Id.* at 237-239. Regarding claim 19, Applicant argued that "wherein an outer surface of the teat portion has a first texture and an outer surface of the areola portion has a second texture...is not taught by the prior art…The Office Action surmises that because there are two lines on the alleged areola portion of mouth interface of Morano, the teat portion is smoother than the areola portion…but this conclusion is

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without evidence and Morano lacks any such disclosure of a 'first texture' and a 'second texture.'" *Id.* at 260-261. In response, the Examiner reopened prosecution.

83. On February 10, 2020, Applicant added third independent claim 20 (which issued as claim 14). Claim 20 was identical to claim 18, except lacking the claim 18 limitation of the vessel "open top with a first diameter, and a body with a second diameter…the first diameter of the open top being less than the second diameter of the body." *Id.* at 147.

84. The examiner subsequently rejected the claims on May 5, 2020, relying on "US Patent No. 1,672,734 (Reilly, hereinafter) in view of US Patent No. 5,784,999 (Larson et al. hereinafter)." *Id.* at 94-108.

85. In response, the Applicant completely rewrote the claims. In particular, section b) of claim 20 (allowed claim 14) was amended to recite that the collar includes "an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, and wherein said sloping portion comprises a majority of the collar's outermost surface." *Id.* at 75-76. Notably, section c) of claim 20 (allowed claim 14) regarding the vent passage was significantly changed. In particular, claim 20 (allowed claim 14) was amended to delete all reference to "a vent passage extending through the domed portion of the base portion with a length not to extend past the collar…, and a valve portion in communication with the vent passage and projecting downwardly from the flange" - the very claim features at

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issue on Appeal (e.g., *Id.* at 237-239). This language was replaced with "a one-way air inlet valve (i) extending through said base, (ii) projecting downwardly from the base portion, (iii) having a length that does not extend past the collar's lower rim, and (iv) disposed at least partially inwardly from the collar."

86. After these amendments, the Examiner subsequently allowed the claims and a Notice of Allowance was mailed on November 16, 2020. *Id.* at 33-38.

D. '930 Patent Claims

87. The '930 Patent has 20 claims. Claims 1, 13, and 14 are independent. Claims 2-12 depend from Claim 1, Claims 15-20 depend from Claim 14. Claim 1 is illustrative and is set forth below:

(i) Claim 1

A feeding bottle comprising:

a) a vessel having an open top,

b) a collar having an upper rim and a lower rim comprising:

an internally threaded inner surface,

an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, and

wherein said sloping portion comprises a majority of the collar's outermost surface,

c) a nipple having:

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a teat portion having a variable wall thickness including an aperture,

a base portion having a domed configuration,

an areola portion between the teat portion and the base portion,

a flange depending from the base portion,

a one-way air inlet valve (i) extending through said base, (ii) projecting downwardly from the base portion, (iii) having a length that does not extend past the collar's lower rim, and (iv) disposed at least partially inwardly from the collar;

the flange being arranged to seal with the vessel;

d) the nipple being secured to the collar by sealingly capturing an inner edge of the collar between the base portion and the flange; and,

e) the nipple being secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel.

VI. The '244 Patent

A. Summary of the '244 Patent

88. The '244 Patent, titled "Baby Bottle With Flexible Nipple Regions," is a continuation of the '930 Patent. *See* Ex[1003] at 1. Accordingly, I incorporate my analysis of the summary of the '930 Patent. *See supra* § V.A.

B. Summary of the Claimed Subject Matter

89. The '244 Patent does not claim new elements or components but claims conventional arrangements of commonplace features and elements to provide a

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known baby bottle nipple design. The claims recite only generic feeding bottles comprising a generic vessel, collar, and nipple.

90. The four independent claims are largely repetitive. For example, Claims 1, 21, 30, and 31 each generally recite the same three components: (1) a feeding vessel; (2) a collar; and (3) a nipple. *Id.* at 6:60-10:25. The nipple and collar are claimed as part of a cover assembly. *Id.* Claims 30 and 31 further recite a base portion. *Id.* The remaining limitations describe particular ornamental or aesthetic features of these components, and further recite a particular arrangement securing the vessel, the collar, and the nipple. *Id.*

91. The feeding bottle (with particular elements) claimed and any benefits they provide are not new and would have been obvious to, and well understood by a POSA by the early 2000s. The '244 Patent claims nothing more than a natural combination of steps known in the art.

C. '244 Patent File History

92. The '244 Patent is a continuation of the '930 Patent, with a substantially identical specification. *See* Ex[1003] at 1. I understand that the file history of a parent patent may be useful in interpreting subsequent continuations. Accordingly, I incorporate my analysis of the file history of the '930 Patent. *See supra* § V.C.

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93. Prosecution of the '244 Patent further encompassed one Non-Final Office Action, and one Response including claim amendments, with a Notice of Allowance mailed thereafter. The originally filed claims were rewritten after a preliminary amendment to include 39 new claims with claims 18, 37 (issued as Claim 21), 46 and 47 being independent.

D. '244 Patent Claims

94. The '244 Patent has 31 claims. Claims 1, 21, 30, and 31 are independent. Claims 2-20 depend from Claim 1, and Claims 22-29 depend from Claim 21. Claim 21 is illustrative and is set forth below:

(i) Claim 21

A drinking vessel comprising:

a container comprising a varying internal circumference and an opening into the container; and

a cover assembly configured to couple to the container over the opening, the cover assembly comprising:

i. a nipple comprising a mouthpiece configured to allow liquid flow through the nipple to an aperture, a flex region configured to allow flex of the mouthpiece towards and away from a lower portion of the nipple, the mouthpiece defining a bite region, and a flange depending from the lower

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portion of the nipple defining the nipple circumference furthest from the aperture; and

ii. a collar configured to removably couple to the nipple to seal over the opening of the container; and

wherein the collar and the lower portion of the nipple together define a downward domed shape that extends outwardly and downwardly from the flex region of the nipple towards a widest circumferential edge of the collar.

VII. The Challenged Claims

95. The '930 Patent has 20 claims. I understand that Petitioner is challenging the validity of Claims 14, 16, 17, and 19 of the '930 Patent in the Petition for *Inter Partes* Review. I have considered invalidity with respect to Claims 14, 16, 17, and 19 of the '930 Patent.

96. The '244 Patent has 31 claims. I understand that Petitioner is challenging the validity of Claims 21-24, 26, and 27 of the '244 Patent in the Petition for *Inter Partes* Review. I have considered invalidity with respect to Claims 21–24, 26, and 27 of the '244 Patent.

VIII. Claim Construction

97. For purposes of this *Inter Partes* Review, I have reviewed the parties' proposed constructions advanced in the pending district court litigation. I previously provided opinions on the correct construction afforded certain terms in connection

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with the district court litigation. Ex[1020]. My opinions expressed in this previous declaration remain unchanged.

98. I have also considered the claim language, specification, and the prosecution history, to determine the ordinary and customary meaning of the claim language as it would have been understood by a person of ordinary skill in the art at the time of the invention.

A. "a teat portion" ('930 Patent Claims 14, 15)

99. Claims 14 and 15 of the '930 Patent recite "a teat portion." *See* Ex[1001] at Claims 14, 15.

100. Claim 14, for example, recites: "a teat portion having a variable wall thickness including an aperture . . . " Ex[1001] at Claim 14 (emphasis added).

101. I understand that Petitioner construes this term to mean "the entire part projecting generally perpendicular to the mouth of the vessel, disposed above the areola portion, which extends into a baby's mouth for feeding." Ex[1018] at 12.

102. I understand that Patent Owner alleges this term to mean "part projection generally perpendicular to the mouth of the vessel and disposed above the areola portion." *Id.*

103. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "a teat portion." Except where noted below, my analysis

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applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

B. "an areola portion" ('930 Patent Claims 14, 18)

104. Claims 14 and 15 of the '930 Patent recite "a teat portion." *See* Ex[1001] at Claims 14, 15.

105. Claim 14, for example, recites: "an areola portion between the teat portion and the base portion . . . " Ex[1001] at Claim 14 (emphasis added).

106. I understand that Petitioner construes this term to mean "a surface area, that includes a different characteristic and functionality than the rest of the nipple, surrounding and extending beyond the bottom of the teat portion [as construed by Petitioner]." Ex[1018] at 13.

107. I understand that Patent Owner alleges this term to mean "part extending beyond the bottom of the teat portion" *Id.*

108. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "an areola portion." Except where noted below, my analysis applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

C. "base portion" ('930 Patent Claim 14)

109. Claim 14 of the '930 Patent recites "base portion." *See* Ex[1001] at Claim 14.

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110. Claim 14, for example, recites: "a base portion having a domed configuration . . . " Ex[1001] at Claim 14 (emphasis added).

111. I understand that Petitioner construes this term to mean "the lowest portion of the nipple, beginning where the nipple meets the top rim of the vessel, that is mountable to the vessel." Ex[1018] at 16.

112. I understand that Patent Owner alleges this term to mean "part below the areola portion." *Id.*

113. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "base portion." Except where noted below, my analysis applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

D. "domed configuration / a base portion having a domed configuration" ('930 Patent Claim 14)

114. Claim 14 of the '930 Patent recites "a domed configuration" and "a base portion having a domed configuration." *See* Ex[1001] at Claim 14.

115. Claim 14, for example, recites: "a base portion having a domed configuration . . . " Ex[1001] at Claim 14 (emphasis added).

116. I understand that Petitioner construes this term to mean "having a rounded shape in profile." Ex[1018] at 17.

117. I understand that Patent Owner alleges this term to mean "wide circular base with an arc-shaped cross-sectional profile." *Id.*

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118. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "a domed configuration / a base portion having a domed configuration." Except where noted below, my analysis applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

E. "a teat portion having a variable wall thickness" ('930 Patent Claim 14)

119. Claim 14 of the '930 Patent recites "a teat portion having a variable wall thickness." *See* Ex[1001] at Claim 14.

120. Claim 14, for example, recites: "a teat portion having a variable wall thickness including an aperture. . . " Ex[1001] at Claim 14 (emphasis added).

121. I understand that Petitioner construes this term to mean "a teat portion having a helical groove." Ex[1018] at 19.

122. I understand that Patent Owner alleges this term should be afforded its plain and ordinary meaning. *Id.*

123. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "a teat portion having a variable wall thickness." Except where noted below, my analysis applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

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F. "at least partially inwardly" ('930 Patent Claim 14)

124. Claim 14 of the '930 Patent recites "a teat portion having a variable wall thickness." *See* Ex[1001] at Claim 14.

125. Claim 14, for example, recites: "a one-way inlet valve . . . (iv) disposed at least partially inwardly from the collar . . ." Ex[1001] at Claim 14 (emphasis added).

126. I understand that Petitioner construes this term to be indefinite under 35 U.S.C. § 112(b). Ex[1018] at 20.

127. I understand that Patent Owner alleges this term should be afforded its plain and ordinary meaning. *Id.*

128. I previously provided an opinion on the correct construction afforded "at least partially inwardly" in connection with the district court litigation. Specifically, after reviewing the claim language, specification, and the prosecution history of the '930 Patent, it is my opinion that "at least partially inwardly" is indefinite under 35 U.S.C. § 112(b). Ex[1020]. My opinions expressed in this expert declaration are merely intended with respect to the validity of '930 and '244 Patents with regard to anticipation and/or obviousness. They are not intended to represent my opinion on the validity of the claims under 35 U.S.C. § 112(b), nor do they represent an admission or waiver of Petitioner's defenses in the related litigation or my opinions expressed in support thereof. *See* Ex[1018]; Ex[1020].

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129. For purposes of this proceeding, I apply Patent Owner's proposed construction that this term should be afforded its plain and ordinary meaning. As noted below, under my analysis of Patent Owner's proposed construction of "at least partially inwardly" the grounds below render the claims anticipated/obvious.

G. "flex region" ('244 Patent Claim 21)

130. Claim 21 of the '244 Patent recites "flex region." *See* Ex[1003] at Claim 21.

131. Claim 21, for example, recites: "a flex region configured to allow flex of the mouthpiece towards and away from a lower portion of the nipple . . . " Ex[1003] at Claim 21 (emphasis added).

132. I understand that Petitioner construes this term to mean "a region having characteristics, e.g., groves or channels, specifically designed to enable flexing." Ex[1003] at 21.

133. I understand that Patent Owner alleges this term to mean "a region having surface characteristics that control flexing." *Id.*

134. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "flex region." Except where noted below, my analysis applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

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H. "mouthpiece" ('244 Patent Claims 21, 24, 26)

135. Claims 21, 24, and 26 of the '244 Patent recites "mouthpiece." *See* Ex[1003] at Claim 21, 24, 26.

136. Claim 21, for example, recites: "a flex region configured to allow flex of the ***mouthpiece*** towards and away from a lower portion of the nipple . . . " Ex[1003] at Claim 21 (emphasis added).

137. I understand that Petitioner construes this term to mean "teat portion, i.e., the entire part projecting generally perpendicular to the mouth of the vessel, disposed above the areola portion, which extends into a baby's mouth for feeding." Ex[1018] at 24.

138. I understand that Patent Owner alleges this term to mean "part projecting generally perpendicular to the mouth of the vessel and disposed above the areola portion." *Id.*

139. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "mouthpiece." Except where noted below, my analysis applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

I. "flex of the mouthpiece towards and away from a lower portion of the nipple" ('244 Patent Claim 21)

140. Claim 21 of the '244 Patent recites "flex of the mouthpiece towards and away from a lower portion of the nipple." *See* Ex[1003] at Claim 21.

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141. Claim 21, for example, recites: "a flex region configured to allow ***flex of the mouthpiece towards and away from a lower portion of the nipple*** . . . " Ex[1003] at Claim 21 (emphasis added).

142. I understand that Petitioner construes this term to mean "up and down movement of the mouthpiece relative to a lower portion of the nipple." Ex[1018] at 25.

143. I understand that Patent Owner alleges this term should be afforded its plain and ordinary meaning. *Id.*

144. For purposes of this proceeding, I offer no opinion with regard to the correct construction of "flex of the mouthpiece towards and away from a lower portion of the nipple." Except where noted below, my analysis applies to both Petitioner's and Patent Owner's proposed constructions, and under either construction the grounds render the claims anticipated/obvious.

IX. Summary of the Prior Art

145. There are many patents and publications which constitute prior art to the '930 and '244 Patents. I have reviewed and considered all of the following prior art patent and printed publications, which I believe were all publicly available or filed with the USPTO prior to June 29, 2004, the earliest priority date claimed on the face of the '930 and '244 Patents. A description of these references follows.

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Meyers was cited, but not relied upon, by the USPTO during prosecution of the '244 Patent. *See* Ex[1001] at (56) (References Cited).

A. Meyers

146. U.S. Patent No. 6,032,810 ("Meyers") was filed July 17, 1997 and issued March 7, 2000. Ex[1006] at 1. *Meyers* qualifies as prior art at least because it was published more than one year prior to the earliest effective priority date of the '930 Patent. 35 U.S.C. §§ 102(a) and (b).

147. *Meyers* discloses a one-piece, integral nipple/collar unit for use in conjunction with nurser bottles. Ex[1006] at 1:39-41, 3:1-3. Nipple 6 has an upper portion 25 and base area 26 molded over collar 2. *Id.* at 3:66-4:3. Nipple 6 covers the entire exterior side 3 of collar 4. *Id.* at 4:14-16. The collar includes a fastener 5 such as conventional threads on the interior surface 4 of the collar 2. Rigid collar 2 "includes at least one interlocking portion…shaped to physically capture a portion of nipple 6 to ensure a secure interconnection between collar 2 and nipple 6." *Id.* at 3:25-32. U-shaped ring portion 20 of collar 2 assists in forming a leak resistant seal with an associated nurser bottle 10. In particular, flat lowermost surface 24 "assists in forming a leak resistant seal with an associated nurser bottle 10." *Id.* at 3:51-60. "Nipple 6 also includes a flat sealing flange 29…configured to seal against a neck portion 11 of an associated nurser bottle 11 to form a tight liquid seal." *Id.* at 4:6-10. "Vent 35 is in the form of a channel-shaped aperture extending radially outwardly

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along sealing flange 29…[and] permits air to be drawn into the nurser bottle around collar threads 5." Figs. 6-12 illustrate a method of making the one-piece nipple collar 1 using overmolding. *Id.* at 1:67, 4:41-65, Claim 1.

B. *Sepehr*

148. GB Patent No. 2,250,017A ("*Sepehr*") was filed October 31, 1991 and published May 27, 1992. Ex[1007] at 1. *Sepehr* qualifies as prior art at least because it was published more than one year prior to the earliest effective priority date of the '930 Patent. 35 U.S.C. §§ 102(a) and (b).

149. *Sepehr* discloses a teat from which a child can suck liquid from a nursing bottle and an automatic "one-way air inlet valve 2." Ex[1007] at Abs., Claim 2. The valve includes "a concave elongate semi spherical shape with a slit at its dome which can be produced of silicone…in a single mould." *Id.* at 2:13-18. "[S]ince the valve operates on the principal of pressure difference between inside and outside the baby bottle it may be located at any part of the bottle. Alternatively, one or more valves may be produced as integral part(s) of the teat which…can easily be cleaned together with the teat following each use." *Id.* at 2:21-26. As the baby drinks, "vacuum is formed within the bottle resulting in the formation of a pressure difference outside the valve 2 which causes the flow of air through the slit 3 into the bottle, hence, maintains easy flow of milk…during feeding." *Id.* at 3:15-19.

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C. *Ishimaru*

150. JP Patent No. P2001-299877 (Ex[1008], "*Ishimaru*") was filed on April 24, 2000 and published October 30, 2001. Ex[1008] at 1. *Ishimaru* qualifies as prior art at least because it was published more than one year prior to the priority date of the '930 Patent. 35 U.S.C. §§ 102(a) and (b).

151. *Ishimaru* discloses "an artificial nipple which is more similar to the mother's nipple…having a nipple trunk [110] and teat portion [120] protruding from this nipple trunk, and this artificial nipple 100 is constituted in a manner wherein the…teat portion 120 and/or the…nipple trunk 110 is provided with an elongate portion 122, which is more easily extensible than other portions." Ex[1008] at Abs., Fig. 1. "[T]hin walled portions 122, 122…are elongation portions with a thin wall, are formed in a groove-like pattern, for example, at seven annular locations, as sown in Fig. 1." *Id.* at ¶ 41. Thin walled portions can also be formed in "a spiral shape." *Id.* at ¶ 60. Nipple 100 is mounted on a feeding bottle containing milk, and the nipple is inserted into the mouth of the infant who sucks the milk up into the nipple 100. *Id.* at ¶ 43, Fig. 5. "In this state, the tip of the teat portion 120…is in contact with the tip of the sucking fossa 220 of the infant 200" performing a "suckling movement by peristaltic movement of the tongue." *Id.* at ¶ 44. Further, "there is a base portion 112 with a nipple side vent hole, which is a flange portion for connecting to a feeding bottle main body." *Id.* at ¶ 37.

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D. *Kurkjian*

152. U.S. Patent No. 2,093,730 (Ex[1009], "*Kurkjian*") was filed on August 23, 1935 and issued September 21, 1937. Ex[1009] at 1. *Kurkjian* thus qualifies as prior art at least because it was published more than one year prior to the earliest effective priority date of the '930 Patent. 35 U.S.C. §§ 102(a) and (b).

153. *Kurkjian* discloses a "flexible nipple having a vented flexible flange" Ex[1009] at 1:10-11. The nipple comprises a "body portion constituting a neck . . . and preferably annular flange 4." *Id.* at 1:48-53. The body portion of the nipple includes "overhanging shoulder 6 adjacent the point of junction between the body portion 3 and the flange 4." *Id.* at 2:6-9. The flange includes a "single venting aperture 5 and it should be understood that the flange 4 is integral with the body portion 3 of the nipple." *Id.* "It should be understood that as a vacuum is built up in the bottle through the baby sucking upon the nipple or body portion 13 thereof, the flange 14 may flex away from the inner face of the flange 20 of the cap 17 and draw the Upper face of the flange adjacent the vent 15 away from the inner face of the flange 20 of the cap 17 and allow air to pass under the shoulder 16 and between the body portion 13 of the nipple and the edge of the aperture 18, under the under face of the flange 20 of the cap 17, and through the vent opening 15 into the bottle." *Id.* at 2:54-3:10.

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E. *Atkin*

154. U.S. Patent No. 4,613,050 (Ex[1010], "*Atkin*") was filed September 27, 1984 and issued September 23, 1986. Ex[1010] at 1. *Atkin* thus qualifies as prior art at least because it was published more than one year prior to the earliest effective priority date of the '930 Patent. 35 U.S.C. §§ 102(a), (b), and (b).

155. *Atkin* discloses a nipple design to overcomes the problem of "teat collapse, especially in the case of the commonly preferred soft teat" by "arranging for [a] lip [valve] to fit with a small clearance inside the bottle neck…such that when the cap is screwed down, it acts on the teat to deform the annular flange." Ex[1010] at 1:33-35. *Atkin* discloses in Fig. 7A teat 48 screwed loosely on the bottle neck. "[T]eat flange 32 and inner depending lip 34 are undistorted, with the lip 34 spaced with small radial clearance within the next of the bottle." *Id.* at 5:55-65. Fig. 7B "shows the effect of tightening the cap/teat subassembly by screwing the cap [50] further…The annular flange 32 is deformed downwardly at its inner end region 52…, [and i]n consequence, the inner depending lip 34 is turned radially outwardly to engage and seal with the interior wall of the bottle next, as indicated at 54." *Id.* at 5:63-6:9. "The manner in which the depending lip 34 acts as a flap valve, in use of the bottle by a baby, can…be visualized from Figure 7B. External air pressure exists on the…outer side of the lip [34], in space 56, due to free passage of air past the interrupted screwthreads 16, 36 and the radial grooves 33 in the teat flange 32.

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Consequently, if pressure in the bottle…fall[s] due to feed being sucked out through the teat, the lip 34 is deformed inwardly…, i.e. opening in the manner of a flap valve to let air into the bottle." *Id.* at 6:12-23.

X. '930 PATENT GROUND 1: *Meyers* in View of *Sepehr* Renders Claims 14, 16, 17, and 19 Obvious in View of the Knowledge of a Person of Ordinary Skill in the Art

156. As discussed below, *Meyers* in view of *Sepehr* discloses and renders obvious each and every claim limitation of at least Claims 14, 16, 17, and 19 of the '930 Patent. To the extent there are any differences between Claims 14, 16, 17, and 19 of the '930 Patent and the subject matter taught by *Meyers-Sepehr*, those differences would have been obvious to a POSA, and thus, *Meyers-Sepehr* still renders at least Claims 14, 16, 17, and 19 of the '930 Patent obvious in view of the knowledge of a POSA at the time of the purported invention.

157. In reaching this conclusion, I have considered the disclosures of these prior art references, the motivations to combine these references, and the knowledge of a POSA, as discussed below. In my opinion, a POSA reviewing these disclosures prior to the priority date of the patents would have been motivated to design a nipple and collar design similar to the following:

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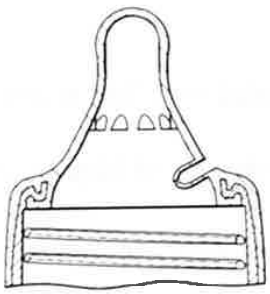


FIG. 1

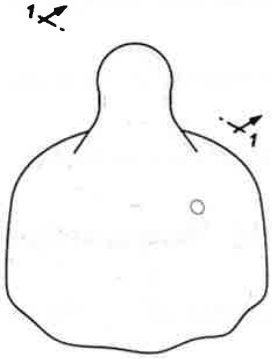


FIG. 2

158. Such a design would have been obvious to a POSA no later than the priority date of the '930 Patent, and would render the challenged claims of the '930 Patent obvious.

A. Motivation For Combining Meyers and *Sepehr*

159. A POSA would have considered *Meyers* and *Sepehr* in the same field of endeavor as the '930 Patent as they all relate to nursing bottles and nipples that attach thereto. Ex[1006] at 1:1-12; Ex[1007] at 1:3-7. A POSA would be motivated to modify or combine the nipples of *Meyers* and *Sepehr* because they both teach analogous solutions for, and describe the benefits of, nipples with air vents and collars to provide a durable, hygienic design that relieves negative pressure, and permits easy cleaning. Ex[1006] at 4:22-35; Ex[1007] at Abs., 2:4-11. Moreover, each reference teaches the same solution: using a rounded nipple with particular design elements that imitate feeding from a human breast, and providing an air vent

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in a location that will reliably vent the interior of the vessel to equalize the pressure between the vessel and the atmosphere. *Id.*

160. A POSA would be further motivated and find it obvious, to the extent not disclosed by *Meyers*, to modify the nipple design of *Meyers* as taught by one or more embodiments of *Sepehr* in order to further improve reliability of the nipple to equalize the pressure. Ex[1006] at 4:22-35; Ex[1007] at 1:9-16, 2:4-11, Fig. 3. Both *Meyers* and *Sepehr* identify the need to equalize the pressure in the bottle to prevent, for example, nipple collapse and colic. Ex[1006] at 4:22-35; Ex[1007] at 1:9-16, 2:4-11. *Sepehr* discloses without effective venting "a vacuum is created within the bottle often causing severe pain in the stomach." Ex[1007] at 1:9-16, 2:4-11.

161. A POSA would have been motivated to combine *Meyers* and *Sepehr* because in addition to each being directed to the same problem and using the same solution, they analogously describe nipple designs with air vents and other means for equalizing the pressure between the interior of the vessel and the atmosphere. Ex[1006] at 4:22-35; Ex[1007] at 1:9-16, 2:4-11. *Meyers* discloses that it's air vent can "assume different shapes, and be positioned at various locations." Ex[1006] at 4:34-35.

162. A POSA reviewing *Meyers* would be motivated to move the location of the vent 35 of *Meyers* from below the collar to above the collar as taught in *Sepehr* to improve *Meyers*' vent to further improve the functionality and reliability of the

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nipple to equalize the pressure by improving the flow of air that can vary in the collar region due to the compressive force applied to the vent passage from connection to the bottle or due to changes to the shape or size or integrity of the vent passage caused by the bottle lip as the parts are secured together or due to changes in the material over time that would impede the reliability of the valve to relieve negative pressure in the nipple without leaking. Ex[1007] at 1:9-16, 2:4-11; Ex[1006] at 4:22-35. Specifically, a POSA reviewing *Sepehr* would be motivated to move the location of the vent above the collar as taught in *Sepehr* to improve *Meyers'* air flow. The one-way air vent communicating directly with the external environment in *Sepehr* is more effective at pulling air into the bottle, than an air vent through the flange covered by the collar pulling in air through the threads as in *Meyers*.

163. A POSA would be further motivated and find it obvious, to the extent not disclosed by *Meyers*, to modify the nipple design of *Meyers* such that the air valve is placed above the collar as taught by *Sepehr* in order to improve cleaning and maintenance of the nipple. Ex[1006] at 1:64-2:6, 5:29-34; Ex[1007] at 3:21-24, Fig. 3. Both *Meyers* and *Sepehr* teach the importance and inconvenience of cleaning and disinfecting the nipple, for example by dissembling the nipple from the collar, and the risk of contamination during this process. Ex[1006] at 1:12-28, 1:64-2:6, 5:29-34; Ex[1007] at 2:20-26, 3:21-24. A POSA reading *Meyers* in view of *Sepehr* would be motivated to locate the vent above the collar, e.g., in the nipple, such that "it can

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easily be boiled and hygienically cleaned following each use." Ex[1007] at 2:20-26, 3:21-24. As disclosed by *Sepehr*, A POSA would understand moving the vent would allow for "low cost of production and can easily be cleaned together with the teat following each use." Ex[1007] at 2:20-26.

164. A POSA would have therefore understood that incorporating elements of the nipple, collar, and vessel of *Meyers* with the air valve of *Sepehr*, would provide a wide, curved nipple attachment with a multi-diameter vessel that would result in an ergonomic, easy-to clean, and aesthetically pleasing nipple and vessel. Such a combination would further improve the design and goals to provide easy cleaning, prevent nipple collapse, and provide a breast-like appearance.

165. The example combinations and modifications described represent a known, finite number of identified predictable solutions to solve the problem of designing a nipple that (1) equalizes the pressure in the bottle to prevent, for example, nipple collapse and colic, and (2) is hygienic and can be easily cleaned. Ex[1006] at 1:12-28, 1:64-2:6, 4:31-35, 5:29-34; Ex[1007] at 1:9-16, 2:4-11, 2:20-26, 3:21-24. A POSA reading *Meyers* and *Sepehr* would be motivated to combine and substitute these familiar elements according to known methods to yield predictable results. A POSA would expect that modifying *Meyers*' nipple in view of *Sepehr* would provide a more reliable and more hygienic solution to equalize the

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pressure in the bottle and provides improved protection against leakage of fluid out of the bottle.

166. Moreover, a POSA would have had a reasonable expectation of success in combining these nipples because each nipple would work as in their respective disclosures, and the references demonstrate that a POSA could have combined the disclosed features with reasonable expectation of success in doing so. Therefore, a POSA would have been motivated to combine the nipple and vessel of *Meyers* with the modifications to a nipple and vessels taught by *Sepehr*.

B. Claim 14

(i) [14.PRE]: A feeding bottle comprising:

167. To the extent the preamble is limiting, it is taught by *Meyers* or rendered obvious by the *Meyers-Sepehr* combination.

168. *Meyers* discloses a feeding bottle. Specifically, *Meyers* discloses a "nipple/collar" which is "specifically adapted for use with a nurser bottle." Ex[1006] at 3:1-7, Abs., 1:34-38, Fig. 14. Figure 14 reproduced here shows the nipple/collar as "an enlarged fragmentary, longitudinal cross-sectional view of the nipple/collar and an associated nurser bottle." *Id.* at 2:43-45, 3:1-7

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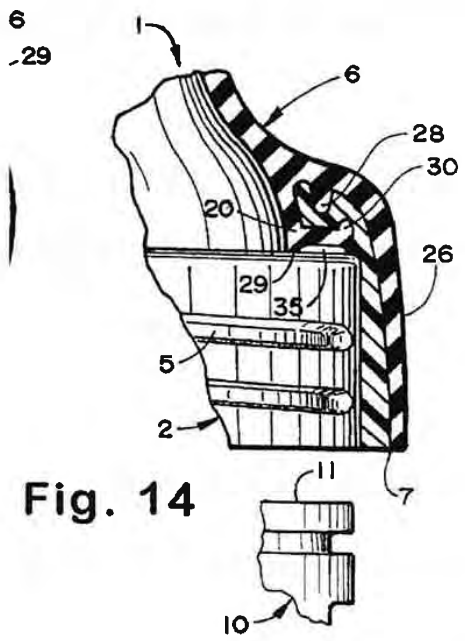


Fig. 14

Ex[1006] at Fig. 14, showing nipple/collar 1 and associated nursing bottle 10.

169. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(ii) [14.A]: a) a vessel having an open top,

170. This limitation is taught by *Meyers* or rendered obvious by the *Meyers-Sepehr* combination.

171. *Meyers* discloses a vessel having an open top. Specifically, *Meyers* discloses a "nursing bottle" to be used with an associated "nipple/collar." Ex[1006] at 3:1-7, 3:15-18, Fig. 14. The "nursing bottle" is disclosed to be a "container" and a type of "drinking vessel," which a POSA understands to have an open top. *Id.* at 3:1-7, 3:13-22.

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172. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(iii) [14.B]: b) a collar having an upper rim and a lower rim comprising: an internally threaded inner surface,

173. This limitation is taught by *Meyers* or rendered obvious by the *Meyers-Sepehr* combination.

174. *Meyers* discloses a collar having an upper rim and a lower rim comprising an internally threaded inner surface. Specifically, *Meyers* discloses its "nipple/collar" as "include[ing] a rigid collar having an exterior surface and an interior surface." Ex[1006] at Abs., 3:24-31, 3:47, 4:29-30, Figs. 2, 3, 9, 14. *Meyers* also discloses that the "collar 2 (FIGS. 2-4) is constructed from a rigid synthetic material, and in the illustrated example, ***fastener 5 comprises conventional threads disposed on the interior surface 4 of collar 2***." *Id.* at 3:24-31 (emphasis added), 1:7-10 ("nipple that is detachably mounted on the neck of a nurser bottle by a separate, ***internally threaded collar***" (emphasis added)). *Meyers* also discloses that this "collar 2 includes ***a lower edge 15***" as well as "***an upper edge 18***." *Id.* at 3:41-45 (emphasis added). Figures 2 and 5 here show the upper edge and lower edge, respectively, as well as visually present the collar's internally threaded inner surface.

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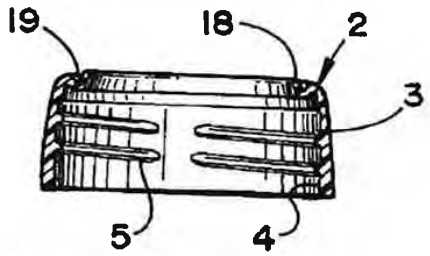


Fig. 2

Ex[1006] at Fig. 2, showing the upper edge 18 of collar 2 as well as the internally threaded inner surface (fastener 5).

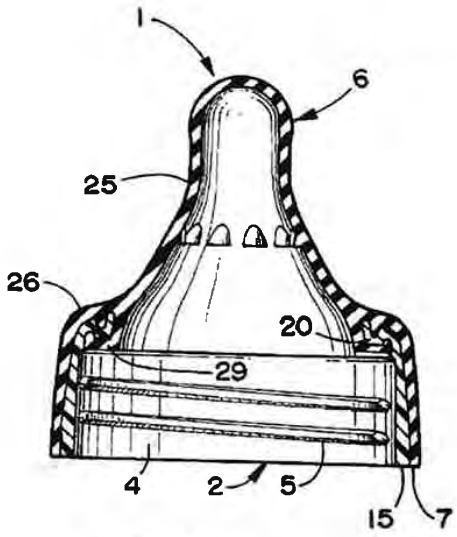


Fig. 5

175. Ex[1006] at Fig. 5, showing lower edge 15 of collar 2 as well as the internally threaded inner surface (fastener 5).

176. For at least these reasons, this claim limitation is rendered obvious by Meyers-*Sepehr*.

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(iv) [14.C]: an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, and wherein said sloping portion comprises a majority of the collar's outermost surface

177. This limitation is taught by *Meyers* or rendered obvious by the Meyers-*Sepehr* combination.

178. *Meyers* discloses that the collar has an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, and wherein the sloping portion comprises a majority of the collar's outermost surface. Specifically, *Meyers* discloses that its "rigid collar" has "an exterior surface." Ex[1006] at Abs., 3:24-31. Figures 2, 3, 5, 6, 9, and 14 all show the collar or portions thereof wherein the external surface of the collar is sloping downwardly and outwardly. Figures 2 and 9 are shown here for example:

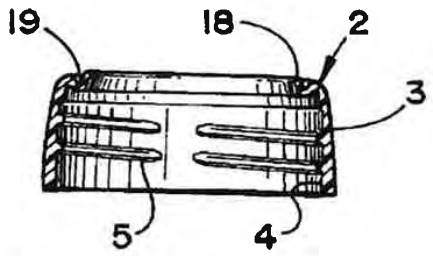


Fig. 2

Ex[1006] at Fig. 2, showing the exterior surface 3 of collar 2 and how it is sloped down and outward.

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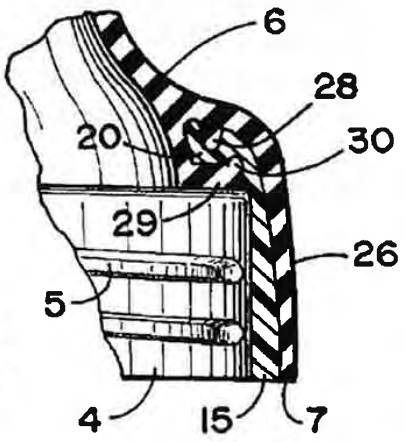


Fig. 9

Ex[1006] at Fig. 9, showing collar 4 comprised of its exterior surface shown to be sloped down and outward.

179. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(v) [14.D]: c) a nipple having: a teat portion having a variable wall thickness including an aperture,

180. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination.

181. *Meyers* discloses a nipple having a teat portion having a variable wall thickness and including an aperture. Specifically, *Meyers* discloses a "flexible nipple" which "includes a conventional shaped upper portion 25, and a uniquely shaped base area 26, which is molded over collar 2." Ex[1006] at 3:66-4:1, Figs. 1, 6.

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182. A POSA would understand that the nipple described by *Meyers* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively, under either Petitioner or Patent Owner's proposed construction. These portions are annotated on Figure 5 below. Specifically for [14.D], a POSA would consider that that uppermost portion of the nipple as described in *Meyers* constitutes a "teat" portion under Patent Owner's construction relating to this term. Both constructions agree that the teat portion is disposed above the areola portion and is generally perpendicularly upward relative to the mouth of the vessel, which in this case is the upper, open end of the bottle disclosed by *Meyers*. A POSA would consider that the upper portion of *Meyers*' nipple constitutes a teat portion.

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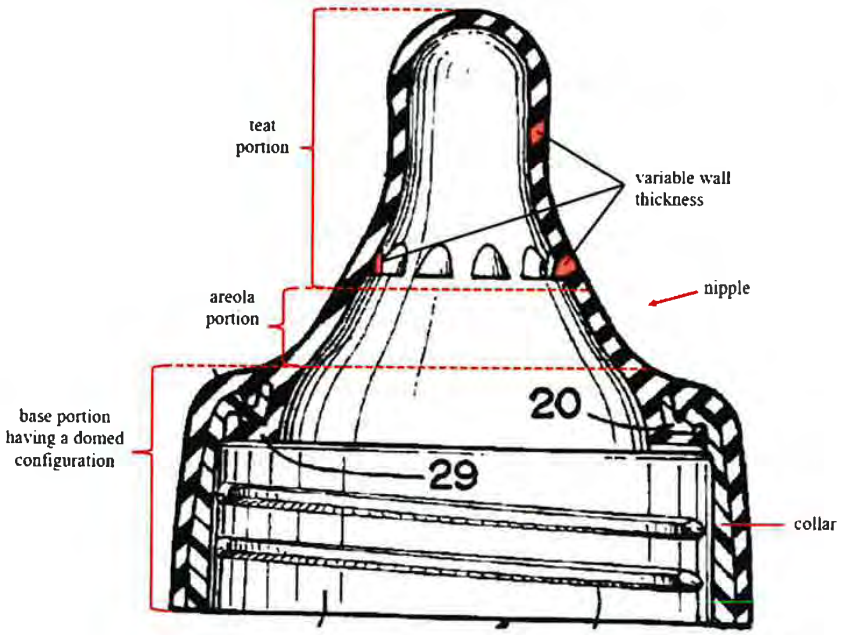


FIG. 5 of Meyers
Patent Owner's Construction

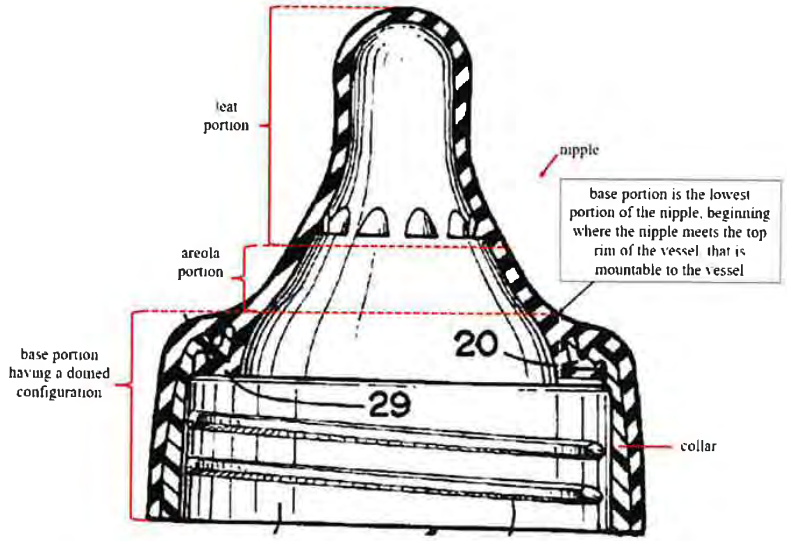


FIG. 5 of Meyers
Petitioner's Construction

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Ex[1006] at Fig. 5, showing nipple 6 and annotated with the claimed teat, base, and areola portions.

183. *Meyers* further discloses that this teat portion has a variable thickness under Patent Owner's construction—that variable thickness is entitled its plain and ordinary meaning. *Meyers* discloses that its nipple may include internally raised bumps positioned, as shown on Figure 5, in a ring around the portion of the nipple that a POSA would consider to be the teat portion. *Id.* at Fig. 5. Figure 6 additionally shows a varying thickness of the nipple wall (Figure 6 is presented to illustrate a nipple mold, whereby the mold cavity 46 illustrates where the nipple mold material would form the resulting nipple. *Id.* at Fig. 6, 4:41-5:1. A POSA would understand these illustrations to indicate that the nipple has a variable wall thickness, this variable thickness present in the portion of the nipple corresponding to the teat portion. *Id.*

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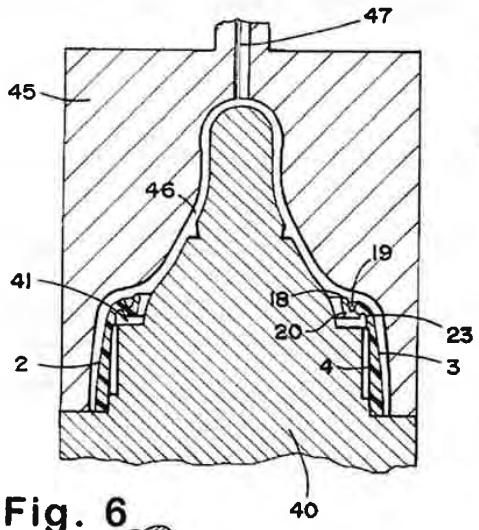


Fig. 6

184. Finally, *Meyers* discloses that the teat portion has an aperture: "At least one orifice 50 is then formed in the upper portion 25 of nipple 6" through which fluid will flow. *Id.* at 5:7-12, 1:21-27, Figs. 1, 10-13.

185. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(vi) [14.E]: a base portion having a domed configuration,

186. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination.

187. *Meyers* discloses that the nipple has a base portion having a domed configuration. Specifically, *Meyers* discloses a "flexible nipple" which "includes a conventional shaped upper portion 25, and a ***uniquely shaped base area 26***, which is molded over collar 2." Ex[1006] at 3:66-4:1 (emphasis added), Figs. 1, 6.

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188. As previously explained, a POSA would understand that the nipple described by *Meyers* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively. These portions are annotated on Figure 5 below. Specifically for [14.E], a POSA would consider that that lower portion of the nipple as described in *Meyers* constitutes a "base portion" under Patent Owner's construction relating to this term.

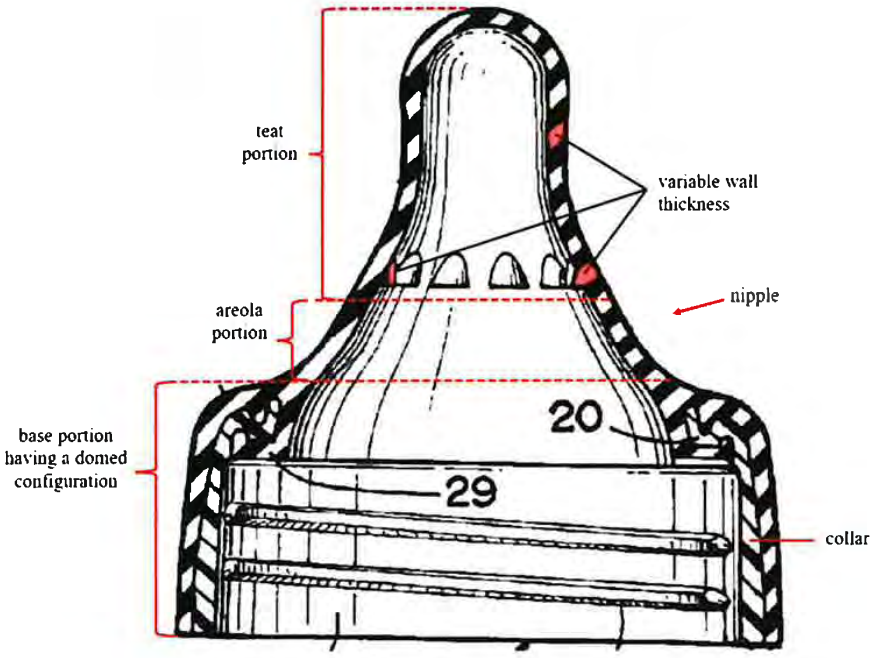


FIG. 5 of Meyers
Patent Owner's Construction

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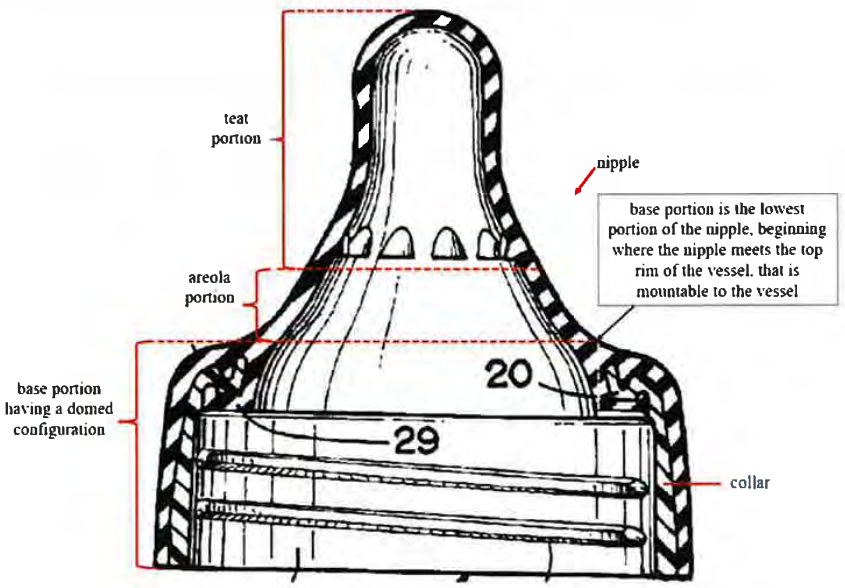


FIG. 5 of Meyers
Petitioner's Construction

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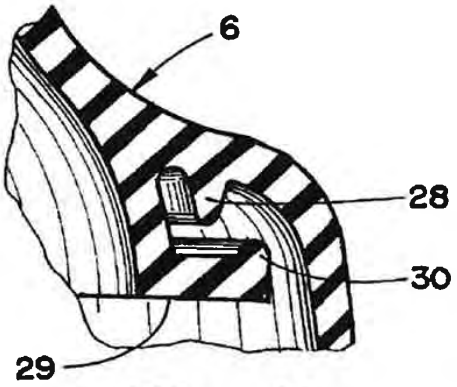


Fig. 7

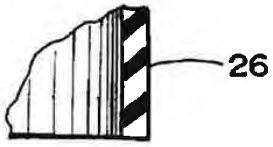


Fig. 8

Ex[1006] at Figs. 7 and 8, showing upper and lower portions of the base area 26 of the nipple 6.

189. Both constructions agree that the base portion is the lowest portion of the nipple, whereas Petitioner's construction additionally requires that the base portion is mountable to the vessel (bottle) and begins where the nipple meets the top portion of the vessel. *See supra* § VIII.C. *Meyers* discloses that the nipple is mountable to the bottle. Ex[1006] at 1:7-10 ("nipple that is detachably mounted on the neck of a nurser bottle by a separate, internally threaded collar"), 3:66-4:13

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("illustrated nipple 6 … is configured to seal against a neck portion 11 of an associated nurser bottle 10 to form a tight liquid seal therebetween." (emphasis added)). *Meyers* thus discloses that the base portion begins where the nipple meets the top portion of the vessel.

190. *Meyers* further discloses that this base portion has a domed configuration under both Petitioner's and Patent Owner's constructions of the term. Under Petitioner's construction—that the base has a rounded configuration in profile—*Meyers* shows in Figures 5, 6, and 7 above that the portion identified as what a POSA would consider the "base" portion is rounded in profile. *Id.* at Figs. 1, 5, 6, 7.

191. Under Patent Owner's construction—that the base portion is a wide circular base with an arc-shaped cross-section—*Meyers* shows that the combined "upper portion" and "lower portion" of its "base area 26" is wider than the portions of the nipple above it. *Id.* These same figures additionally show that this base portion's cross-section is arc-shaped. *Id.* Finally, as best illustrated in Figure 12, this base portion, and indeed the entire top-down view of the nipple itself, is circular in *Meyers*.

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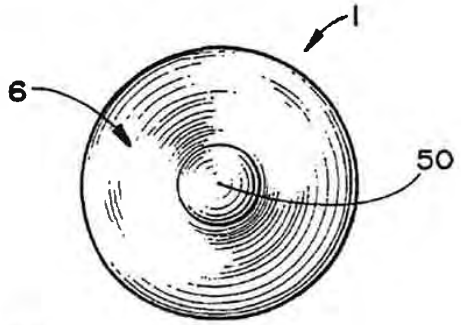


Fig. 12

Ex[1006] at Fig. 12, showing circular nipple 6, the widest our outermost portion corresponding to the base portion.

192. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(vii) [14.F]: an areola portion between the teat portion and the base portion,

193. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination.

194. *Meyers* discloses an areola portion between the teat portion and the base portion. Specifically, *Meyers* discloses a "flexible nipple" which "includes a conventional shaped upper portion 25, and a uniquely shaped base area 26, which is molded over collar 2." Ex[1006] at 3:66-4:1, Figs. 1, 6.

195. As described above, a POSA would understand that the nipple described by *Meyers* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively. These

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portions are illustrated on Figure 5 below. Specifically for [14.F], a POSA would consider that that middle portion of the nipple as described in *Meyers* constitutes an "areola" portion under either Petitioner or Patent Owner's constructions relating to this term.

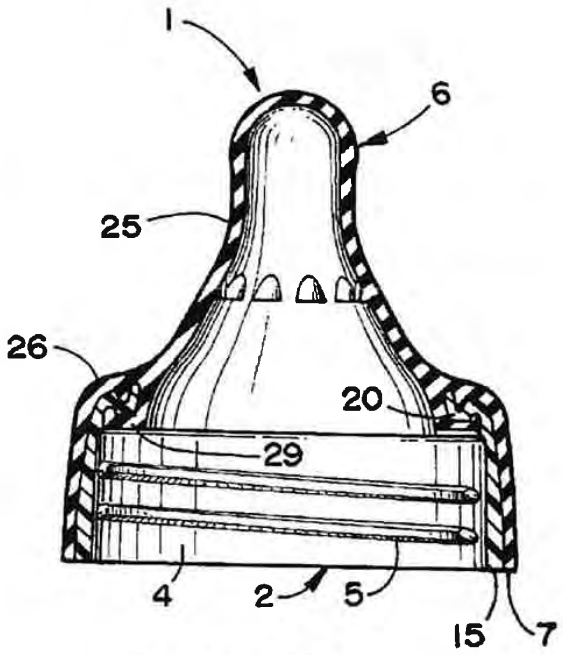


Fig. 5

196. Both constructions agree that the areola portion extends beyond the bottom of the teat portion—as shown above, a POSA would understand that *Meyers* discloses that the areola portion is disposed just below the teat portion and extends from it. Alternatively, under Petitioner's construction—that the areola portion has a different characteristic and functionality from the rest of the nipple—*Meyers* shows in, e.g., Figure 5, that the portion considered by a POSA to be the areola

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portion has a different cross-sectional slope than the other two portions of the nipple. *Id.* at Figs. 1, 5, 6, 10.

197. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(viii) [14.G]: a flange depending from the base portion,

198. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination.

199. *Meyers* discloses a flange depending from the base portion of the nipple. Specifically, *Meyers* states that the "nipple 6 also includes a ***flat sealing flange 29***, which extends in a radially outward direction, overlying collar surface 24, and is configured to seal against a neck portion 11 of an associated nurser bottle 10 to form a tight liquid seal therebetween." *Id.* at 4:1-13 (emphasis added). As explained above, a POSA would understand that the nipple described by *Meyers* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively. These portions are illustrated on Figure 5 below.

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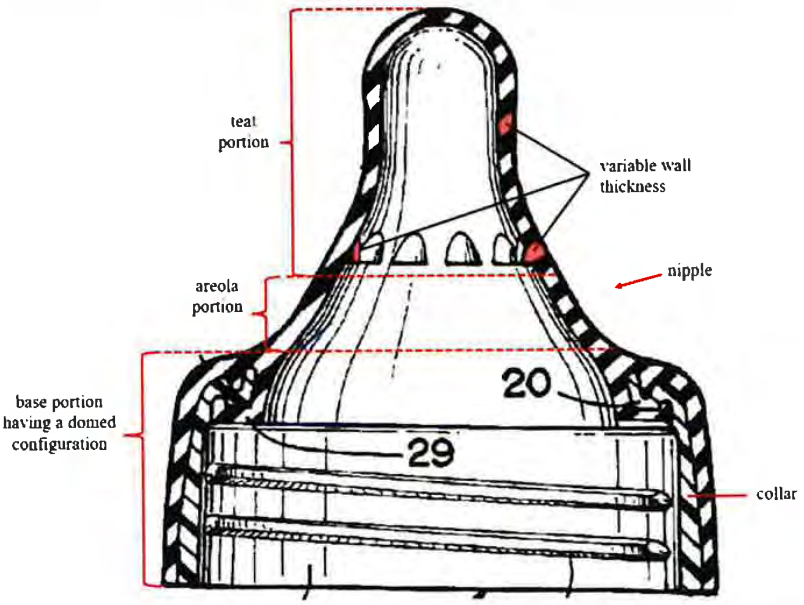


FIG. 5 of Meyers
Patent Owner's Construction

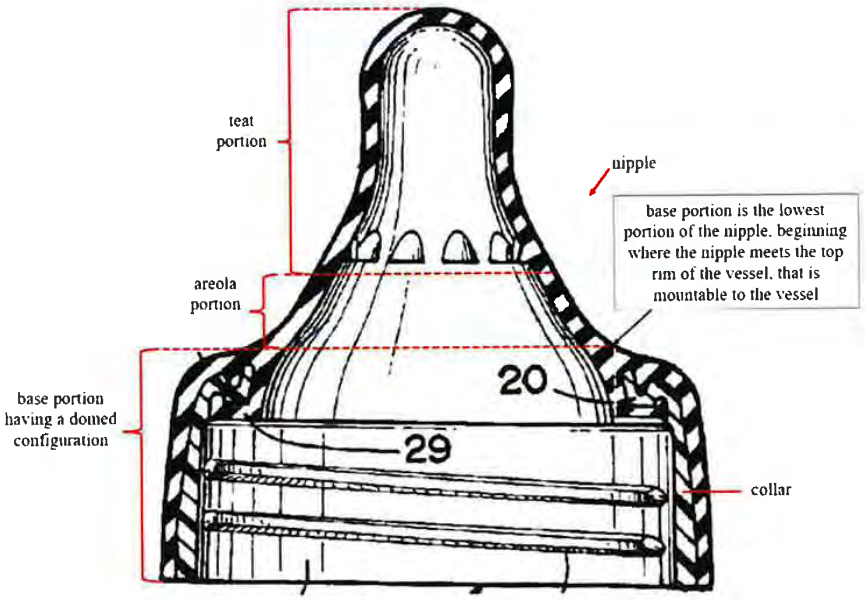


FIG. 5 of Meyers
Petitioner's Construction

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200. As can be seen in the above annotated Figure 5 and additionally in Figure 7 below, flange 29 depends from what a POSA would consider to be the base portion. *Meyers* states that "The outermost portion of sealing flange 29 includes an upstanding rim or bead 30." *Id.* at 4:1-13. *Meyers* further discloses that this flange "is closely received in channel 23 of collar 2 to further physically interconnect collar 2 and nipple 6." *Id.*

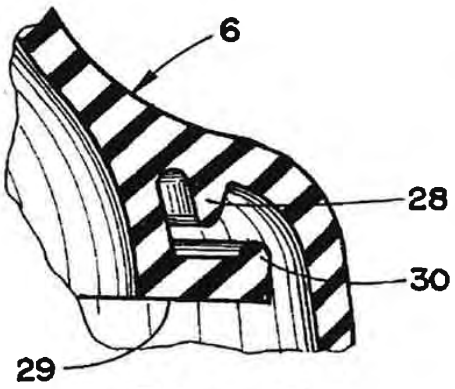


Fig. 7

Ex[1006] at Fig. 7, showing upper portion of the base area 26 of the nipple 6 with flange 29 and its bead 30.

201. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(ix) [14.H]: a one-way air inlet valve (i) extending through said base,

202. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination. As explained in §X.A above, a POSA would have

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been motivated to modify *Meyers* based on the teachings of *Sepehr*, such that the one-way air valve extends through the base just outside of the collar.

203. *Meyers* discloses an air inlet. Specifically, *Meyers* discloses that its nipple/collar design, "a vent 35 may be provided on the interior of nipple/collar 1 to permit air to be sucked back into the nurser after dispensing." Ex[1006] at 4:22-29. *Meyers* further discloses that "[v]ent 35 permits ambient air to be drawn back into the nurser bottle around collar threads 5." *Id.* (emphasis added). This, along with the previous analysis as to what a POSA would consider to be the claimed "base portion" of *Meyers*' nipple (see above and annotated Figure 5), tells us that the disclosed venting aperture is disposed through the base portion of the nipple. This is consistent with what is shown in, for example, Figure 13 below—that the nipple includes a vent. *Id.* at Figs. 13, 14.

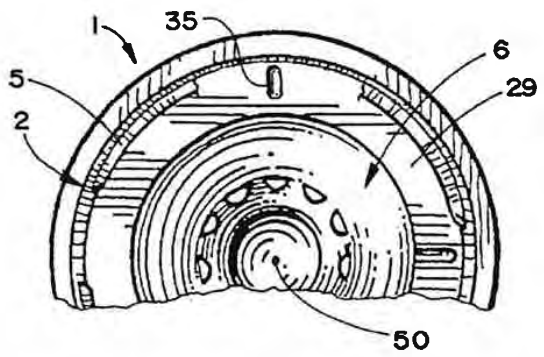


Fig. 13

Ex[1006] at Fig. 13, showing vent 35 extending through nipple 6.

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204. *Meyers* discloses that this venting aperture allows air into the bottle during operation: "***[v]ent 35 permits ambient air to be drawn back into the nurser bottle*** around collar threads 5." *Id.* at 4:22-29 (emphasis added). It would be obvious to modify the teachings of *Meyers* to introduce teachings from *Sepehr* to arrive at a nipple having a one-way air inlet valve disposed through the nipple's base portion. *See supra* §X.A.

205. *Sepehr* discloses a one-way air inlet valve. Specifically, *Sepehr* discloses that its design includes a "***one-way air inlet valve*** 2 operable automatically." Ex[1007] at Abs. (emphasis added). *Sepehr* further explains: "The valve comprises a flexible membrane having an opening 3 which ***admits air into the container*** when the air pressure within the container becomes depressed relative to the external air pressure, as a result of the feeding action of the child." *Id.* at Abs. (emphasis added), 1:3-7, 2:4-11, 2:13-18, 2:32-3:6, 3:8-19 ("automatic valve 2 produced as an integral part of teat 1 which has a slit 3 across the valve 2 in order to allow the air to enter the bottle"), 3:26-4:2, 4:8-12. *Sepehr* discloses that this "valve may be integral with the teat or a separate component removable from teat or bottle," and *Sepehr* additionally shows this valve in Figure 1, located slightly above the flange of its disclosed nipple. *Id.* at Abs., Figs. 1-4. This is indicating that it is disposed, on a comparable nipple taught by *Meyers*, to be extending through the

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portion of the nipple which a POSA would understand to be the claimed "base portion." *Id.* at Abs.

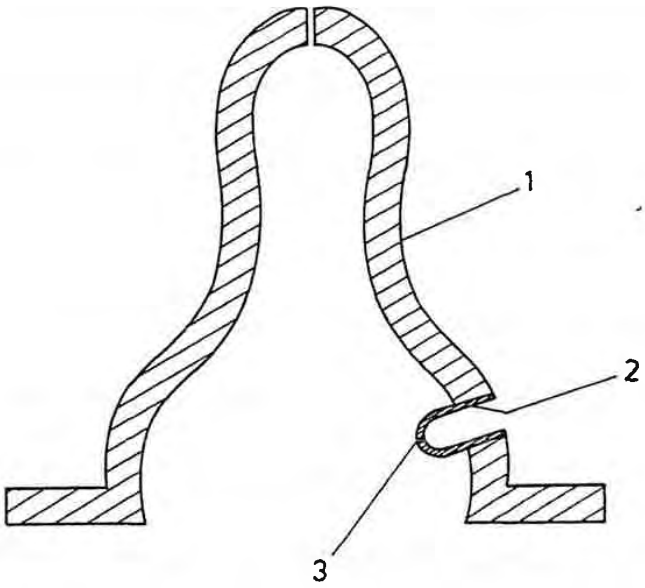


FIG. 1

Ex[1007] at Fig. 1, showing one-way air inlet valve 2 with slit 3.

206. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(x) [14.I]: (ii) projecting downwardly from the base portion,

207. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination. As explained in §X.A above, a POSA would have been motivated to modify *Meyers* based on the teachings of *Sepehr*, such that the one-way air valve projects downwardly from the base just outside of the collar.

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208. *Meyers* discloses that a "[v]ent 35 is in the form of a channel-shaped aperture." Ex[1006] at 4:21-29. *Meyers* states that "[v]ent 35 permits ambient air to be drawn back into the nurser bottle." *Id.* at 4:43-35. A POSA would find it obvious, to the extent not explicitly taught by *Meyers*, to position the vent such that it projects downwardly as taught by *Sepehr*; the motivation to do this is taught simply by *Meyers* itself in disclosing that "[v]ent 35 can also assume different shapes, and be positioned at various locations." *Id.* at 4:34-35. *Sepehr* discloses that its "***one-way air inlet valve*** 2" is positioned downwardly through said base, as can be seen in, for example, *Sepehr's* Figure 1 in above. Ex[1007] at Fig. 1, Abs. As explained previously, a POSA would be motivated to incorporate the one-way air vent disclosed by *Sepehr* into the nipple taught by *Meyers*. *See supra* §X.A.

209. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(xi) [14.J]: (iii) having a length that does not extend past the collar's lower rim, and

210. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination. As explained in §X.A above, a POSA would have been motivated to modify *Meyers* based on the teachings of *Sepehr*, such that the one-way air valve has a length that does not extend past the collar's lower rim.

211. *Meyers* discloses that the air inlet has a length that does not extend past the collar's lower rim. As can be seen, for example, in Figure 14 below, the

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disclosed "vent 35" is shown to have a length that does not extend past the lower rim of the collar. *Sepehr* discloses that its "***one-way air inlet valve*** 2" has a length that does not extend past the collar's lower rim, as shown in *Sepehr's* Figure 1 above. Ex[1007] at Fig. 1, Abs.

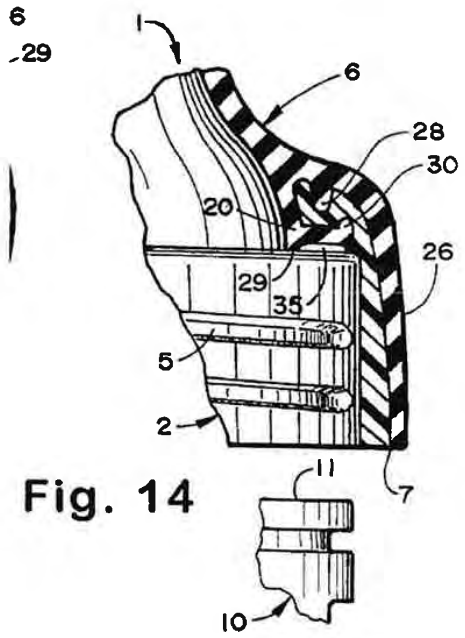


Fig. 14

Ex[1006] at Fig. 14, showing nipple/collar 1 with flange 29 and vent 35, and additionally showing the position of collar 2.

212. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(xii) [14.K]: (iv) disposed at least partially inwardly from the collar; the flange being arranged to seal with the vessel

213. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination. As explained in §X.A above, a POSA would have

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been motivated to modify *Meyers* based on the teachings of *Sepehr*, such that the one-way air valve is disposed at least partially inwardly from the collar.

214. *Meyers* discloses that the inlet valve is disposed at least partially inwardly from the collar, and where the flange is arranged to seal with the vessel. As can be seen, for example, in Figure 14 below, the disclosed "vent 35" is shown to be disposed radially inwardly from the collar 2, particularly the outer portion of the collar 2. Ex[1006] at 4:21-29, Fig. 14. *Sepehr* also discloses that its "***one-way air inlet valve*** 2" is disposed at inwardly from the position of the collar, as shown in *Sepehr's* Figure 1 above. Ex[1007] at Fig. 1, Abs.

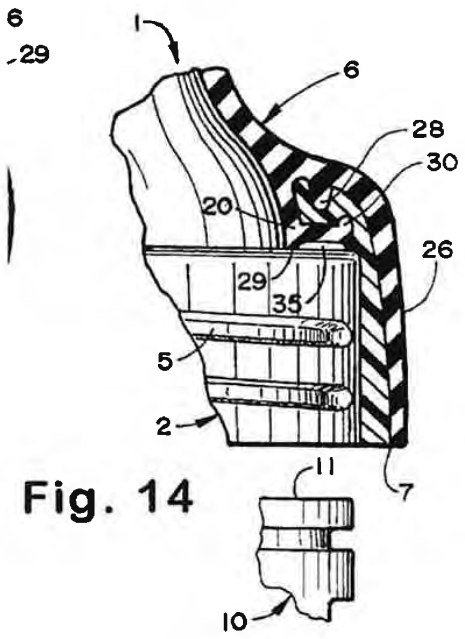


Fig. 14

Ex[1006] at Fig. 14, showing nipple/collar 1 with flange 29 and vent 35, and additionally showing the position of collar 2.

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215. *Meyers* additionally discloses that the flange is arranged to seal with the vessel. *Meyers* discloses that its nipple includes a "***sealing flange 29***" that is "configured to ***seal against a neck portion 11 of an associated nurser bottle 10 to form a tight liquid seal therebetween***." Ex[1006] at 4:6-10, Fig. 14.

216. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(xiii) [14.L]: d) the nipple being secured to the collar by sealingly capturing an inner edge of the collar between the base portion and the flange; and

217. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the Meyers-*Sepehr* combination.

218. *Meyers* discloses that the nipple is secured to the collar by "sealingly" capturing an inner edge of the collar between the base portion and the flange. Specifically, *Meyers* discloses that its "nipple/collar" includes a "rigid collar" and "flexible nipple." Ex[1006] at Abs., 3:1-12. *Meyers* describes a secure connection between nipple and collar: "the nipple material is received into upper groove 19 and arcuate channel 23, so as to ***physically capture the nipple 6 on the collar 2*** to ensure a ***secure interconnection*** therebetween." *Id.* at 3:61-65, 5:1-6, Figs. 5, 9, 14. The "arcuate channel 23" of the collar is "formed on the collar interior side 4," and the "upper groove 19" of the collar is "provided along the upper edge 18 of collar 2." *Id.* at 3:47-65. Further, *Meyer* discloses that "[t]he outermost portion of sealing

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flange 29 [of the nipple] includes an upstanding rim or bead 30 that is closely received in ***channel 23 of collar 2 to further physically interconnect collar 2 and nipple 6***." *Id.* at 3:66-4:14 (emphasis added). The interconnection described is shown, for example, in Figure 14 below:

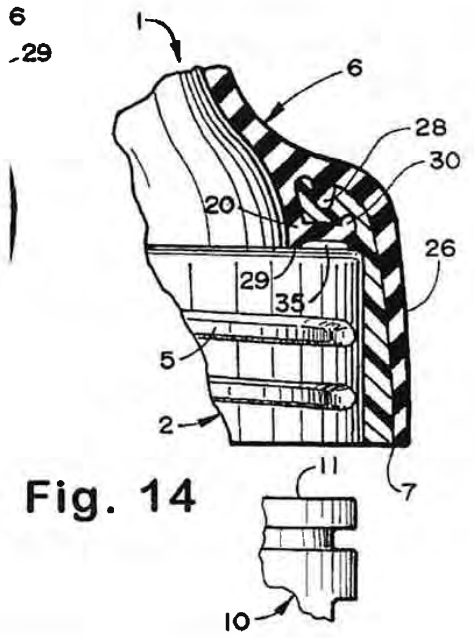


Fig. 14

Ex[1006] at Fig. 14, showing nipple/collar 1 with flange 29 and base portion 26 capturing the collar between them.

219. *Meyers*' Figures 5, 6, 7, 9, 14 and 15 also show this contact between the nipple's flange and the collar. *Id.* at Figs. 5-7, 9, 14-15. *Meyers* shows in Figure 14 above that just as its nipple has a protruding bead ("bead 30") and flange ("flange 29") clamped underneath the flange of the collar, the collar's flange is likewise secured by means of being captured between this flange 29 of the nipple and the

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radially outer portion of the nipple (which includes bead 28 as numbered in Figure 14 above). *Id.*

220. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

(xiv) [14.M]: e) the nipple being secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel.

221. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination.

222. *Meyers* discloses that the nipple is secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel. Specifically, *Meyers* discloses that its "nipple/collar" includes a "rigid collar" and "flexible nipple." Ex[1006] at Abs., 3:1-12. *Meyers* describes a secure connection between nipple and collar: "the nipple material is received into upper groove 19 and arcuate channel 23, so as to ***physically capture the nipple 6 on the collar 2*** to ensure a ***secure interconnection*** therebetween." *Id.* at 3:61-65, 5:1-6, Figs. 5, 9, 14. The "arcuate channel 23" of the collar is "formed on the collar interior side 4," and the "upper groove 19" of the collar is "provided along the upper edge 18 of collar 2." *Id.* at 3:47-65. Further, *Meyers* discloses that "[t]he outermost portion of sealing flange 29 [of the nipple] includes an upstanding rim or bead 30 that is ***closely***

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received in channel 23 of collar 2 ***to further physically interconnect collar 2 and nipple 6***." *Id.* at 3:66-4:14 (emphasis added).

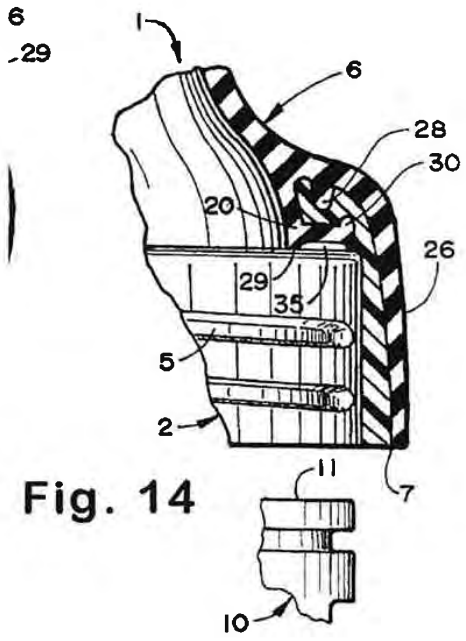


Fig. 14

Ex[1006] at Fig. 14, showing nipple/collar 1 with flange 29.

223. *Meyers* confirms that the nipple is physically sealed against the top of the bottle: "***nipple*** that is detachably ***mounted on the neck of a nurser bottle*** by a separate, internally threaded collar..." *Id.* at 1:7-10, 4:1-13 ("***nipple 6*** also includes a flat sealing flange 29, which extends in a radially outward direction, overlying collar surface 24, and ***is configured to seal against a neck portion 11 of an associated nurser bottle 10*** to form a tight liquid seal therebetween." (emphasis added)).

224. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

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C. Claim 16

(i) [16]: The feeding bottle of claim 14 wherein the open top of the vessel comprises an outwardly threaded vessel neck.

225. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination.

226. *Meyers* discloses wherein the open top of the vessel comprises an outwardly threaded vessel neck. Specifically, *Meyer*s discloses its "nipple/collar" as "include[ing] a rigid collar having an exterior surface and an interior surface." Ex[1006] at Abs., 3:24-31, 3:47, 4:29-30, Figs. 2, 3, 9, 14. *Meyers* also discloses that the "collar 2 (FIGS. 2-4) is constructed from a rigid synthetic material, and in the illustrated example, ***fastener 5 comprises conventional threads disposed on the interior surface 4 of collar 2***." *Id.* at 3:24-31 (emphasis added), 1:7-10 ("nipple that is detachably mounted on the neck of a nurser bottle by a separate, ***internally threaded collar***" (emphasis added)). A POSA would understand that in order for a collar with internal threads to fasten onto the neck of a bottle, the bottle must necessarily have *external* or *outward* threads. *Id.* at 4:51-55 ("the ***threads*** 5 of collar 2, which might interfere with the ***fastening of the same to*** an 55 associated ***nurser bottle***..." (emphasis added)); 1:52-55 (".a collar having an exterior surface and an interior surface with a ***fastening mechanism*** thereon for detachable ***connecting the nipple/collar with an associated nurser bottle***." (emphasis added)).

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227. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

D. Claim 17

(i) [17]: The feeding bottle of claim 14 wherein the air inlet valve comprises a slit opening.

228. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination. As explained in §X.A above, a POSA would have been motivated to modify *Meyers* based on the teachings of *Sepehr*, such that the one-way air valve has a slit opening.

229. *Meyers* discloses an air inlet opening. Specifically, *Meyers* discloses that in its nipple/collar design, its "vent 35 may be provided on the interior of nipple/collar 1 to permit air to be sucked back into the nurser after dispensing." Ex[1006] at 4:22-29. *Meyers* further discloses that "[v]ent 35 is in the form of a ***channel-shaped aperture extending radially outwardly along sealing flange 29*** from a location adjacent the interior side of the sealing flange to a location adjacent the interior side 4 of collar 2" and "[v]ent 35 permits ambient air to be drawn back into the nurser bottle around collar threads 5." *Id.* (emphasis added).

230. *Sepehr* discloses that the air inlet valve comprises a slit opening. *Sepehr* teaches a "***one-way air inlet valve*** 2 operable automatically." Ex[1007] at Abs. (emphasis added). *Sepehr* further explains: "The valve comprises a flexible membrane having an opening 3 which admits air into the container." *Id.* at Abs., 1:3-

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7, 2:4-11, 2:13-18, 2:32-3:6, 3:8-19. *Sepehr* consistently describes this valve as comprising a slit opening: *Id.* at 2:13-18 ("valve … is composed of a concave elongate semi spherical shape with ***a slit*** at its dome" (emphasis added)), 3:8-14 ("automatic ***valve 2*** produced as an integral part of teat 1 which ***has a slit 3 across the valve 2*** in order to allow the air to enter the bottle" (emphasis added)), 3:14-19 ("pressure difference outside the valve 2 which causes the ***flow of air through the slit 3*** into the bottle" (emphasis added)), 3:26-32 ("valve has an air inlet slit"), 3:34-4:2, 4:8-12.

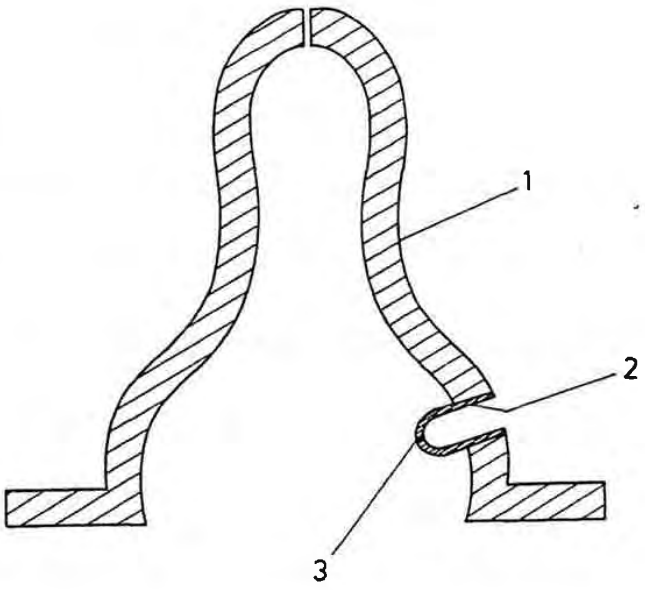


FIG. 1

Ex[1007] at Fig. 1, showing one-way air inlet valve 2 with slit 3.

231. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

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E. Claim 19

(i) [19]: The feeding bottle of claim 14 wherein the vessel comprises an upper body having a first internal diameter and a portion below the upper body having a second, different internal diameter.

232. This limitation is taught by *Meyers* or *Sepehr* or rendered obvious by the *Meyers-Sepehr* combination.

233. *Meyers* discloses the vessel having an upper and lower body with different first and second internal diameters, respectively. Specifically, *Meyers* discloses that its nursing bottle has an upper portion: "a ***neck portion 11*** of an associated nurser bottle." Ex[1006] at 4:1-13. A POSA would understand first that a bottle described as having a neck portion would also have a non-neck, lower portion. *Meyers* contemplates the use of different types of bottles, at least "conventional bottles, reusable and/or disposable nursers, and other similar drinking vessels, including children's training cups and the like" as well as "similar infant and children liquid container designs." *Id.* at 3:14-22. A POSA would understand that various types of bottles have different portions with different internal diameters, and that on many bottles, the neck portion has a smaller internal diameter than the lower portion of the same bottle. Thus, applying the disclosure of *Meyers*, it would be obvious that a bottle has two portions with two different internal diameters.

234. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr*.

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XI. '930 PATENT GROUND 2: *Meyers* in View of *Sepehr* and *Ishimaru* Renders Claims 14, 16, 17, and 19 Obvious in View of the Knowledge of a Person of Ordinary Skill in the Art

235. It is my opinion that claims 14, 16, 17, and 19 are rendered obvious by *Meyers* in View of *Sepehr* and *Ishimaru*. As discussed below, a POSA designing a nipple for use with a nursing bottle would be motivated to combine *Meyers* with *Sepehr* and *Ishimaru*.

236. In reaching this conclusion, I have considered the disclosures of these prior art references, the motivations to combine these references, and the knowledge of a POSA, as discussed below. In my opinion, a POSA reviewing these disclosures prior to the priority date of the patents would have been motivated to design a nipple and collar design similar to the following:

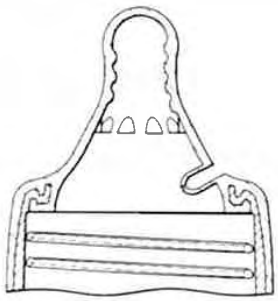


FIG. 1

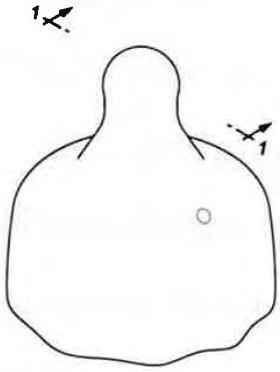


FIG. 2

237. Such a design would have been obvious to a POSA no later than the priority date of the '930 Patent, and would render the challenged claims of the '930 Patent obvious.

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A. Motivation For Combining *Meyers*, *Sepehr*, and *Ishimaru*

238. A POSA would have considered *Ishimaru*, *Meyers*, and *Sepehr* in the same field of endeavor as they all relate to nursing bottles and nipples that attach thereto. Ex[1008] at ¶¶ 01-06; Ex[1006] at 1:1-12; Ex[1007] at 1:3-7. A POSA would be motivated to modify or combine the nipples of *Ishimaru*, *Meyers*, and *Sepehr* because they all teach analogous solutions for, and describe the benefits of, nipples with air vents and collars to provide a durable, hygienic design that relieves negative pressure in the nipple, and permits easy cleaning. Ex[1008] at ¶¶ 19, 48; Ex[1006] at 4:22-35; Ex[1007] at Abs., 2:4-11. Moreover, each reference teaches the same solution: using a rounded nipple with particular design elements that imitate that imitate feeding from a human breast, and providing an air vent in a location that will reliably vent the interior of the vessel to equalize the pressure between the vessel and the atmosphere. *Id.*

239. A POSA would be further motivated and find it obvious, to the extent not disclosed by *Meyers*, to modify the nipple design of *Meyers* as taught by one or more embodiments of *Ishimaru* and *Sepehr* in order to further improve reliability of the nipple to equalize the pressure. Ex[1008] at Abs., ¶¶ 07, 19, 48; Ex[1006] at 4:22-35; Ex[1007] at 1:9-16, 2:4-11, Fig. 3. All of *Ishimaru*, *Meyers*, and *Sepehr* identify the need to equalize the pressure in the bottle to prevent, for example, nipple collapse and colic. Ex[1008] at Abs., ¶¶ 07, 19, 48; Ex[1006] at 4:22-35; Ex[1007]

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at 1:9-16, 2:4-11. *Ishimaru* explains the need for such a design: "Therefore, when the user, e.g. an infant, sucks on the aforesaid teat portion and/or the aforesaid nipple trunk, the artificial nipple is subjected to pressure in the lateral direction. At this time, the internal pressure in the aforesaid beverage space increases, and since the aforesaid elongation portion is formed in the aforesaid teat portion and/or the aforesaid nipple trunk, the pressure acts in the direction of elongation of the artificial nipple in the longitudinal direction, causing the aforesaid teat portion and/or the aforesaid nipple trunk to elongate. Furthermore, because the internal pressure in the aforesaid beverage space increased, the aforesaid teat portion and/or the aforesaid nipple trunk will not collapse even if pressure is applied in the lateral direction of the artificial nipple due to the suckling movement of the infant, etc." Ex[1008] at ¶ 19. *Ishimaru* discloses an artificial nipple that "is more easily extensible than other portions to form a beverage space inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means is provided in the aforesaid nipple trunk to adjust the internal pressure of this beverage space." Ex[1008] at ¶¶ 05-06. *Sepehr* discloses without effective venting "a vacuum is created within the bottle often causing severe pain in the stomach." Ex[1007] at 1:9-16, 2:4-11.

240. A POSA would have been motivated to combine *Meyers*, *Sepehr*, and *Ishimaru* because in addition to each being directed to the same problem and using

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the same solution, they analogously describe nipple designs with air vents and other means for equalizing the pressure between the interior of the vessel and the atmosphere. Ex[1006] at 4:22-35; Ex[1007] at 1:9-16, 2:4-11; Ex[1008] at ¶ 04. *Meyers* discloses that it's air vent can "assume different shapes, and be positioned at various locations." Ex[1006] at 4:34-35.

241. A POSA reviewing *Meyers* would be motivated to move the location of the vent above the collar as taught in *Sepehr* to improve *Meyers*' vent to further improve the reliability of the nipple to relieve negative pressure by improving the flow of air that can vary in the collar region due to the compressive force applied to the vent passage. A POSA reviewing *Ishimaru* would be motivated to incorporate the variable thickness teat as taught in *Ishimaru* to improve *Meyers*' nipple to further improve the flow and reliability of the nipple to prevent collapse of the nipple when the pressure in the nipple changes, and reduce the risk of colic. Ex[1007] at 1:9-16, 2:4-11; Ex[1006] at 4:22-35; Ex[1008] at ¶¶ 41-42, 46, 48.

242. A POSA would be further motivated and find it obvious, to the extent not disclosed by *Meyers*, to modify the nipple design of *Meyers* such that the air valve is placed above the collar as taught by *Sepehr* in order to improvement cleaning and maintenance of the nipple and ensure the integrity or performance of the valve is not impacted by attachment of the bottle to the collar. Ex[1006] at 1:64-2:6, 5:29-34; Ex[1007] at 3:21-24, Fig. 3. All of *Meyers*, *Ishimaru*, and *Sepehr* teach

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the importance and inconvenience of cleaning and disinfecting the nipple, for example by dissembling the nipple from the collar, and the risk of contamination during this process. Ex[1006] at 1:12-28, 1:64-2:6, 5:29-34; Ex[1008] at ¶ 54; Ex[1007] at 2:20-26, 3:21-24. A POSA reading *Meyers* in view of *Sepehr* and *Ishimaru* would be motivated to locate the vent above the collar, e.g., in the nipple, such that "it can easily be boiled and hygienically cleaned following each use." Ex[1007] at 2:20-26, 3:21-24. As disclosed by *Sepehr*, A POSA would understand moving the vent would allow for "low cost of production and can easily be cleaned together with the teat following each use." Ex[1007] at 2:20-26.

243. A POSA would have therefore understood that incorporating elements of the nipple, collar, and vessel of *Meyers*, *Sepehr*, and *Ishimaru* would provide a wide, curved nipple attachment with a multi-diameter vessel that would result in an ergonomic, easy-to clean, and aesthetically pleasing nipple and vessel. Such a combination would further improve the design and goals to provide easy cleaning, prevent nipple collapse, and provide a breast-like appearance.

244. The example combinations and modifications described represent a known, finite number of identified predictable solutions to solve the problem of designing a nipple that (1) equalizes the pressure in the bottle to prevent, for example, nipple collapse and colic, and (2) is hygienic and can be easily cleaned. Ex[1008] at ¶¶ 19, 48; Ex[1006] at 1:12-28, 1:64-2:6, 4:31-35, 5:29-34; Ex[1007] at

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1:9-16, 2:4-11, 2:20-26, 3:21-24. A POSA reading *Meyers*, *Sepehr*, and *Ishimaru*, would be motivated to combine and substitute these familiar elements according to known methods to yield predictable results. A POSA would expect that modifying *Meyers*' nipple in view of *Ishimaru* and *Sepehr* would provide a more reliable and more hygienic solution to equalize the pressure in the bottle and provides improved protection against leakage of fluid out of the bottle.

245. Moreover, a POSA would have had a reasonable expectation of success in combining these nipples because each nipple would work as in their respective disclosures, and the references demonstrate that a POSA could have combined the disclosed features with reasonable expectation of success in doing so. Therefore, a POSA would have been motivated to combine the nipple and vessel of *Meyers* with the nipple and vessels of *Sepehr* and *Ishimaru*.

B. Claim 14

(i) [14.PRE]: A feeding bottle comprising:

246. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(i). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

247. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

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(ii) [14.A]: a) a vessel having an open top,

248. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(ii). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

249. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(iii) [14.B]: b) a collar having an upper rim and a lower rim comprising: an internally threaded inner surface,

250. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(iii). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

251. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(iv) [14.C]: an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, and wherein said sloping portion comprises a majority of the collar's outermost surface;

252. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(iv). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

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253. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(v) [14.D]: c) a nipple having: a teat portion having a variable wall thickness including an aperture,

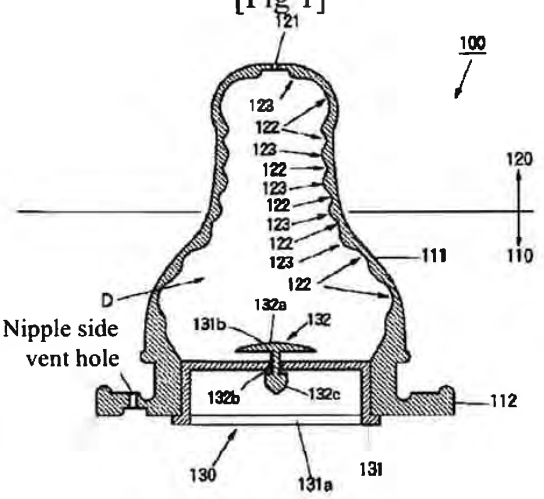
254. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(v). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

255. In addition to that analysis, *Ishimaru* discloses a nipple having a teat portion with a variable wall thickness and an aperture under Petitioner's construction relating to this term. Specifically, *Ishimaru* discloses "an artificial nipple having a nipple trunk and a teat portion protruding from this nipple trunk." Ex[1008] at Abs., Figs. 1-2, 10-11. *Ishimaru* discloses that this teat portion has a wall of variable thickness under either Petitioner's or Patent Owner's constructions. Specifically, under Petitioner's construction—that the wall has a helical groove—*Ishimaru* discloses that "on the teat portion 120, … thin-walled portions 122, 122 and 122, which are elongation portions with a thin wall, are formed in ***a groove-like pattern***" and which are "formed in a manner that the ***wall thickness gradually increases*** from the thinnest portion." *Id.* at ¶¶ 41 (emphasis added), 42. *Ishimaru* further discloses that multiple thin and thick-walled portions are "forming a wave shape as shown in Fig. 1" on the inside wall of the teat portion of the nipple. *Id.* at ¶ 41, Fig. 1. Further,

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the "the thin-walled portions 122 are placed at intervals" which are "predetermined" amount of spacing in millimeters. *Id.* at ¶ 42. This is shown, for example, in Figure 1 below. Alternatively, under Patent Owner's construction—that the term is afforded its plain and ordinary meaning—*Ishimaru* discloses that its teat portion is comprised of a wall of variable thickness as shown in Figure 1. Additionally, *Ishimaru* discloses that its teat portion of the nipple has an aperture: "a teat opening 121 is provided at the tip of the aforesaid teat portion 120," which is also shown for example in Figure 1. *Id.* at ¶¶ 37, 40, 52, Fig. 1.

[Fig 1]



Ex[1008] at Fig. 1, showing groove patterns forming a "wave shape" made by thin-walled portions 122 and thick-walled portions 123 in the wall of teat portion 120 of the nipple.

256. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*. *See supra* §XI.A.

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(vi) [14.E]: a base portion having a domed configuration,

257. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(vi). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

258. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(vii) [14.F]: an areola portion between the teat portion and the base portion,

259. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(vii). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

260. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(viii) [14.G]: a flange depending from the base portion,

261. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(viii). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

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262. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(ix) [14.H]: a one-way air inlet valve (i) extending through said base,

263. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(ix). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

264. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(x) [14.I]: (ii) projecting downwardly from the base portion,

265. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(x). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

266. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(xi) [14.J]: (iii) having a length that does not extend past the collar's lower rim, and

267. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(xi). The described functionality would

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be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

268. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(xii) [14.K]: (iv) disposed at least partially inwardly from the collar; the flange being arranged to seal with the vessel;

269. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(xii). The described functionality would be carried over into the Meyers-*Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

270. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

(xiii) [14.M]: e) the nipple being secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel.

271. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.B(xiii). The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

272. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

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C. Claim 16

(i) [16]: The feeding bottle of claim 14 wherein the open top of the vessel comprises an outwardly threaded vessel neck.

273. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.C. The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

274. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

D. Claim 17

(i) [17]: The feeding bottle of claim 14 wherein the air inlet valve comprises a slit opening.

275. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.D. The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

276. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

E. Claim 19

(i) [19]: The feeding bottle of claim 14 wherein the vessel comprises an upper body having a first internal diameter and a portion below the upper body having a second, different internal diameter.

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277. As previously explained, this limitation is disclosed or rendered obvious by *Meyers-Sepehr*. *See supra* §X.E. The described functionality would be carried over into the *Meyers-Sepehr-Ishimaru* combination, as previously explained. *See supra* §XI.A.

278. For at least these reasons, this claim limitation is rendered obvious by *Meyers-Sepehr-Ishimaru*.

XII. '930 PATENT GROUND 3: *Kurkjian* in view of Sepeher and *Ishimaru* Renders Claims 14, 16, 17, and 19 of the '930 Patent Obvious in view of the Knowledge of a Person of Ordinary Skill in the Art

279. It is my opinion that claims 14, 16, 17, and 19 are rendered obvious by *Kurkjian* in combination with *Sepehr* and *Ishimaru*. As discussed below, a POSA designing an artificial nipple for nursing would be motivated to combine *Kurkjian* with *Sepehr* and *Ishimaru*.

280. In reaching this conclusion, I have considered the disclosures of these prior art references, the motivations to combine these references, and the knowledge of a POSA, as discussed below. In my opinion, a POSA reviewing these disclosures prior to the priority date of the patents would have been motivated to design a nipple and collar design similar to the following:

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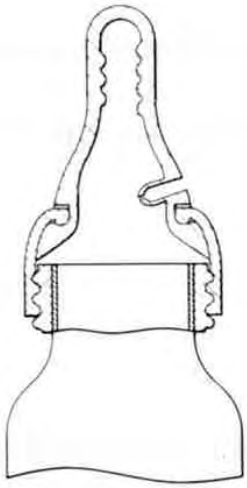


FIG. 1

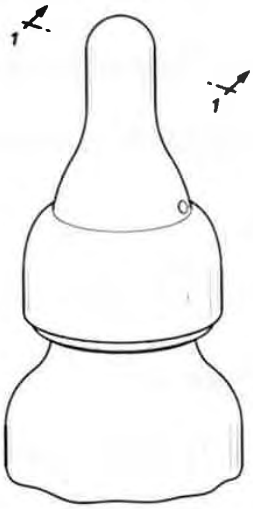


FIG. 2

281. Such a design would have been obvious to a POSA no later than the priority date of the '930 Patent, and would render the challenged claims of the '930 Patent obvious.

A. Motivation For Combining *Kurkjian*, *Sepehr*, and *Ishimaru*

282. A POSA would have considered *Ishimaru*, *Kurkjian*, and *Sepehr* in the same field of endeavor as they all relate to nursing bottles and nipples that attach thereto. Ex[1008] at ¶¶ 01-06; Ex[1009] at 1:1-8; Ex[1007] at 1:3-7. A POSA would be motivated to modify or combine the nipples of *Ishimaru*, *Kurkjian*, and *Sepehr* because they all teach analogous solutions for, and describe the benefits of, nipples with air vents and collars to provide a durable, hygienic design that relieves negative pressure in the nipple, and permits easy cleaning. Ex[1008] at ¶¶ 19, 48; Ex[1009] at 2:35-49, 2:54-3:10; Ex[1007] at Abs., 2:4-11. Moreover, each reference teaches

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the same solution: using a rounded nipple with particular design elements that imitate feeding from a human breast, and providing an air vent in a location that will reliably vent the interior of the vessel to equalize the pressure between the vessel and the atmosphere. *Id.*

283. *Kurkjian* further discloses that one or more elements of its various embodiments can be combined: "It should be understood that certain detail changes in the mechanical construction, combination and arrangement of parts may be employed without departing from the spirit of the invention, so long as such changes fall within the scope of the appended claims." Ex[1009] at 3:70-4:5.

284. A POSA would be further motivated and find it obvious, to the extent not disclosed by *Kurkjian*, to modify the nipple design of *Kurkjian* as taught by one or more embodiments of *Ishimaru* and *Sepehr* in order to further improve reliability and functionality of the nipple to equalize the pressure. Ex[1008] at Abs., ¶¶ 07, 19, 48; Ex[1009] at 1:1-8, 2:35-49; Ex[1007] at 1:9-16, 2:4-11, Fig. 3. All of *Ishimaru*, *Kurkjian*, and *Sepehr* identify the need to equalize the pressure in the bottle to prevent, for example, nipple collapse and colic. Ex[1008] at Abs., ¶¶ 07, 19, 48; Ex[1009] at 1:1-8, Ex[1007] at 1:9-16, 2:4-11. *Ishimaru* explains the need for such a design: "Therefore, when the user, e.g. an infant, sucks on the aforesaid teat portion and/or the aforesaid nipple trunk, the artificial nipple is subjected to pressure in the lateral direction. At this time, the internal pressure in the aforesaid beverage space

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increases, and since the aforesaid elongation portion is formed in the aforesaid teat portion and/or the aforesaid nipple trunk, the pressure acts in the direction of elongation of the artificial nipple in the longitudinal direction, causing the aforesaid teat portion and/or the aforesaid nipple trunk to elongate. Furthermore, because the internal pressure in the aforesaid beverage space increased, the aforesaid teat portion and/or the aforesaid nipple trunk will not collapse even if pressure is applied in the lateral direction of the artificial nipple due to the suckling movement of the infant, etc." Ex[1008] at ¶ 19. *Ishimaru* discloses an artificial nipple that "is more easily extensible than other portions to form a beverage space inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means is provided in the aforesaid nipple trunk to adjust the internal pressure of this beverage space." Ex[1008] at ¶¶ 05-06. *Kurkjian* describes nipple with a venting aperture "for preventing the body portion of the nipple from collapsing inwardly of the neck of the bottle when a vacuum is built up therein." Ex[1009] at 3:20-25, 1:9-15, 3:50-52, Claims 1-4. *Sepehr* discloses without effective venting "a vacuum is created within the bottle often causing severe pain in the stomach." Ex[1007] at 1:9-16, 2:4-11.

285. A POSA would have been motivated to combine *Kurkjian*, *Sepehr*, and *Ishimaru* because in addition to each being directed to the same problem and using the same solution, they analogously describe nipple designs with air vents and other

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means for equalizing the pressure between the interior of the vessel and the atmosphere. Ex[1009] at 1:1-8; Ex[1007] at 1:9-16, 2:4-11; Ex[1008] at ¶ 04. Specifically, a POSA reviewing *Sepehr* would be motivated to move the location of the vent above the collar as taught in *Sepehr* to improve *Kurkjian*'s vent to further improve the reliability of the nipple to equalize the pressure by improving the flow of air trapped that can vary in the collar region due to the compressive force applied to the vent passage from connection to the bottle or due to changes to the shape or size or integrity of the vent passage caused by the bottle lip as the parts are secured together or due to changes in the material over time that would impede the reliability of the valve to relieve negative pressure in the nipple without leaking. Specifically, a POSA reviewing *Sepehr* would be motivated to move the location of the vent above the collar as taught in *Sepehr* to improve *Kurkjian's* air flow. The one-way air vent communicating directly with the external environment in *Sepehr* is more effective at pulling air into the bottle, than an air vent pulling in air through the flange covered by the collar through the threads as in Kurkjians. A POSA reviewing *Ishimaru* would be motivated to incorporate the variable thickness teat as taught in *Ishimaru* to improve *Kurkjian*'s nipple to further improve the flow and reliability of the nipple to prevent collapse of the nipple when the pressure in the nipple changes, and reduce the risk of colic. Ex[1007] at 1:9-16, 2:4-11; Ex[1009] at 3:20-25, 1:9-15, 3:50-52, Claims 1-4; Ex[1008] at ¶¶ 41-42, 46, 48.

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286. A POSA would be further motivated and find it obvious, to the extent not disclosed by *Kurkjian*, to modify the nipple design of *Kurkjian* such that the air valve is placed above the collar as taught by *Sepehr* in order to improvement cleaning and maintenance of the nipple. Ex[1009] at 3:20-25, 1:9-15, 3:50-52, Figs. 1, 6-7; Ex[1007] at 3:21-24, Fig. 3. Both *Ishimaru* and *Sepehr* teach the importance and inconvenience of cleaning and disinfecting the nipple, for example by dissembling the nipple from the collar, and the risk of contamination during this process. Ex[1008] at ¶ 54; Ex[1007] at 2:20-26, 3:21-24. A POSA reading *Sepehr* in view of *Kurkjian* and *Ishimaru* would be motivated to locate the vent above the collar, e.g., in the nipple, such that "it can easily be boiled and hygienically cleaned following each use." Ex[1007] at 2:20-26, 3:21-24. As disclosed by *Sepehr*, A POSA would understand moving the vent would allow for "low cost of production and can easily be cleaned together with the teat following each use." Ex[1007] at 2:20-26.

287. A POSA reading *Kurkjian* in view of *Sepehr* and *Ishimaru* would be further motivated to combine elements of the collar taught in Kurjian with the nipple and collar disclosed in *Sepehr* and *Ishimaru*. For example, a POSA would be further motivated to incorporate elements of the retaining and securing caps of *Kurkjian* to improve upon the detachable feeding bottle mounting cap in order to design a "streamline type of connection between the bottle and the nipple." Ex[1009] at 1:16-20. A POSA would identify and recognize that certain design elements disclosed in

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the retaining cap and securing cap embodiments of *Kurkjian* would improve upon the detachable feeding bottle mounting cap of *Ishimaru* and/or *Sepehr*. Ex[1009] at 2:14-27, 3:33-51, 3:55-71.

288. A POSA would have therefore understood that incorporating elements of the nipple, collar, and vessel of *Kurkjian*, *Sepehr*, and *Ishimaru* would provide a wide, curved nipple attachment with a multi-diameter vessel that would result in an ergonomic, easy-to clean, and aesthetically pleasing nipple and vessel. Such a combination would further improve the design and goals to provide easy cleaning, prevent nipple collapse, and provide a breast-like appearance.

289. The example combinations and modifications described represent a known, finite number of identified predictable solutions to solve the problem of designing a nipple that (1) equalizes the pressure in the bottle to prevent, for example, nipple collapse and colic, and (2) is hygienic and can be easily cleaned. Ex[1008] at ¶¶ 19, 48; Ex[1009] at 1:1-8; Ex[1007] at 1:9-16, 2:4-11, 2:20-26, 3:21-24. A POSA reading *Ishimaru*, *Kurkjian*, and *Sepehr* would be motivated to combine and substitute these familiar elements according to known methods to yield predictable results. A POSA would expect that modifying *Kurkjian*'s nipple in view of *Ishimaru* and *Sepehr* would provide a more reliable and more hygienic solution to equalize the pressure in the bottle and provides improved protection against leakage of fluid out of the bottle.

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290. As I discussed above, *Ishimaru* further discloses the need for a nipple "that is more similar to a mother's nipple," namely a nipple that "has a shape similar to a mother's breast and nipple as shown in Fig. 1, because it is used when a mother feeds her infant with artificial milk using a feeding bottle, etc., instead of her own breast milk." Ex[1008] at ¶ 41. *Ishimaru* stresses the importance of a nipple that is breast-like to encourage bottle feeding: "there as a problem that the conventional artificial nipple 10 does not elongate the teat portion of the mother's nipple or the portion corresponding to the mammary areola, and thus do not approximate the nipple." *Id.* at ¶ 04. *Ishimaru* directly addresses this problem through "thin-walled portions 122, 122 and 122, which are elongation portions with a thin wall, are formed in a groove-like pattern, for example, at seven annular locations." *Id.* at ¶ 41. Such a configuration "provides an artificial nipple that is more similar to a mother's nipple." *Id.* at ¶ 61. "[T]he artificial nipple 100 of this embodiment elongates in the same way as the mother's nipple, thereby increasing the amount of milk spurted, and the artificial nipple 100 itself does not collapse in the same way as the mother's nipple, and its rigidity can be maintained." *Id.* at ¶ 48.

291. A POSA would have therefore understood that *Kurkjian*'s nipple and vessel could be improved by employing the techniques from *Ishimaru* to facilitate a wide, curved nipple attachment with a multi-diameter vessel that would result in an ergonomic, easy-to clean, and aesthetically pleasing nipple and vessel. Such a

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combination would further improve the design and goals of *Ishimaru* to provide easy cleaning, prevent nipple collapse, and provide a breast-like appearance. Ex[1008] at ¶¶ 51, 52.

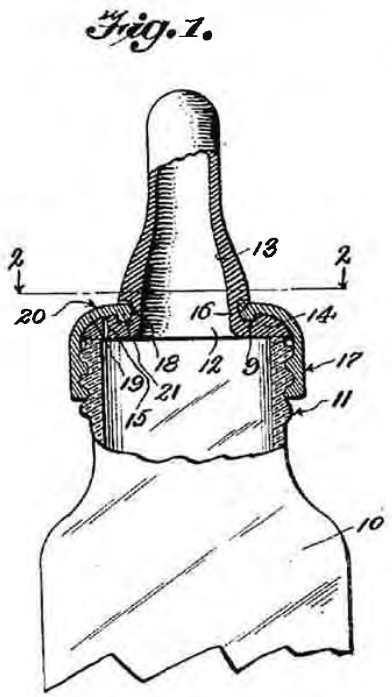
292. Moreover, a POSA would have had a reasonable expectation of success in combining these nipples because each nipple would work as in their respective disclosures, and the references demonstrate that a POSA could have combined the disclosed features with reasonable expectation of success in doing so. Therefore, a POSA would have been motivated to combine the nipple and vessel of *Kurkjian* with the nipple and vessels of *Sepehr* and *Ishimaru*.

B. Claim 14

(i) [14.PRE]: A feeding bottle comprising:

293. *Kurkjian* discloses a feeding bottle. For example, *Kurkjian* discloses "nursing units" having a "resilient, flared nipple." Ex[1009] at 1:1-8. *Kurkjian* further discusses this "nursing unit" and identifies, for example, a "nursing bottle" designated by "10" in Figure 1. Ex[1007] at 1:41-44, 1:25-26, Fig. 1.

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Ex[1009] at Fig. 1, showing a nursing bottle.

294. *Kurkjian* displays additional views of the disclosed nursing unit in, for example, Figures 6 and 7. Ex[1009] at Figs. 6, 7. Additionally, *Kurkjian*'s Claims 1-4 describe the "nursing unit" with "nipple" and "bottle." *Id.* at Claims 1-4.

295. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XII.A.

(ii) [14.A]: a) a vessel having an open top,

296. *Kurkjian* discloses a vessel having an open top. For example, *Kurkjian* describes that the "nursing bottle" of the nursing unit is "preferably of the wide-mouth type, having threads 11 formed near its open or outer end." Ex[1009] at 1:41-44. This describes the nursing bottle as having an end which is "***open***." *Id.*

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297. The open end, or top, of the nursing bottle disclosed by *Kurkjian* is shown, for example, in Figure 1 above, described as near threads 11, wherein a "flexible nipple 12" fits over the open end of the bottle. *Id.* at 1:45-49. *Kurkjian* displays additional views of the disclosed nursing bottle with open end in, for example, Figures 6 and 7. Ex[1007] at Figs. 6, 7. Additionally, *Kurkjian* reiterates in its claim set that the nursning unit comprises "a bottle having an open outer end." *Id.* at Claims 1-4.

298. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* § XII.A.

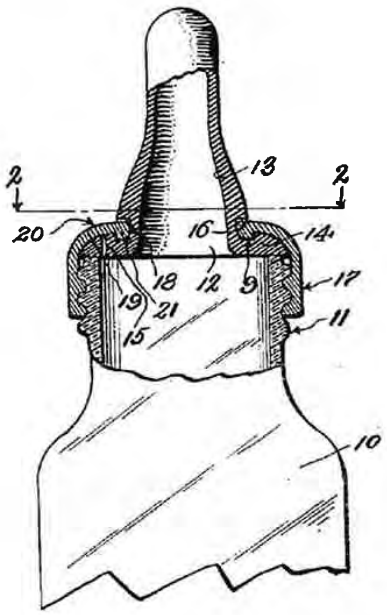
(iii) [14.B]: b) a collar having an upper rim and a lower rim comprising: an internally threaded inner surface,

299. *Kurkjian* discloses a collar having an upper rim and a lower rim comprising an internally threaded inner surface. *See, e.g.,* Ex[1009] at 2:14-35, Figs. 1, 6, 7, Claims 1-4. Specifically, *Kurkjian* describes a "retaining cap 17" which is "removably fitted over the outer or open end of the bottle" of the disclosed nursing unit. Ex[1009] at 2:14-17. The retaining cap has an upper rim and a lower rim—specifically, the cap is disclosed to include "an inwardly extending annular flange 19" which "is preferably curved upon its outer face 20 from the body portion 13 of the nipple." *Id.* As illustrated in Figure 1 below, this retaining cap includes an upper rim (the upper portion of flange 19 denoted by outer face 20 and/or bead 21 in Figure

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1 below) and a lower rim. Each of these two rims are shown in Figure 1 to include slopes and characteristics different from each other.

Fig. 1.

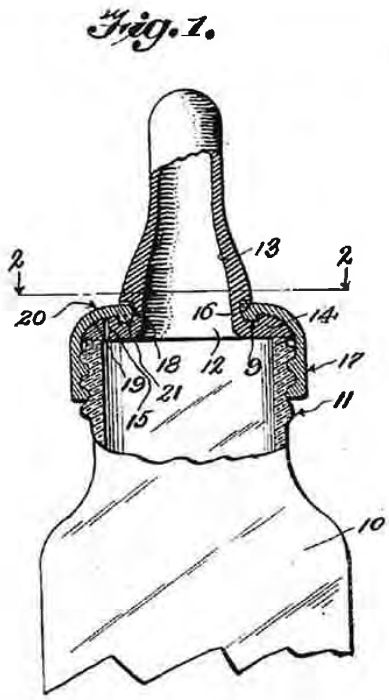


Ex[1009] at Fig. 1, showing a nursing unit comprising retaining cap 17, itself comprising flange 17 with outer face 20 and bead 21.

300. The retaining cap in *Kurkjian* is also described as having an internally threaded inner surface: "retaining cap 17 … is provided with screw-threads for interfitting with the threads 11 [of the bottle]." *Id.* at 2:14-17. *Kurkjian* shows that these threads are internal. For example, the retaining cap is described in *Kurkjian* as fitting ***over*** the open outer end of the bottle. *Id.* This is consistent with what is shown in Figure 1, in which the "threads 11" of the open, outer end of the bottle are on the external side of the bottle's top, and the "screw-threads for interfitting with

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the threads 11" are thus on the internal side of the retaining cap. *Id.* at 2:14-17, Fig. 1. A closeup is also shown in Figure 3. *Id.* at 1:29-30, Fig. 3.

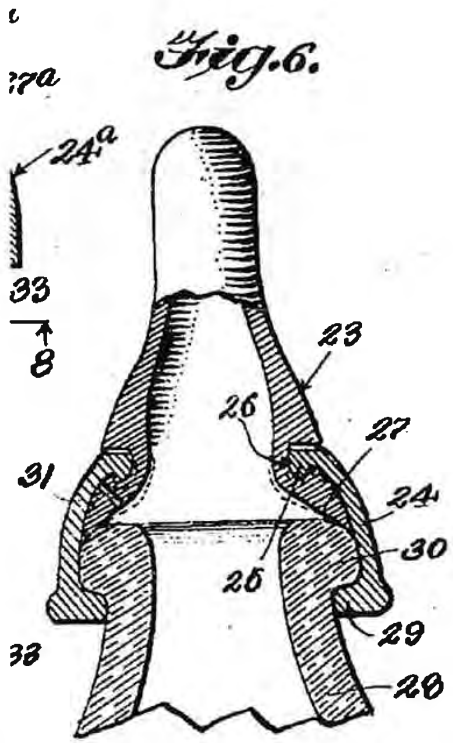


Ex[1009] at Fig. 1, showing a nursing unit comprising a bottle with threads 11 and a retaining cap 17 fitting over the threads.

301. *Kurkjian* describes, in a "modified form of the invention," a slight variant on the cap, described as a "securing cap" which "consists of a conical body of a thimble-like structure" and includes, as with the aforementioned cap, "an inwardly extending annular flange 29." *Id.* at 3:29-51. "The outer face of the cap 24 preferably conforms to the contour of the nipple 23 and constitutes a continuation thereof to provide a streamline type connection between the nipple and the bottle 28." *Id.* at 3:42-47. This is shown in Figure 6 below, illustrating an additional

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iteration of the cap which also consists of an upper rim (upper part of cap 24 towards bead 26) and lower rim (lower part of cap 24 towards inwardly extending flange 29). As with the first cap variation, each of these upper and lower rims have characteristics and slopes different from each other.



Ex[1009] at Fig. 6, showing the cap variant 24 with annular flange 29.

302. Also, as with the previously described cap, this "securing cap" might comprise an internally threaded inner surface as claimed by the '930 Patent. *Kurkjian* says of the "securing cap": it "may be secured in any suitable or desired manner to the neck, or to the bottle 32." *Id.* at 3:57-63. A POSA would understand "any suitable" manner to include the previously taught securing method of threading, as depicted in Figures 1 and 3 and described above with respect to the first-described

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retaining cap. *Id.* A POSA would be motivated to incorporate the internal thread design of Figures 1 to the shape of the cap depicted in Figures 6 or 7.

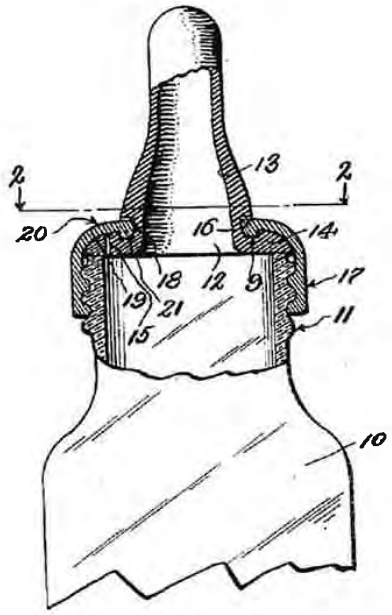
303. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XII.A.

(iv) [14.C]: an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, and wherein said sloping portion comprises a majority of the collar's outermost surface;

304. In addition to this analysis, *Kurkjian* discloses that the collar has an outermost surface having a sloping portion that extends outwardly and downwardly relative to said upper rim, wherein said sloping portion comprises a majority of the collar's outermost surface. Specifically, *Kurkjian* describes that its "retaining cap" (analogous to the claimed collar) "is preferably curved upon its outer face 20 from the body portion 13 of the nipple toward the outer periphery of the cap 17 to provide a convex outer face upon the outer end of the cap 17 and provide a receding outer face upon the cap away from the nose of the baby while sucking." Ex[1009] at 2:14-35, Fig. 1. As illustrated in Figure 1 below, the retaining cap's outer surface along said outer face 20 comprises a sloping portion that extends outwardly and downwardly relative to its upper rim; Figure 1 shows that this sloping portion comprises a majority of the cap's outermost surface.

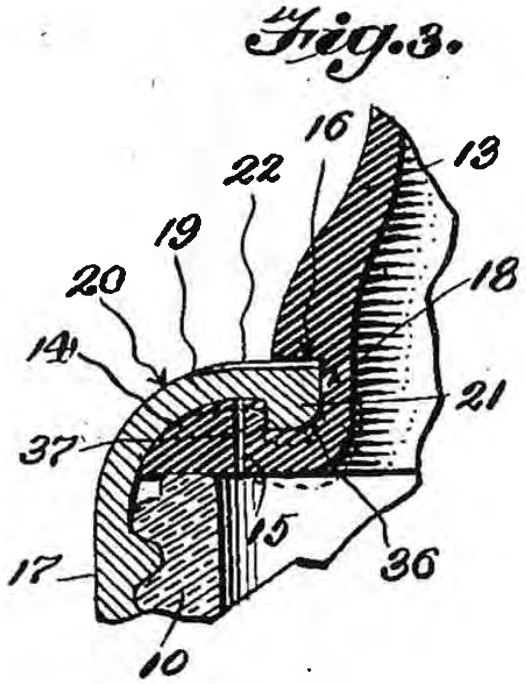
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Fig. 1.



Ex[1009] at Fig. 1, showing a nursing unit comprising retaining cap 17 having sloped outer face 20.

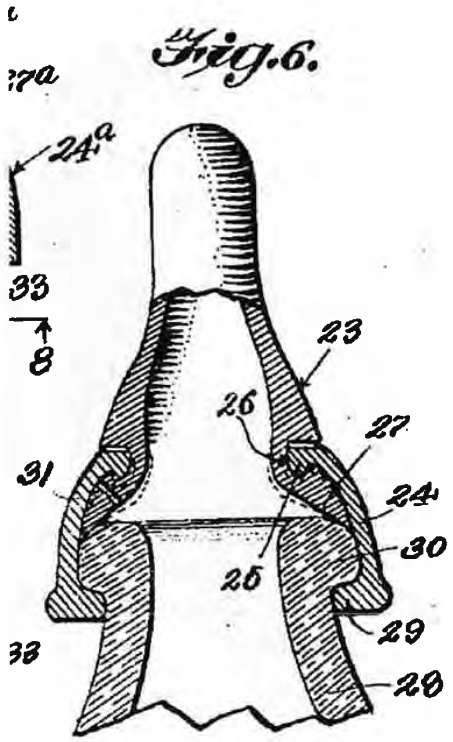
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Ex[1009] at Fig. 3, showing a portion of retaining cap 17 having flange 19 and curved outer face 20.

305. *Kurkjian* additionally describes, with respect to the described "securing cap," that the outer face "conforms to the contour of the nipple and constitutes a continuation thereof to provide a streamline type connection between the nipple 23 and the bottle 28," and accordingly is shown in Figure 6 below as having a sloping outer contour. *Id.* at 3:42-47, Fig. 6. *Kurkjian* thus describes, and confirms by Figure 6, that the securing cap's outer surface slopes out and down relative to its upper rim. *Id.*

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Ex[1009] at Fig. 6, showing the cap variant 24 with annular flange 29, bead 26, and a sloping outer face.

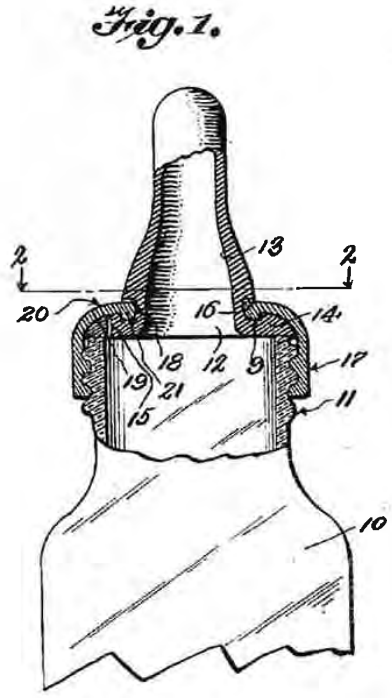
306. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* § XII.A.

(v) [14.D]: c) a nipple having: a teat portion having a variable wall thickness including an aperture,

307. *Kurkjian* discloses a nipple having a teat portion having a variable wall thickness including an aperture. Specifically, *Kurkjian* discloses a "resilient flanged nipple" as part of its "nursing unit." Ex[1009] at 1:1-8, 1:45-49. The "flexible nipple 12" described by *Kurkjian* has "a body portion constituting a neck 13 and laterally extending and preferably annular flange 14." *Id.* at 1:45-55. This nipple is shown,

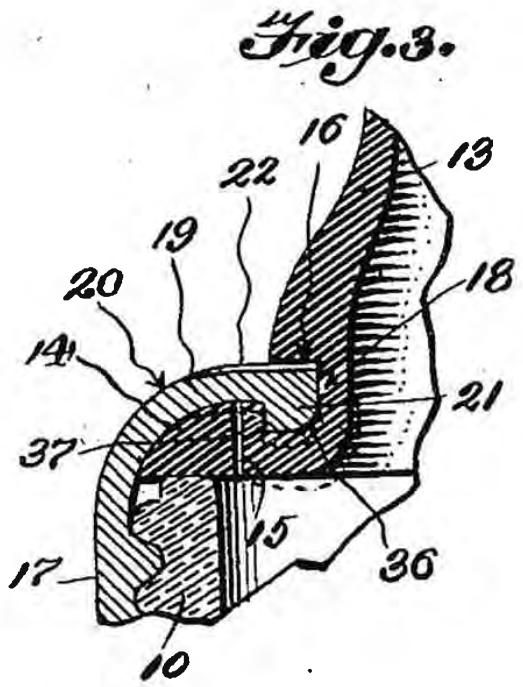
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for example, in Figures 1, 3, and 4. Figures 1 and 3 show the nipple in connection with the cap, while Figure 4 shows "a side elevation of the nipple" on its own. *Id.* at 1:31-32.

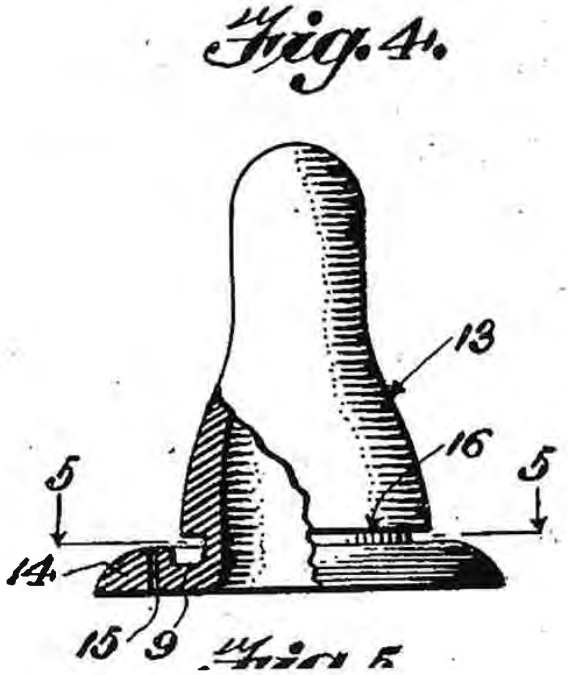


Ex[1009] at Fig. 1, showing a nursing unit comprising nipple 12 having body portion including neck 13 and flange 14.

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Ex[1009] at Fig. 3, showing a portion of nipple 12 having neck 13 and flange 14.



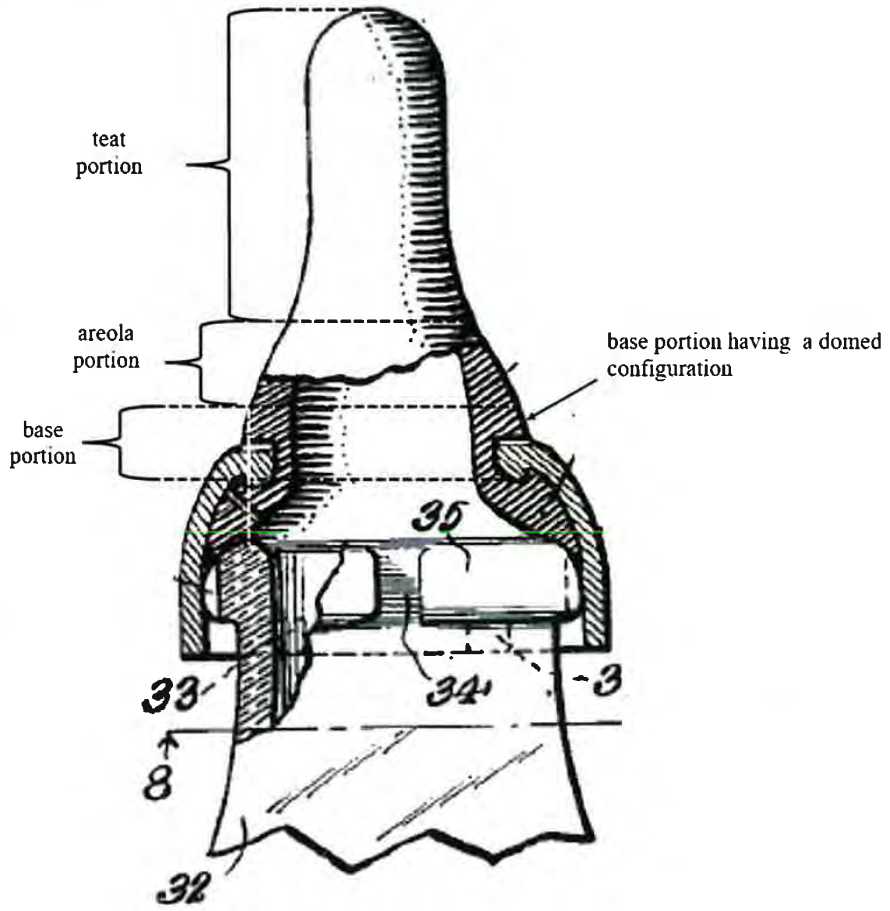
Ex[1009] at Fig. 4, showing nipple 12 with body portion, neck 13, and flange 14.

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308. A POSA would understand that the nipple described by *Kurkjian* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively. These portions are illustrated on Figure 7 below. Specifically for [14.D], a POSA would consider that that uppermost portion of the nipple as described in *Kurkjian* constitutes a "teat" portion under either Petitioner or Patent Owner's constructions relating to this term. Both constructions agree that the teat portion is disposed above the areola portion and is generally perpendicularly upward relative to the mouth of the vessel, which in this case is the upper, open end of the bottle disclosed by *Kurkjian*. The competing constructions do not change the analysis, which is that a POSA would consider that the upper portion of *Kurkjian*'s nipple constitutes a teat portion.

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Kurkjian according to Petitioner's/PO Construction



Ex[1009] at Fig. 7, showing nipple annotated to show the locations of the teat, base, and areola portions as a POSA would understand them.

309. *Kurkjian* further discloses that this teat portion has a variable thickness. Specifically, under Patent Owner's construction—that variable thickness is entitled its plain and ordinary meaning—it can be seen in any of Figures 1, 3, 4, 6, and 7 that the portion identified as the "teat" portion is pictured as having a variable thickness. *See, e.g., id.* at Figs. 1,3, 4,6,7.

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310. To the extent that *Kurkjian* does not explicitly disclose a teat portion of variable thickness under Petitioner's construction—that the wall has a helical groove—this limitation is rendered obvious by the combination of *Kurkjian* with *Sepehr* and *Ishimaru*. As explained previously, *Ishimaru* discloses a helical groove. *See supra* §XI.B(v). A POSA would have been motivated to incorporate the helical groove taught by *Ishimaru* into the teat of the nipple disclosed by *Kurkjian*. *See supra* §XII.A.

311. Finally, *Kurkjian* discloses that the teat portion of the nipple has an aperture. Although not explicitly stated in the disclosure of *Kurkjian*, a POSA would understand that in order to fulfill its purpose as a "nursing unit," the nipple contains an aperture through which a baby can consume the contents of the bottle. *See, e.g., id.* at 2:54-3:10 ("the baby sucking upon the nipple or body portion 13 thereof..."), 1:54-2:4 ("the flow of milk ***through*** the nipple..." (emphasis added)), 2:20-28. A POSA would understand that such an aperture must be present in the teat portion of the nipple, which is the uppermost portion of the nipple that would extend into the baby's mouth in order for the baby to suck upon the nipple as disclosed. *Id.*

312. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XII.A.

(vi) [14.E]: a base portion having a domed configuration,

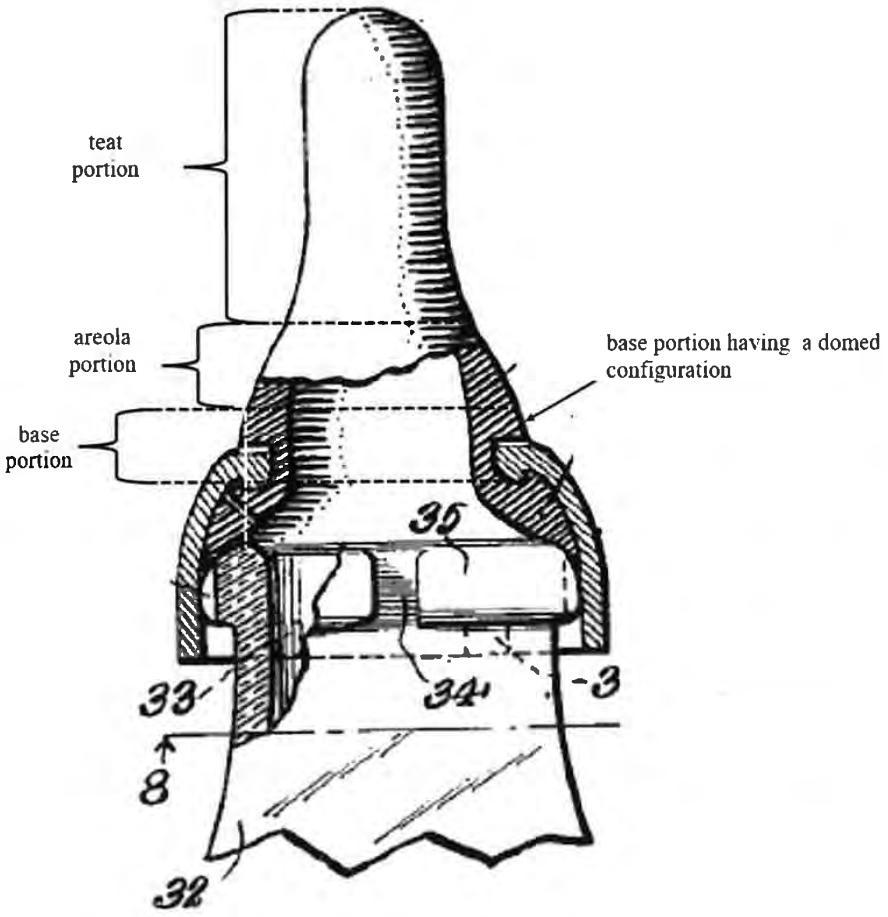
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313. *Kurkjian* discloses a base portion having a domed configuration. As previously explained, *Kurkjian* discloses a "resilient flanged nipple" as part of its "nursing unit." Ex[1009] at 1:1-8, 1:45-49. The "flexible nipple 12" described by *Kurkjian* has "a body portion constituting a neck 13 and laterally extending and preferably annular flange 14." *Id.* at 1:45-55.

314. As described above, a POSA would understand that the nipple described by *Kurkjian* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively. These portions are illustrated on Figure 7 below. Specifically for [14.E], a POSA would consider that that lower portion of the nipple as described in *Kurkjian* constitutes a "base" portion under either Petitioner or Patent Owner's constructions relating to this term.

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Kurkjian according to Petitioner's/PO Construction



Ex[1009] at Fig. 7, showing nipple annotated to show the locations of the teat, base, and areola portions as a POSA would understand them.

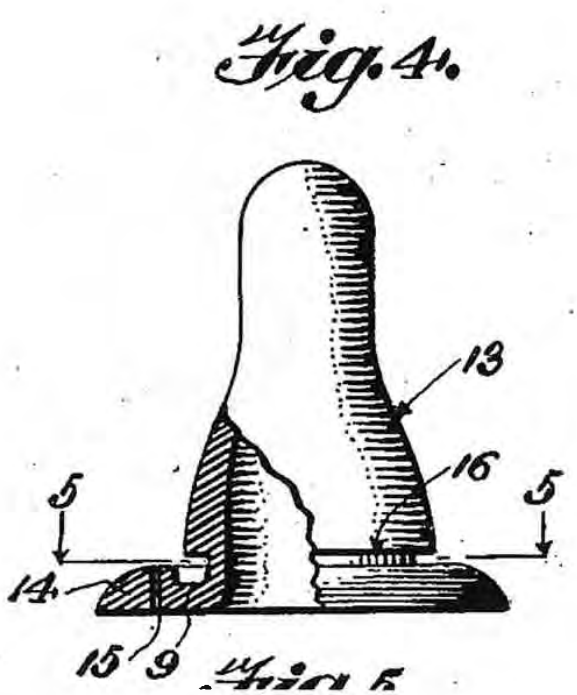
315. Both constructions agree that the base portion is the lowest portion of the nipple, whereas Petitioner's construction additionally requires that the base portion is mountable to the vessel (bottle) and begins where the nipple meets the top portion of the vessel. *Kurkjian* discloses that the nipple is mountable to the bottle via the previously discussed retaining cap or securing cap. *Id.* at 2:40-48 ("The outer

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edge of the flange 14 [of the nipple] is adapted to be firmly clamped between the flange 20 of the cap 17 and the extreme outer edge of the neck of the bottle 10..."). To the extent that *Kurkjian* does not explicitly disclose a base portion mountable to the vessel and beginning where the nipple meats the top portion of the vessel, this limitation is rendered obvious by the combination of *Kurkjian* with *Sepehr* and *Ishimaru*.

316. *Kurkjian* further discloses that this base portion has a domed configuration under both Petitioner's and Patent Owner's constructions of the term. Under Petitioner's construction—that the base has a rounded configuration in profile—*Kurkjian* discloses that the flange area of the nipple is "laterally extending" and is "preferably annular," meaning ring-shaped, or rounded. *Id.* at 1:45-55. A rounded nature of the disclosed flange is also shown in, for example, Figures 1, 3, 4.

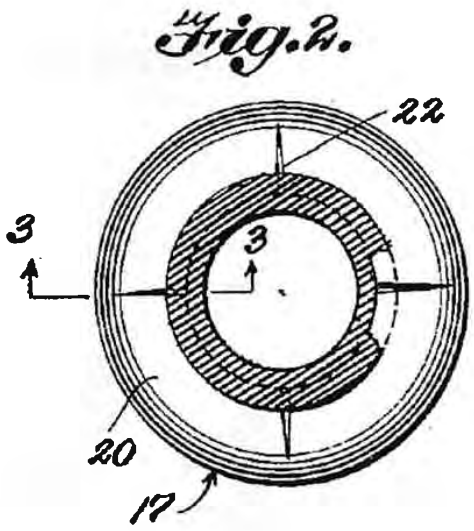
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Ex[1009] at Fig. 4, showing nipple 12 in profile with body portion, neck 13, and rounded flange 14.

317. Alternatively, under Patent Owner's construction—that the base portion is a wide circular base with an arc-shaped cross-section—*Kurkjian* discloses that the flange area of the nipple is "laterally extending," and as shown in Figure 4 above, this base portion is wider than the two portions above it. *Id.* at 1:45-55. This same figure additionally shows that this base portion's cross-section is arc-shaped. *Id.* at Fig. 4, 6, 7. Finally, as best illustrated in Figure 2, this base portion is circular.

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Ex[1009] at Fig. 2, showing circular configuration of nipple (shaded inner portion).

318. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XII.A.

(vii) [14.F]: an areola portion between the teat portion and the base portion,

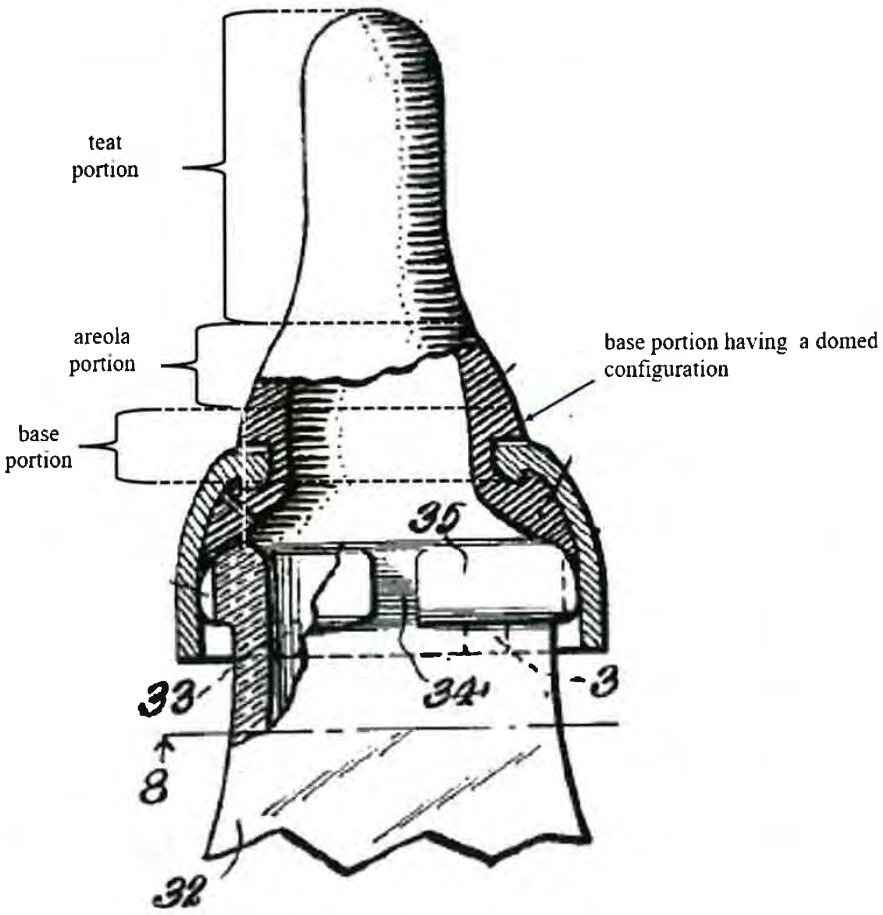
319. *Kurkjian* discloses that the nipple has an areola portion between the teat portion and the base portion. As previously explained, *Kurkjian* discloses a "resilient flanged nipple" as part of its "nursing unit." Ex[1009] at 1:1-8, 1:45-49. The "flexible nipple 12" described by *Kurkjian* has "a body portion constituting a neck 13 and laterally extending and preferably annular flange 14." *Id.* at 1:45-55.

320. As described above, a POSA would understand that the nipple described by *Kurkjian* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively. These

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portions are illustrated on Figure 7 below. Specifically for [14.F], a POSA would consider that that middle portion of the nipple as described in *Kurkjian* constitutes an "areola" portion under either Petitioner or Patent Owner's constructions relating to this term.

Kurkjian according to Petitioner's/PO Construction



321. Both constructions agree that the areola portion extends beyond the bottom of the teat portion—as shown above, a POSA would understand that *Kurkjian* discloses that the areola portion is disposed just below the teat portion and

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extends from it. Alternatively, under Petitioner's construction—that the areola portion has a different characteristic and functionality from the rest of the nipple—*Kurkjian* shows in, e.g., Figure 4, that the portion considered by a POSA to be the areola portion has a different cross-sectional slope than the other two portions of the nipple, and additionally different thicknesses. *Id.* at Figs. 1, 3-4, 6-7.

322. To the extent that *Kurkjian* does not explicitly disclose an areola portion having different characteristic and function from the rest of the nipple, this limitation is rendered obvious by the combination of *Kurkjian* with *Sepehr* and *Ishimaru*.

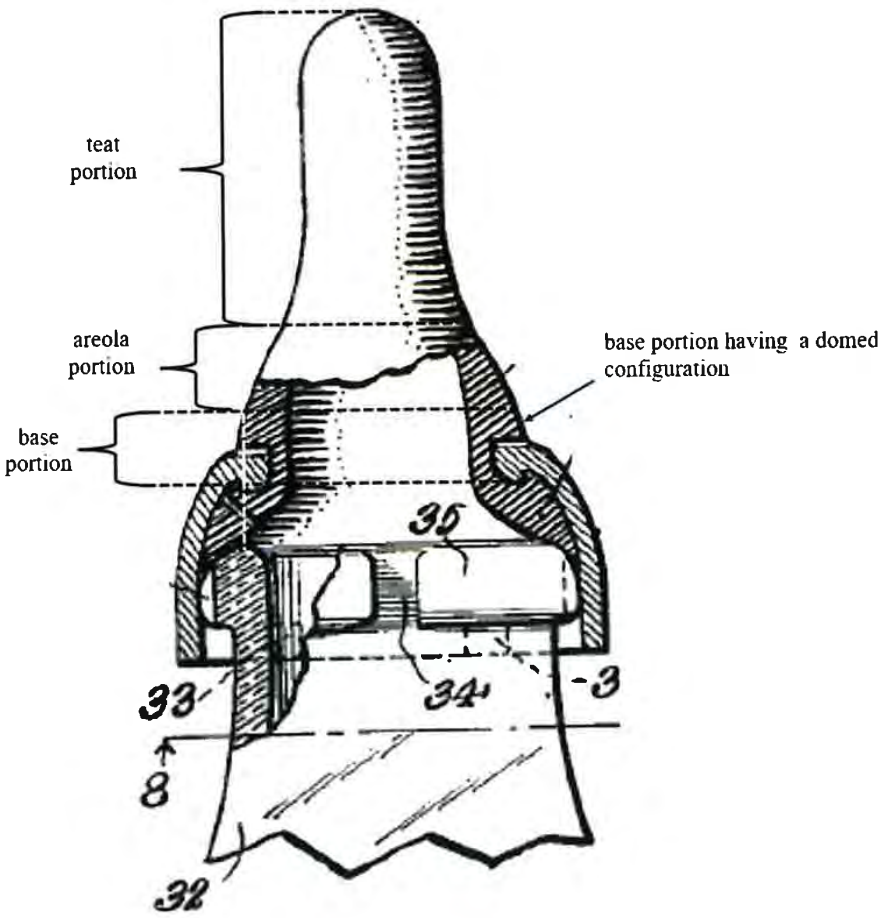
323. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XII.A.

(viii) [14.G]: a flange depending from the base portion,

324. *Kurkjian* discloses a flange depending from the base portion of the nipple. Specifically, *Kurkjian* states that the "flexible nipple 12" is provided with "a laterally extending and preferably annular ***flange*** 14." Ex[1009] at 1:45-55 (emphasis added), 1:9-15 ("a flexible nipple having a vented flexible ***flange***." (emphasis added)). As explained above, a POSA would understand that the nipple described by *Kurkjian* has three portions corresponding to the teat, base, and areola portions of Claim 14, limitations [14.D], [14.E], and [14.F], respectively. These portions are illustrated on Figure 7 below.

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Kurkjian according to Petitioner's/PO Construction



325. As can be seen in the above annotated Figure, flange 14 depends from the base portion. *Kurkjian* states that "it should be understood that the flange 14 is integral with the body portion 13 of the nipple," teaching that it is connected to the rest of the nipple including the claimed base portion. *Id.* at 1:45-2:10. *Kurkjian* further discloses that this flange is gripped by any cap disclosed to mount the nipple to the bottle. *Id.* at 2:53-3:17, 3:33-70.

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326. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XII.A.

(ix) [14.H]: a one-way air inlet valve (i) extending through said base,

327. As explained in §XII.A above, a POSA would have been motivated to modify *Kurkjian* based on the teachings of *Sepehr*, such that the one-way air valve extends through the base just outside of the collar. *Kurkjian* discloses an air inlet valve. Specifically, *Kurkjian* discloses that the nursing unit has a "flexible nipple having a ***vented*** flexible flange..." Ex[1009] at 1:9-15 (emphasis added).

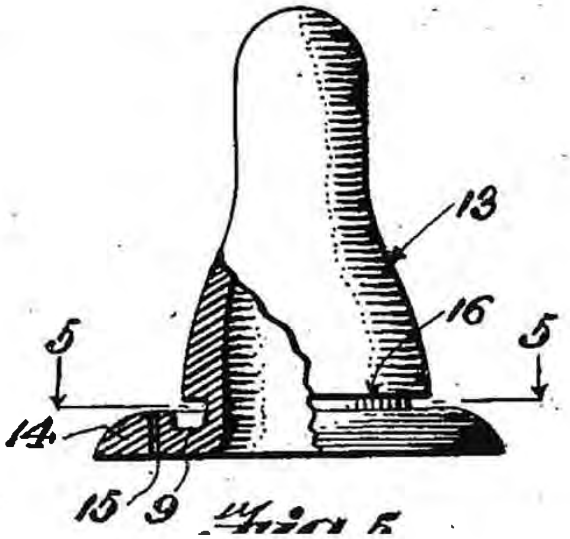
328. Further, *Kurkjian* discloses that this venting aperture is an air inlet valve, allowing air into the bottle during operation: "It should be understood that as a vacuum is built up in the bottle through the baby sucking upon the nipple...the flange 14 may flex [and] draw the upper face of the flange adjacent the vent 15 away from the inner face of the flange 20 of the cap 17 and ***allow air to pass*** under the shoulder 16 and between the body portion 13 of the nipple and the edge of the aperture 18, under the face of the flange 20 of the cap 17, and ***through the vent opening 15 into the bottle***." *Id.* at 3:54-2:10 (emphasis added). It would be obvious to modify the teachings of *Kurkjian* to introduce teachings from *Sepehr* to arrive at a nipple having a one-way air inlet valve disposed through the nipple's base portion. *See supra* §XII.A. *Sepehr* discloses a one-way air inlet valve located above the collar and disposed through the base portion of the nipple. Specifically, *Sepehr* discloses

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that its design includes a "***one-way air inlet valve*** 2 operable automatically." Ex[1007] at Abs. (emphasis added). *Sepehr* further explains: "The valve comprises a flexible membrane having an opening 3 which ***admits air into the container*** when the air pressure within the container becomes depressed relative to the external air pressure, as a result of the feeding action of the child." *Id.* at Abs. (emphasis added), 1:3-7, 2:4-11, 2:13-18, 2:32-3:6, 3:8-19 ("automatic valve 2 produced as an integral part of teat 1 which has a slit 3 across the valve 2 in order to allow the air to enter the bottle"), 3:26-4:2, 4:8-12. *Sepehr* discloses that this "valve may be integral with the teat or a separate component removable from teat or bottle," and *Sepehr* additionally shows this valve in Figure 1, located slightly above the flange of its disclosed nipple. *Id.* at Abs., Figs. 1-4. This is indicating that it is disposed, on a comparable nipple taught by *Kurkjian*, to be extending through the portion of the nipple which a POSA would understand to be the claimed "base portion." *Id.* at Abs.

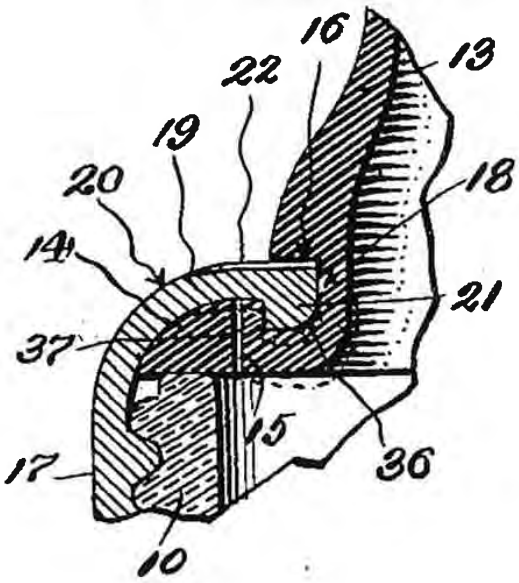
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Fig. 4.



Ex[1009] at Fig. 4, showing nipple 12 in profile with flange 14 and venting aperture 15.

Fig. 3.



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Ex[1009] at Fig. 3, showing a portion of nipple 12 having flange 14 and venting aperture 15.

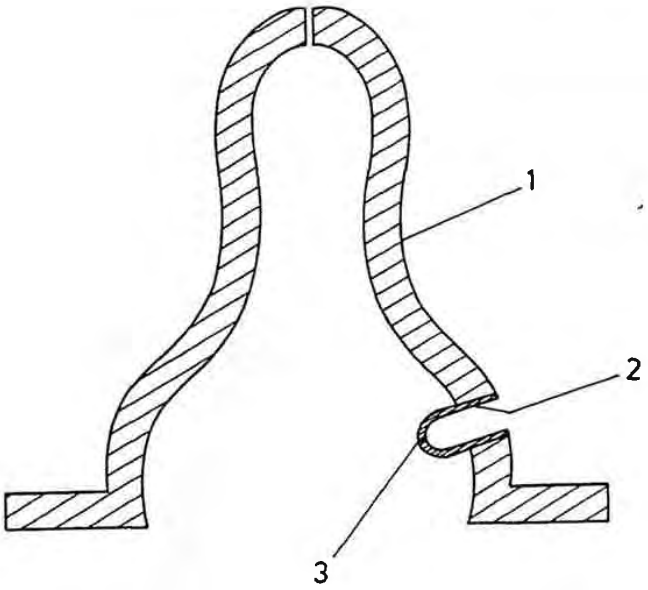


FIG. 1

Ex[1007] at Fig. 1, showing one-way air inlet valve 2 with slit 3.

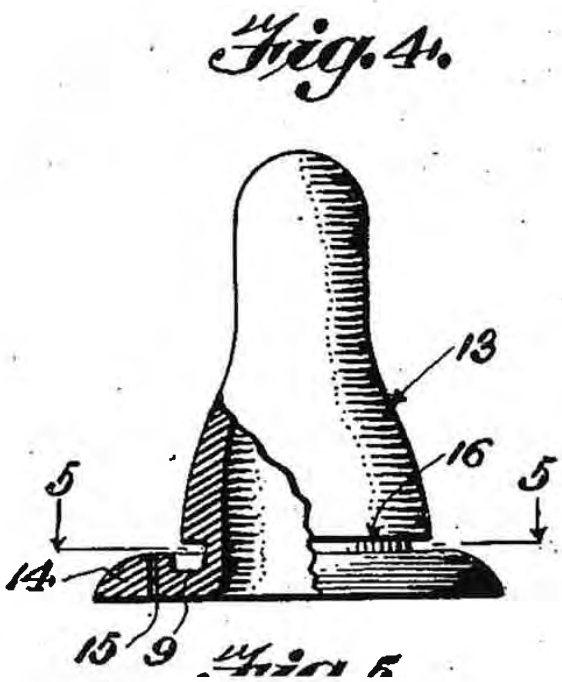
329. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.B(ix).

(x) [14.I]: (ii) projecting downwardly from the base portion,

330. As explained in §XII.A above, a POSA would have been motivated to modify *Kurkjian* based on the teachings of *Sepehr*, such that the one-way air valve extends through the base just outside of the collar. *Kurkjian* discloses a one-way air inlet valve extending through said base. *Kurkjian* discloses that the one-way air inlet projects downward from the base portion. As previously explained, *Kurkjian*

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discloses that its "vented aperture 15" allows air into the bottle and is disposed through the base. Ex[1009] at 1:9-15, 1:45-55, Fig. 1, 3, 4. *Sepehr* discloses that its "***one-way air inlet valve*** 2" is positioned downwardly through said base, as can be seen in, for example, *Sepehr's* Figure 1 in above. Ex[1007] at Fig. 1, Abs. As explained previously, a POSA would be motivated to incorporate the one-way air vent disclosed by *Sepehr* into the nipple taught by *Kurkjian*. *See supra* §XII.A.



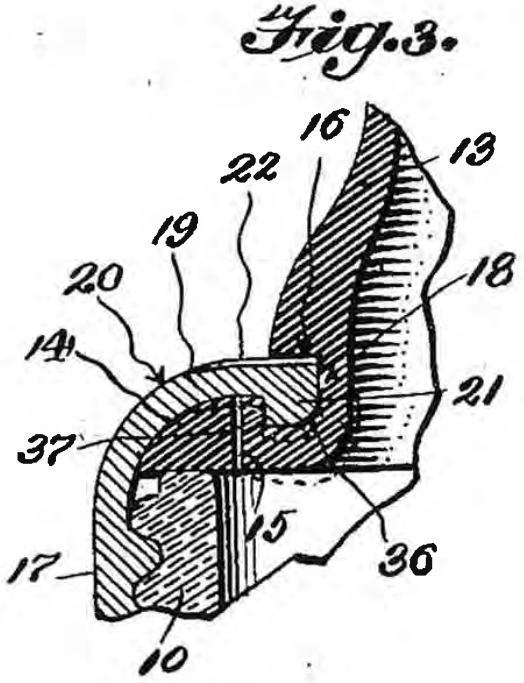
Ex[1009] at Fig. 4, showing nipple 12 in profile with flange 14 and vertical vented aperture 15.

331. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.B(x).

(xi) [14.J]: (iii) having a length that does not extend past the collar's lower rim, and

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332. As explained in §XII.A above, a POSA would have been motivated to modify *Kurkjian* based on the teachings of *Sepehr*, such that the one-way air valve extends through the base just outside of the collar. *Kurkjian* discloses a one-way air inlet valve extending through said base. *Kurkjian* discloses that its air inlet has a length that does not extend past the collar's lower rim. Ex[1009] at 2:54-3:28. As can be seen, for example, in Figure 3 below, the disclosed "venting aperture 15" is shown to have a vertical length that does not extend past the lower rim of the disclosed cap 17 (the claimed collar). *Sepehr* discloses that its "***one-way air inlet valve*** 2" has a length that does not extend past the collar's lower rim, as shown in *Sepehr's* Figure 1 above. Ex[1007] at Fig. 1, Abs.



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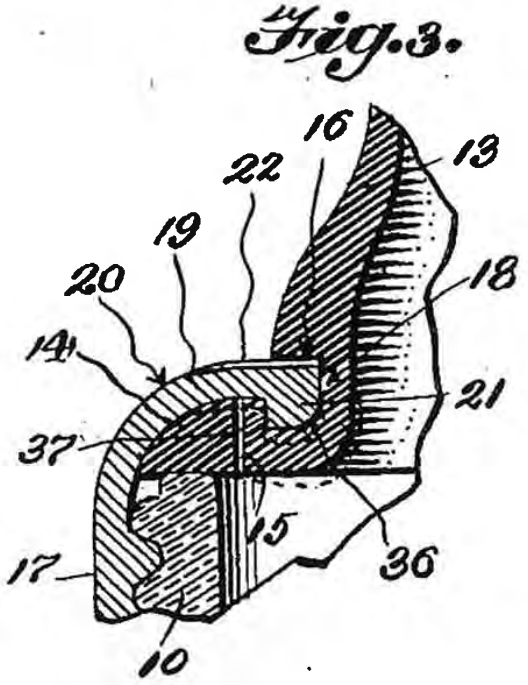
Ex[1009] at Fig. 3, showing a portion of nipple 12 having flange 14 and venting aperture 15.

333. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.B(xi).

(xii) [14.K]: (iv) disposed at least partially inwardly from the collar; the flange being arranged to seal with the vessel;

334. As explained in §XII.A above, a POSA would have been motivated to modify *Kurkjian* based on the teachings of *Sepehr*, such that the one-way air valve extends through the base just outside of the collar. *Kurkjian* discloses a one-way air inlet valve extending through said base. *Kurkjian* discloses that the air inlet is disposed at least partially inwardly from the collar. As can be seen, for example, in Figure 3 below, *Kurkjian*'s disclosed "venting aperture 15" is disposed partially inwardly (towards the center of the bottle) from the disclosed cap 17 (claimed collar). In Figure 3, the collar 17 is shown arcing up and around the nipple's flange 14 and around the flange's aperture 15.

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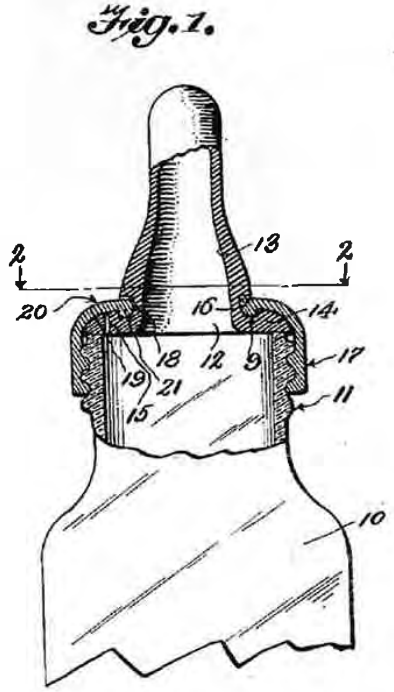


Ex[1009] at Fig. 3, showing a portion of nipple 12 having flange 14 and venting aperture 15, and additionally showing a portion of collar 17.

335. *Kurkjian* further discloses that the flange is being arranged to seal with the vessel. Specifically, *Kurkjian* discloses that its disclosed flange is "retained upon the neck of a bottle my beans of a retaining cap." *Id.* at 1:9-15. *Kurkjian* describes that the flange seals with the bottle (claimed vessel) and is held in place by the cap: "The outer edge of the ***flange 14 is adapted to be firmly clamped*** between the flange 20 of the cap 17 and the extreme outer edge of the neck of the bottle 10." *Id.* at 2:40-48 (emphasis added), 2:53-3:28. This is shown, for example, in Figure 1 below. *Kurkjian*'s other disclosed types of caps are similarly designed to produce the same connection between the flange of the nipple and the bottle: with respect to the visual

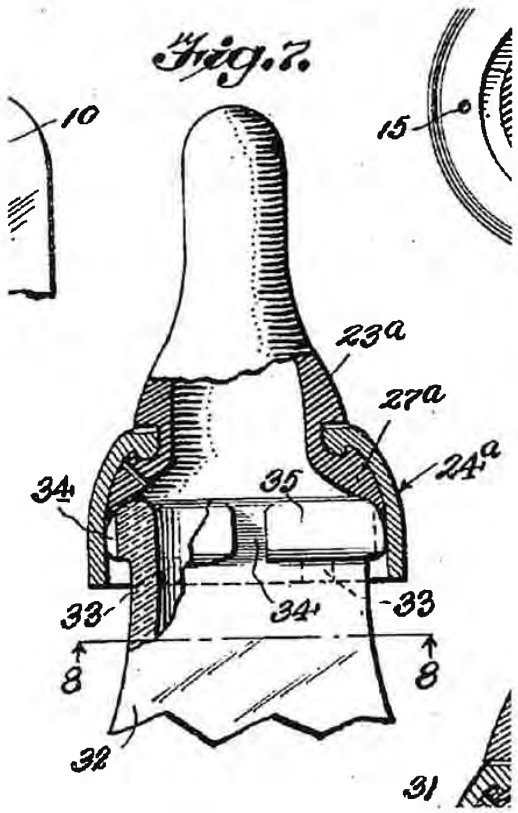
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provided by Figure 7, "the flange 27a of the nipple 23a will be ***clamped*** between the upper edge of the cap 24 and the upper edge of the bottle neck 32." *Id.* at 3:52-71. It will be understood to a POSA that the description of the flange in either design being "clamped" / "clamped firmly" constitutes the flange being sealed to the bottle.



Ex[1009] at Fig. 1, showing a nursing unit comprising nipple 12 having body portion including flange 14 which is sealed against the top of bottle 10.

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Ex[1009] at Fig. 7, showing nursing unit with nipple 23a having flange 27a, which is clamped between cap 24 and bottle neck 32.

336. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.B(xii).

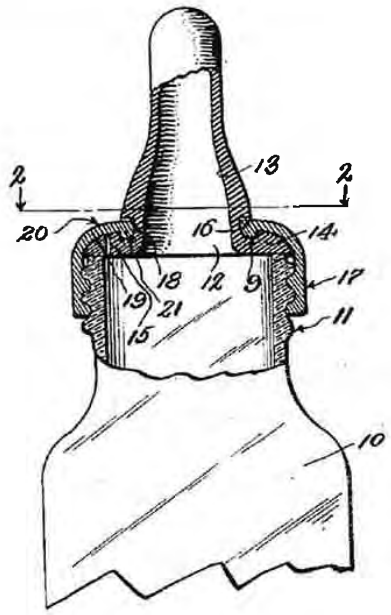
(xiii) [14.L]: d) the nipple being secured to the collar by sealingly capturing an inner edge of the collar between the base portion and the flange; and,

337. *Kurkjian* discloses that the nipple is secured to the collar by "sealingly" capturing an inner edge of the collar between the base portion and the flange. Specifically, *Kurkjian* discloses that its "nursing unit" having a "nipple" which is comprised of a body portion, a neck, and flange. Ex[1009] at 1:45-2:10, Figs. 1, 3.

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Kurkjian also discloses that its "nursing unit" has a "cap," such as a "retaining cap 17" which by which the nipple is "retained upon the neck of a bottle by means of a retaining cap." *Id.* at 1:9-15. This text indicates that the nipple and cap are secured together by physical contact, which is further confirmed by disclosure that "[t]he outer edge of the flange 14 [of the nipple] is adapted to be ***firmly clamped between the flange 20 of the cap 17*** and the extreme outer edge of the neck of the bottle 10." *Id.* at 2:40-48 (emphasis added). Figures 1, 3, 6, and 7 also show this contact between the nipple's flange and the cap. *Id.* at Figs. 1, 3, 6-7. Figure 1 is reproduced below.

Fig. 1.

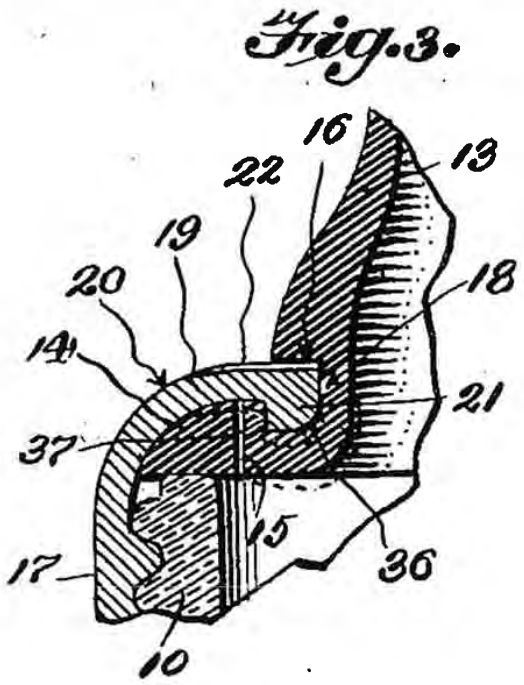


Ex[1009] at Fig. 1, showing a nursing unit comprising nipple 12 having body portion including flange 14 which is sealed against bottle 10 and cap 17.

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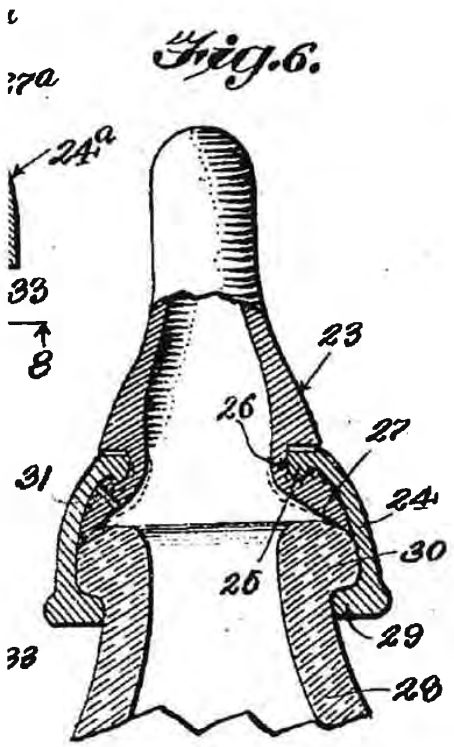
338. As is further described and shown in Figure 1 above, the nipple's connection with the cap is characterized by the capture of what *Kurkjian* calls "bead 21" which is "adapted to fit within the channel 9 of the flange 14 directly under the shoulder 16 of the body portion 13 of the nipple." *Id.* at 2:11-48. As shown in closer detail in Figure 3 below, *Kurkjian*'s bead 21 is an inner edge of the cap 17 (claimed collar) and is secured between the nipple's shoulder 16 and flange 14. *Kurkjian*'s other disclosed types of caps are similarly designed to produce the same connection between the nipple and the cap *(id.* at Figs. 6, 7)*:* with respect to the visual provided by Figure 6, the "cap 24 is provided with ***a bead 25*** adjacent the central aperture 26 through which the nipple 23 extends, ***the bead portion gripping the flange 27 of the nipple 23 in a manner similar to that described with respect to Figure 1***." *Id.* at 3:29-51 (emphasis added). This bead 25 of the cap variant is thus secured, as with the cap in Figure 1, between the nipple's flange and its shoulder 15 (not numbered in Figure 6). As previously explained, *Kurkjian*'s nipple comprises three portions including a base portion—it will be understood to a POSA that the aforementioned "base portion" includes said "shoulder 15" of the nipple, as shown in the annotated Figure 7 in previous sections, and thus *Kurkjian* discloses that the cap's "bead" (which forms the inner edge of the claimed collar) is captured between the "base portion" of the nipple and the "flange" of the nipple. *Id.*

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Ex[1009] at Fig. 3, showing a portion of nipple 12 having flange 14 and shoulder 16, and additionally showing a portion of collar 17 having bead 21 which is fitted between flange 14 and shoulder 16.

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Ex[1009] at Fig. 6, showing nursing unit with nipple 23 having flange 27 and a shoulder (not numbered here), and additionally showing a cap variant 24 with bead 25 which is clamped between flange 27 and the shoulder of nipple 23.

339. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.B(xiii).

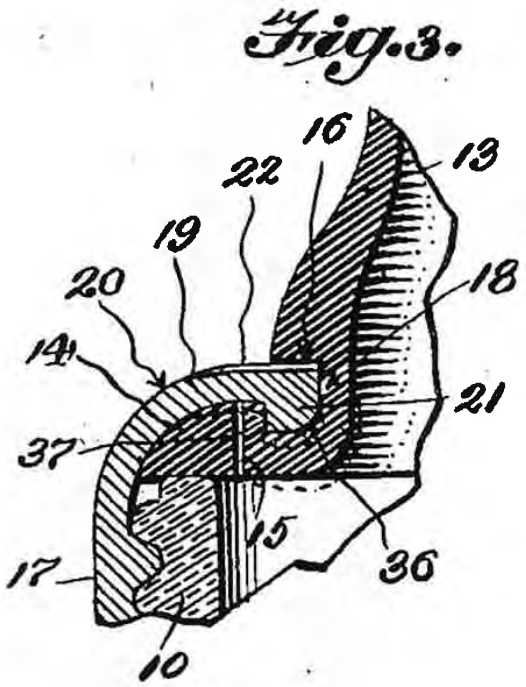
(xiv) [14.M]: e) the nipple being secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel.

340. *Kurkjian* discloses that the nipple is secured to the vessel by capturing the flange of the nipple between the collar and the open top of the vessel. As previously explained, *Kurkjian* discloses that its "nursing unit" has a "nipple" which is comprised of a body portion including neck and flange. Ex[1009] at 1:45-2:10,

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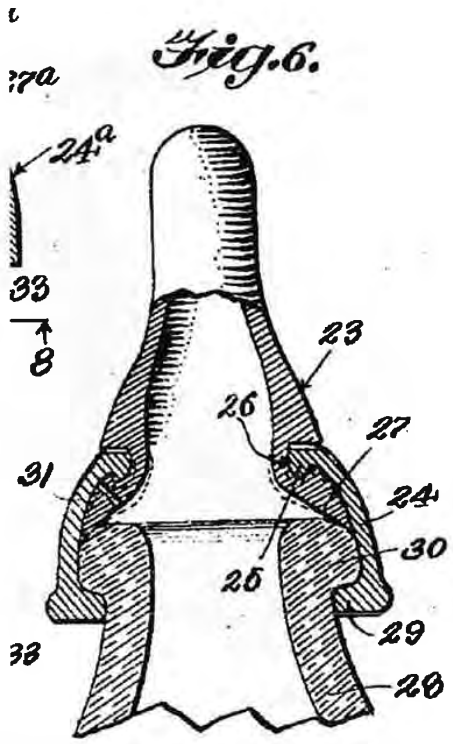
Figs. 1, 3. *Kurkjian* also discloses that its "nursing unit" has a "cap," such as a "retaining cap 17" which by which the nipple is "retained upon the neck of a bottle by means of a retaining cap." *Id.* at 1:9-15. This text indicates that the nipple and the neck of the bottle are secured together by physical contact, which is further confirmed by disclosure that "[t]he outer edge of ***the flange 14 [of the nipple] is adapted to be firmly clamped*** between the flange 20 of the cap 17 and the ***extreme outer edge of the neck of the bottle 10***." *Id.* at 2:40-48 (emphasis added). *Kurkjian* explains here that just as its cap has a protruding bead clamped between the flange and shoulder of the nipple (as explained in the previous section), the nipple's flange is likewise secured to the bottle by means of being captured between this protruding bead of the cap and the top of the bottle. *Id.* at 2:40-48. Figures 1, 3, 6, and 7 also show this contact between the nipple's flange and the bottle and that the nipple's flange is captured between the cap and bottle. *Id.* at Figs. 1, 3, 6-7.

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Ex[1009] at Fig. 3, showing a portion of nipple 12 having flange 14, which is captured between bead 21 of collar 17 and bottle 10.

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Ex[1009] at Fig. 6, showing nursing unit with nipple 23 having flange 27, which is clamped between bead 25 of cap variant 24 and bead 30 of the bottle.

341. Additionally, *Kurkjian* confirms multiple times that this flange is connected to the open top of the bottle (claimed vessel): "the nipple [is] secured to ***the mouth*** of a bottle," "a vented flexible flange is removably retained upon the neck of a bottle," "flexible nipple 12 is adapted to fit over the ***open outer end*** of the bottle." *Id.* at 1:1-8 (emphasis added), 1:9-15, 1:45-49 (emphasis added), 2:40-48.

342. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.B(xiv).

C. Claim 16

(i) [16]: The feeding bottle of claim 14 wherein the open top of

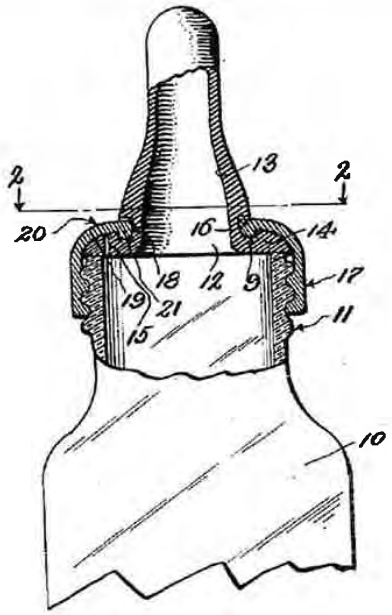
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the vessel comprises an outwardly threaded vessel neck.

343. *Kurkjian* discloses that the open top of the vessel comprises an outwardly threaded vessel neck. Specifically, *Kurkjian* describes that the "nursing bottle" of the nursing unit is "preferably of the wide-mouth type, having ***threads 11*** formed near its open or outer end." Ex[1009] at 1:41-44. This end of the bottle is described as it's "neck." *Id.* at 1:11-15 ("nipple having a vented flexible flange is removably retained upon the ***neck*** of the bottle..." (emphasis added)). *Kurkjian* shows that these threads are outwardly. For example, the retaining cap is described in *Kurkjian* as fitting ***over*** the open outer end of the bottle. *Id.* This is consistent with what is shown in Figure 1, in which the "threads 11" of the open, outer end of the bottle are on the external, outwardly side of the bottle's top, and the "screw-threads for interfitting with the threads 11" are on the internal side of the retaining cap. *Id.* at 2:14-17, Fig. 1. A closeup is also shown in Figure 3. *Id.* at 1:29-30, Fig. 3.

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Fig. 1.



Ex[1009] at Fig. 1, showing a nursing unit comprising a bottle with threads 11 and a retaining cap 17 fitting over the threads.

344. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.C.

D. Claim 17

(i) [17]: The feeding bottle of claim 14 wherein the air inlet valve comprises a slit opening.

345. As explained in §XII.A above, a POSA would have been motivated to modify *Kurkjian* based on the teachings of *Sepehr*, such that the one-way air valve extends through the base just outside of the collar. *Kurkjian* discloses an air inlet valve. Specifically, *Kurkjian* discloses that the nursing unit has a "flexible nipple having a ***vented*** flexible flange..." Ex[1009] at 1:9-15 (emphasis added). *Kurkjian*

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further discloses that this nipple "is provided with a body portion constituting a neck 13 and a laterally extending and preferably annular flange 14. This flange 14 is preferably provided with a single ***venting aperture 15*** and it should be understood that the flange 14 is integral with the body portion 13 of the nipple, the body portion and flange being formed of flexible material." *Id.* at 1:45-55 (emphasis added).

346. To the extent that *Kurkjian* does not explicitly disclose that the vented aperture (claimed air inlet valve) comprises a slit opening, this limitation is rendered obvious by the combination of *Kurkjian* with *Sepehr* and *Ishimaru*. *See supra* §XII.A. *Sepehr* discloses that the air inlet valve comprises a slit opening. *Sepehr* teaches a "***one-way air inlet valve*** 2 operable automatically." Ex[1007] at Abs. (emphasis added). *Sepehr* further explains: "The valve comprises a flexible membrane having an opening 3 which admits air into the container." *Id.* at Abs., 1:3-7, 2:4-11, 2:13-18, 2:32-3:6, 3:8-19. *Sepehr* consistently describes this valve as comprising a slit opening: *Id.* at 2:13-18 ("valve … is composed of a concave elongate semi spherical shape with ***a slit*** at its dome" (emphasis added)), 3:8-14 ("automatic ***valve 2*** produced as an integral part of teat 1 which ***has a slit 3 across the valve 2*** in order to allow the air to enter the bottle" (emphasis added)), 3:14-19 ("pressure difference outside the valve 2 which causes the ***flow of air through the slit 3*** into the bottle" (emphasis added)), 3:26-32 ("valve has an air inlet slit"), 3:34-4:2, 4:8-12.

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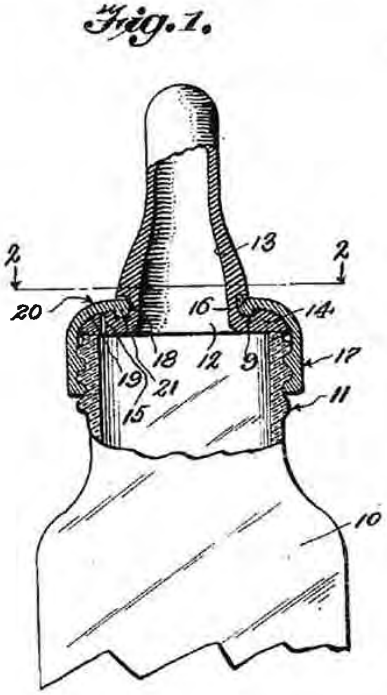
347. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.D.

E. Claim 19

(i) [19]: The feeding bottle of claim 14 wherein the vessel comprises an upper body having a first internal diameter and a portion below the upper body having a second, different internal diameter.

348. *Kurkjian* discloses that the vessel comprises an upper body and lower body having different first and second internal diameters, respectively. Specifically, *Kurkjian* discloses that its "nursing unit" comprises a "bottle." Ex[1009] at 1:1-8. This "bottle 10" comprises a "neck" and is "preferably of the wide-mouth type." *Id.* at 1:41-43. As can be confirmed by at least Figure 1, the "neck" portion of *Kurkjian*'s bottle 10, which is the claimed upper portion of the bottle, is characterized by having an internal diameter smaller than the internal diameter of the main, lower portion of the bottle, as a POSA would expect of a bottle described as having a "neck." *Id.* at 1:41-43, Fig. 1. Figure 1 is shown below showing the two different internal diameters of *Kurkjian*'s bottle (claimed vessel).

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Ex[1009] at Fig. 1, showing a nursing unit comprising a bottle 10 having a neck with threads 11.

349. To the extent that *Kurkjian* does not explicitly disclose that its bottle has an upper and lower portions with different internal diameters, this limitation is rendered obvious by the combination of *Kurkjian* with *Sepehr* and *Ishimaru*.

350. For at least these reasons, this claim limitation is rendered obvious by *Kurkjian-Sepehr-Ishimaru*. *See supra* §XI.E.

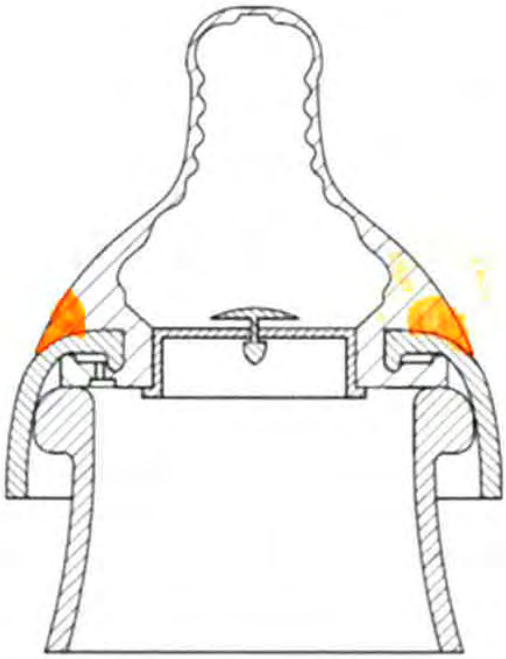
XIII. '244 PATENT GROUND 1: *Ishimaru* Renders Claims 21, 24, 26, and 27 Obvious in View of *Kurkjian in* View of the Knowledge of a Person of Ordinary Skill in the Art

351. As discussed below, *Ishimaru* in view of *Kurkjian* discloses and renders obvious each and every claim limitation of at least Claims 21, 24, 26, and 27 of the

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'244 Patent. To the extent there are any differences between Claims 21, 24, 26, and 27 of the '244 Patent and the subject matter taught by *Ishimaru-Kurkjian*, those differences would have been obvious to a POSA, and thus, *Ishimaru-Kurkjian* still renders at least Claims 21, 24, 26, and 27 of the '244 Patent obvious in view of the knowledge of a POSA at the time of the purported invention.

352. In reaching this conclusion, I have considered the disclosures of these prior art references, the motivations to combine these references, and the knowledge of a POSA, as discussed below. In my opinion, a POSA reviewing these disclosures prior to the priority date of the patents would have been motivated to design a nipple and collar design similar to the following:



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353. Such a design would have been obvious to a POSA no later than the priority date of the '244 Patent, and would render the challenged claims of the '244 Patent obvious.

A. Motivation For Combining *Ishimaru* and *Kurkjian*

354. A person of ordinary skill in the art would have been motivated to combine the nipple and vessel designs of *Ishimaru* with the nipple and vessel designs of *Kurkjian* as modified in Ground 2 because (1) *Ishimaru* stresses the importance and need for providing a realistic, human-like nipple, and (2) both references suggest the need for a nipple that equalizes pressures between the nipple and the atmosphere as a child consumes its contents. Moreover, each reference teaches the same solution: using a rounded nipple with particular design elements that imitate feeding from a human breast, and providing an air vent in a location that will reliably vent the interior of the vessel to equalize the pressure between the vessel and the atmosphere. Each of the functionalities described in Ground 1 would be carried over into the *Ishimaru-Kurkjian* combination.

355. Both *Ishimaru* and *Kurkjian* are directed to an improvement to a nipple design directed to improving venting and equalizing pressure between the interior of the vessel and the atmosphere. *Ishimaru* explains the need for such a design: "Therefore, when the user, e.g. an infant, sucks on the aforesaid teat portion and/or the aforesaid nipple trunk, the artificial nipple is subjected to pressure in the lateral

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direction. At this time, the internal pressure in the aforesaid beverage space increases, and since the aforesaid elongation portion is formed in the aforesaid teat portion and/or the aforesaid nipple trunk, the pressure acts in the direction of elongation of the artificial nipple in the longitudinal direction, causing the aforesaid teat portion and/or the aforesaid nipple trunk to elongate. Furthermore, because the internal pressure in the aforesaid beverage space increased, the aforesaid teat portion and/or the aforesaid nipple trunk will not collapse even if pressure is applied in the lateral direction of the artificial nipple due to the suckling movement of the infant, etc." Ex[1008] at ¶ 19. *Ishimaru* discloses an artificial nipple that "is more easily extensible than other portions to form a beverage space inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means is provided in the aforesaid nipple trunk to adjust the internal pressure of this beverage space." Ex[1008] at ¶¶ 05-06. *Kurkjian* describes nipple with a venting aperture "for preventing the body portion of the nipple from collapsing inwardly of the neck of the bottle when a vacuum is built up therein." Ex[1009] at 3:20-25, 1:9-15, 3:50-52, Claims 1-4. Both *Ishimaru* and *Kurkjian* discuss the advantages of such nipple designs and further emphasize the drawbacks and consequences of being unable to vent the interior of the nipple with the atmosphere, which include for example nipple collapse. *See* Ex[1008] at ¶¶ 06-07; Ex[1009] at 3:20-25, 1:9-15, Claims 1-4. A POSA would have been motivated to

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combine *Kurkjian* with *Ishimaru* because in addition to each being directed to the same problem and using the same solution, they analogously describe nipple designs with air vents and other means for equalizing the pressure between the interior of the vessel and the atmosphere.

356. As I discussed above, *Ishimaru* further discloses the need for a nipple "that is more similar to a mother's nipple," namely a nipple that "has a shape similar to a mother's breast and nipple as shown in Fig. 1, because it is used when a mother feeds her infant with artificial milk using a feeding bottle, etc., instead of her own breast milk." Ex[1008] at ¶ 41. *Ishimaru* stresses the importance of a nipple that is breast-like to encourage bottle feeding: "there as a problem that the conventional artificial nipple 10 does not elongate the teat portion of the mother's nipple or the portion corresponding to the mammary areola, and thus do not approximate the nipple." *Id.* at ¶ 04. *Ishimaru* directly addresses this problem through "thin-walled portions 122, 122 and 122, which are elongation portions with a thin wall, are formed in a groove-like pattern, for example, at seven annular locations." *Id.* at ¶ 41. Such a configuration "provides an artificial nipple that is more similar to a mother's nipple." *Id.* at ¶ 61. "[T]he artificial nipple 100 of this embodiment elongates in the same way as the mother's nipple, thereby increasing the amount of milk spurted, and the artificial nipple 100 itself does not collapse in the same way as the mother's nipple, and its rigidity can be maintained." Ex[1008] at ¶ 48.

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357. *Kurkjian* also discloses a similar nipple with other design elements that are similar to a human breast. *Kurkjian* discloses several elements that a POSA would recognize would improve the breast-like appearance of *Ishimaru*. First, *Kurkjian* discloses a securing cap that forms a downwardly domed shape with the nipple of *Kurkjian* that a POSA would recognize more closely simulates the rounded appearance of a human breast. Ex[1009] at 2:14-27, 3:33-51, 3:55-71, Figs. 1, 6-7. Specifically, *Kurkjian* teaches "The outer face of the cap 24 preferably conforms to the contour of the nipple 23 and constitutes a continuation thereof to provide a streamline type connection between the nipple 23 and the bottle 28." *Id.* Secondly, a POSA would be motivated to incorporate the vessel disclosed in *Kurkjian* with varying diameters to improve the nipple and vessel design. *Id.* at Figs. 1, 6-7. A vessel with multiple diameters would optimize vessel volume, user ergonomics, and aesthetic appearance, while also facilitating attachment of a wider, more breast-like nipple though a wide vessel mouth.

358. A POSA reading *Ishimaru* in view of *Kurkjian* would be further motivated to combine elements of the collar taught in Kurjian with the nipple and collar disclosed in *Ishimaru*. While *Ishimaru* discloses a detachable feeding bottle mounting cap to connect the nipple to the vessel (Ex[1008] at ¶ 54), a POSA would be further motivated to incorporate elements of the retaining and securing caps of *Kurkjian* to improve upon the detachable feeding bottle mounting cap in order to

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design a "streamline type of connection between the bottle and the nipple." Ex[1009] at 1:16-20. A POSA would identify and recognize that certain design elements disclosed in the retaining cap and securing cap embodiments of *Kurkjian* would improve upon the detachable feeding bottle mounting cap of *Ishimaru*. *See id.* at 2:14-27, 3:33-51, 3:55-71.

359. A POSA would have therefore understood that *Ishimaru*'s nipple and vessel could be improved by employing the techniques from *Kurkjian* to facilitate a wide, curved nipple attachment with a multi-diameter vessel that would result in an ergonomic, easy-to clean, and aesthetically pleasing nipple and vessel. Such a combination would further improve the design and goals of *Ishimaru* to provide easy cleaning, prevent nipple collapse, and provide a breast-like appearance. Ex[1008] at ¶¶ 51, 52.

360. Furthermore, a POSA would have been motivated, when reading *Ishimaru* and *Kurkjian*, to combine and substitute the familiar elements described using known methods to yield predictable results. Moreover, a POSA would have had a reasonable expectation of success in combining the nipple and vessel taught by *Ishimaru* and the nipple and vessel taught in *Kurkjian*, because both would be working as described in their respective references and the references themselves demonstrate that a POSA would have been able to combine the features of the systems and would have expected success in doing so. For example, a POSA would

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have expected modifying *Ishimaru*'s nipple in view of *Kurkjian* to provide an aesthetically suitable solution to the need to equalize pressure within the bottle. Therefore, a POSA would have been motivated to combine the nipple and vessel of *Ishimaru* with the nipple and vessel of *Kurkjian*.

B. Claim 21

(i) [21.PRE]: A drinking vessel comprising:

361. To the extent the preamble is limiting, this limitation is disclosed or rendered obvious by *Ishimaru*. *Ishimaru* discloses: "Conventional artificial nipples are mounted to feeding bottles, for example, and are used for infants, etc. to drink milk or other liquids contained in the feeding bottles." Ex[1008] at ¶¶ 01-04. *Ishimaru* further discloses a feeding bottle as illustrated in Figures 1-2: "Thus, the check valve 130 directs the beverage, e.g., milk, from the feeding bottle main body, which is provided in the downward direction in Figs. 1 and 2." *Id.* at ¶¶ 39-40, 43.

362. To the extent the preamble is limiting, this limitation is disclosed or rendered obvious by *Kurkjian*. *Kurkjian* is directed to "a resilient flanged nipple which is so constructed as to permit the nipple to be secured to the mouth of a bottle by means of a retaining cap, and permit the entrance of air into the interior of the bottle, and also prevent the nipple from collapsing inwardly of the retaining cap." Ex[1009] at 1:3-9, Claims 1-4. *Kurkjian* depicts a nipple connected to a bottle in several drawings: "By referring to the drawing, it will be seen that 10 designates the

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nursing bottle which is preferably of the wide-mouth type, having threads formed near its open or outer end." *Id.* at 1:41-45, Figs. 1, 3, 6-7. *Kurkjian* further discloses that "A flexible nipple 12 is adapted to fit over the open outer end of the bottle 10." *Id.* at 1:46-47.

363. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, including a bottle with multiple diameters would, for example, be more resistant to tipping, be better for hand holding (ergonomics), and be better suited to couple with a wider, realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

364. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

(ii) [21.A]: a container comprising a varying internal circumference and an opening into the container; and

365. This limitation is disclosed or rendered obvious by *Kurkjian*. For example, multiple figures of *Kurkjian* that disclose a container with a varying internal circumference. *See* Ex[1010] at Figs. 1, 3, 6, 7:

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Fig. 1.

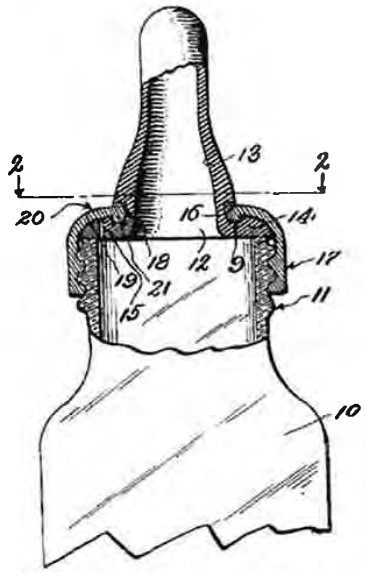
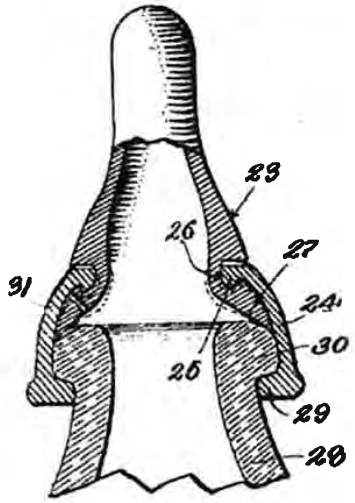
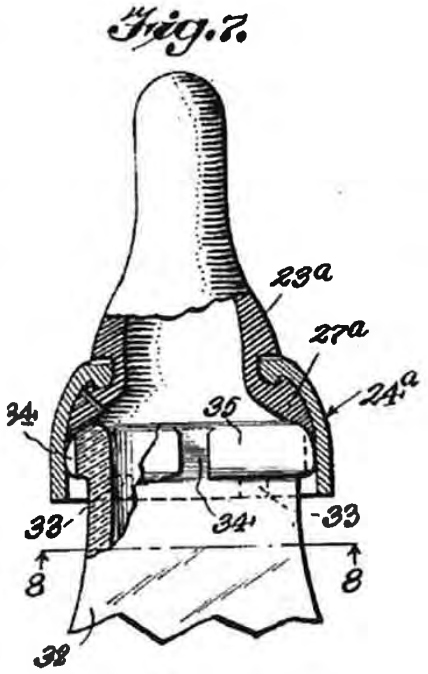


Fig. 6.



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366. As illustrated in these Figures, the bottles in *Kurkjian* include both an upper diameter (e.g., near the mouth of the vessel), and a wider, lower diameter (e.g., near the bottom of the vessel). *Id.*

367. *Kurkjian* further teaches "a resilient flanged nipple to be secured to the mouth of a bottle by means of a retaining cap, and permit the entrance of air into the interior of the bottle, and also prevent the nipple from collapsing inwardly of the retaining cap." Ex[1009] at 1:1-10, Claims 1-4.

368. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA

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would recognize, as *Kurkjian* discloses, including a bottle with multiple diameters would, for example, be more resistant to tipping, be better for hand holding (ergonomics), and be better suited to couple with a wider, realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

369. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

(iii) [21.B]: a cover assembly configured to couple to the container over the opening, the cover assembly comprising:

370. This limitation is disclosed or rendered obvious by *Ishimaru*. For example, *Ishimaru* discloses that the nipple may be connected to the vessel using a mounting cap: "in this embodiment, the lid portion 420 is bonded to the base portion 112 with a silicone adhesive, but it is not limited to this form, and it can also be fixed using a ***detachable feeding bottle mounting cap (not shown in the figure)***, which is used when mounting the artificial nipple 200 to the feeding bottle. In this case, it is a configuration that the lid portion 420 and the base portion can be separated by removing the cap, which allows for easy cleaning, etc." Ex[1008] at ¶ 54 (emphasis added).

371. In addition to that analysis, this limitation is disclosed or rendered obvious by *Kurkjian*. *Kurkjian* discloses a nipple and a collar which comprise the cover assembly to couple to the container over the opening. For example, Figures

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1, 6, and 7 illustrate a cover over the mouth of the bottle that includes a teat (e.g., a nipple, as described in *Kurkjian*) and a collar (e.g., a retaining cap, as described in *Kurkjian*):

Fig. 1.

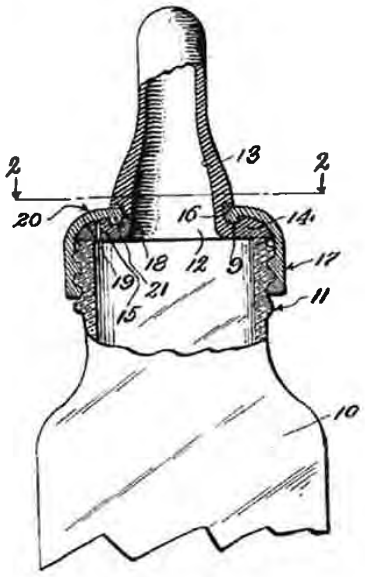
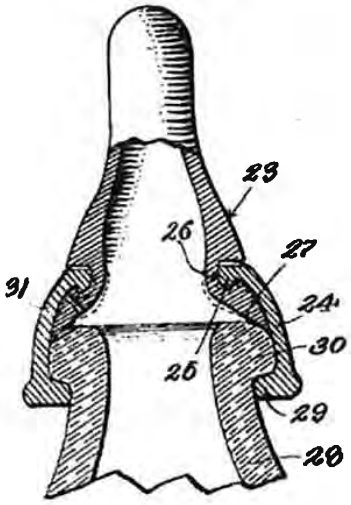


Fig. 6.



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372. *Kurkjian* further discloses "A retaining cap 17 is removably fitted over the outer or open end of the bottle 10, as shown in Figure 1, and is provided with screw-threads for interfitting with the threads 11. ***This cap 17 is provided with a centrally located aperture 18 through which the neck or body portion 13 of the nipple extends***." Ex[1009] at 2:14-20 (emphasis added), 2:41-44. *Kurkjian*'s claims further recites: "a cap removably fitting upon the open end of the bottle, said cap having a central aperture." *Id.* at Claims 1–3.

373. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, including a cover assembly, comprising a nipple and collar, to couple the container over the opening, using a nipple and collar that are removably coupled to one another would better seal over the opening of the container and would thus provide a more durable design over repeated use that reduces stress on the nipple due to repeated stretching of the nipple over the opening of the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

374. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

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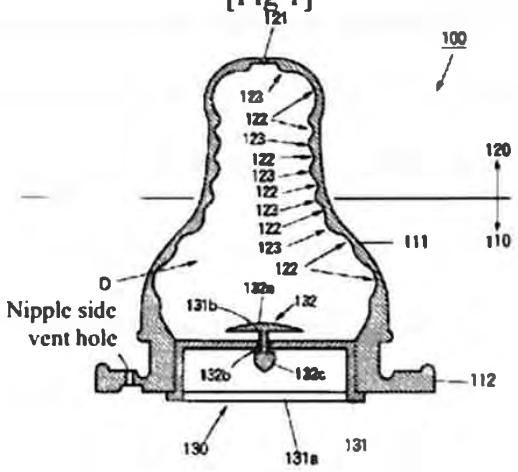
(iv) [21.C]: i. a nipple comprising a mouthpiece configured to allow liquid flow through the nipple to an aperture,

375. This limitation is disclosed or rendered obvious by *Ishimaru* under either Petitioner's or Patent Owner's proposed construction. I note that both Petitioner's and Patent Owner's proposed constructions of mouthpiece are similar for this limitation, both requiring: "part projecting generally perpendicular to the mouth of the vessel, disposed above the areola portion." *See* Ex[1018].

376. *Ishimaru* discloses or renders obvious this limitation under Patent Owner's construction. For example, *Ishimaru* discloses "an artificial nipple having a nipple trunk and a teat portion protruding from this nipple trunk[.]" Ex[1008] at Claims 1, 7, ¶¶ 03, 06. *Ishimaru* further discloses that in operation, "an infant[] sucks on the aforesaid teat portion and/or the aforesaid nipple trunk[.]" *Id.* at ¶¶ 07, 27, 46. Figure 1 discloses a "bowl-shaped ***nipple trunk 110*** equivalent to a mother's breast and a ***teat portion 120*** equivalent to a mother's nipple, which is connected to the nipple trunk 110." *Id.* at ¶ 37 (emphasis added), Fig. 1:

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[Fig 1]



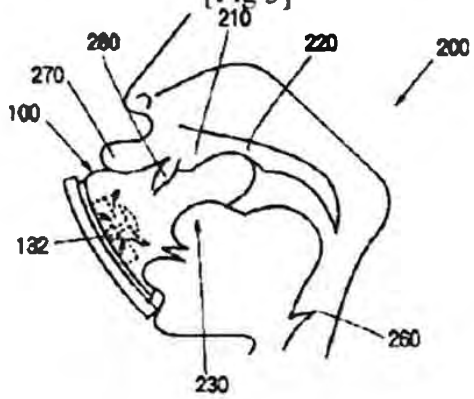
377. A POSA would understand that the nipple described by *Ishimaru* has three portions corresponding to the teat, base, and areola portions. Specifically, a POSA would consider that that middle portion of the nipple as described in *Ishimaru* constitutes an "areola" portion under either Petitioner or Patent Owner's constructions relating to this term. A POSA would further understand this teat portion to be located above the areola portion under either Petitioner's or Patent Owner's construction. A POSA would understand the teat portion of *Ishimaru*'s nipple to satisfy this limitation.

378. Under Petitioner's construction, *Ishimaru* also discloses or renders obvious this limitation. *Ishimaru* discloses a teat portion, which projects perpendicularly to the mouth of the vessel, disposed above the areola portion, and extends into the baby (or child, infant, or juvenile)'s mouth for feeding. For example,

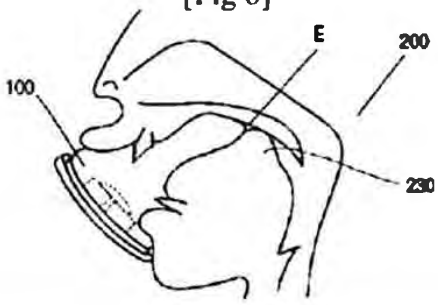
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at least Figures 5-9 and 20 of *Ishimaru* disclose at least the teat portion of the nipple extending into the baby's mouth for feeding:

[Fig 5]



[Fig 8]



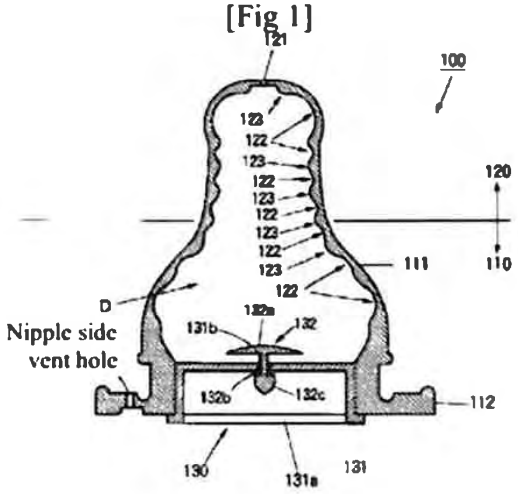
Ex[1008] at Figs. 5-9, 20.

379. *Ishimaru* further discloses that the mouthpiece is configured to allow liquid flow through the nipple to an aperture. Indeed, *Ishimaru* teaches a teat opening 121 such that "milk introduced into the space D of the artificial nipple 100 is discharged to the outside of the artificial nipple 100 ***through the teat opening 121***

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of the teat portion 120, as described above, when the infant, etc. performs the suckling movement." Ex[1008] at ¶¶ 40 (emphasis added), 43, 52-53, Fig. 1:

[Fig 1]



380. In addition to that analysis, this limitation is disclosed or rendered obvious by *Kurkjian* under both Petitioner's and Patent Owner's proposed construction of "mouthpiece." As previously discussed with regard to Ground 3 of the 930 Patent, *Kurkjian* discloses a "resilient flanged nipple" as part of its "nursing unit." Ex[1009] at 1:1-8, 1:45-49. The "flexible nipple 12" described by *Kurkjian* has "a body portion constituting a neck 13 and laterally extending and preferably annular flange 14." *Id.* at 1:45-55. This nipple is shown, for example, in Figures 1, 3, and 4. Figures 1 and 3 show the nipple in connection with the cap, while Figure 4 shows "a side elevation of the nipple" on its own. *Id.* at 1:31-32.

381. A POSA would understand that the nipple described by *Kurkjian* has three portions corresponding to the teat, base, and areola portions. Specifically a

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POSA would consider that that uppermost portion of the nipple as described in *Kurkjian* constitutes a "teat" portion that would satisfy the "mouthpiece" as recited in this element under either Petitioner or Patent Owner's constructions relating to this term. Both constructions agree that the mouthpiece is disposed above the areola portion and is generally perpendicular relative to the mouth of the vessel, which in this case is the upper, open end of the bottle disclosed by *Kurkjian*. The competing constructions do not change the analysis, which is that a POSA would consider that the upper portion of *Kurkjian*'s nipple constitutes a mouthpiece.

382. Under Petitioner's construction, a POSA would understand *Kurkjian* to disclose or render obvious this limitation, as a POSA would understand the mouthpiece in *Kurkjian* to "extends into a baby's mouth for feeding" under Petitioner's proposed construction.

383. *Kurkjian* further discloses or renders obvious that the mouthpiece is configured to allow liquid flow through the nipple to an aperture. Indeed, *Kurkjian* teaches that the baby sucks upon the nipple, thereby building up a vacuum. Ex[1009] at 2:54-3:10. A POSA reading *Kurkjian* would understand the mouthpiece of *Kurkjian* to comprise an aperture that would allow liquid flow through the nipple.

384. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable

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design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, including a mouthpiece provides a more realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

385. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

(v) [21.D]: a flex region configured to allow flex of the mouthpiece towards and away from a lower portion of the nipple,

386. This limitation is disclosed or rendered obvious by *Ishimaru* under either Petitioner's or Patent Owner's proposed construction.

387. *Ishimaru* discloses or renders obvious this limitation under Patent Owner's construction of "flex region." For example, *Ishimaru* discloses that the "teat portion and/or the aforesaid nipple trunk is provided with an elongation portion, which is more easily extensible than other portions to form a beverage space inside the aforesaid teat portion and the aforesaid nipple trunk[.]" Ex[1008] at Claims 1, 7, ¶¶ 03, 06. *Ishimaru* further discloses the "elongation portion is formed by a groove," and "the area where this groove is provided ***will elongate further***." Ex[1008] at Claims 4, 13, ¶¶ 12-13, 30, 31 (emphasis added). *Ishimaru* further describes: "on the teat portion 120 and nipple trunk 110 of the artificial nipple 100 of this embodiment,

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thin-walled portions 122, 122 and 122, which are elongation portions with a thin wall, ***are formed in a groove-like pattern,*** for example, at seven annular locations, as shown in Fig. 1." Ex[1008] at ¶ 41 (emphasis added).

388. *Ishimaru* discloses or renders obvious this limitation under Patent Owner's and Petitioner's construction of "flex of the mouthpiece towards and away from a lower portion of the nipple." For example, *Ishimaru* discloses: "the pressure acts in the direction of elongation of the artificial nipple in the longitudinal direction, causing the aforesaid teat portion and/or the aforesaid nipple trunk to elongate." Ex[1008] at ¶¶ 07, 10, 11, 19, 25, 27. "[S]ince the thin-walled portions 122 are placed at 7 locations across the teat portion 120 and the nipple trunk 110, the peristaltic movement of the tongue 230 of the infant 200 described above will cause these seven thin-walled portions 122 to elongate, and the teat portion 120 and nipple trunk 110 will also be elongated in the mouth of the infant 200. At this time, since several thin-walled portions 122 are provided at predetermined intervals from the teat portion 120 to the nipple trunk 110, the teat portion 120 and the nipple trunk 110 are elongated more evenly." *Id.* at ¶ 46.

389. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA

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would recognize, as *Kurkjian* discloses, including a mouthpiece provides a more realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

390. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

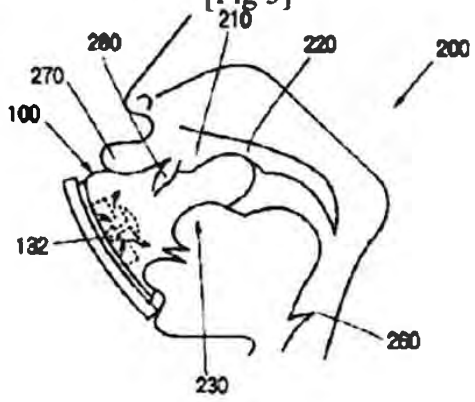
(vi) [21.E]: the mouthpiece defining a bite region,

391. This limitation is disclosed or rendered obvious by *Ishimaru*. As I previously explained with regard to element [21.D], *Ishimaru* discloses a mouthpiece under either Petitioner's or Patent Owner's proposed construction. *Supra* §XIII.B(v). *Ishimaru* further discloses or renders obvious a bite region. For example, *Ishimaru* teaches that a baby's upper palate contacts a portion of the mouthpiece in the baby's mouth. "As shown in the figure, the infant 20 presses the teat portion 12 of the artificial nipple 10 against the sucking fossa 22 on its upper palate 21 by the peristaltic movement of its tongue 23. At this time, the pressure in the enclosed space B formed by the soft palate 24, tongue 23, and teat portion 12 is close to 0 (zero)." Ex[1008] at ¶¶ 03, 44, 47, Figs. 5, 8, 20. *Ishimaru* further describes the process of feeding an infant by placing this region in the infant's mouth, imitating feeding from a mother's breast. *Id.* at ¶¶ 43-44, 46. A POSA would have understood from this disclosure that nipple of *Ishimaru* constitutes a bite

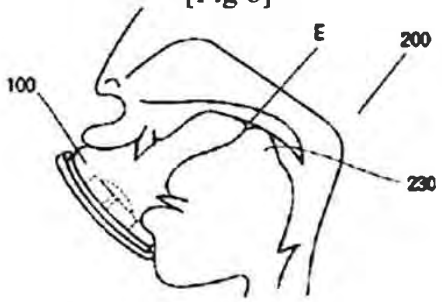
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region, similar to how a baby "bites" or "latches" to a mother's nipple during breast feeding.

[Fig 5]

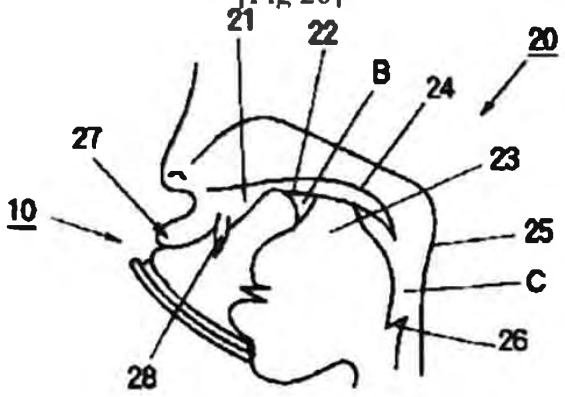


[Fig 8]



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[Fig 20]



392. A POSA reading *Ishimaru* would understand that the region of the mouthpiece contacting the palate would constitute a mouthpiece.

393. In addition, this limitation is disclosed or rendered obvious by *Kurkjian*. As I previously explained with regard to element [21.D], *Kurkjian* discloses a mouthpiece under either Petitioner's or Patent Owner's proposed construction. *Supra* §XIII.B(v). *Kurkjian* further discloses or renders obvious a bite region. For example, *Kurkjian* further discloses that the mouthpiece is configured to allow liquid flow through the nipple to an aperture. *Kurkjian* teaches that the baby sucks upon the nipple, thereby building up a vacuum. Ex[1009] at 2:54-3:10, Figs. 1, 6,-7.

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Fig. 1.

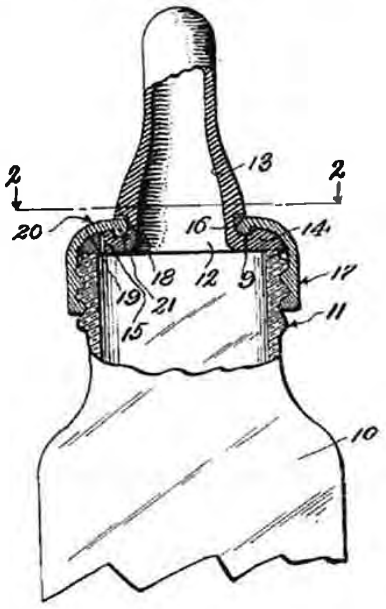
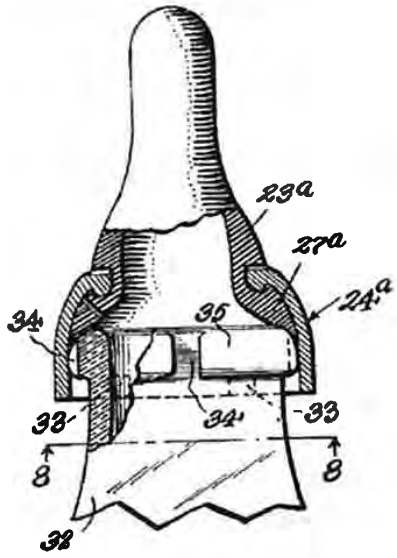


Fig. 7.



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394. A POSA reading *Kurkjian* would understand that as the baby sucks upon the nipple, a region of the mouthpiece contacts the baby's palate and constitutes a bite region.

395. As illustrated by *Kurkjian*, a POSA would understand this nearly flat or very shallowly curved surface 24 at the end of the mouthpiece taught by *Kurkjian* to delineate a bite region within the mouthpiece.

396. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, including a bite region within the mouthpiece provides a more realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

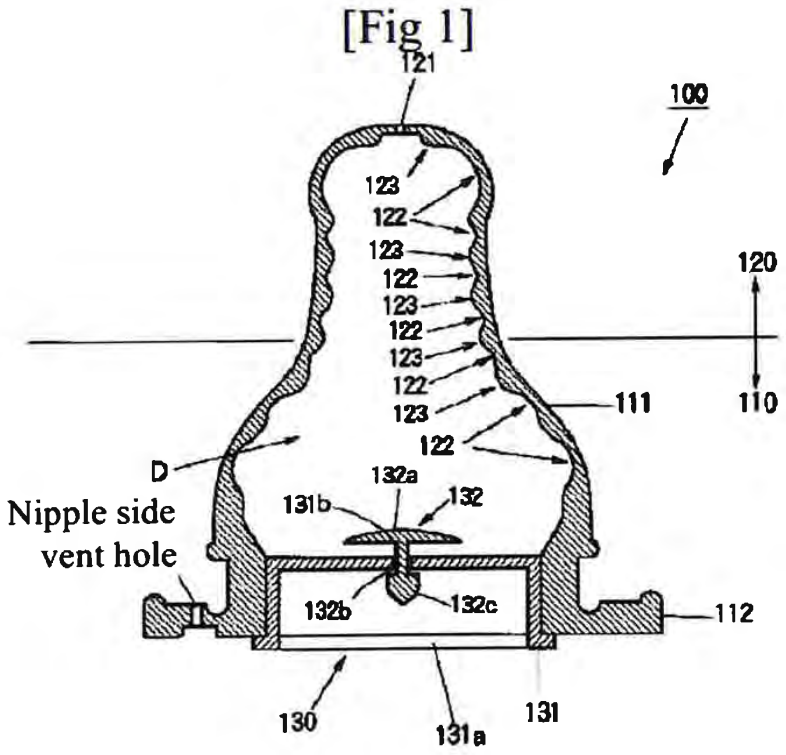
397. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

(vii) [21.F]: and a flange depending from the lower portion of the nipple defining the nipple circumference furthest from the aperture; and,

398. This limitation is disclosed or rendered obvious by *Ishimaru*. Specifically, *Ishimaru* discloses "a flange portion for connecting to a feeding bottle

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main body" which is depending from what *Ishimaru* refers to as the "base portion 112." Ex[1009] at ¶¶ 37, 50. *Ishimaru's* "base portion" would include the lower portion of the nipple. Figure 1 of *Ishimaru* shows this flange depends from the lower portion of the nipple and defines the circumference of the nipple at a point furthest from the teat opening 121:



399. In addition to that analysis, this limitation is disclosed or rendered obvious by *Kurkjian*. *Kurkjian* discloses a flange depending from the base portion of the nipple. Specifically, *Kurkjian* states that the "flexible nipple 12" is provided with "a laterally extending and ***preferably annular flange*** 14." Ex[1009] at 1:45-55 (emphasis added), 1:9-15 ("a flexible nipple having a ***vented flexible flange.***"

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(emphasis added)). As can be seen in the below Figures, flange 14 depends from the base portion. *Kurkjian* states that "it should be understood that the flange 14 is integral with the body portion 13 of the nipple," indicating that it is connected to and depended from the rest of the body portion including the claimed lower portion. *Id.* at 1:45-2:10.

400. *Kurkjian* also teaches, as a way of assuring that the nipple stays securely over the open outer end of the bottle, that "the nipple is provided with an overhanging shoulder 16 adjacent the point of junction between the body portion 13 and the flange 14, and this shoulder 16 is spaced vertically with respect to the upper face of the flange 14." *Id.* at 1:45-2:10. *Kurkjian*'s disclosure also includes details on how " a retaining cap 17 is removably fitted over the outer or open end of the bottle 10," including a "flange 19 is preferably curved upon its outer face 20 from the body portion 13 of the nipple toward the outer periphery of the cap 17 to provide a convex outer face upon the outer end of the cap 17…," thus describing to a POSA "***the lower portion of the nipple defining the nipple circumference furthest from the aperture***." *Id.* at 2:14-53; *see also id.* at 2:53-3:17 (describing how vacuum is built up in the bottle and how air channels are used to provide an air-tight fit, all suggesting the lower portion of the nipple), 3:33-70 (describing a securing cap with "a continuation thereof to provide a streamline type connection between the nipple 23 and the bottle 28" and using "lugs 33 formed on the inner face of the cap 24 for

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interfitting through the notches 34 of the flange 34…wherein the outer face of the cap 24 will merge into the contour of the outer face of the nipple 23," all suggesting the circumference of the lower portion of the nipple), 1:9-15 ("a flexible nipple having a vented flexible flange is removably retained upon the neck of a bottle by means of a retaining cap which is so constructed as to resist the spreading of the vented portion of the flange in the event of excessive pull thereon"). Furthermore, *Kurkjian*'s claims describe "said nipple having a laterally extending flange adapted to be clamped between the end of said bottle and said cap," again, teaching the circumference of the flange. *Id.* at Claims 1-4.

401. As understood by a POSA and illustrated in Figures 1, 6, and 7, the flange disclosed in *Kurkjian* depends from a lower portion of the nipple and a nipple circumference furthest from the aperture:

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Fig. 1.

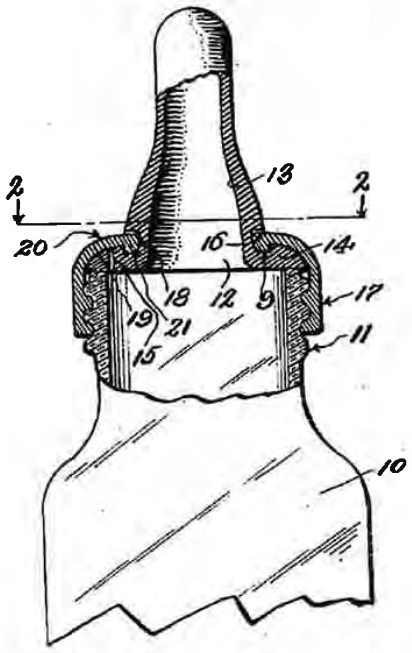
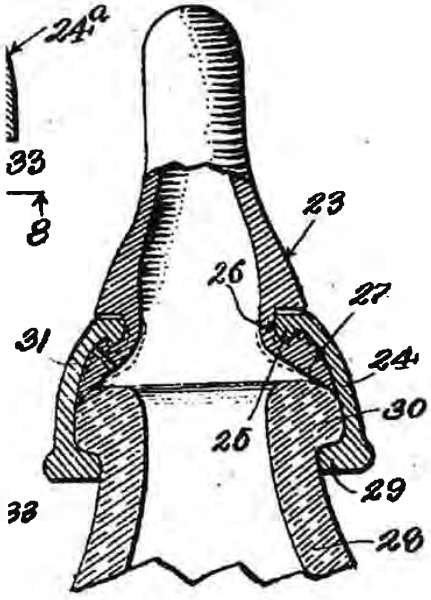


Fig. 6.



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402. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, using a nipple with a flange depending form the lower portion of the nipple would provide additional stability and would better seal over the opening of the container and would thus provide a more durable design over repeated use that reduces stress on the nipple due to repeated stretching of the nipple over the opening of the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

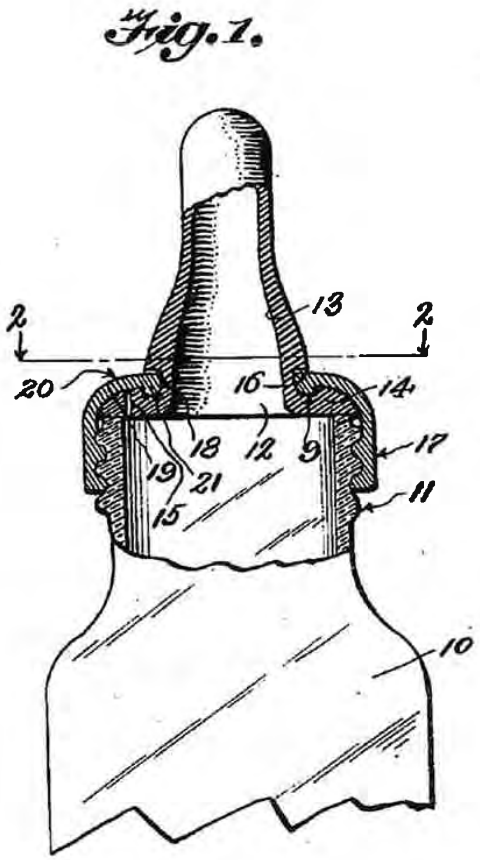
403. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

(viii) [21.G]: ii. a collar configured to removably couple to the nipple to seal over the opening of the container; and,

404. This limitation is disclosed or rendered obvious by *Ishimaru*. Specifically, *Ishimaru* discloses "a ***detachable*** feeding bottle ***mounting cap*** (not shown in the figure), which is used when mounting the artificial nipple 200 to the feeding bottle." Ex[1008] at ¶¶ 54, 56, 58 (emphasis added), Fig. 15. A POSA would understand this detachable mounting cap as disclosed in *Ishimaru* to couple the nipple to seal over the opening of the container.

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405. In addition to that analysis, This limitation is disclosed or rendered obvious by *Kurkjian*. *Kurkjian* discloses a collar that is configurable to couple to the nipple and seal over the opening of the collar. *See, e.g.*, Ex[1009] at 2:14-35, Figs. 1, 6-7, Claims 1-4. Specifically, *Kurkjian* describes a "retaining cap 17" which is "removably fitted over the outer or open end of the bottle" of the disclosed nursing unit. Ex[1009] at 2:14-17. A POSA would understand this retaining cap to represent a collar as recited in Claim 21.



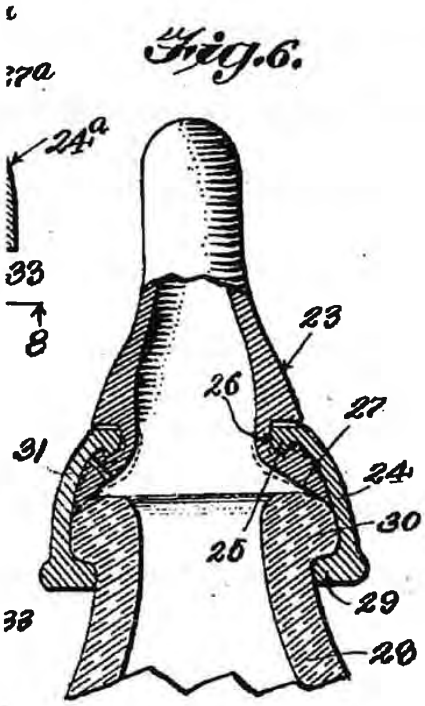
406. The retaining cap in *Kurkjian* is also described as having an internally threaded inner surface: "retaining cap 17 … is provided with screw-threads for

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interfitting with the threads 11 [of the bottle]." *Id.* at 2:14-17. *Kurkjian* shows that these threads are internal. For example, the retaining cap is described in *Kurkjian* as fitting over the open outer end of the bottle. *Id.* This is consistent with what is shown in Figure 1, in which the "threads 11" of the open, outer end of the bottle are on the external side of the bottle's top, and the "screw-threads for inter-fitting with the threads 11" are thus on the internal side of the retaining cap. *Id.* at 2:14-17, Fig. 1. A closeup is also shown in Figure 3. *Id.* at 1:29-30, Fig. 3. "an annular cap ***which screw fits to the bottle neck*** to attach the teat by pressing the teat flange against the rim of the bottle neck." Ex[1010] at 1:9-12 (emphasis added). A POSA would understand these screw threads to be used to seal the nipple over the opening of the container.

407. *Kurkjian* also describes, in a "modified form of the invention," a slight variant on the cap, described as a "securing cap" which "consists of a conical body of a thimble-like structure" and includes, as with the aforementioned cap, "an inwardly extending annular flange 29." *Id.* at 3:29-51. "The outer face of the cap 24 preferably conforms to the contour of the nipple 23 and constitutes a continuation thereof to ***provide a streamline type connection between the nipple and the bottle 28.***" *Id.* at 3:42-47 (emphasis added). This is shown in Figure 6 below, illustrating an additional iteration of the cap. A POSA would understand this securing cap to represent a collar as recited in Claim 21.

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408. *Kurkjian* further discloses a securing cap (24), which "is provided with a bead 25 adjacent the central aperture 26 through which the nipple 23 extends" and cap 24a, which may be secured in any suitable or desired manner to the neck, or to the bottle 32." *Id.* at 3:33-70, Figs. 6-7 (reproduced below).

409. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, using a nipple and collar that are removably coupled to one another would better seal over the opening of the container and would thus provide a more durable design over repeated use that reduces stress on the

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nipple due to repeated stretching of the nipple over the opening of the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

410. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

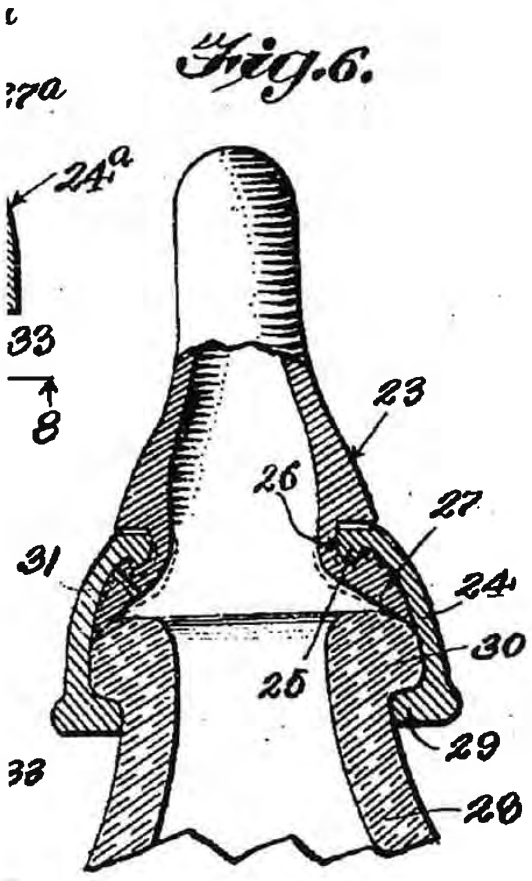
(ix) [21.H]: wherein the collar and the lower portion of the nipple together define a downward domed shape that extends outwardly and downwardly from the flex region of the nipple towards a widest circumferential edge of the collar.

411. This limitation is disclosed or rendered obvious by *Kurkjian*. Specifically, *Kurkjian* discloses that the collar and lower portion of the nipple together define a downward domed shape that extends outwardly and downwardly from the flex region of the nipple towards a widest circumferential edge of the collar. Specifically, *Kurkjian* describes that its "retaining cap" (analogous to the claimed collar) "is preferably curved upon its outer face 20 from the body portion 13 of the nipple toward the outer periphery of the cap 17 to provide a convex outer face upon the outer end of the cap 17 and provide a receding outer face upon the cap away from the nose of the baby while sucking." *Id.* at 2:14-35, Fig. 1.

412. *Kurkjian* additionally describes, with respect to the described "securing cap," that the outer face "***conforms to the contour of the nipple and constitutes a continuation thereof to provide a streamline type connection*** between the nipple 23 and the bottle 28," and accordingly is shown in Figure 6 below as having a sloping

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outer contour, that together with the nipple, define a downward domed shape. *Id.* at 3:42-47, Fig. 6. *Kurkjian* thus describes, and confirms by Figure 6, that the securing cap's outer surface slopes out and down relative to its upper rim. *Id.* This securing cap moves outwardly and downwardly towards the widest circumferential edge of the collar. *Id.*



413. A POSA reading *Kurkjian* in view of *Ishimaru* would find this limitation obvious. A primary objective of *Ishimaru* is to create a nipple that is more human and breast-like. *See supra* §XIII.A. A POSA would understand this to include a wide, dome-shaped that would appear to a baby or child to imitate a human breast.

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A POSA reviewing *Ishimaru* and intending to design a breast-like structure would understand that an abrupt change in slope between the nipple and collar would not optimally imitate the human breast.

414. Instead, a POSA reading *Ishimaru* in view of *Kurkjian* would be motivated to design a continuous, downward dome shape between the lower portion of the nipple and the annular cap, similar to Figure 6 of *Kurkjian*. The shape of the annular cap would thus extend outwardly and downwardly from the flex region of the nipple towards the widest edge of the collar. Such a design would further simulate the human breast, as directed in *Ishimaru*, and would have been an obvious modification no later than the priority date of the '244 Patent.

415. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

C. Claim 24

(i) [24]: The drinking vessel of claim 21, wherein the cover assembly further comprises an air vent apart from the mouthpiece.

416. As I previously explained, *Ishimaru-Kurkjian* discloses or renders obvious each and every limitation of Claim 21. *Supra* §XIII.B. I incorporate my analysis of Claim 21 in Ground 1 of the '244 Patent analysis.

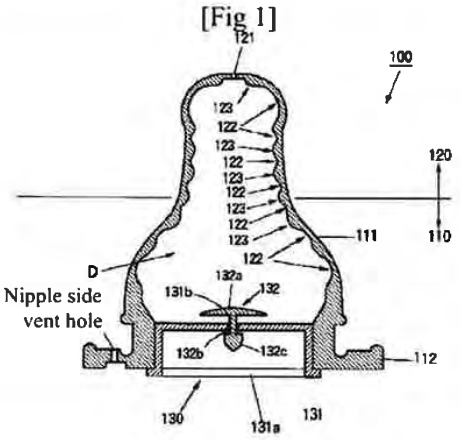
417. This limitation is disclosed or rendered obvious by *Ishimaru*. *Ishimaru* discloses an air vent apart from the mouthpiece. Specifically, *Ishimaru* discloses "a

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base portion 112 with a nipple side vent hole." Ex[1009] at ¶¶ 37 (emphasis added), 50.

418. *Ishimaru* also discloses that "nipple side vent holes and lid portion vent holes are provided in a manner that the pressure inside the bottle does not change from the outside air even when the contents of the feeding bottle are reduced," which a POSA would understand to mean that the vent holes allow air into the apparatus to prevent the internal pressure from changing as liquid is dispensed. *Id.* at ¶¶ 52 (emphasis added), 37, 50, 57.

419. Figure 1 of *Ishimaru* shows this flange with vent hole apart from the mouthpiece:



420. In addition to that analysis, this limitation is disclosed or rendered obvious by *Kurkjian*. *Kurkjian* teaches that the nursing unit has a "flexible nipple having a ***vented flexible flange***." Ex[1009] at 1:9-15 (emphasis added).

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421. *Kurkjian* further discloses that this nipple "is provided with a body portion constituting a neck 13 and a laterally extending and preferably annular flange 14. This flange 14 is preferably provided with a single venting aperture 15 and it should be understood that the flange 14 is integral ***with the body portion 13 of the nipple,*** the body portion and flange being formed of flexible material." *Id.* at 1:45-55 (emphasis added).

422. *Kurkjian* further explains that the vent may be used to "prevent[] the body portion of the nipple from collapsing inwardly of the neck of the bottle when a vacuum is built up therein." *Id.* at 2:53-3:28.

423. *Kurkjian* also describes another "vent opening 31 similar to the vent opening 15 previously described." *Id.* at 3:33-70. Finally, in *Kurkijan*, the claims mention and the figures illustrate the vents as claimed in this limitation. *Id.* at Figs. 1, 3, 6-7, Claims 1-4.

424. This is consistent with what is shown in, for example, Figures 3 and 6 below, which illustrates an air vent apart from the mouthpiece:

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Fig. 3.

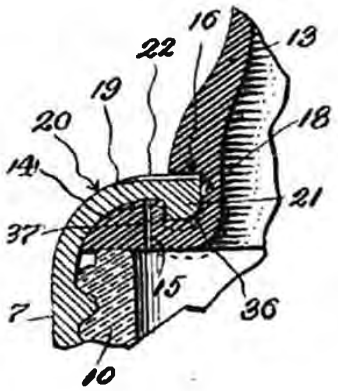
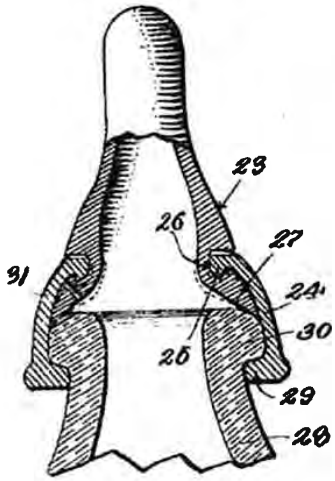


Fig. 6.



425. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A.

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426. A POSA would recognize, as *Ishimaru* and *Kurkjian* both disclose, including an air vent apart from the mouthpiece of the nipple provides a more reliable means to equalize the pressure in the vessel and the pressure in the atmosphere, and locating it outside the mouthpiece would reduce the risk of blockage or other obstructions in the air vent due to the compressive force applied to the vent passage from connection to the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

427. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

D. Claim 26

(i) [26]: The drinking vessel of claim 21, wherein the mouthpiece is located in the center of the nipple.

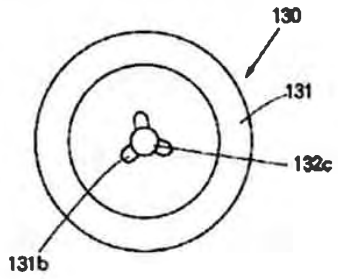
428. As I previously explained, *Ishimaru-Kurkjian* discloses or renders obvious each and every limitation of Claim 21. *Supra* §XIII.B. I incorporate my analysis of Claim 21 in Ground 1 of the '244 Patent analysis.

429. This limitation is disclosed or rendered obvious by *Ishimaru* under both Petitioner's and Patent Owner's proposed construction of "mouthpiece". *Ishimaru* further discloses that the mouthpiece is located in the center of the nipple. *Ishimaru* discloses a nipple with a teat opening 121 and mouthpiece such that the mouthpiece is located at the center of the nipple. Ex[1008] at ¶¶ 40, 43, 52-53. Figures 3, 4, 12,

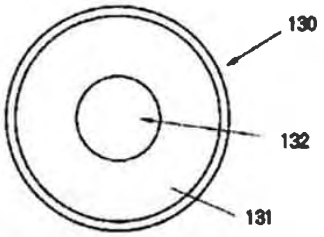
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and 13 of *Ishimaru* shows a top-view of the nipple where the mouthpiece is located at the center of the nipple. *Id.* at Figs. 1, 3, 4, 12, 13:

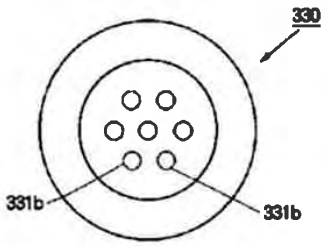
【図３】



【図４】



【図１２】

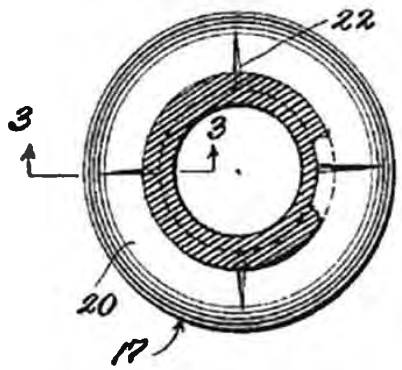


430. In addition to that analysis, this limitation is disclosed or rendered obvious by *Kurkjian* under both Petitioner's and Patent Owner's proposed

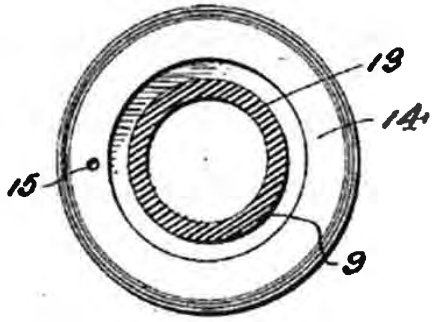
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construction of "mouthpiece." A POSA would understand *Kurkjian* to disclose this limitation, as *Kurkjian* teaches the mouthpieces are located at the center of the nipple. Specifically, Figures 2, 5, and 8 of *Kurkjian* illustrate a top-view of the nipples that locate the mouthpiece at the center of the nipple:

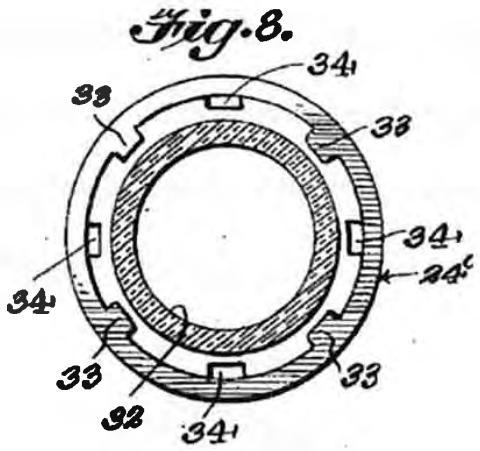
Fig. 2.



15 9 Fig. 5.



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Ex[1008] at Figs. 2, 5, 8.

431. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, positioning the mouthpiece in the center of the nipple provides a more realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

432. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

E. Claim 27

(i) **[27]: The drinking vessel of claim 21, wherein the teat portion comprises a resilient material.**

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433. As I previously explained, *Ishimaru-Kurkjian* discloses or renders obvious each and every limitation of Claim 21. *Supra* §XIII.B. I incorporate my analysis of Claim 21 in Ground 1 of the '244 Patent analysis.

434. This limitation is disclosed or rendered obvious by *Ishimaru*. For example, *Ishimaru* discloses an artificial nipple made of silicone rubber. Ex[1008] at ¶¶ 02, 52, Fig. 11. A POSA would consider silicone rubber to represent a resilient material. A POSA would further consider the teat to be constructed of a single material (e.g., the flange would also be constructed of silicone rubber).

435. This limitation is also disclosed or rendered obvious by *Kurkjian*. For example, *Kurkjian* discloses an artificial nipple made of a "flexible material" such as rubber. Ex[1009] at 1:50-54, Fig. 11. A POSA would consider rubber to represent a resilient material. A POSA would further consider the teat to be constructed of a single material (e.g., the flange would also be constructed of silicone rubber).

436. As described above, a POSA would implement elements of *Kurkjian*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIII.A. A POSA would recognize, as *Kurkjian* discloses, a resilient material improves the durability of the nipple over repeated use. To the extent not already disclosed, *Ishimaru*'s

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nipple and vessel design is improved by incorporating these design elements as taught by *Kurkjian*.

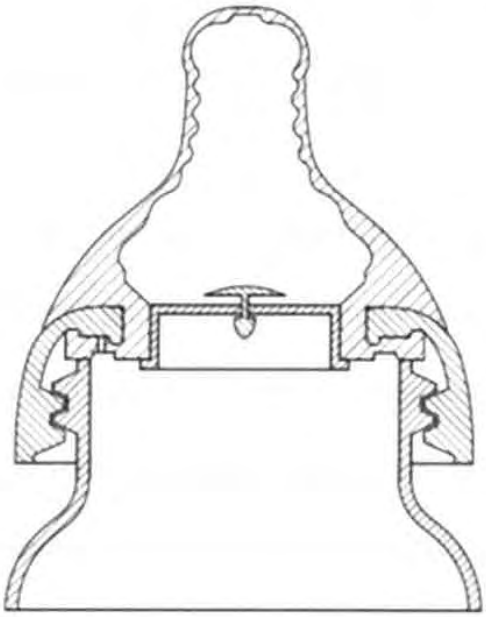
437. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Kurkjian*.

XIV. '244 PATENT GROUND 2: *Ishimaru* Renders Claims 21 – 24, 26, and 27 Obvious in View of *Atkin in* View of the Knowledge of a Person of Ordinary Skill in the Art

438. As discussed below, *Ishimaru* in view of *Atkin* discloses and renders obvious each and every claim limitation of at least Claims 21–24, 26, and 27 of the '244 Patent. To the extent there are any differences between Claims 21–24, 26, and 27 of the '244 Patent and the subject matter taught by *Ishimaru-Atkin*, those differences would have been obvious to a POSA, and thus, *Ishimaru-Atkin* still renders at least Claims 21–24, 26, and 27 of the '244 Patent obvious in view of the knowledge of a POSA at the time of the purported invention.

439. In reaching this conclusion, I have considered the disclosures of these prior art references, the motivations to combine these references, and the knowledge of a POSA, as discussed below. In my opinion, a POSA reviewing these disclosures prior to the priority date of the patents would have been motivated to design a nipple and collar design similar to the following:

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440. Such a design would have been obvious to a POSA no later than the priority date of the '244 Patent, and would render the challenged claims of the '244 Patent obvious.

A. Motivation For Combining *Ishimaru* and *Atkin*

441. A person of ordinary skill in the art would have been motivated to combine the nipple and vessel designs of *Ishimaru* with the nipple and vessel designs of *Atkin* as modified in Ground 2 because (1) *Ishimaru* stresses the importance and need for providing a realistic, human-like nipple, and (2) both references suggest the need for a nipple that equalizes pressures between the nipple and the atmosphere a child consumes its contents. Moreover, each reference teaches the same solution: using a rounded nipple with particular design elements that imitate feeding from a human breast, and providing an air vent in a location that will reliably vent the

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interior of the vessel to equalize the pressure between the vessel and the atmosphere. Each of the functionalities described in Ground 1 would be carried over into the *Ishimaru-Atkin* combination.

442. Both *Ishimaru* and *Atkin* are directed to an improvement to a nipple design directed to improving venting and equalizing pressure between the interior of the vessel and the atmosphere. *Ishimaru* explains the need for such a design: "Therefore, when the user, e.g. an infant, sucks on the aforesaid teat portion and/or the aforesaid nipple trunk, the artificial nipple is subjected to pressure in the lateral direction. At this time, the internal pressure in the aforesaid beverage space increases, and since the aforesaid elongation portion is formed in the aforesaid teat portion and/or the aforesaid nipple trunk, the pressure acts in the direction of elongation of the artificial nipple in the longitudinal direction, causing the aforesaid teat portion and/or the aforesaid nipple trunk to elongate. Furthermore, because the internal pressure in the aforesaid beverage space increased, the aforesaid teat portion and/or the aforesaid nipple trunk will not collapse even if pressure is applied in the lateral direction of the artificial nipple due to the suckling movement of the infant, etc." Ex[1008] at ¶ 19. *Ishimaru* discloses an artificial nipple that "is more easily extensible than other portions to form a beverage space inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means is provided in the aforesaid nipple trunk to adjust the internal

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pressure of this beverage space." Ex[1008] at ¶¶ 05-06. *Atkin* describes nipple design that "minimises risk of teat collapse, even with the relatively large teat of this invention." Ex[1010] at 6:12-27, 3:28-33. Both *Ishimaru* and *Atkin* discuss the advantages of such nipple designs and further emphasize the drawbacks and consequences of being unable to vent the interior of the nipple with the atmosphere. *See* Ex[1008] at ¶¶ 06-07; Ex[1010] at 1:33-45, 2:28-33. A POSA would have been motivated to combine *Atkin* with *Ishimaru* because in addition to each being directed to the same problem and using the same solution, they analogously describe nipple designs with air vents and collars and other means for equalizing the pressure between the interior of the vessel and the atmosphere.

443. As I discussed above, *Ishimaru* further discloses the need for a nipple "that is more similar to a mother's nipple," namely a nipple that "has a shape similar to a mother's breast and nipple as shown in Fig. 1, because it is used when a mother feeds her infant with artificial milk using a feeding bottle, etc., instead of her own breast milk." Ex[1008] at ¶ 41; *supra* Section XII.A. *Ishimaru* stresses the importance of a nipple that is breast-like to encourage bottle feeding: "there as a problem that the conventional artificial nipple 10 does not elongate the teat portion of the mother's nipple or the portion corresponding to the mammary areola, and thus do not approximate the nipple." *Id.* at ¶ 04. *Ishimaru* directly addresses this problem through "thin-walled portions 122, 122 and 122, which are elongation portions with

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a thin wall, are formed in a groove-like pattern, for example, at seven annular locations." *Id.* at ¶ 41. Such a configuration "provides an artificial nipple that is more similar to a mother's nipple." *Id.* at ¶ 61. "[T]he artificial nipple 100 of this embodiment elongates in the same way as the mother's nipple, thereby increasing the amount of milk spurted, and the artificial nipple 100 itself does not collapse in the same way as the mother's nipple, and its rigidity can be maintained." Ex[1008] at ¶ 48.

444. *Atkin* also discloses a similar nipple with other design elements that are similar to a human breast. *Atkin* discloses at least two techniques that a POSA would recognize would improve the breast-like appearance of *Ishimaru*. First, *Atkin* discloses a "wide concave profile" of a teat that a POSA would recognize more closely simulates the rounded appearance of a human breast. Ex[1010] at 3:20-26, 5:7-17, 6:42-49, Figs. 3, 4, 7A-B. Second, *Atkin* discloses a wide, varying diameter vessel: "the main portion having a capacity in the range 25 to 40 ml per cm height and the neck portion having a mean cross sectional area not less than 0.45 of the cross sectional area of the main portion. Preferably, the main portion is substantially tubular and the neck 60 portion is cylindrical having a mean diameter not less than 0.65 of the main portion diameter." *Id.* at 2:55-61, 3:10-27, Fig. 1. A vessel with multiple diameters or internal circumferences would optimize vessel volume, user ergonomics, and aesthetic appearance, while also facilitating attachment of a wider,

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more breast-like nipple though a wide vessel mouth. *Atkin* further teaches that a multi-diameter, wide-vessel mouth "is less liable to being tipped over. In addition, the wider neck facilitates the insertion of food ingredients, as by means of a scoop, and is more readily cleaned internally after use." *Id.* at 3:20-23.

445. A POSA would have therefore understood that *Ishimaru*'s nipple and vessel could be improved by employing the techniques from *Atkin* to facilitate a wide, curved nipple attachment with a multi-diameter vessel that would result in an ergonomic, easy-to clean, and aesthetically pleasing nipple and vessel. Such a combination would further improve the design and goals of *Ishimaru* to provide easy cleaning, prevent nipple collapse (and colic), and provide a breast-like appearance. Ex[1008] at ¶¶ 51, 52. A POSA would be further motivated and find it obvious, to the extent not disclosed by *Ishimaru*, to modify the vessel design as taught by one or more embodiments disclosed in *Atkin* in order to provide a more ergonomic, durable, and aesthetically pleasing design better suited for *Ishimaru*'s nipple design. For example, incorporating *Atkin* design with varying diameters to improve the nipple and vessel design would result in a vessel with multiple diameters that would optimize vessel volume, user ergonomics, and aesthetic appearance, while also facilitating attachment of a wider, more breast-like nipple though a wide vessel mouth. "Furthermore, a larger diameter neck enables the use of a larger teat,

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enabling use of the bottle by the baby more closely resembling natural feeding." Ex[1010] at 3:10-27.

446. Furthermore, a POSA would have been motivated, when reading *Ishimaru* and *Atkin*, to combine and substitute the familiar elements described using known methods to yield predictable results. Moreover, a POSA would have had a reasonable expectation of success in combining the nipple and vessel taught by *Ishimaru* and the nipple and vessel taught in *Atkin*, because both would be working as described in their respective references and the references themselves demonstrate that a POSA would have been able to combine the features of the systems and would have expected success in doing so. For example, a POSA would have expected modifying *Ishimaru*'s nipple in view of *Atkin* to provide a more reliable, aesthetically suitable solution to the need to equalize pressure within the bottle. Therefore, a POSA would have been motivated to combine the nipple and vessel of *Ishimaru* with the nipple and vessel of *Atkin*.

B. Claim 21

(i) [21.PRE]: A drinking vessel comprising:

447. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(i). The described functionality of *Ishimaru* would be carried over into the *Ishimaru*-

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Atkin combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

448. In addition to that analysis, to the extent the preamble is limiting, it is taught by *Atkin*. *Atkin* discloses a drinking vessel. For example, multiple figures of *Atkin* disclose a drinking vessel. *See* Ex[1010] at Figs. 1, 7A-7B:

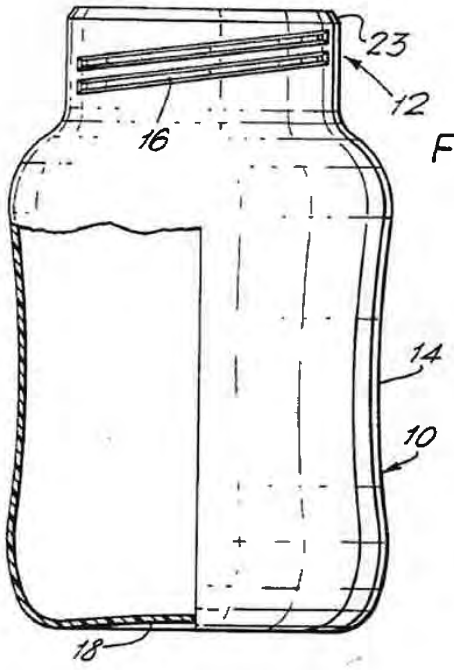
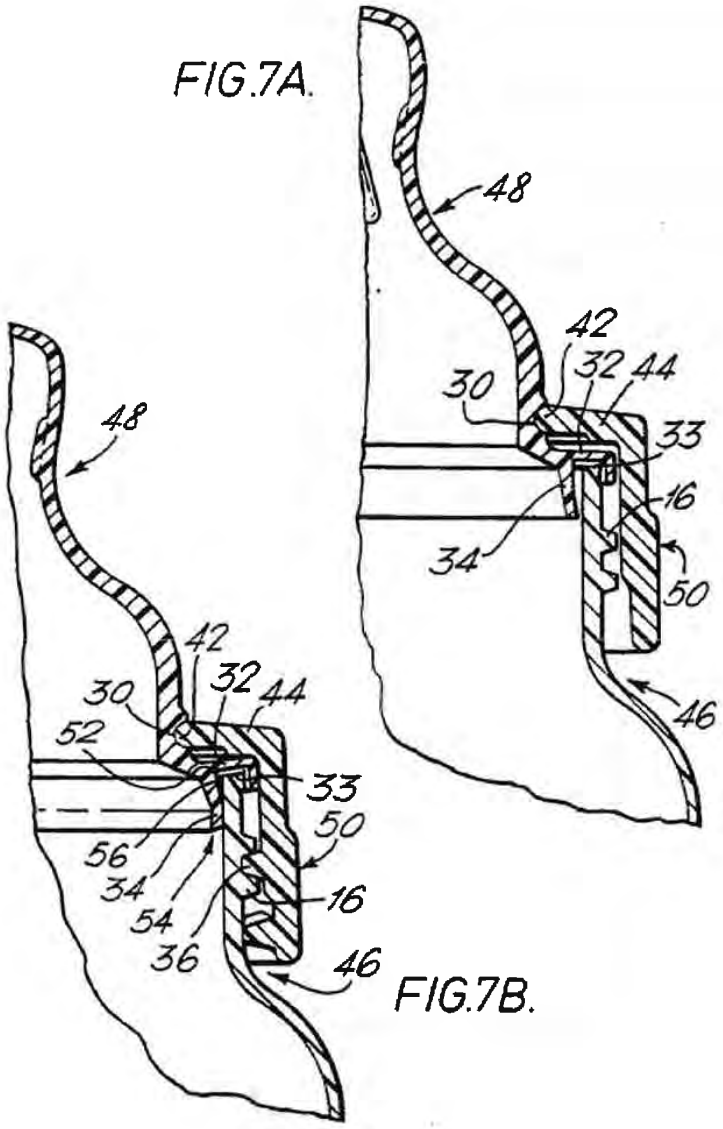


FIG.1.

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449. *Atkin* further recites "This invention relates to a ***baby feed bottle*** and also to a ***baby feed bottle combination*** which comprises ***bottle***, teat and teat fitting cap and may also include other components such as a dormal cap." Ex[1010] at 1:1-6. *Atkin* extensively describes the dimensions and characteristics of a feed bottle: "A

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typical bottle is relatively tall, having a capacity of the order of about 20 ml per cm height. This typical bottle therefore, having a neck portion above the bottle full mark of about 3 cm height will, in the case of a 250 ml full capacity bottle, stand about 15 cm high. Being of a diameter of the order of 5 cm, it thus tends to stand in a critically stable manner, and even a small disturbance is likely to knock or tip it over. This can lead to leakage of baby feed through the teat, and may create the need for re-sterilisation." Ex[1010] at 1:12-23.

450. *Atkin* further cites to prior art that describes a baby feed bottle. *See* Ex[1010] at 1:55-2:14. Claims 1-16 of *Atkin* further recite "A baby feed bottle combination . . ." Ex[1010] at 8:16-9:39.

451. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, including a bottle with multiple diameters would, for example, be more resistant to tipping, be better for hand holding (ergonomics), and be better suited to couple with a wider, realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

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452. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

(ii) [21.A]: a container comprising a varying internal circumference and an opening into the container; and

453. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(ii). The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

454. *Atkin* discloses or renders obvious this limitation. For example, multiple figures of *Atkin* that disclose a container with a varying internal circumference. *See* Ex[1010] at Figs. 1, 7A-7B:

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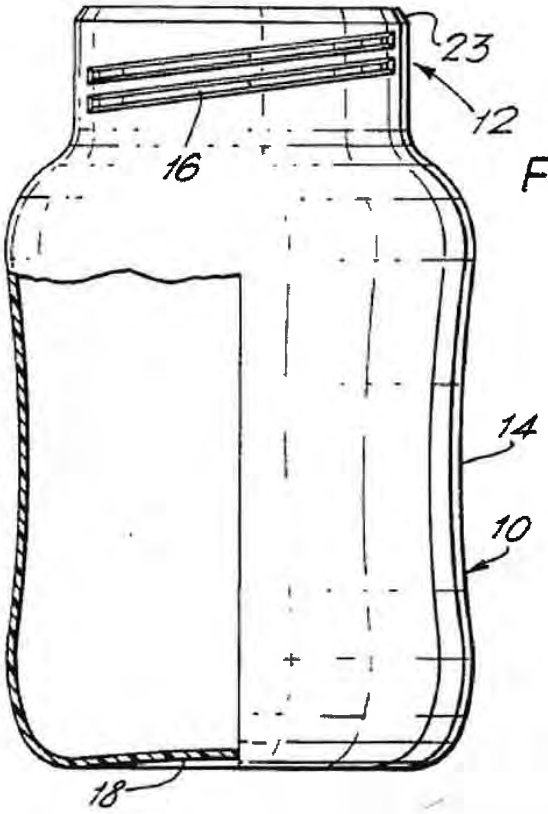


FIG.1.

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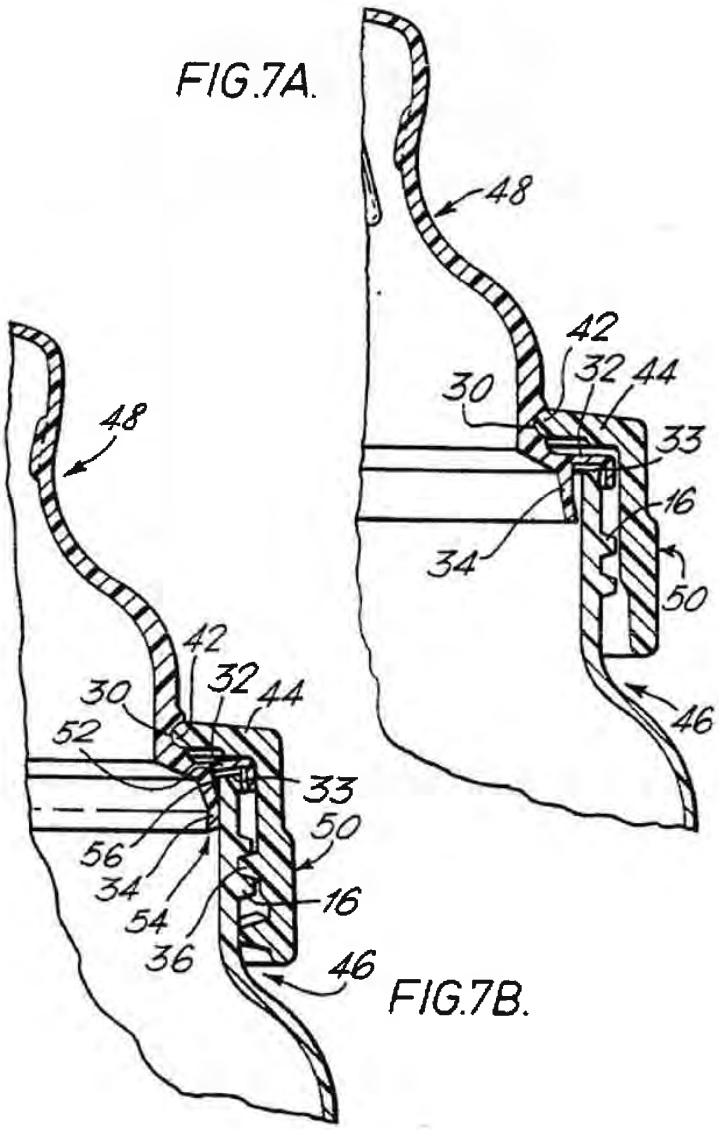


FIG.7A.

FIG.7B.

455. For example, Figure 1 of *Atkin* discloses at least three different internal diameters: A first diameter at the bottom of the vessel; a second diameter "marginally waisted, as indicated at 14, to facilitate hand holding"; and a third diameter at neck portion 12. Ex[1010] at 4:37-41.

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456. With regard to Figure 1, *Atkin* teaches: "The bottle is made of clear polycarbonate and provided with graduated markings indicating capacity, for example up to a full capacity just at the top of the main portion 10 where it starts to merge into the neck portion 12 of reduced diameter. The illustrated bottle, having a full capacity of 250 ml, is of a short, squat shape compared to a conventional feed bottle. Thus, the illustrated bottle has a main portion mean diameter of about 6.75 cm (7 cm maximum top and bottom to 6.5 cm at the centre of the waist) and main portion height up to the full capacity mark of about 8 cm. The neck portion diameter is about 5 cm. The total bottle height is about 12 cm. More particularly, in accordance with the invention, the capacity per cm height lies between 25 to 40 ml per cm, in fact about 31 ml per cm, and a neck portion diameter of about 0.75 times the main portion mean diameter." Ex[1010] at 4:44-63.

457. For example, Figure 1 of *Atkin* discloses at least three different internal diameters: A first diameter at the bottom of the vessel; a second diameter "marginally waisted, as indicated at 14, to facilitate hand holding;" and a third diameter at neck portion 12. Ex[1010] at 4:37-41, 3:10-27.

458. As another example, Figures 7A and 7B of *Atkin* further illustrates at least two different diameters in the bottle: A first diameter in the neck portion of the vessel; and a second diameter for the remainder of the bottle.

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459. *Atkin* further discloses that different diameters apply to both the internal and external diameters of the bottle. *See* Ex[1010] at 2:62-3:9.

460. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, including a bottle with multiple diameters would, for example, be more resistant to tipping, be better for hand holding (ergonomics), and be better suited to couple with a wider, realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

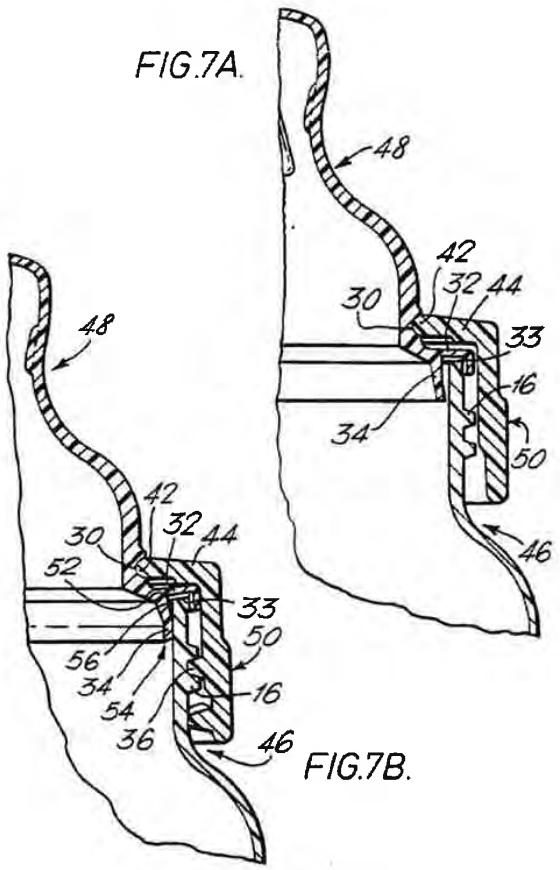
461. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

(iii) [21.B]: a cover assembly configured to couple to the container over the opening, the cover assembly comprising:

462. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(iii). The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

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463. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin*. *Atkin* discloses a nipple and a collar which comprise the cover assembly to couple to the container over the opening. For example, Figures 7A and 7B of *Atkin* illustrate a cover over the mouth of the bottle that includes a teat (e.g., a nipple, as described in *Atkin*) and a collar (e.g., an annular cap, as described in *Atkin*):



464. Specifically, *Atkin* teaches: "Figures 7A and 7B are now referred to for facilitating understanding of the manner in which the bottle, ***teat and annular cap*** cooperate with one another when the **cap** and **teat sub-assembly** so is screwed into

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position. In these two figures, the bottle neck is generally referenced 46, the **teat 48 and annular cap 50**. The previously described features of these three components are referenced in accordance with the preceding description." Ex[1010] at 5:46-56.

465. *Atkin* further teaches that the teat and annular cap cover the mouth opening of the vessel (along with an outer cap) such that the contents of the vessel can be shaken without spilling the contents: "Yet again, shaking of the mixture in the bottle is only readily enabled by the provision and fitting of a separate cap in place of the annular cap and teat, or at least a closure disc in place of the teat, since if the bottle with a fitted teat is shaken, feed is liable to be shaken out through the teat perforations or the teat valve system. Shaking of the mixture in the bottle can also lead to blockage of the radial groove in the teat flange, which must be kept clear to avoid the problem of teat collapse." Ex[1010] at 1:45-54; *see also id* at 5:29–46.

466. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, including a cover assembly, comprising a nipple and collar, to couple the container over the opening, using a nipple and collar that are removably coupled to one another would better seal over the opening of the container and would thus provide a more durable design over repeated use that

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reduces stress on the nipple due to repeated stretching of the nipple over the opening of the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

467. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

(iv) [21.C]: i. a nipple comprising a mouthpiece configured to allow liquid flow through the nipple to an aperture,

468. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(iv). The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

469. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin* under both Petitioner's and Patent Owner's proposed construction of "mouthpiece." *Atkin* discloses: a nipple comprising a mouthpiece configured to allow liquid to flow through the nipple. For example, *Atkin* teaches that "The ***teat has*** a nearly flat or very shallowly curved surface 24 at the end of the ***mouthpiece 26***; the teat perforations are formed in this end surface. Below the mouthpiece the teat widens out to a pair of spaced external ribs 28 which define an annular groove 30 between them, immediately above an annular flange 32. The flange 32 has an inner depending annular lip 34, and an outer axially shorter, shaped depending is

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bead or lip 35." Ex[1010] at 5:6-16 (emphasis added). At least Figs. 4A, 7A and 7B illustrate this limitation:

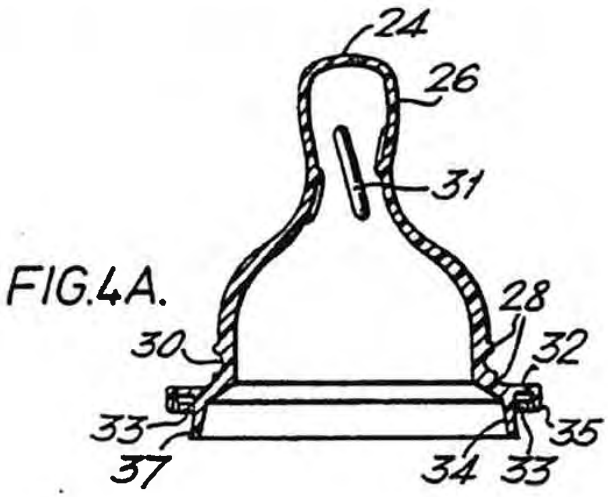
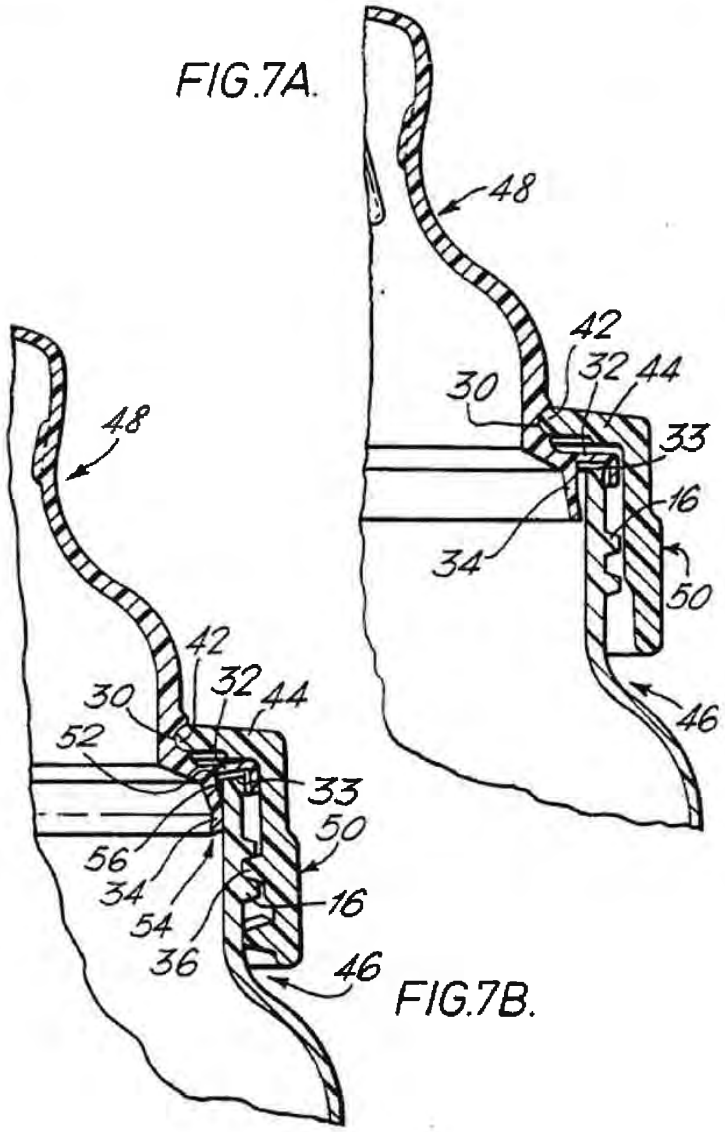


FIG.4A.

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470. As illustrated in Figs. 7A and 7B, a POSA would understand *Atkin* to disclose this limitation under either Petitioner or Patent Owner's proposed construction of mouthpiece, as the mouthpiece in *Atkin* projects generally perpendicular to the mouth of the vessel and is disposed above the areola portion

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(under both parties' proposed constructions), and this mouthpiece "extends into a baby's mouth for feeding" under Petitioner's proposed construction.

471. *Atkin* further discloses that the mouthpiece is configured to allow liquid flow through the nipple to an aperture. Indeed, one of the goals of *Atkin* is to "avoid collapse of the teat mouthpiece ***when feed is sucked out of the bottle***[.]" Ex[1010] at 8:5-12 (emphasis added), 3:28-33, Claim 1.

472. *Atkin* further discloses a trainer spout with "an upstanding eccentric spout 68 having small apertures 70 in its end through which baby feed can be taken by a baby with a sucking and/or drinking technique." Ex[1010] at 7:39-42.

473. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, including a mouthpiece provides a more realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

474. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

(v) [21.D]: a flex region configured to allow flex of the mouthpiece towards and away from a lower portion of the

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nipple,

475. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(v). The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

476. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

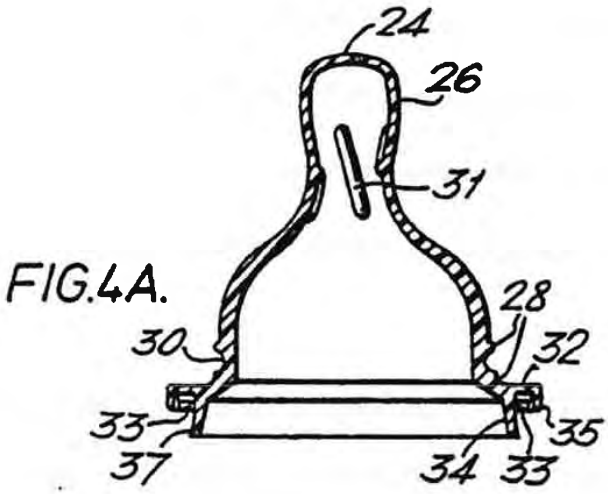
(vi) [21.E]: the mouthpiece defining a bite region,

477. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(vi). The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

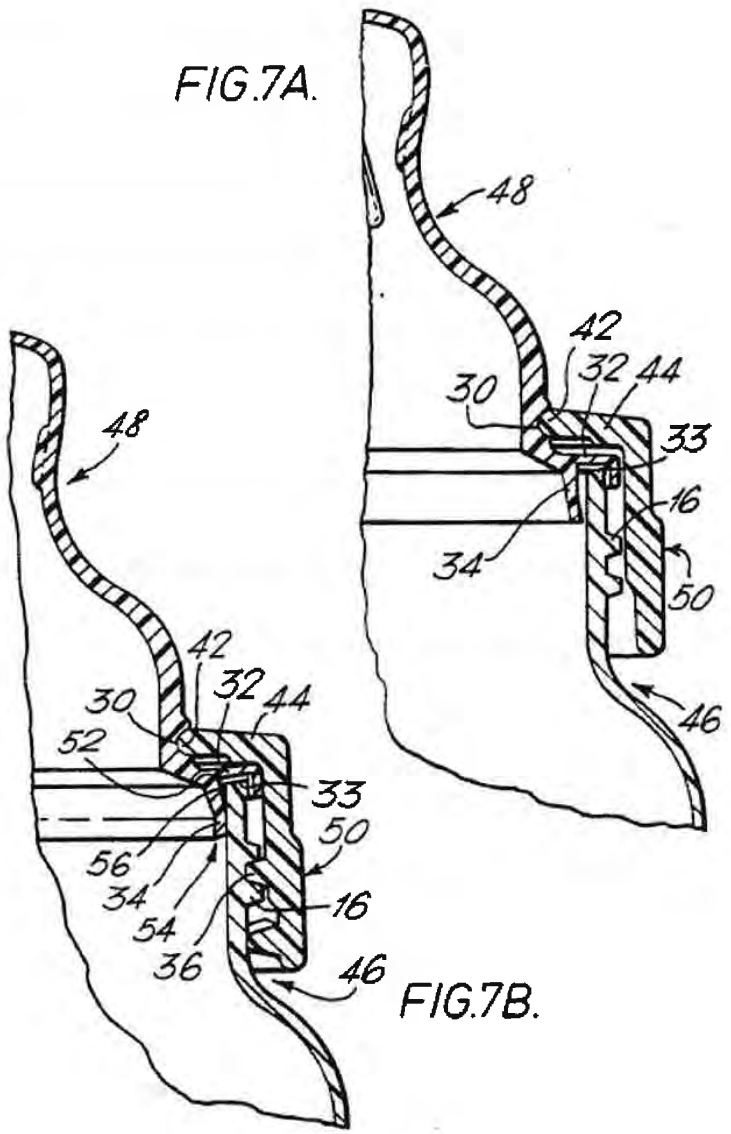
478. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin* under both Petitioner's and Patent Owner's proposed construction of "mouthpiece". I previously explained with regard to limitation 21[D] that *Atkin* discloses or renders obvious mouthpiece. *See supra* §XIII.B(v). I incorporate my analysis of limitation 21[D] herein.

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479. For example, *Atkin* teaches that "The ***teat has a nearly flat or very shallowly curved surface 24 at the end of the mouthpiece 26.***" Ex[1010] at 5:6-16 (emphasis added). At least Figs. 4, 7A and 7B illustrate this limitation:



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480. As illustrated by *Atkin*, a POSA would understand this nearly flat or very shallowly curved surface 24 at the end of the mouthpiece taught by *Atkin* to delineate a bite region within the mouthpiece.

481. *Atkin* further discloses that the mouthpiece is configured to allow liquid flow through the nipple to an aperture. Indeed, one of the goals of *Atkin* is to "avoid

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collapse of the teat mouthpiece ***when feed is sucked out of the bottle***[.]" Ex[1010] at 8:5-12 (emphasis added); 3:28-33, Claim 1). A POSA reading *Atkin* would understand that a baby or child may be inclined to bite the mouthpiece when sucking the contents out of the bottle via the mouthpiece. A POSA would further intend that the baby or child bite on the flat or very shallowly curved surface as this would provide an ergonomic, delineated area with which to bite.

482. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. See supra §XIV.A.. A POSA would recognize, as *Atkin* discloses, including a bite region within the mouthpiece provides a more realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

483. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

(vii) [21.F]: and a flange depending from the lower portion of the nipple defining the nipple circumference furthest from the aperture; and,

484. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(vii).

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The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

485. In addition to that analysis, this limitation is taught by *Atkin*. *Atkin* discloses an "arrangement being such that when the cap is screwed down, it acts on the teat ***to deform the annular flange*** thereof so that the said 20 lip is turned outwardly to engage the interior surface of the bottle neck to provide a normally closed flap valve." Ex[1010] at 2:17-22; 3:44-65. As further illustrated in Figures 3 and 4 of *Atkin*, the flange in *Atkin* depends from the lower portion of the nipple: "The flange 32 has an inner depending annular lip 34, and an outer axially shorter, shaped depending is bead or lip 35. The reference 31 denotes inclined inwardly directed stiffening ribs formed in the side wall of the mouthpiece of the teat." Ex[1010] at 5:13-18, Fig. 3-4; *see also id.* at Figs. 7-8.

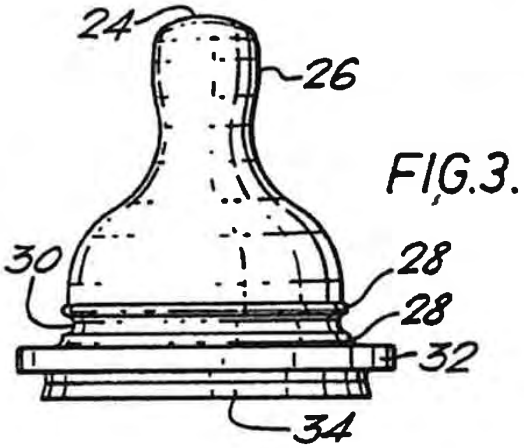


FIG.3.

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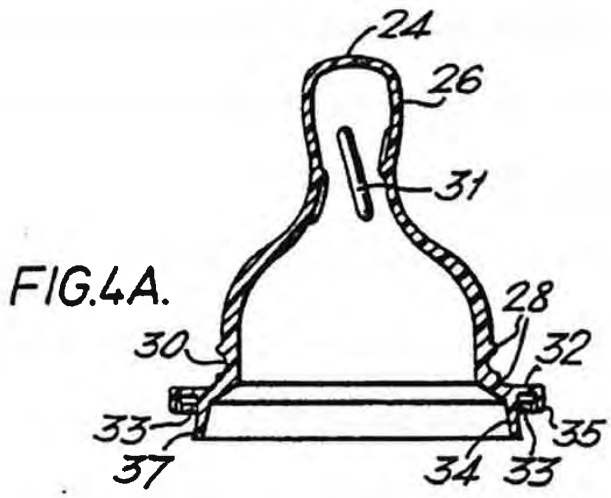


FIG.4A.

486. As illustrated in Figure 3, the flange 32 (which includes depending annular lip 34 ("The flange 32 has an inner depending annular lip 34", Ex[1010] at 5:13-18)) extends from the lower portion of the nipple and defines the circumference of the nipple furthest from the aperture. *Atkin* teaches "The flange is dimensioned to seat on the rim 20 of the bottle neck, with the inner lip 34 extending 20 into the interior of the bottle neck with small clearances from the interior surface of the latter." Ex[1010] at 5:19-23.

487. *Atkin* further discloses or renders obvious this limitation with respect to Figures 7A and 7B, and the accompanying descriptions. *See* Ex[1010] at Figs. 7A, 7B; 5:56-6:27.

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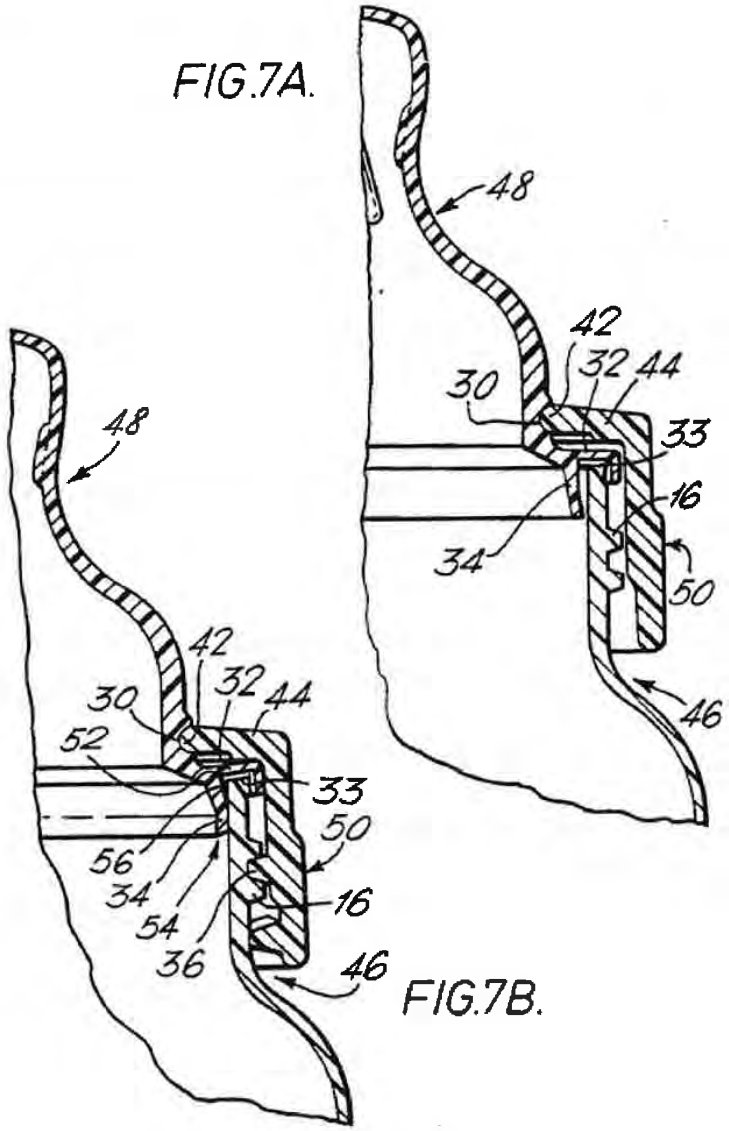


FIG.7A.

FIG.7B.

488. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, using a nipple with a flange depending form the

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lower portion of the nipple would provide additional stability and would better seal over the opening of the container and would thus provide a more durable design over repeated use that reduces stress on the nipple due to repeated stretching of the nipple over the opening of the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

489. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

(viii) [21.G]: ii. a collar configured to removably couple to the nipple to seal over the opening of the container; and,

490. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.B(viii). The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

491. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin*. *Atkin* discloses "an annular cap ***which screw fits to the bottle neck*** to attach the teat by pressing the teat flange against the rim of the bottle neck." Ex[1010] at 1:9-12 (emphasis added).

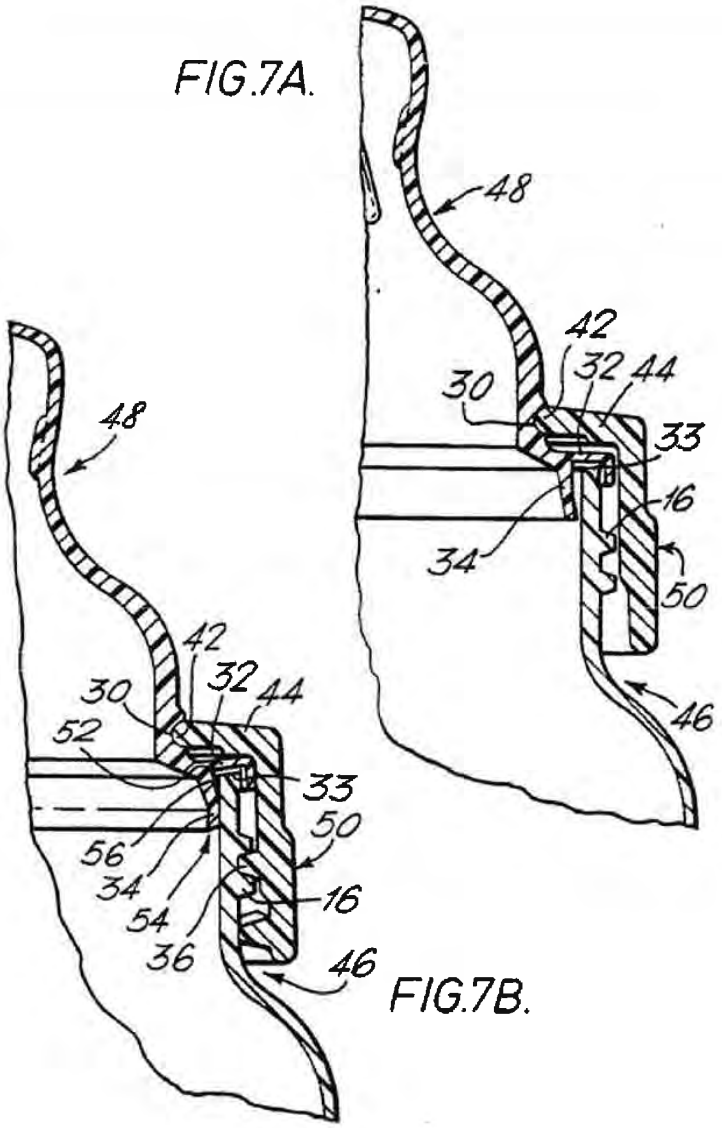
492. *Atkin* further teaches that this annular cap is removably coupled to the nipple: "In practice, however, ***the teat is attached to the annular cap*** of Figures 5

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and 6 before being fitted to the bottle. The annular cap has an internal interrupted screwthread 36 for screwing to the externally threaded bottle neck, and externally the cap is shouldered at 38, being provided with an enlargement 40 on the wider diameter portion below the shoulder. The enlargement 40 facilitates the screwing and unscrewing of the cap. The cap, in addition to its internally threaded cylindrical wall, ***has an annular end wall 42 of 40 which the interior peripheral rim 44 is dimensioned to fit into the external annular groove 30 on the teat***. The teat and annular cap ***can thus be press fitted together***, so that the cap then locates the teat and the two can be fitted as a subassembly to the bottle." Ex[1010] at 5:29-46 (emphasis added).

493. Figures 7A and 7B further illustrate that the teat and annular cap in *Atkin* are removably coupled to one another to seal the opening over the container. Ex[1010] at 5:47-52; Figs.7A-7B.

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494. A POSA reading *Atkin* would further understand that, although the annular cap and teat are coupled to one another, they are distinct, separate components (e.g., they are removeable from one another). For example, the teat and collar are described separately, and illustrated as separate, distinct components from

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one another. Ex[1010] at 5:2-46, Figs. 3-4 (showing teat); Figs. 5-6 (showing annular cap)

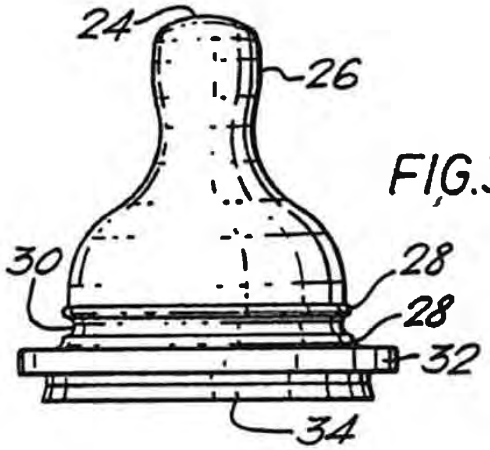


FIG.3.

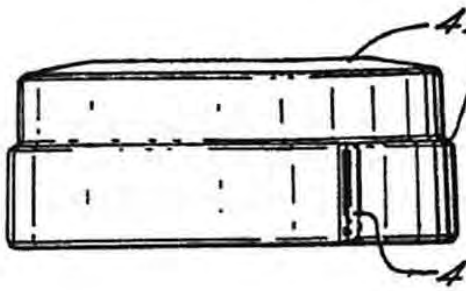


FIG.5.

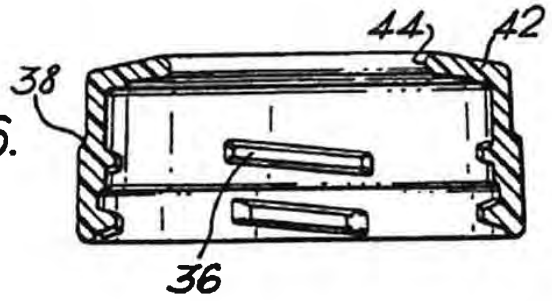


FIG.6.

495. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to

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design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, using a nipple and collar that are removably coupled to one another would better seal over the opening of the container and would thus provide a more durable design over repeated use that reduces stress on the nipple due to repeated stretching of the nipple over the opening of the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

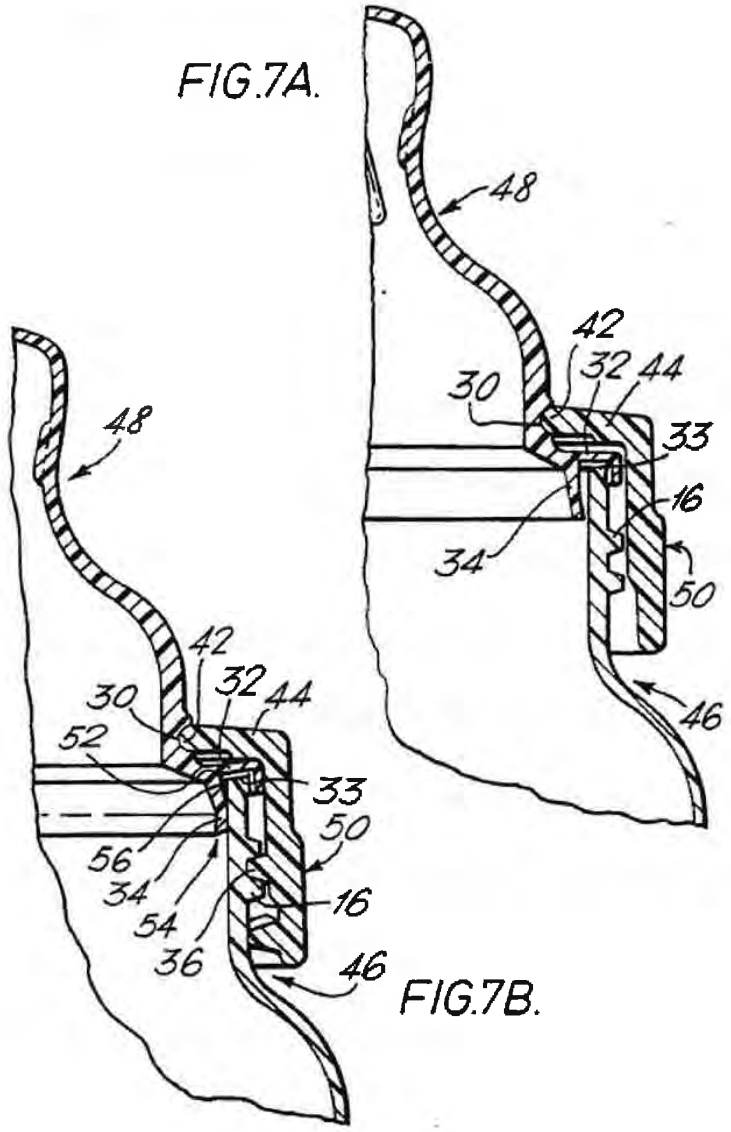
496. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

(ix) [21.H]: wherein the collar and the lower portion of the nipple together define a downward domed shape that extends outwardly and downwardly from the flex region of the nipple towards a widest circumferential edge of the collar.

497. A POSA reading *Atkin* in view of *Ishimaru* would find this limitation obvious. A primary objective of *Ishimaru* is to create a nipple that is more human and breast-like. *See supra* §XIV.A. A POSA would understand this to include a wide, dome-shaped that would appear to a baby or child to imitate a human breast. A POSA reviewing *Atkin* and intending to design a breast-like structure would understand that an abrupt change in slope between the nipple and collar, and a nearly vertical collar as disclosed in *Atkin* would not optimally imitate the human breast.

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Figures 7A and 7B further illustrate slope between the lower portion of the teat and the annular cap. Ex[1010] at 5:47-52, Figs.7A-7B.



498. Instead, a POSA reading *Ishimaru* in view of *Atkin* would be motivated to design a continuous, downward dome shape between the lower portion of the nipple and the annular cap. The shape of the annular cap would thus extend

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outwardly and downwardly from the flex region of the nipple towards the widest edge of the collar—particularly where the collar is wide to allow the nipple/cap combination to accommodate a "particularly wide mouthed" bottle, as disclosed by *Atkin*. Ex[1010] at Abs. Such a design would further simulate the human breast, as directed in *Ishimaru*, and would have been an obvious modification no later than the priority date of the '244 Patent.

499. A POSA reading *Ishimaru* in view of *Atkin* would be motivated to make these modifications, and have a reasonable expectation of success in doing so, at least because *Ishimaru* and *Atkin* in the same field of endeavor as they both relate to nursing bottles and nipples that attach thereto. Ex[1010] at 1:1-12; Ex[1008] at ¶¶ 01-06. A POSA would be further motivated to modify or combine the nipples of *Ishimaru* and *Atkin* because they all teach analogous solutions for, and describe the benefits of, realistic, human-like nipples with air vents and collars to provide a durable design that relieves negative pressure in the nipple. Ex[1010] at 3:16-23, 3:28-33, 6:12-27; Ex[1008] at ¶¶ 05, 19, 48, 61.

500. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

C. Claim 22

(i) [22]: The drinking vessel of claim 21, wherein the container is a trainer cup.

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501. As I previously explained, *Ishimaru-Atkin* discloses or renders obvious each and every limitation of Claim 21. *See supra* §XIV.B(i). I incorporate my analysis of Claim 21 in Ground 2 of the '244 Patent analysis.

502. *Atkin* discloses or renders obvious this limitation. Specifically, *Atkin*s discloses embodiments that include a cup trainer. Ex[1010] at 4:24-35. *Atkin* further teaches that "the annular cap may, of course, be screwed on to the bottle without a fitted teat. Figures 10 and 11 show a trainer spout which can be push fitted over the screwed on annular cap, when the teat is omitted." *Id.* at 5:31-54, Figs. 9-10. A POSA would be motivated to combine the trainer cup embodiments of *Atkin* with nipple embodiments of *Atkin*, at least because the trainer cup would provide a large, stable vessel (such as might allow a toddler might learn how to hold a vessel while maintaining the benefits of the nipple design) that is less susceptible to being tipped over, while providing a realistic, human breast-like appearance to the nipple, as taught in *Ishimaru* in view of *Atkin*. *See* Ex[1008] at ¶ 05; Ex[1010] at 3:10-27; *See supra* §XIV.A.

503. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would be motivated to combine and substitute these familiar elements, namely a

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bottle for a trainer cup, according to known methods to yield predictable results. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

504. For at least these reasons, this claim is disclosed or rendered obvious by *Ishimaru-Atkin*.

D. Claim 23

(i) [23]: The drinking vessel of claim 21, wherein the container comprises a material more rigid than the nipple material.

505. As I previously explained, *Ishimaru-Atkin* discloses or renders obvious each and every limitation of Claim 21. *See supra* §XIV.B. I incorporate my analysis of Claim 21 in Ground 2 of the '244 Patent analysis.

506. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.C. The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

507. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin*. For example, *Atkin* discloses that the bottle is made of clear polycarbonate. Ex[1010] at 4:44-46, 6:35-40. *Atkin* further discloses that "the user of silicone rubber as the teat material is preferred." Ex[1010] at 6:34-41; 8:10-12;

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Claims 8, 18. A POSA would consider polycarbonate to constitute a more rigid material than silicone rubber.

508. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, using a more rigid material for the vessel compared to the nipple would provide a more durable design over repeated use. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

509. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

E. Claim 24

(i) [24]: The drinking vessel of claim 21, wherein the cover assembly further comprises an air vent apart from the mouthpiece.

510. As I previously explained, *Ishimaru-Atkin* discloses or renders obvious each and every limitation of Claim 21. *See supra* §XIV.B. I incorporate my analysis of Claim 21 in Ground 2 of the '244 Patent analysis.

511. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.D. The

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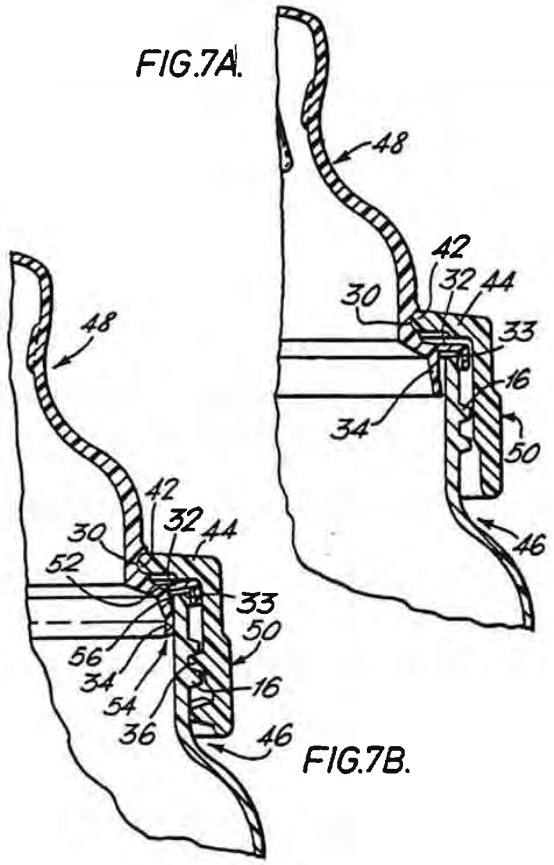
described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

512. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin*, under either Petitioner or Patent Owner's proposed construction of "mouthpiece." *Atkin* teaches a lip that acts as a flap valve in the neck of the bottle. Ex[1010] at 1:35-41, 2:23-28, 5:52-65, Fig. 7B. Specifically, *Atkin* states: "in order to assist passage of air past the flap valve into the bottle interior, the teat flange may be provided with at least one groove located to 45 bridge the rim of the bottle neck when seated thereon. Preferably, there are two of said grooves located diametrically opposite each other and the bottle neck and the cap cooperate through interrupted screwthreads in order to facilitate so access of air to the or each of said recesses in the teat flange." *Id.* at 2:42-51, 4:1-8. Further, "Consequently, if pressure in the bottle tends to fall due to feed being sucked out through the teat, the lip 34 is deformed inwardly away from the inside of the bottle neck wall, i.e. ***opening in the manner of a flap valve to let air into the bottle.***" *Id.* at 6:13-32 (emphasis added) Claims 5, 7, 23, Fig. 6B.

513. Furthermore, *Atkin*'s teaches using a "flap valve which is normally closed but is opened responsively to an air pressure reduction within the bottle, as when baby feed is sucked out through the teat." *Id.* at 2:39-44; *see also id.* at 5:52-

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65 (describing how, when the pressure in the teat falls during feeding, "the lip 34 is deformed inwardly away from the inside of the bottle neck wall, i.e. opening in the manner of a flap valve to let air into the bottle," Figs. 7A-7B (reproduced below). Figure 7B further illustrates an air valve that is not located in the mouthpiece of the nipple:



514. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA

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would recognize, as *Atkin* discloses, including an air valve apart from the mouthpiece of the nipple provides a more reliable means to equalize the pressure in the vessel and the pressure in the atmosphere, and locating it outside the mouthpiece would reduce the risk of blockage or other obstructions in the air vent due to the compressive force applied to the vent passage from connection to the bottle. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

515. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

F. Claim 26

(i) [26]: The drinking vessel of claim 21, wherein the mouthpiece is located in the center of the nipple.

516. As I previously explained, *Ishimaru-Atkin* discloses or renders obvious each and every limitation of Claim 21. *See supra* §XIV.B. I incorporate my analysis of Claim 21 in Ground 2 of the '244 Patent analysis.

517. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.E. The described functionality of *Ishimaru* would be carried over into the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

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518. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin*. *Atkin* teaches that "The ***teat has*** a nearly flat or very shallowly curved surface 24 at the end of the ***mouthpiece 26.*** Ex[1010] at 5:6-16 (emphasis added). At least Figs. 4A, 7A and 7B illustrate this limitation:

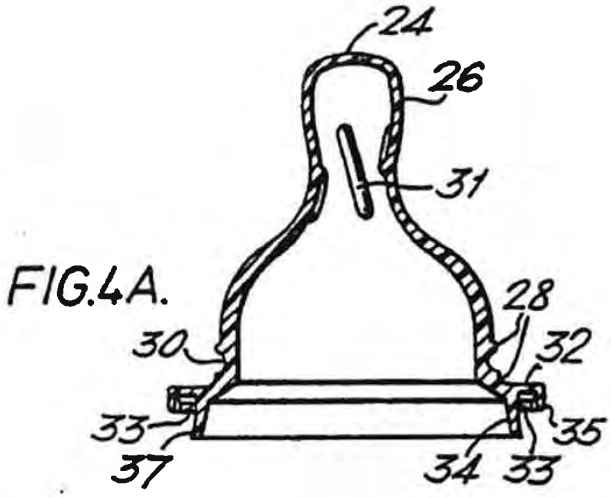
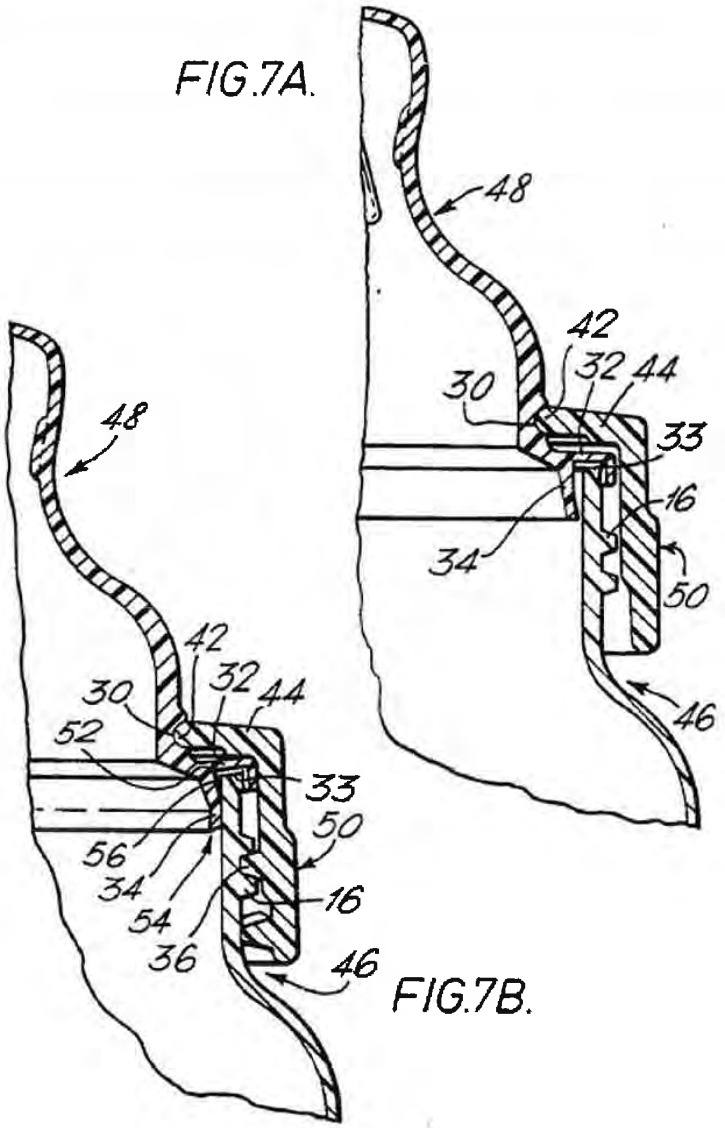


FIG.4A.

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519. *Atkin* further discloses that the mouthpiece is configured to allow liquid flow through the nipple to an aperture. Indeed, one of the goals of *Atkin* is to "avoid collapse of the teat mouthpiece ***when feed is sucked out of the bottle***[.]" Ex[1010] at 8:5-12 (emphasis added), 3:28-33, Claim 1, 2:14-22, 6:12-27, Figs. 7A-7B. A

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POSA reading *Atkin* would understand that the mouthpiece of the nipples disclosed in at least Figs. 4A, 7A, and 7B would be located in the center of the nipple.

520. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, positioning the mouthpiece in the center of the nipple provides a more realistic, breast-like nipple. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

521. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

G. Claim 27

(i) [27]: The drinking vessel of claim 21, wherein the teat portion comprises a resilient material.

522. As I previously explained, *Ishimaru-Atkin* discloses or renders obvious each and every limitation of Claim 21. *See supra* §XIV.B(i). I incorporate my analysis of Claim 21 in Ground 2 of the '244 Patent analysis.

523. As I previously explained with regard to Ground 1 of the '244 Patent, this limitation is disclosed or rendered obvious by *Ishimaru*. *See supra* §XIII.F; Ex[1018] at 16. The described functionality of *Ishimaru* would be carried over into

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the *Ishimaru-Atkin* combination. *See supra* §XIV.A. I incorporate my Ground 1 of the '244 Patent analysis in the *Ishimaru-Atkin* combination.

524. In addition to that analysis, this limitation is disclosed or rendered obvious by *Atkin*. For example, *Atkin* discloses that "the user of silicone rubber as the teat material is preferred." Ex[1010] at 6:34-41, 8:10-12, Claims 8, 18. Claim 1 of *Atkin* further discloses "the teat having a dependent annular lip (34) thereon which is ***sufficiently resilient*** to deform inwardly away from the interior surface of the bottle neck and open responsively to a pressure reduction in 25 the bottle when baby feed is sucked through the teat[.]" Ex[1010] at Claim 1. A POSA would consider silicone rubber to represent a resilient material. A POSA would further consider the teat to be constructed of a single material (e.g., the flange would also be constructed of silicone rubber).

525. *Atkin* further discloses: "The use of silicone rubber as the teat material is preferred in the context of the above-described flap valve arrangement, because whereas a teat of conventional rubber tends to "grow" as it ages, a silicon rubber teat has a much reduced tendency to do so with the result that its critical shaping and dimensioning is retained throughout the life of the teat." Ex[1010] at 6:34-41.

526. As described above, a POSA would implement elements of *Atkin*'s nipple and vessel design into the nipple and vessel design of *Ishimaru* in order to design a realistic, human-like nipple with air vents and collars to provide a durable

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design that relieves negative pressure in the nipple. *See supra* §XIV.A. A POSA would recognize, as *Atkin* discloses, a resilient material improves the durability of the nipple over repeated use. To the extent not already disclosed, *Ishimaru*'s nipple and vessel design is improved by incorporating these design elements as taught by *Atkin*.

527. For at least these reasons, this claim limitation is disclosed or rendered obvious by *Ishimaru-Atkin*.

XIV. Reservation of Rights

528. My opinions are based upon the information that I have considered to date. I am unaware of any evidence of objective indicia with respect to the '930 and '244 Patents that would render any of the challenged claims non-obvious. I reserve the right, however, to supplement my opinions in the future to respond to any arguments raised by the owner of the '930 and '244 Patents, and to take into account new information that becomes available to me.

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I hereby declare that all statements made herein of my own knowledge are true and all statements made based on information and belief are believed to be true. Further, these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code. I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 12, 2023.

DocuSigned by:
Brian Silver
/_____/
1D7596AC644E48E

Brian Silver

EXHIBIT 1006

US006032810A

United States Patent [19]

Meyers et al.

[11] **Patent Number: 6,032,810**

[45] **Date of Patent: Mar. 7, 2000**

[54] **ONE-PIECE NIPPLE/COLLAR FOR NURSERS AND THE LIKE**

[75] Inventors: **Brenda J. Meyers**, Reedsburg; **Mark A. Gilbertson**, Sauk City; **Edward A. Raleigh**, Waunakee, all of Wis.; **Mark S. Stowe**, Fort Worth, Tex.

[73] Assignee: **Gerber Products Company**, Fremont, Mich.

[21] Appl. No.: **08/895,951**

[22] Filed: **Jul. 17, 1997**

[51] **Int. Cl.**[7] **A61J 11/02**; A61J 11/04; B29C 45/16

[52] **U.S. Cl.** **215/11.1**; 215/11.5; 264/273

[58] **Field of Search** 215/11.1, 11.5; 264/273

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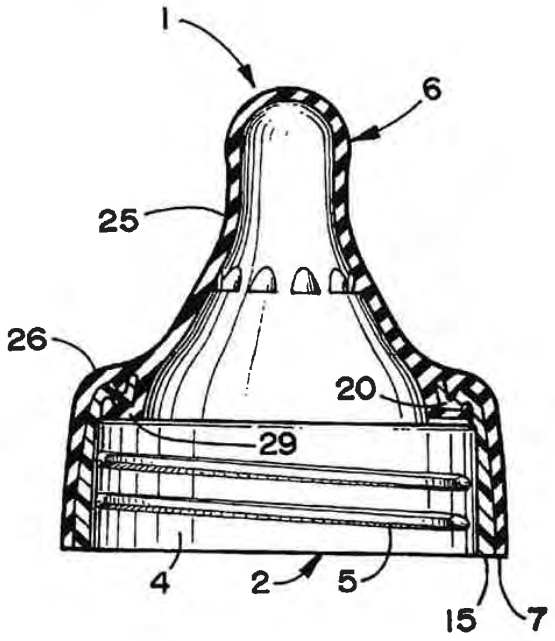
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Primary Examiner—Sue A. Weaver
Attorney, Agent, or Firm—Price, Heneveld, Cooper, DeWitt & Litton

[57] **ABSTRACT**

A one-piece nipple/collar includes a rigid collar having an exterior surface and an interior surface with a fastener thereon for detachably connecting the same with a nurser bottle or the like. A flexible nipple is molded over at least a portion of the exterior surface of the collar to form an integral, one-piece unit. The nipple extends along at least a portion of the exterior surface of the collar to a termination point that is spaced apart from the interior surface of the collar to avoid interference with the fastener.

11 Claims, 3 Drawing Sheets





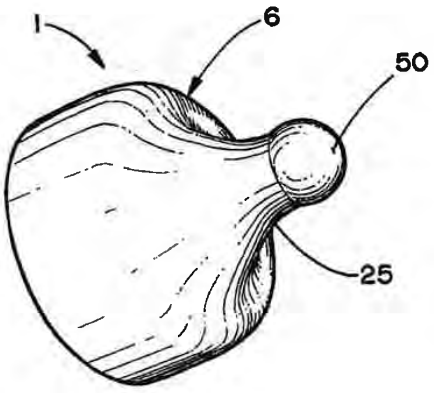


Fig. 1

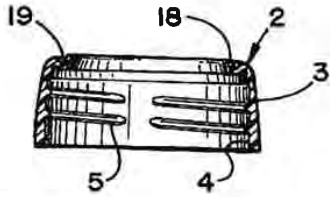


Fig. 2

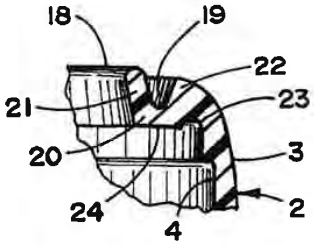


Fig. 3

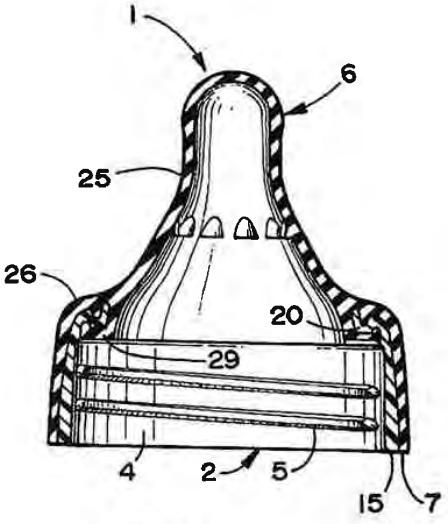


Fig. 5

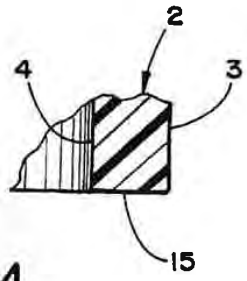


Fig. 4

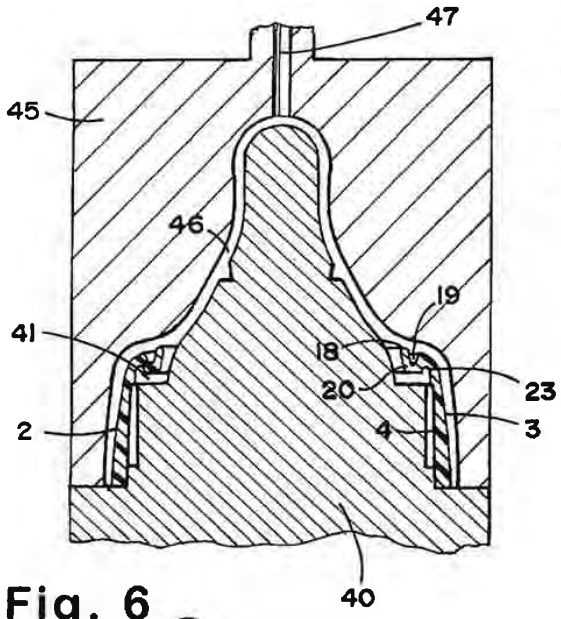


Fig. 6

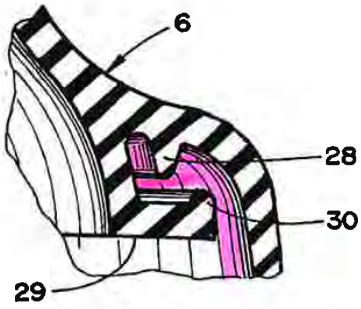


Fig. 7



Fig. 8

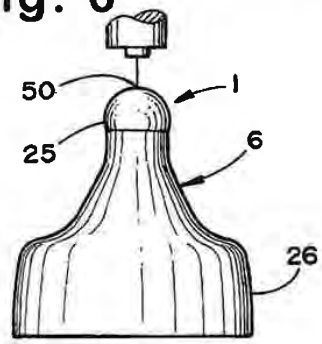


Fig. 10

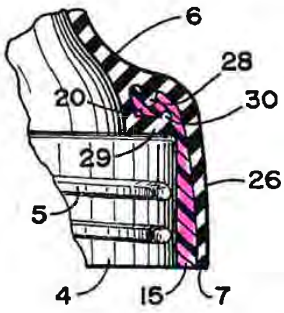


Fig. 9

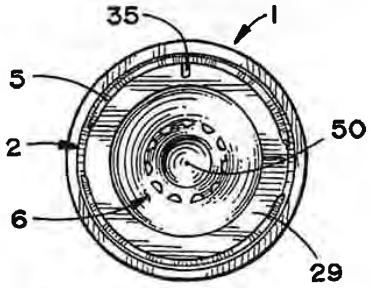


Fig. 11

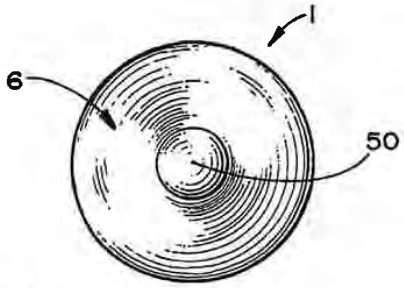


Fig. 12

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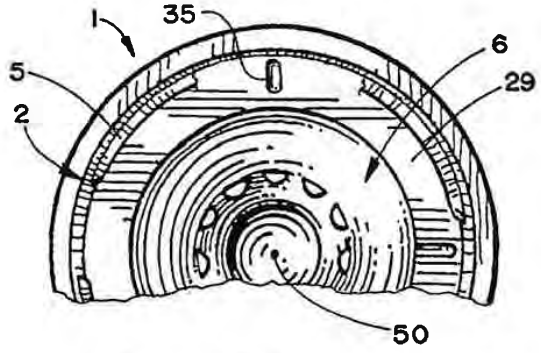


Fig. 13

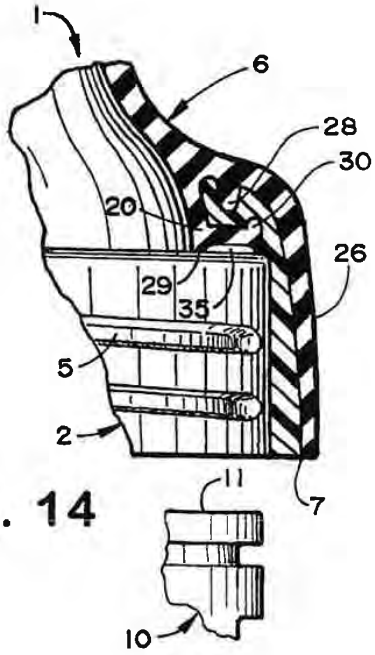


Fig. 14

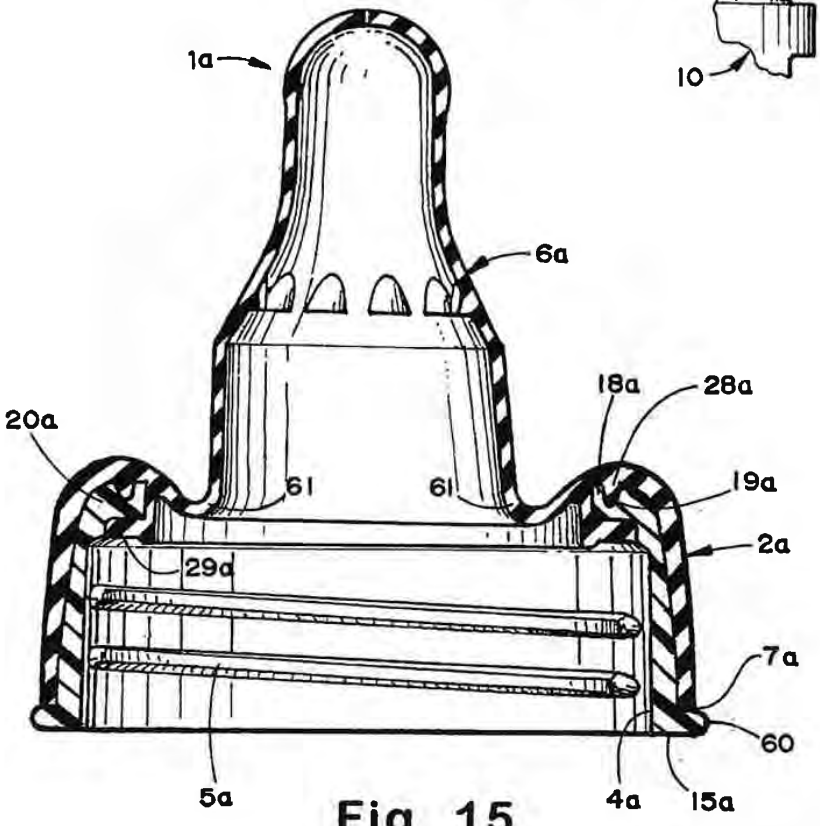


Fig. 15

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ONE-PIECE NIPPLE/COLLAR FOR NURSERS AND THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to nursers and the like, and in particular to a one-piece nipple/collar therefor.

Nursers for infants, and other similar applications, are well-known in the art, and typically include a nipple that is detachably mounted on the neck of a nurser bottle by a separate, internally threaded collar. While such nurser constructions have proven quite effective, certain inconveniences still exist. For example, to properly clean the parts of a conventional nurser, the nipple must first be disassembled from the collar, so that all surfaces of the two separate parts can be thoroughly washed and sanitized. After the collar and nipple parts have been cleaned and disinfected, they must be reassembled prior to attaching the same to a nurser bottle. The additional handling associated with this process is both time consuming and tedious, and can also led to contamination of the nipple and/or collar during reassembly. The separate nurser parts are relatively small in size, thereby making the cleaning of the same even more difficult. When cleaning conventional nurser parts in an automatic dishwasher, the individual nurser nipples and collars tend to become displaced from their original position in the washer, and often drop to the bottom of the washer where they can be damaged by the heating coil. Since a separate nipple can be removed from its associated collar even when attached to a nurser bottle, inadvertent leakage can sometimes occur, and may even present a safety hazard under exceptional circumstances.

SUMMARY OF THE INVENTION

One aspect of the present invention is to provide a one-piece nipple/collar for nursers and the like, which includes a collar having an exterior surface and an interior surface with a fastener thereon for detachably connecting the same with a nurser bottle or the like. A flexible nipple is molded over at least a portion of the exterior surface of the collar to form an integral, one-piece unit. The nipple extends along at least a portion of the exterior surface of the collar to a termination point that is spaced apart from the interior surface of the collar to avoid interference with the fastener.

Preferably, the collar includes at least one interlocking portion positioned adjacent the exterior surface of the same, which is shaped to physically capture a portion of the nipple to ensure a secure interconnection between the collar and the nipple.

Another aspect of the present invention is a method for making one-piece nipple/collars for nursers and the like, which comprises providing a collar having an exterior surface and an interior surface with a fastener mechanism thereon for detachably connecting the nipple/collar with an associated nurser bottle. The method further includes molding a flexible nipple over at least a portion of the exterior surface of the collar to form an integral, one-piece construction therefor, wherein the nipple is molded to extend along at least a portion of the collar exterior surface to a termination point spaced apart from the interior surface of the collar, so as to avoid interference with the fastener mechanism. The method further includes forming an orifice in the nipple adjacent the normally uppermost portion thereof.

The principal objects of the present invention are to provide a one-piece nipple/collar which is more convenient to use, and is easier to clean. The one-piece nipple/collar includes a collar with an overmolded nipple that is securely

interconnected to form an integral, one-piece construction that provides a spill resistant construction with improved child safety. The one-piece nipple/collar has an uncomplicated design, is efficient in use, economical to manufacture, capable of a long operating life, and particularly well adapted for the proposed use.

These and other advantages of the invention will be further understood and appreciated by those skilled in the art by reference to the following written specification, claims and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a one-piece nipple/collar embodying the present invention.

FIG. **2** is a longitudinal cross-sectional view of a collar portion of the nipple/collar.

FIG. **3** is a fragmentary, enlarged view of an upper portion of the collar portion.

FIG. **4** is a fragmentary, enlarged view of a lower portion of the collar portion.

FIG. **5** is a longitudinal cross-sectional view of the nipple/collar.

FIG. **6** is a partially schematic, longitudinal cross-sectional view of a mold for molding a flexible nipple portion over the collar portion.

FIG. **7** is a fragmentary, enlarged view of an upper portion of a base area of the nipple portion.

FIG. **8** is a fragmentary, enlarged view of a lower portion of the base area of the nipple portion.

FIG. **9** is a fragmentary, enlarged, longitudinal cross-sectional view of the nipple/collar.

FIG. **10** is a partial schematic side elevational view of the nipple/collar, showing the forming of orifices in the upper portion of the nipple portion.

FIG. **11** is a bottom plan view of the nipple/collar.

FIG. **12** is a top plan view of the nipple/collar.

FIG. **13** is an enlarged, fragmentary, bottom plan view of the nipple/collar, with a portion thereof broken away to show a vent.

FIG. **14** is an enlarged, fragmentary, longitudinal cross-sectional view of the nipple/collar and an associated nurser bottle, particularly showing the vent.

FIG. **15** is a longitudinal cross-sectional view of another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

For purpose of description herein, the terms "upper", "lower", "right", "left", "rear", "front", "vertical", "horizontal", and derivatives thereof shall relate to the invention as oriented in FIGS. **5** and **10**. However, it is to be understood that the invention may assume various alternative orientations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

The reference numeral **1** (FIGS. **1–5**) generally designates a one-piece nipple and collar, or nipple/collar embodying the

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present invention. The illustrated nipple/collar **1** is particularly adapted for use in conjunction with nurser bottles (not shown), or other similar containers. One-piece nipple/collar **1** includes a collar **2** having an exterior side or surface **3** and an interior side or surface **4** with a fastener **5** thereon for detachably connecting the same with an associated nurser bottle **10** (FIG. **14**). A flexible nipple **6** (FIGS. **1–5**) is molded over at least a portion of the exterior surface **3** of collar **2** to form an integral, one-piece unit. The nipple **6** extends along at least a portion of the exterior surface **3** of collar **2** to a termination point **7** that is spaced apart from the interior surface **4** of collar **2** to avoid interference with the fastener **5**.

Nipple/collar **1** may be provided in a wide variety of shapes and sizes to accommodate different applications, including conventional bottles, reusable and/or disposable nursers, and other similar drinking vessels, including children's training cups and the like. Furthermore, it is to be understood that flexible nipple **6** can assume different configurations and sizes depending upon the specific type of dispensing desired, and contemplates removable closures such as soft drinking spouts, and other similar infant and children liquid container designs.

The illustrated collar **2** (FIGS. **2–4**) is constructed from a rigid synthetic material, and in the illustrated example, fastener **5** comprises conventional threads disposed on the interior surface **4** of collar **2**. As described in greater detail below, rigid collar **2** preferably includes at least one interlocking portion that is positioned adjacent the exterior surface **3** of collar **2**, and is shaped to physically capture a portion of nipple **6** to ensure a secure interconnection between collar **2** and nipple **6**.

In one working embodiment of the present invention, collar **2** is constructed from a polypropylene copolymer, such as that material manufactured by Exxon Chemical Company under the trade name "Escorene". Proper matching of the materials for collar **2** and nipple **6** preferably results in a strong, heat fused bond between the same. In some cases, the bond may be sufficiently strong that mechanical interconnection of the collar **2** and nipple **6** is not required.

With reference to FIGS. **1–5**, in the illustrated example, collar **2** includes a lower edge **15** disposed along and between a normally lowermost portion of the exterior surface **3** and interior surface **4**. Lower edge **15** is disposed substantially perpendicular with interior surface **4**.

Collar **2** also includes an upper edge **18** disposed along and between a normally uppermost portion of the exterior surface **3** and interior surface **4**. A groove **19** is provided along the upper edge **18** of collar **2**, and in the illustrated example is defined by a generally U-shaped ring portion **20** of collar **2**. The opposite legs **21** and **22** of ring portion **20** are inclined with respect to the longitudinal or axial axis of collar **2**, and in the illustrated example are positioned at a mutually included angle of around 20–40 degrees. An arcuate channel **23** is formed on the collar interior side **4**, just outwardly of ring portion **20**. The lowermost surface **24** of ring portion **20** is flat, and disposed generally perpendicular to the axial axis of collar **2**, and assists in forming a leak resistant seal with an associated nurser bottle **10**, as discussed more fully below. When nipple **6** is overmolded on collar **2**, the nipple material is received into upper groove **19** and arcuate channel **23**, so as to physically capture the nipple **6** on the collar **2** to ensure a secure interconnection therebetween, as described in greater detail hereinafter.

The nipple **6** illustrated in FIGS. **1–12** includes a conventional shaped upper portion **25**, and a uniquely shaped base area **26**, which is molded over collar **2**. As best illustrated in FIG. **7**, when nipple **6** is overmolded onto collar **2**, the upper portion of the base area **26** includes a depending ring or bead **28** that is closely received within the upper groove **19** of collar **2** to further interconnect the collar **2** and nipple **6**. The illustrated nipple **6** also includes a flat sealing flange **29**, which extends in a radially outward direction, overlying collar surface **24**, and is configured to seal against a neck portion **11** of an associated nurser bottle **10** to form a tight liquid seal therebetween. The outermost portion of sealing flange **29** includes an upstanding rim or bead **30** that is closely received in channel **23** of collar **2** to further physically interconnect collar **2** and nipple **6**.

In the nipple/collar **1** illustrated in FIGS. **1–12**, nipple **6** extends along the entire exterior side **3** of collar **4** to the collar lower edge **15**. However, it is to be understood that nipple **6** may extend over only a portion of the collar exterior side **3**, such as about only the collar portion associated with upper ring **20**. However, the overlap between nipple **6** and collar **4** must be sufficient to create a secure, leak-resistant interconnection therebetween.

As best illustrated in FIGS. **13** and **14**, a vent **35** may be provided on the interior of nipple/collar **1** to permit air to be sucked back into the nurser after dispensing. Vent **35** is in the form of a channel-shaped aperture extending radially outwardly along sealing flange **29** from a location adjacent the interior side of the sealing flange to a location adjacent the interior side **4** of collar **2**. Vent **35** permits ambient air to be drawn back into the nurser bottle around collar threads **5**.

It is to be understood that vent **35** is optional, since nipple **6** can be provided with enlarged dispensing orifices, or otherwise equipped to equalize the pressure in the nurser bottle. Vent **35** can also assume different shapes, and be positioned at various locations.

In one example of the present invention, nipple **6** is constructed from a clear thermoplastic elastomer, such as that marketed under the trade name synprene (RT-3850M) by Synergistics. It is to be understood that other similar materials can also be used to form nipple **6**.

FIGS. **6–12** illustrate a method for making one-piece nipple collar **1** embodying the present invention. With reference to FIG. **6**, a male mold member **40** is provided onto which a preformed collar **2** is positioned in the manner illustrated in FIG. **6**. In general, male mold member **40** is shaped identical to the internal surface of the upper portion **25** of nipple **6**. Male mold member **40** engages the interior surface **4** of collar **2** at a ledge portion **41** of the mold, which is spaced below the uppermost edge **18** of collar **2**, so as to form the annularly shaped, sealing flange portion **29** of nipple **6**. Male mold member **40** also engages the interior surface **4** of collar **2** adjacent the lower edge **15** to avoid the application of any nipple material onto the threads **5** of collar **2**, which might interfere with the fastening of the same to an associated nurser bottle. A female mold member **45** mates with male mold member **40**, and is disposed about collar **2**. In general, female mold member **45** is shaped identical to the exterior surface of nipple/collar **1**. A void or space **46** is formed between the male and female mold members **40** and **45**, and defines the mold cavity, which communicates with a sprue **47** for injecting nipple material into the mold cavity **46**. When mold members **40** and **45** are mated together for filling, as shown in FIG. **6**, the nipple material flows through sprue **47** into the mold cavity **46** formed between mold members **40** and **45** to shape the finished nipple **6**. The nipple material flows into the grooves **19** and **23** of collar **2**, and also forms annular sealing flange **29** over collar surface

24. The nipple material adheres to the exposed surfaces of collar **2** to assist in interconnecting the same. The beads **28** and **30** formed in nipple **6** are captured in their associated collar grooves **19** and **23** respectively, to physically connect collar **2** and nipple **6** and ensure a secure interconnection therebetween.

The molded nipple/collar assembly **1** is then removed from the mold. At least one orifice **50** is then formed in the upper portion **25** of nipple **6** by means such as piecing or laser cutting or the like, as shown schematically in FIG. **10**. Alternatively, orifice **50** may be molded into nipple **6** during the molding process discussed above.

The reference numeral **1***a* (FIG. **15**) generally designates another embodiment of the present invention, having a somewhat different configuration. Since nipple/collar **1***a* is similar to the previously described nipple/collar **1**, similar parts appearing in FIGS. **1–14** and **15** respectively are represented by the same, corresponding reference numeral, except for the suffix "a" in the numerals of the latter.

In the illustrated nipple/collar **1***a* (FIG. **15**), collar **2***a* has a ring **60** projecting radially outwardly about the lower edge **15***a* thereof to define a ledge against which abuts the lower termination point **7***a* of nipple **6***a*. Furthermore, nipple **6***a* has a J-shaped medial portion **61** which provides greater flexure to nipple **6***a*. The J-shaped medial portion **61** of nipple **6***a* functions like a bellows to better control the rate of fluid flow through orifice **50**.

The completed one-piece nipple/collars **1** and **1***a* are more convenient to use and easier to clean. The nipples **6** and **6***a* are not only adhered to at least positions of the exterior surfaces of the collars, they are also physically captured on the associated collar to ensure a secure interconnection that provides improved child safety.

In the forgoing description, it will be readily appreciated by those skilled in the art that modifications may be made to the invention without departing from the concepts disclosed herein. Such modifications are to be considered as included in the following claims, unless these claims by their language expressly state otherwise.

The invention claimed is as follows:

1. A one-piece nipple/collar for nursers and the like, comprising:

a collar having an upper edge, a lower edge, an exterior surface and an interior surface with a fastener mechanism thereon for detachably connecting said nipple/collar with an associated nurser bottle; said collar provided with an interlocking portion that includes a ring portion outwardly disposed along the uppermost portions of said exterior and interior surfaces; and

a flexible nipple molded over the exterior surface of said collar to form an integral, one-piece construction therefor and molded over said ring portion of said interlocking portion such that said collar physically captures a portion of said nipple to ensure a secure interconnection between said collar and said nipple; said nipple having an exterior portion extending along and covering said collar exterior surface to said lower edge of said collar at a spaced apart distance from the interior surface of said collar, so as to avoid interference with said fastener mechanism, and an interior portion extending along and covering a lower side of the upper edge of said collar to form an annular flange configured to seal against an associated neck portion of the nurser.

2. A nipple/collar as set forth in claim **1**, wherein:

said annular flange includes a vent to permit air to enter the nurser bottle.

3. A nipple/collar as set forth in claim **2**, wherein:

said ring portion of said interlocking portion defines a groove in said upper edge of said collar.

4. A nipple/collar as set forth in claim **3**, wherein:

said groove has a generally U-shaped lateral cross-sectional shape.

5. A nipple/collar as set forth in claim **4**, wherein:

said collar is constructed from polypropylene.

6. A nipple/collar as set forth in claim **5**, wherein:

said nipple is constructed from synprene.

7. A nipple/collar as set forth in claim **1**, wherein:

said ring portion of said interlocking portion defines a groove in said upper edge of said collar.

8. A nipple/collar as set forth in claim **1**, wherein:

said nipple is constructed from synprene.

9. A method for making one-piece nipple/collars for nursers and the like, comprising:

providing a collar having an upper edge, a lower edge, an exterior surface and an interior surface with a fastener mechanism thereon for detachably connecting the nipple/collar with an associated nurser bottle, wherein the collar is provided with an interlocking portion that includes a ring portion outwardly disposed along the uppermost portions of said exterior and interior surfaces;

molding a flexible nipple over the exterior surface of the rigid collar to form an integral, one-piece construction therefor, wherein the nipple is molded over the ring portion of the interlocking portion such that the collar physically captures a portion of the nipple to ensure a secure interconnection between the collar and the nipple, and the nipple is molded to have an exterior portion extending along and covering the collar exterior surface to the lower edge of the collar at a spaced apart distance from the interior surface of the collar, so as to avoid interference with the fastener mechanism, and an interior portion extending along and covering a lower side of the upper edge of the collar to form an annular flange configured to seal against an associated neck portion of the nurser; and

forming an orifice in the nipple adjacent a normally upper portion thereof.

10. A method as set forth in claim **9**, including:

providing the annular flange with a vent to permit air to enter the nurser bottle.

11. A method as set forth in claim **9**, including:

forming a groove in the upper edge of the collar disposed along a normally uppermost portion of the exterior surface to define the interlocking portion.

* * * * *

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EXHIBIT 1007

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US 1146639 A

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(54) Child feeding bottle

(57) A child feeding bottle comprises a liquid container (4, fig 3), a teat whereby the child can suck liquid from the container and an one-way air inlet valve 2 operable automatically. The valve comprises a flexible membrane having an opening 3 which admits air into the container when the air pressure within the container becomes depressed relative to the external air pressure, as a result of the feeding action of the child.

The valve may be integral with the teat or a separate component removable from teat or bottle. The valve when separate may be removed and replaced to aid cleaning and is constructed in two parts (fig 2). The membrane of the valve is concave and protruding inwardly and is substantially u-shaped in longitudinal section and may be produced in silicone or similar material.

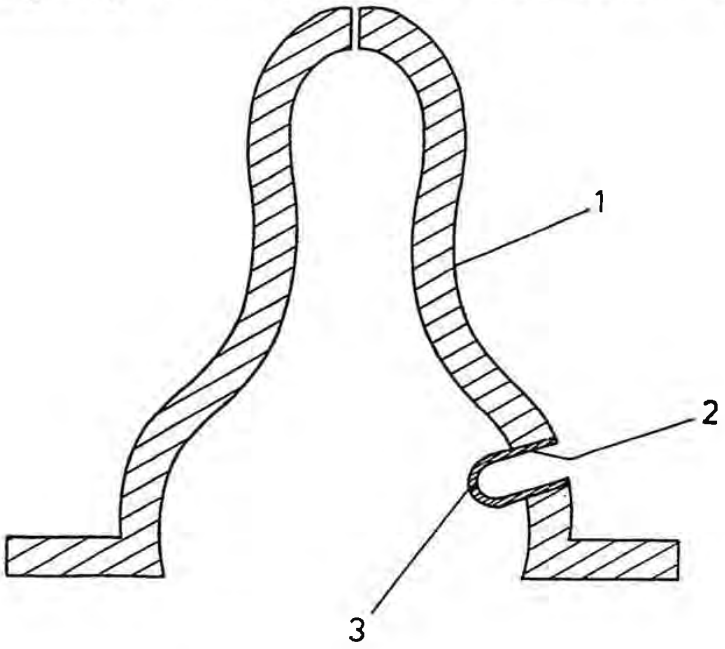


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy

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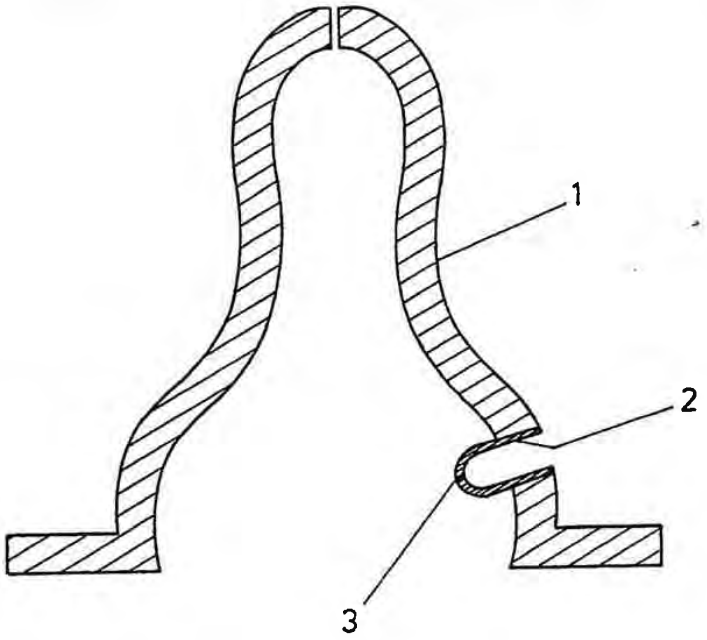


FIG. 1

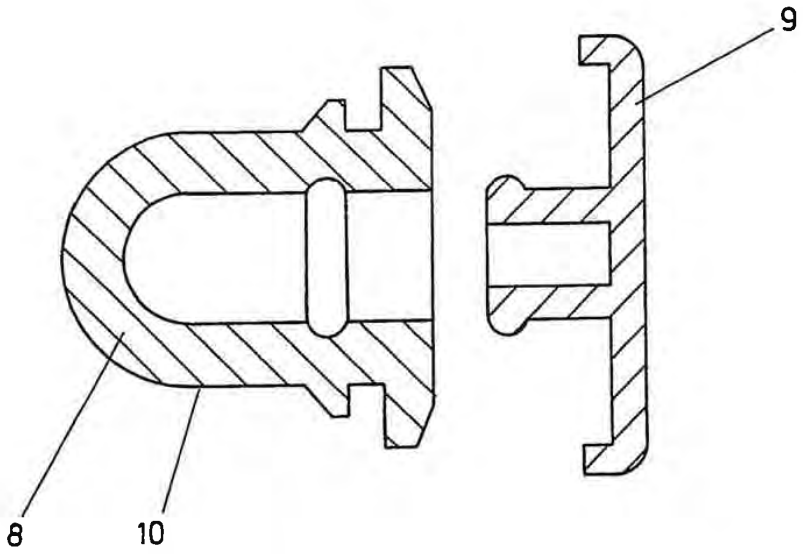


FIG. 2

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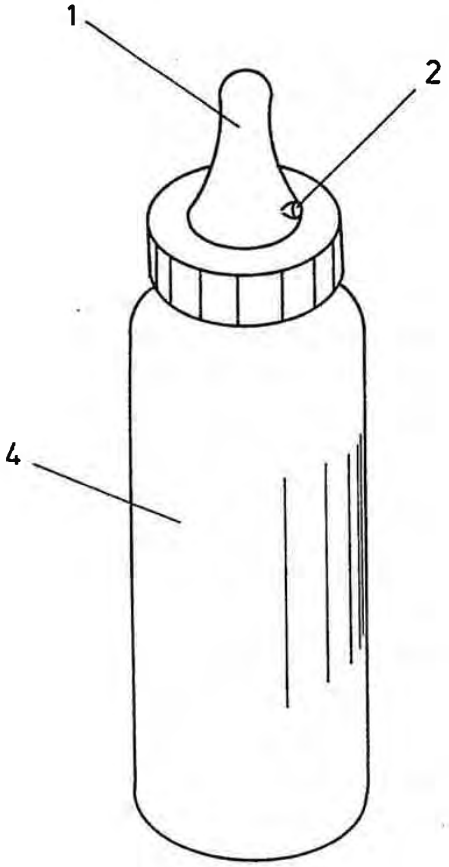


FIG. 3

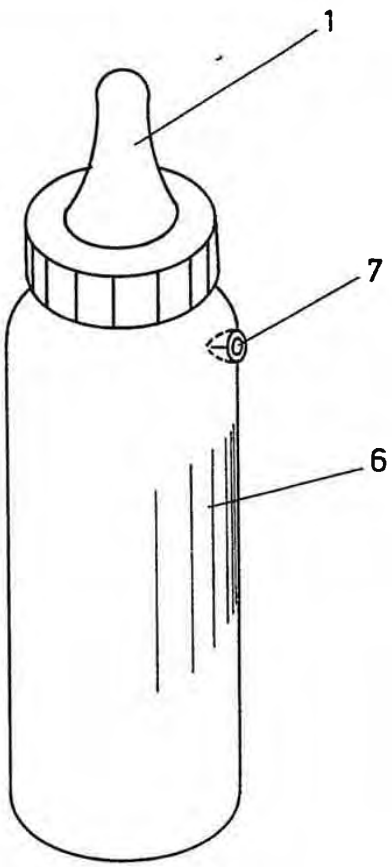


FIG. 4

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CHILD FEEDING BOTTLE

This invention relates to nursing bottles and teats, and more particularly to an improved nursing bottle and teat with a removable automatic air inlet valve on the bottle and/or a permanently and integrally produced automatic air inlet valve as an integral part of the teat.

Conventional baby feeding bottles have a major disadvantage in that, as the baby withdraws milk or any desired liquid a vacuum is created within the bottle often causing severe pain in the stomach. The reason is that, babies tend to continue their sucking until a vacuum is formed within the bottle, whereby they cannot avoid sucking false air from outside the bottle which frequently creates areophagia, the basic cause of colic.

Many attempts have been made to overcome the problem of formation of vacuum within the bottle by permitting air to enter the baby bottle from a manual or automatic valve mechanism, or the use of a collapsing bag of the disposable type, inserted into a simulated baby bottle which exposes the collapsible bag into atmospheric pressure, whereby as an infant sucks milk from the bag, the bag gradually collapses, and the milk may be withdrawn without the formation of a vacuum in the bag. However, collapsing bag baby feeding systems have disadvantages such as extra cost of bags, having a sufficient amount of bags always in reserve and the whole process of preparing the feed can be time consuming.

Furthermore, existing manual or automatic valve incorporated baby bottles have distinct disadvantages as commercial acceptability of such approaches to the

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solution requires low cost of production, assured sealing, proper functioning and maintained sanitation.

According to the present invention, there is provided an automatic air inlet valve (hereinafter called the valve) which can be employed to be used removably in connection with a baby feeding bottle and/or produced as an integral part of the teat in order to prevent formation of vacuum within a baby feeding bottle, thus preventing collapse of nipple during a feeding process and reducing the chance of the infant developing colic due to excess air intake.

The valve according to the present invention is composed of a concave elongate semi spherical shape with a slit at its dome which can be produced of silicone or any similar material in a single mould during a manufacturing process and has the aforesaid characteristics and which readily can be boiled and cleaned after each use.

In accordance with the present invention, since the valve operates on the principal of pressure difference between inside and outside the baby bottle it may be located at any part of the bottle. Alternatively, one or more valves may be produced as integral part(s) of the teat which has low cost of production and can easily be cleaned together with the teat following each use.

The invention will be further described by way of example, with reference to the accompanying drawings in which:

- Figure 1 is a cross section of the baby feeding teat and the valve in accordance with the present invention;
- Figure 2 is an enlarged cross section of a valve in accordance with the invention, which is designed to be

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inserted into an opening on a baby bottle;

- Figure 3 is a perspective view of a bottle and the valve shown in Figure 1, produced as an integral part of the teat; and
- Figure 4 is a perspective view of a bottle with the removable valve of Figure 2 in position.

With reference to the drawings, Figure 1 represents a teat 1 for a child feeding bottle, together with an automatic valve 2 produced as an integral part of teat 1 which has a slit 3 across the valve 2 in order to allow the air to enter the bottle when a vacuum is formed within it and a pressure difference between inside and outside the bottle is established. Clearly, when a baby withdraws milk, a vacuum is formed within the bottle resulting in the formation of a pressure difference outside the valve 2 which causes the flow of air through the slit 3 into the bottle, hence, maintains easy flow of milk or any desired liquid during feeding.

One of the main advantages of the present invention is the valve 2 is produced as an integral part of the teat 1 of bottle 4 (see Figure 3) therefore, it can easily be boiled and hygenically cleaned following each use.

Figure 2 shows a valve 10 which can be used in a bottle, by inserting the valve in an opening in either the teat or the main body (see Figure 4) of the bottle. The valve can be removed and replaced, e.g. for cleaning. In Figure 2, the valve 10 comprises two separate components, 8 and 9. The valve has an air inlet slit (not shown) through which air may pass into the bottle in use.

Figure 4 shows valve 10 in use, as a separate and independent unit, in a feeding bottle. The valve 10 can

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be inserted into the opening 7 of bottle 6 before filling it with milk or any other liquid.

After each feeding, the valve 10 can easily be pulled out, boiled and cleaned and then reinserted into the bottle opening 7 for further use.

The principle of operation of the valve 10 in this embodiment is also based on the formation of pressure difference in both sides of the valve 10 during feeding which results in passing of air into the bottle 4 or 6 through the slit automatically.

While the invention has been described in connection with two preferred embodiments, it is not intended to limit the scope of the invention to the particular forms set forth, but on the contrary it is intended to cover such alterations, modifications and equivalents as may be included within the scope and the spirit of this invention.

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CLAIMS

1. A child feeding bottle comprising a liquid container, means whereby a child can suck liquid from the container and an air inlet valve operable automatically to admit air into the container should the air pressure within the container become depressed relative to the external air pressure, as a result of the feeding action of the child.

2. A bottle according to claim 1, wherein the valve is a one-way valve, allowing air to enter but not leave the bottle through the valve.

3. A bottle according to claim 1 or claim 2, wherein the valve comprises a flexible membrane having an opening through which air can pass into the bottle when the pressure inside the bottle becomes depressed relative to the external air pressure as a result of the feeding action of the child.

4. A bottle according to claim 3, wherein the valve membrane is concave and protrudes inwardly into the bottle in use.

5. A bottle according to claim 4, wherein the valve membrane is, in longitudinal section, substantially U-shaped.

6. A bottle according to any one of the preceding claims, wherein the air inlet valve is located in the teat of the bottle.

7. A bottle according to claim 6, wherein the valve

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is integral with the teat.

8. A bottle according to any one of claims 1-5, wherein the air inlet valve is located in the main body of the bottle.

9. A bottle according to any one of the preceding claims, wherein the air inlet valve is a separate component which may be removed from and replaced in the bottle.

10. An air inlet valve for use in a child feeding bottle according to any one of the preceding claims.

11. A child feeding bottle substantially as herein described with reference to the accompanying illustrative drawings.

12. An air inlet valve for use in a child feeding bottle, substantially as herein described with reference to the accompanying illustrative drawings.

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Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number

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(ii) Int Cl (Edition 5) B65D:23/00,23/04 A61J:11/00

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ALAN O'DONNELL

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

7 FEBRUARY 1992

Documents considered relevant following a search in respect of claims 1-9,11

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 0444024 A (MACOY) see Figures 3 and 5	1,2,3, 4,10
X	US 3511407 A (PALMA) see Figure 4	1,2,3, 8,9
X	US 1146639 A (MILLER) see Figures 1 and 2	1,2,3, 6,7
X	DE 2836150 A1 (MAPA GMBH GUMMI) see Figure 1	1,2,3,4, 5,6,7

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		to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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EXHIBIT 1008

EXHIBIT 1008 08/10/12/23 PENGAD 800-631-6989

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Examination Request: Not yet made Number of Claims: 15 OL (Total 13 pages)

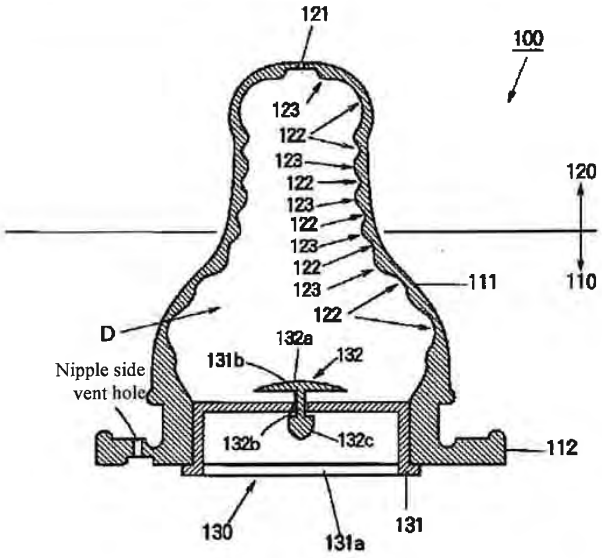
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Continues to the final page.

(54) [Name of Invention] Artificial Nipple

(57) [Abstract]
[Problem to Be Solved] To provide an artificial nipple which is more similar to the mother's nipple.
[Means for Solving the Problem] It is an artificial nipple having a nipple trunk and a teat portion protruding from this nipple trunk, and this artificial nipple 100 is constituted in a manner wherein the aforesaid teat portion 120 and/or the aforesaid nipple trunk 110 is provided with an elongation portion 122, which is more easily extensible than other portions to form a beverage space D inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means 130 is provided in the aforesaid nipple trunk to adjust the internal pressure of this beverage space.



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[Scope of Patent Claims]
[Claim 1] An artificial nipple,
which is an artificial nipple having a nipple trunk
and a teat portion protruding from this nipple trunk,
wherein the aforesaid teat portion and/or the aforesaid nipple trunk is provided with an elongation portion, which is more easily extensible than other portions to form a beverage space inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means is provided in the aforesaid nipple trunk to adjust the internal pressure of this beverage space.
[Claim 2] An artificial nipple as described in Claim 1, wherein the aforesaid internal pressure adjusting means is formed by a check valve.
[Claim 3] An artificial nipple as described in Claim 1 or Claim 2, wherein the aforesaid elongation portion is thinner than the wall thickness of the artificial nipple.
[Claim 4] An artificial nipple as described in Claim 1 or Claim 2, wherein the aforesaid elongation portion is formed by a groove.
[Claim 5] An artificial nipple as described in any claim of Claim 1 to Claim 4, wherein the aforesaid elongation portions are formed at predetermined intervals along the longitudinal direction of the artificial nipple.
[Claim 6] An artificial nipple as described in any claim of Claim 1 to Claim 5, wherein the boundary between the aforesaid elongation portion and the other inner surface of the artificial nipple is gently formed.
[Claim 7] An artificial nipple,
which is an artificial nipple having a nipple trunk,
a teat portion protruding from this nipple trunk,
and a teat opening formed in this teat portion,
wherein the aforesaid teat portion and/or aforesaid nipple trunk is provided with an elongation portion that is more easily extensible than other portions,
a lid portion is formed on the artificial nipple to form a closed space inside the aforesaid teat portion and the aforesaid nipple trunk,
the lid portion is provided with a beverage opening,
and a beverage pathway is provided to connect this beverage opening to the aforesaid teat opening.
[Claim 8] An artificial nipple as described in Claim 7, wherein the aforesaid lid portion is formed in a manner of being detachable from the aforesaid artificial nipple.
[Claim 9] An artificial nipple as described in Claim 7, wherein the aforesaid lid portion is formed as an integral part of the aforesaid artificial nipple.
[Claim 10] An artificial nipple as described in any claim of Claim 7 to Claim 9, wherein the aforesaid beverage pathway is formed of a tubular member and the tubular member has a length corresponding to the change in distance between the aforesaid teat opening and the aforesaid beverage opening.
[Claim 11] An artificial nipple as described in any claim of Claim 7 to Claim 9, wherein the aforesaid beverage pathway is formed of a tubular member and the tubular member has a 1st tubular member at the aforesaid teat opening and a 2nd tubular member at the aforesaid beverage opening, which is joined to the 1st tubular member.
[Claim 12] An artificial nipple as described in any claim of Claim 7 to Claim 11, wherein the aforesaid elongation portion is thinner than the wall thickness of the artificial nipple.
[Claim 13] An artificial nipple as described in any claim of Claim 7 to Claim 11, wherein the aforesaid elongation portion is formed by a groove.
[Claim 14] An artificial nipple as described in any claim of Claim 7 to Claim 13, wherein the aforesaid elongation portions are formed at predetermined intervals along the longitudinal direction of the artificial nipple.
[Claim 15] An artificial nipple as described in any claim of Claim 7 to Claim 14, wherein the boundary between the aforesaid elongation portion and the other inner surface of the artificial nipple is gently formed.
[Detailed Description of Invention]
[0001]
[Technical field to which the invention belongs] This invention relates to an artificial nipple used, for example, by infants for feeding milk, etc.
[0002]
[Conventional technology] Conventional artificial nipples are mounted to feeding bottles, for example, and are used for infants, etc. to drink milk or other liquids contained in the feeding bottles. Such an artificial nipple is constituted in a manner as shown in Fig. 19. Fig. 19 is a cross-sectional view of an artificial nipple 10. In other words, the artificial nipple 10 is made of silicone rubber, and has a hollow portion A inside which milk or other liquids flow from a feeding bottle or the like. And, the silicone rubber part is made up of a nipple trunk 11 and a teat portion 12, etc. This nipple trunk 11 has a base portion 11a for mounting to the above-mentioned feeding bottle, etc. and a nipple trunk main body 11b equivalent to a part of the mother's breast. This teat portion 12 has an opening 12a through which milk or other liquids spurt out. Such an artificial nipple 10 is mounted to a feeding bottle, etc., not shown in the figure, and the baby drinks milk, etc. contained in the feeding bottle through the artificial nipple 10.
[0003] Fig. 20 is a diagram showing the state in which an infant 20 is using artificial nipple 10 to drink milk, etc. in a feeding bottle not shown in the figure. As shown in the figure, the infant 20 presses the teat portion 12 of the artificial nipple 10 against the sucking fossa 22 on its upper palate 21 by the peristaltic movement of its tongue 23. At this time, the pressure in the enclosed space B formed by the soft palate 24, tongue 23, and teat portion 12 is close to 0 (zero). Then, tongue 23 moves toward the back of the mouth (space C side) by peristaltic movement while maintaining the enclosed state, and the suction force due to the negative pressure of the enclosed space B is strengthened. At this time, the tongue 23, which had formed the enclosed space B, is separated from upper palate 21 to be connected with space C. This causes milk, etc. in the above-mentioned artificial nipple 10 to spurt

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out from the opening 12a of teat portion 12 and be led in the direction of the epiglottis 26. By generating pressure in the oral cavity in this way, the infant 20 drinks the milk, etc. in the feeding bottle connected to the artificial nipple 10.

[0004]

[Problem to be solved] However, recently, research has been conducted on the oral movement (suckling movement) of the infant 20 when he/she drinks milk, etc., and the following facts were revealed for the first time. In other words, when an infant 20 drinks milk from a feeding bottle with an artificial nipple 10 or its mother's breast milk, the deformation of the artificial nipple 10 or its mother's nipple was observed by echography. The results showed that when the infant 20 held the artificial nipple 10, peristaltic movement of the tongue 23 elongated the teat portion and nipple area corresponding to the teat portion 12 of the artificial nipple 20 among maternal nipples. This was found by feeding an infant 20 with a feeding bottle containing milk with an artificial nipple 10 and the mother's breast milk, and measuring the elongation state of the artificial nipple 10 and the nipple of the mother during the suckling movement. By the way, the artificial nipple 10 is mounted to a feeding bottle containing milk, etc., and is given to the infant in place of the mother's breast milk, so it is desirable that the artificial nipple 10 should be as similar to the mother's nipple as possible. However, according to the results of the above-mentioned research, there as a problem that the conventional artificial nipple 10 does not elongate the teat portion of the mother's nipple or the portion corresponding to the mammary areola, and thus do not approximate the nipple.

[0005] In light of the above facts, this invention aims to provide an artificial nipple that is more similar to a mother's nipple.

[0006]

[Means for solving the problem] In order to achieve the above-mentioned purpose, according to the invention of Claim 1, it is an artificial nipple, which is an artificial nipple having a nipple trunk and a teat portion protruding from this nipple trunk, wherein the aforesaid teat portion and/or the aforesaid nipple trunk is provided with an elongation portion, which is more easily extensible than other portions to form a beverage space inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means is provided in the aforesaid nipple trunk to adjust the internal pressure of this beverage space.

[0007] According to the aforesaid configuration, the aforesaid teat portion and/or a portion of the aforesaid nipple trunk is provided with an elongation portion that is more easily extensible than other portions, a beverage space is formed inside the aforesaid teat portion and the aforesaid nipple trunk, and at the same time, an internal pressure adjusting means is provided to adjust the internal pressure of the beverage space. Therefore, when a beverage is introduced into the aforesaid beverage space, the aforesaid beverage space is maintained at a certain internal pressure by the aforesaid internal pressure adjusting means. Therefore, when the user, e.g. an infant, sucks on the aforesaid teat portion and/or the aforesaid nipple trunk, the artificial nipple is subjected to pressure in the lateral direction. At this time, the internal pressure in the aforesaid beverage space increases, and since the aforesaid elongation portion is formed in the aforesaid teat portion and/or the aforesaid nipple trunk, the pressure acts in the direction of elongation of the artificial nipple in the longitudinal direction, causing the aforesaid teat portion and/or the aforesaid nipple trunk to elongate. Furthermore, because the internal pressure in the aforesaid beverage space increased, the aforesaid teat portion and/or the aforesaid nipple trunk will not collapse even if pressure is applied in the lateral direction of the artificial nipple due to the suckling movement of the infant, etc.

[0008] Preferably, according to the invention of Claim 2, it is an artificial nipple as described in Claim 1, wherein the aforesaid internal pressure adjusting means is formed by a check valve.

[0009] According to the aforesaid configuration, the aforesaid internal pressure adjusting means is formed by a check valve, so once the beverage flows into the aforesaid beverage space, it stays in this beverage space without back-flow and maintains a constant internal pressure.

[0010] Preferably, according to the invention of Claim 3, it is an artificial nipple as described in Claim 1 or Claim 2, wherein the aforesaid elongation portion is thinner than the wall thickness of the artificial nipple.

[0011] According to the aforesaid configuration, the aforesaid elongation portion is thinner than the wall thickness of the artificial nipple, therefore, this elongation portion will elongate further when pressure is applied to the aforesaid teat portion and/or the aforesaid nipple trunk due to the suckling movement of the infant, etc.

[0012] Preferably, according to the invention of Claim 4, it is an artificial nipple as described in Claim 1 or Claim 2, wherein the aforesaid elongation portion is formed by a groove.

[0013] According to the aforesaid configuration, the aforesaid elongation portion is formed by a groove, therefore, the area where this groove is provided will elongate further.

[0014] Preferably, according to the invention of Claim 5, it is an artificial nipple as described in any claim of Claim 1 to Claim 4, wherein the aforesaid elongation portions are formed at predetermined intervals along the longitudinal direction of the artificial nipple.

[0015] According to the aforesaid configuration, the aforesaid elongation portions are formed at predetermined intervals along the longitudinal direction of the artificial nipple, so between the elongation portions, which are the more elongated portions, a portion that is more rigid than this elongation portion is placed. Therefore, the aforesaid teat portion and/or the aforesaid nipple trunk as a whole has a higher rigidity.

[0016] Preferably, according to the invention of Claim 6, it is an artificial nipple as described in any claim of Claim 1 to Claim 5, wherein the boundary between the aforesaid elongation portion and the other inner surface of the artificial nipple is gently formed.

[0017] According to the aforesaid configuration, the boundary between the aforesaid elongation portion and the other inner surface of the artificial nipple is gently formed, so that the rigidity decreases gradually from the other inner surface of the aforesaid artificial nipple to the aforesaid elongation portion.

[0018] In order to achieve the above-mentioned purpose, according to the invention of Claim 7, it is an artificial nipple, which is an artificial nipple having a nipple trunk, a teat portion protruding from this nipple trunk, and a teat opening

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formed in this teat portion, wherein the aforesaid teat portion and/or aforesaid nipple trunk is provided with an elongation portion that is more easily extensible than other portions, a lid portion is formed on the artificial nipple to form a closed space inside the aforesaid teat portion and the aforesaid nipple trunk, the lid portion is provided with a beverage opening, and a beverage pathway is provided to connect this beverage opening to the aforesaid teat opening.

[0019] According to the aforesaid configuration, the aforesaid teat portion and the lid portion for forming a closed space inside the aforesaid nipple trunk are formed for the artificial nipple, therefore, this closed space is maintained at a constant internal pressure by a fixed amount of gas contained within the closed space. Therefore, when a beverage is introduced into the aforesaid beverage space, the aforesaid beverage space is maintained at a certain internal pressure by the aforesaid internal pressure adjusting means. Therefore, when the user, e.g. an infant, sucks on the aforesaid teat portion and/or the aforesaid nipple trunk, the artificial nipple is subjected to pressure in the lateral direction. At this time, the internal pressure in the aforesaid beverage space increases, and since the aforesaid elongation portion is formed in the aforesaid teat portion and/or the aforesaid nipple trunk, the pressure acts in the direction of elongation of the artificial nipple in the longitudinal direction, causing the aforesaid teat portion and/or the aforesaid nipple trunk to elongate. Furthermore, because the internal pressure in the aforesaid beverage space increased, the aforesaid teat portion and/or the aforesaid nipple trunk will not collapse even if pressure is applied in the lateral direction of the artificial nipple due to the suckling movement of the infant, etc. In addition, the aforesaid lid portion has a beverage opening and a beverage pathway connecting the beverage opening and the aforesaid teat opening, therefore, the beverage is supplied to the infant, etc. through this beverage pathway by the change in pressure caused by peristaltic movement.

[0020] Preferably, according to the invention of Claim 8, it is an artificial nipple as described in Claim 7, wherein the aforesaid lid portion is formed in a manner of being detachable from the aforesaid artificial nipple.

[0021] According to the aforesaid configuration, the aforesaid lid portion is formed in a manner of being detachable from the aforesaid artificial nipple, therefore, the user can easily remove the aforesaid lid portion from the aforesaid artificial nipple for cleaning, etc.

[0022] Preferably, according to the invention of Claim 9, it is an artificial nipple as described in Claim 7, wherein the aforesaid lid portion is formed as an integral part of the aforesaid artificial nipple.

[0023] According to the aforesaid configuration, the aforesaid lid portion is formed as a single piece for the aforesaid artificial nipple, therefore, it is easier to form a closed space inside the aforesaid teat portion and the aforesaid nipple trunk.

[0024] Preferably, according to the invention of Claim 10, it is an artificial nipple as described in any claim of Claim 7 to Claim 9, wherein the aforesaid beverage pathway is formed of a tubular member and the tubular member has a length corresponding to the change in distance between the aforesaid teat opening and the aforesaid beverage opening.

[0025] According to the aforesaid configuration, the aforesaid beverage pathway is formed of a tubular member and this tubular member has a length corresponding to the change in distance between the aforesaid teat opening and the aforesaid beverage opening, therefore, the aforesaid tubular member can follow the elongation of the aforesaid teat portion and/or the aforesaid nipple trunk even if the aforesaid teat portion and/or the aforesaid nipple trunk is elongated due to the suckling movement of the infant, etc.

[0026] Preferably, according to the invention of Claim 11, it is an artificial nipple as described in any claim of Claim 7 to Claim 9, wherein the aforesaid beverage pathway is formed of a tubular member and the tubular member has a 1st tubular member at the aforesaid teat opening and a 2nd tubular member at the aforesaid beverage opening which is joined to the 1st tubular member.

[0027] According to the aforesaid configuration, the aforesaid beverage pathway is formed of a tubular member, which has a 1st tubular member at the aforesaid teat opening and a 2nd tubular member at the aforesaid beverage opening that is joined to the 1st tubular member. Therefore, even if the aforesaid teat portion and/or the aforesaid nipple trunk is elongated due to the suckling movement of the infant, etc., the relative position of the aforesaid 1st tubular member and the aforesaid 2nd tubular member can be changed to follow the elongation. In addition, the aforesaid lid portion can be removed from the artificial nipple for easy cleaning.

[0028] Preferably, according to the invention of Claim 12, it is an artificial nipple as described in any claim of Claim 7 to Claim 11, wherein the aforesaid elongation portion is thinner than the wall thickness of the artificial nipple.

[0029] According to the aforesaid configuration, the aforesaid elongation portion is thinner than the wall thickness of the artificial nipple, therefore, this elongation portion will elongate further when pressure is applied to the aforesaid teat portion and/or the aforesaid nipple trunk due to the suckling movement of the infant, etc.

[0030] Preferably, according to the invention of Claim 13, it is an artificial nipple as described in any claim of Claim 7 to Claim 11, wherein the aforesaid elongation portion is formed by a groove.

[0031] According to the aforesaid configuration, the aforesaid elongation portion is formed by a groove, therefore, the area where this groove is provided will elongate further.

[0032] Preferably, according to the invention of Claim 14, it is an artificial nipple as described in any claim of Claim 7 to Claim 13, wherein the aforesaid elongation portions are formed at predetermined intervals along the longitudinal direction of the artificial nipple.

[0033] According to the aforesaid configuration, the aforesaid elongation portions are formed at predetermined intervals along the longitudinal direction of the artificial nipple, so between the elongation portions, which are the more elongated portions, a portion that is more rigid than this elongation portion is placed. Therefore, the aforesaid teat portion and/or the aforesaid nipple trunk as a whole has a higher rigidity.

[0034] Preferably, according to the invention of Claim 15, it is an artificial nipple as described in any claim of Claim 7 to Claim 14, wherein the boundary between the aforesaid elongation portion and the other inner surface of the artificial nipple is gently formed.

[0035] According to the aforesaid configuration, the boundary

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between the aforesaid elongation portion and the other inner surface of the artificial nipple is gently formed, so that the rigidity decreases gradually from the inner surface of the aforesaid other artificial nipple to the aforesaid elongation portion.

[0036]

[Embodiments of the invention] Suitable embodiments of this invention will be described in detail below with reference to Figs. 1 through 18. Moreover, since the embodiments described below are suitable concrete examples of this invention, various technically preferred limitations are attached. However, the scope of this invention is not limited to these embodiments unless specifically stated to limit this invention in the following description.

[0037] Fig. 1 is a schematic cross-sectional view of the artificial nipple 100 according to the 1st embodiment of this invention. As shown in the figure, the artificial nipple 100 has a bowl-shaped nipple trunk 110 equivalent to a mother's breast and a teat portion 120 equivalent to a mother's nipple, which is connected to the nipple trunk 110. In addition, on the lower side of the nipple trunk 110, there is a base portion 112 with a nipple side vent hole, which is a flange portion for connecting to a feeding bottle main body, for example, not shown in the figure. The nipple trunk main body 111 is continuously formed from this base portion 112 so that the diameter is reduced. Also, a teat opening 121 is provided at the tip of the aforesaid teat portion 120. This teat opening 121 is connected to a beverage space D formed by the nipple trunk 110 and the teat portion 120 of the artificial nipple 100. A check valve 130 is provided near the base portion 112 of this beverage space D. This check valve 130 has a check valve main body 131 and a valve 132 as shown in Fig. 1.

[0038] This check valve main body 131 is made of resin, etc., and is cylindrical in shape. Therefore, the check valve opening 131a is formed on the lower side of this check valve main body 131. In addition, on the upper side of the check valve main body 131, there is a mounting hole 131b for mounting the valve 132 in a movable state. In this mounting hole 131b, valve 132 is mounted as shown in Fig. 1. This valve 132 has a disc-shaped valve body 132a as shown in Fig. 1. And, this valve body 132a has a handle for moving valve body 132b, which is used to move the valve body 132a, and this handle for moving valve body 132b is provided with a stopper portion 132c to stop the valve 132 from slipping out of the mounting hole 131b of the check valve main body 131. Therefore, the valve body 132a of valve 132 moves upward in Fig. 1 by the length of the handle for moving valve body 132b. And, when the stopper 132c touches the inside of the check valve main body 131, the valve 132a stops moving and the valve 132 is in an open state.

[0039] On the other hand, Fig. 2 is a diagram showing that the valve body 132a of valve 132 moves downward in the figure and stops moving when the valve body 132 touches the top surface of the check valve main body 131, and the valve 132 is in a closed state. Thus, the check valve 130 directs the beverage, e.g., milk, from the feeding bottle main body, which is provided in the downward direction in Figs. 1 and 2, into the beverage space D, and on the other hand it prevents the milk in the beverage space D from flowing toward the feeding bottle main body. And, after the milk is introduced into the beverage space D, the check valve 130 is closed by the milk as shown in Fig. 2. In this state, when the user, such as an infant, puts the artificial nipple 100 in his/her mouth and performs the suckling movement described below, the nipple trunk 110 and the teat portion 120 of the artificial nipple 100, as shown in Fig. 1, are pushed in the lateral direction, deforming the artificial nipple 100 and increasing the internal pressure. At this time, since the check valve 130 is closed, this pressure does not escape from the artificial nipple 100 in the direction of the feeding bottle, and the internal pressure in the artificial nipple 100 is maintained at a constant level. Fig. 4 and Fig. 3 show the check valve 130 working in this way as seen from above and below in Fig. 1, respectively. As shown in Fig. 3, the mounting holes 131b are formed in three directions around the stopper portion 132c of valve 132.

[0040] By the way, the wall of the shaded portion of the artificial nipple 100 that forms this beverage space D is made of, for example, silicone rubber. When this artificial nipple 100 is connected to, for example, a feeding bottle containing, for example, milk via the base portion 112, the milk in the feeding bottle is transferred from the bottle mouth of the feeding bottle to the base portion of the artificial nipple 100 via the check valve 130, as described above. And, the milk introduced into the space D of the artificial nipple 100 is discharged to the outside of the artificial nipple 100 through the teat opening 121 of the teat portion 120, as described above, when the infant, etc. performs the suckling movement.

[0041] It is a structure that at this time, if the artificial nipple 100 is inserted into the infant's mouth, for example, the discharged milk can be fed to the infant. Such an artificial nipple 100 has a shape similar to a mother's breast and nipple as shown in Fig. 1, because it is used when a mother feeds her infant with artificial milk using a feeding bottle, etc., instead of her own breast milk. By the way, on the teat portion 120 and nipple trunk 110 of the artificial nipple 100 of this embodiment, thin-walled portions 122, 122 and 122, which are elongation portions with a thin wall, are formed in a groove-like pattern, for example, at seven annular locations, as shown in Fig. 1. The thickness of the thin-walled portions 122 is about 0.5 mm at the thinnest part. And, each of the thin-walled portions 122 is formed in a manner that the wall thickness gradually increases from the thinnest portion, and the boundary between the thin-walled portion 122 and the inner surface 123 of the artificial nipple 100 becomes smooth, forming a wave shape as shown in Fig. 1. The thickness of the inner surface 123 of the artificial nipple is about 1.6 mm, for example.

[0042] The thin-walled portions 122 are arranged at predetermined intervals, for example, as shown in Fig. 2. In other words, from the base portion 112 to the thinnest portion of the first thin-walled portion 122, it is 12.5 mm; from this

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thin-walled portion 122 to the thinnest portion of the next thin-walled portion 122, it is 4 mm; to the thinnest portion of the next thin-walled portion 122, it is 4 mm; to the thinnest portion of the next thin-walled portion 122, it is 3.2 mm. Similarly, the thin-walled portions 122 are placed at intervals of 3 mm, 3 mm, and 3.9 mm.

[0043] The artificial nipple 100 of this embodiment is configured in a manner as described above and is used as follows. First, the artificial nipple 100 is mounted on a feeding bottle containing, for example, milk. The mother holds the feeding bottle and inserts the artificial nipple 100 into the infant's mouth to feed milk to the infant. Fig. 5 is a diagram showing the state in which the mother inserts the artificial nipple 100 into the mouth of the infant 200, and the infant 200 sucks the milk up into the artificial nipple 100. In Fig. 5, the feeding bottle, etc. is omitted and only the artificial nipple 100 is shown. In other words, when the infant 200 sucks in the artificial nipple 100, the pressure changes due to several times of peristaltic movement, and the teat opening 121 of the teat portion 120 is sucked first. At this time, the valve 132 of the check valve 130 is in the open state shown in Fig. 1, and milk flows into the artificial nipple 100 from the mounting hole 131b of the check valve main body 131, as shown by the arrow in Fig. 5.

[0044] In this state, the tip of the teat portion 120 of the artificial nipple 100 is in contact with the tip of the sucking fossa 220 of the infant 200, and the tongue 230 of the infant 200 pushes the artificial nipple 100 upward in the figure. In other words, the upper surface of the artificial nipple 100 in Fig. 5 is pushed against the part from the sucking fossa 220 to the upper palate 210 and from the alveolar crest 280 to the lip 270 of the infant 200. By the way, when the infant 200 drinks milk through the artificial nipple 100, he/she performs the suckling movement by peristaltic movement of the tongue, as shown in Fig. 6 to Fig. 7. Fig. 6 and Fig. 7 show a series of images taken with an ultrasound tomography system of the oral cavity of an infant 200 performing the suckling movement. In Fig. 6(a), the infant 200 performing the suckling movement has a depression called the sucking fossa 220. This sucking fossa 220 is present only during the suckling movement of the infant 200 and disappears when the infant grows up.

[0045] The mother's nipple enters this sucking fossa 220 in the oral cavity of the infant 200. In this state, the tongue 230 of the infant 200 hits the nipple from below in the oral cavity, and the sides of the tongue 230 are raised up to wrap the nipple closely. And, as shown in Fig. 6(b) and (c), the front of tongue 230 rises up and pushes the nipple from below, and this movement gradually moves backward in waves, as shown in Fig. 5(a) to (c). In this process, the tongue 230 makes a wave-like peristaltic movement from anterior to posterior, the nipple is squeezed from the base to the tip, and the nipple is elongated and strikes the tip part of the sucking fossa 220. A closed space E is then formed among the nipple, the tongue 230 and the maxilla. This closed space E, shown in Fig. 6(b), becomes smaller as the nipple and other parts elongate, and preferably the nipple and other parts elongate until the closed space E disappears. As a result, the pressure in this closed space E approaches 0 (zero), and then, due to the peristaltic movement of the tongue 230, this closed space E remains enclosed and only the tongue 230 moves to the rear, thereby increasing the volume of this closed space E and increasing the suction force due to negative pressure. And, when the closed space E is opened by the increased suction force, the mother's milk is spurted out with great force in the direction of the epiglottis 260 (see Fig. 5) of the infant 200, and the suckling movement is completed when the spurted milk is swallowed.

[0046] Thus, infant 200 performs peristaltic movement of the tongue 230, elongates the mother's nipple, seals the above-mentioned closed space E, narrows the volume, and moves the tongue 230 further back with peristaltic movement while keeping it enclosed, to effectively generate negative pressure. By effectively generating negative pressure in this way, the spurting of mother's milk is promoted so that the infant can drink breast milk more effectively. In the artificial nipple 100 of this embodiment, as shown in Fig. 1, since the thin-walled portions 122 are placed at 7 locations across the teat portion 120 and the nipple trunk 110, the peristaltic movement of the tongue 230 of the infant 200 described above will cause these seven thin-walled portions 122 to elongate, and the teat portion 120 and nipple trunk 110 will also be elongated in the mouth of the infant 200. At this time, since several thin-walled portions 122 are provided at predetermined intervals from the teat portion 120 to the nipple trunk 110, the teat portion 120 and the nipple trunk 110 are elongated more evenly. In addition, this embodiment has a check valve 130, which prevents the milk from returning to the feeding bottle after it has been introduced into the artificial nipple 100 in the state shown in Fig. 5 above. In addition, the pressure in the artificial nipple 100 is also prevented from escaping to the side of the feeding bottle.

[0047] In this state, when the peristaltic movement of the tongue 230 described above is performed by the infant 200, pressure is applied to the artificial nipple 100 in the direction of collapse in the lateral direction shown in Fig. 1, and this pressure is maintained by the check valve 130 without escaping to the side of the feeding bottle. Therefore, the artificial nipple 100 will not be collapsed by the peristaltic movement of the infant 200. Furthermore, the pressure thus maintained in the artificial nipple 100 acts on the weaker portion, the elongation portion 122, to elongate it further. As shown in Fig. 8, the closed space E formed by the artificial nipple 100, tongue 230, and soft palate 240 is smaller than the one shown in Fig. 5 because the artificial nipple 100 is not collapsed and is further elongated. In this way, the closed space E, which is smaller in volume (preferably, the closed space E has disappeared), becomes closed by the peristaltic movement of tongue 230, as shown in Fig. 8. After this, by moving the

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tongue 230 further, negative pressure is generated and the milk in the artificial nipple 100 spurts out in the direction of the arrow in Fig. 9. And, if the volume of the closed space E in Fig. 8 is small, the amount of milk spurted will be larger.

[0048] Therefore, as in this embodiment, the elongation of the teat portion 120 and nipple trunk 110 by the internal pressure of the elongation portion 122 and the check valve 130 can create higher pressure in the closed space E, and a larger volume of milk can be spurted out from the artificial nipple 100. And, this allows the infant 200 to drink milk more smoothly and appropriately. Furthermore, in this embodiment, as shown in Fig. 1, the boundary between the thin-walled portion 122 and the inner surface of the artificial nipple 123 forms a gentle wave shape, making it easy to pull out of the mold for manufacturing the artificial nipple 100. Therefore, the artificial nipple 100 of this embodiment elongates in the same way as the mother's nipple, thereby increasing the amount of milk spurted, and the artificial nipple 100 itself does not collapse in the same way as the mother's nipple, and its rigidity can be maintained. Moreover, in this embodiment, an example in which the artificial nipple 100 is applied to a feeding bottle containing milk was shown, but it is clear that the artificial nipple 100 in this invention is applicable not only to this embodiment, but also to the case when the infant 200 drinks liquid beverages such as juice in containers other than feeding bottles.

[0049] In addition, in this embodiment, thin-walled portions 122 are provided at 7 locations on the artificial nipple 100, but it is clear that it is not limited to this form, and there can be any number of locations.

[0050] Fig. 10 and Fig. 11 are schematic cross-sectional views showing artificial nipple 300 according to the 2nd embodiment of this invention. Since the configuration of the artificial nipple 300 of this embodiment is similar to that of the artificial nipple 100 of the 1st embodiment described above, the description will focus on the differences and similar configurations will be omitted, by adding the same reference numerals or the like. In Fig. 10, similar to the 1st embodiment described above, the artificial nipple 300 has a nipple trunk 110 equipped with an elongation portion 122, a teat portion 120, and a base portion 112 having nipple side vent holes. However, the artificial nipple 300 has a check valve 330 that is different in structure from the check valve provided in the 1st embodiment. As shown in Fig. 10, the check valve main body 331 has a check valve opening 331a on the side of the feeding bottle, and on its upper surface, as shown in Fig. 12, seven introduction holes 331b are formed. Fig. 12 is a diagram of the check valve 330 viewed from the side of feeding bottle.

[0051] The introduction hole 331b allows beverages such as milk from the feeding bottle to be introduced into the artificial nipple 300. The check valve main body 331 is, for example, made of polypropylene (PP), and, for example, has a valve 332 made of silicone. As shown in Fig. 13, this valve 332 is positioned in a manner of blocking the aforesaid introduction hole 331b, and one end of the valve has a fixed end 332a. Therefore, using the fixed end 332a as a fulcrum, the valve 332 pivots in a manner as shown by the arrow in Fig. 10. Moreover, Fig. 13 is a diagram showing the check valve 330 viewed from the inside of the artificial nipple 300. When milk is introduced from the feeding bottle into the artificial nipple 300, the check valve 330 is in an open state, as shown in Fig. 10. And, after the milk is introduced into the artificial nipple 300, when the peristaltic movement of the infant 200 is performed, the check valve 330 is at the position shown in Fig. 11, and similar to the 1st embodiment, the internal pressure in the artificial nipple 300 is maintained at a constant level.

[0052] Fig. 14 is a schematic cross-sectional view of an artificial nipple 400 according to the 3rd embodiment of this invention. Since the configuration of the artificial nipple 400 of this embodiment is similar to that of the artificial nipple 100 of the 1st embodiment described above, the following description will focus on the differences, and similar configurations will be omitted, by adding the same reference numerals or the like. In Fig. 14, similar to the 1st embodiment described above, the artificial nipple 400 has a nipple trunk 110 equipped with an elongation portion 122, a teat portion 120, and a base portion 112 having nipple side vent holes, etc. However, different from the 1st embodiment, the artificial nipple 400 has a lid portion 420 made of silicone, the same material as the artificial nipple 400, on the lower side of the base portion 112 in the figure. And, the lid portion 420 is bonded to the base portion 112 by a silicone adhesive. This makes it easier for air and other gases to be trapped inside the closed space F as described below. In addition, this lid portion 420 is provided with a beverage opening 420a, and a tube 430 is formed as a beverage pathway to connect the beverage opening 420a to the teat opening 121. In addition, this lid portion 420 has the lid portion vent hole positioned to be connected to the nipple side vent holes. These nipple side vent holes and lid portion vent holes are provided in a manner that the pressure inside the bottle does not change from the outside air even when the contents of the feeding bottle are reduced. And, the nipple side vent holes and lid portion vent holes are provided in concave-convex portions that can be fitted to each other so that they can be aligned vertically.

[0053] This tube 430 is integrally formed in one piece of silicone, the same material as the lid portion 420. And, the end of the tube 430 that connects to the teat opening 121 is fitted into the teat opening 121, as shown in Fig. 15. Furthermore, the tube 430 is formed slightly longer than the height of the artificial nipple 400. By configuring the artificial nipple 400 in this way, a closed space F is formed in the artificial nipple 400, and gases such as air are trapped inside. However, since tube 430 is arranged in this closed space F, milk in the feeding bottle connected to the artificial nipple 400 passes through this tube 430 to reach the teat opening 121, where the infant 200 drinks the milk. When the infant 200 performs peristaltic movement using the artificial nipple 400 with the above configuration as

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in the 1st embodiment, even if pressure is applied to the artificial nipple 400 in the direction of collapse in the lateral direction in the figure, air, etc. are trapped in the closed space F, there will be a force to bounce back the aforesaid pressure. Therefore, it is possible to effectively prevent the artificial nipple 400 from collapsing.

[0054] In addition, when this pressure acts on the elongation portion 122 to elongate the artificial nipple 400 vertically in the figure, and when the pressure acts to further elongate the artificial nipple 400 by the peristaltic movement of the infant 200, the tube 430 follows it while deforming in response to the elongation of the artificial nipple 400. Therefore, the tube 430 does not inhibit the elongation of the artificial nipple 400. Moreover, in this embodiment, the lid portion 420 is bonded to the base portion 112 with a silicone adhesive, but it is not limited to this form, and it can also be fixed using a detachable feeding bottle mounting cap (not shown in the figure), which is used when mounting the artificial nipple 200 to the feeding bottle. In this case, it is a configuration that the lid portion 420 and the base portion can be separated by removing the cap, which allows for easy cleaning, etc.

[0055] Fig. 16 is a schematic cross-sectional view of an artificial nipple 500 according to the 4th embodiment of this invention. Since the configuration of the artificial nipple 500 of this embodiment is similar to that of the artificial nipple 400 of the 3rd embodiment described above, the following description will focus on the differences, and similar configurations will be omitted, by adding the same reference numerals or the like. In Fig. 16, similar to the 3rd embodiment described above, the artificial nipple 500 has a nipple trunk 110 equipped with an elongation portion 122, a teat portion 120, and a base portion 112, as well as a closed space F, etc. However, in this embodiment, different from the 3rd embodiment, the material of the lid portion 520 is made of elastomer or polypropylene (PP). The lid portion 520 is made of elastomer or polypropylene (PP) instead of silicone, which was used in the 3rd embodiment, allowing the lid portion 520 to have hardness, as a result, the lid portion 520 can have hardness, and the above pressure applied to the air, etc. in the closed space F does not escape to the side of lid portion 520, but works in the direction of further extending the artificial nipple 500, making the artificial nipple 500 more similar to the nipple of the mother. In addition, if only the outer circumference of this lid portion 520 is made of soft resin by 2-color molding, this lid portion 520 can be mounted smoothly to the feeding bottle.

[0056] Furthermore, the aforesaid lid portion 520 and the base portion 112 do not necessarily need to be bonded together, but may also be overlapped when attached to the feeding bottle. In this case, the lid portion 520 and the base portion 112 can be secured to the feeding bottle using a feeding bottle mounting cap (not shown in the figure) to make them adhere more closely together. In this case, the lid portion 520 and base portion can be separated by removing the cap, which allows for easy cleaning, etc. Moreover, similar to in the 3rd embodiment described above, the lid portion 520 and the base portion 112 are provided with a lid portion vent hole and a nipple side vent hole in a concavo-convex part that can be mutually fitted. In addition, this embodiment differs from the 3rd embodiment in the configuration of the tubes. In other words, the tube 530 in this embodiment has a lid portion side tube 530a, which is a 2nd tube member formed integrally with the lid portion 520, and a 1st tube member, which is a teat portion side tube 530b, formed integrally with the teat portion 120. And, it is a configuration that this lid portion side tube 530a is fitted inside the teat portion side tube 530b, for example, and is temporarily fixed and joined. And, when the artificial nipple 500 is elongated as in the 1st embodiment, the relative positions of the lid portion side tube member 530a and the teat portion side tube member 530b are shifted to follow the elongation of the artificial nipple 500. In other words, in Fig. 16, it is a configuration that the teat portion side tube 530b moves upward in the figure to absorb the elongation of the artificial nipple 500.

[0057] Fig. 17 is a schematic cross-sectional view showing an artificial nipple 600 according to the 5th embodiment of this invention. Since the configuration of the artificial nipple 600 of this embodiment is similar to that of the artificial nipple 500 of the 4th embodiment described above, the following description will focus on the differences, and similar configurations will be omitted, by adding the same reference numerals or the like. In Fig. 17, similar to the 4th embodiment described above, the artificial nipple 600 has a nipple trunk 110 equipped with an elongation portion 122, a teat portion 120 and a base portion 112, as well as a closed space F, nipple side vent holes, lid portion vent holes, etc. However, in this embodiment, different from the 4th embodiment, the tube 630 has a lid portion side tube 630a, which is integrally formed with lid portion 620 and bent and positioned within artificial nipple 600, and a teat portion side tube 630b, which is integrally formed with the teat portion 120. And, the tip of the lid portion side tube 630a is engaged with and secured to the teat portion side tube 630b. The lid portion side tube 630a and the teat portion side tube 630b can be integrally configured by 2-color molding or insert molding in addition to engagement and fixation.

[0058] By configuring the tube 630 in this way, when the artificial nipple 600 is elongated as in the 1st embodiment, the lid portion side tube 630a, which is arranged in a bent position in the artificial nipple 600, is deformed in a straight direction to follow the elongation of the artificial nipple 600. In addition, in this embodiment, different from the 4th embodiment, the material of the lid portion 620 is formed from a mixture of elastomer and polypropylene (PP). By forming the lid portion 620 from a mixture of elastomer and polypropylene (PP), the sealing property is improved when the lid portion 620 is

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mounted to the feeding bottle, and the softness of the lid portion side tube 630a described above can be obtained to allow the flexure of the tube. In addition, even when pressure due to peristaltic movement of the infant 200 is applied to the closed space F as in the 1st embodiment, it is possible to obtain a hardness that does not deform the lid portion 630 due to the pressure. In other words, since the lid portion 630 is not deformed, the internal pressure in the closed space F can be effectively utilized, resulting in a more elongated artificial nipple 600. Moreover, in this embodiment, the lid portion 620 may be bonded to the base portion 112 with a silicone adhesive, but it is not limited to this form, and it may also be secured using a feeding bottle mounting cap (not shown in the figure), which is used to mount the artificial nipple 600 to the feeding bottle. In the case of being bonded, it is easy to form the closed space F, and in the case of using the feeding bottle mounting cap, the lid portion 620 and the base portion 112 can be separated by removing the cap, which makes it easy to clean, etc.

[0059] Fig. 18 is a schematic cross-sectional view of an artificial nipple 700 according to the 6th embodiment of this invention. Since the configuration of the artificial nipple 700 of this embodiment is similar to that of the artificial nipple 600 of the 5th embodiment described above, the following description will focus on the differences, and similar configurations will be omitted, by adding the same reference numerals or the like. In Fig. 18, similar to the 5th embodiment above, the artificial nipple 700 has a nipple trunk 110 equipped with an elongation portion 122, a teat portion 120 and a base portion 112, as well as a closed space F, nipple side vent holes, lid portion vent holes, etc. However, in this embodiment, different from the 5th embodiment, the lid portion 720 is formed of elastomer and is thicker than the lid portion of the 5th embodiment. In addition, the lid portion side tube 730a of tube 730 is also made of elastomer and is thinner and straighter than the lid portion side tube 630a of the 5th embodiment. Such a thicker lid portion 720 provides better performance for sealing with the feeding bottle, and also effectively prevents the pressure in the closed space F caused by the peristaltic movement of the infant 200 of the 1st embodiment from escaping through the deformation of the lid portion 720. In addition, since the lid portion side tube 730a is made thinner, it does not inhibit the elongation of the artificial nipple 700 because it is configured to elongate in accordance with the elongation of the artificial nipple 700.

[0060] Moreover, in each of the above mentioned embodiments, multiple thin-walled portions 122, etc. were formed as elongation portions, but it is also fine to form the thin-walled portions in a spiral shape. In addition, it is also fine to use a softer material for the thin-walled portions. Furthermore, each of the aforementioned configurations of each embodiment may be omitted in part or changed to any other combination not mentioned above.

[0061]

[Effect of the Invention] As described above, this invention provides an artificial nipple that is more similar to a mother's nipple.

[Brief Description of the Figures]

[Fig. 1] It is a schematic cross-sectional view of an artificial nipple according to the 1st embodiment of this invention.

[Fig. 2] It is another schematic cross-sectional view of an artificial nipple according to the 1st embodiment of this invention.

[Fig. 3] It is a schematic bottom view of the check valve of the 1st embodiment.

[Fig. 4] It is a schematic plan view of the check valve of the 1st embodiment.

[Fig. 5] It is a schematic view showing the open state of the check valve of the 1st embodiment.

[Fig. 6] It is a series of images taken with an ultrasound tomography system showing the state of the infant's oral cavity during suckling.

[Fig. 7] It is another series of images taken with an ultrasound tomography system of the infant's oral cavity during suckling.

[Fig. 8] It is a schematic view showing the state in which the artificial nipple is elongated in the infant's mouth and the check valve is closed in the 1st embodiment.

[Fig. 9] It is a schematic view showing the state of the artificial nipple in the mouth of the infant in the 1st embodiment.

[Fig. 10] It is a schematic cross-sectional view showing the artificial nipple according to the 2nd embodiment of this invention.

[Fig. 11] It is another schematic cross-sectional view showing the artificial nipple according to the 2nd embodiment of this invention.

[Fig. 12] It is a schematic bottom view showing the check valve of the 2nd embodiment.

[Fig. 13] It is a schematic plan view of the check valve of the 2nd embodiment.

[Fig. 14] It is a schematic cross-sectional view showing the artificial nipple of the 3rd embodiment of this invention.

[Fig. 15] It is a partially enlarged view of Fig. 14.

[Fig. 16] It is a schematic cross-sectional view of an artificial nipple according to the 4th embodiment of this invention.

[Fig. 17] It is a schematic cross-sectional view of an artificial nipple according to the 5th embodiment of this invention.

[Fig. 18] It is a schematic cross-sectional view of an artificial nipple according to the 6th embodiment of this invention.

[Fig. 19] It is a cross-sectional view of a conventional artificial nipple.

[Fig. 20] It is a diagram showing an infant using a conventional artificial nipple.

[Description of the reference numerals]

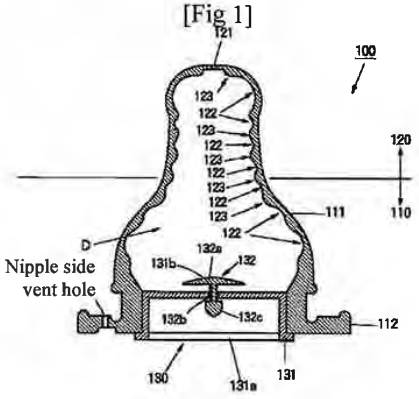
100, 300, 400, 500, 600 and 700 ... artificial nipple
110 ... nipple trunk
111 ... nipple trunk main body
112 ... base portion
120 ... teat portion
121 ... teat opening
122 ... thin-walled portion

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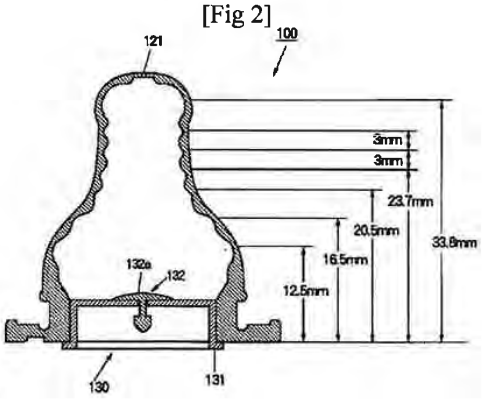
123 ... inner surface of artificial nipple
130 ... check valve
131 ... check valve main body
131a ... check valve opening
131b ... mounting hole
132 ... valve
132a ... valve body
132b ... handle for moving valve body
132c ... stopper portion

200 ... infant
210 ... upper palate
220 ... sucking fossa
230 ... tongue
260 ... epiglottis
270 ... lip
280 ... alveolar crest
D ... beverage space

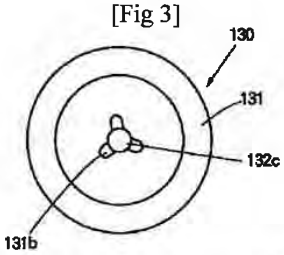
[Fig 1]



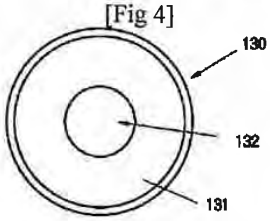
[Fig 2]



[Fig 3]



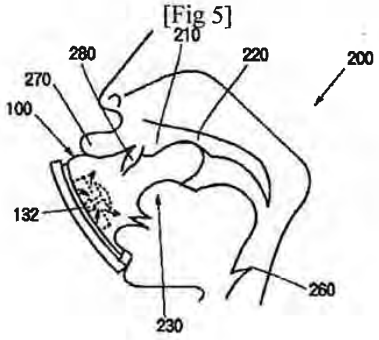
[Fig 4]



[Fig 9]

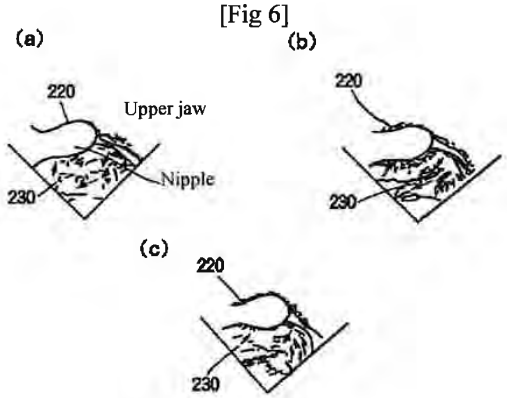


[Fig 5]

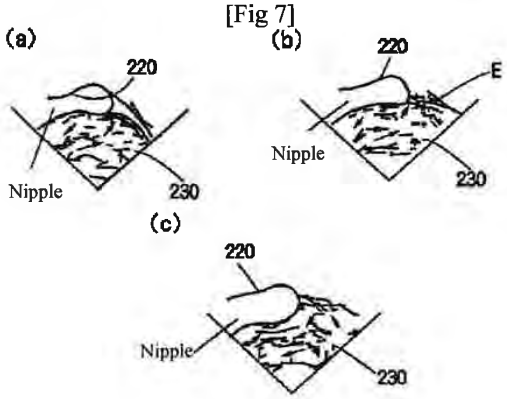


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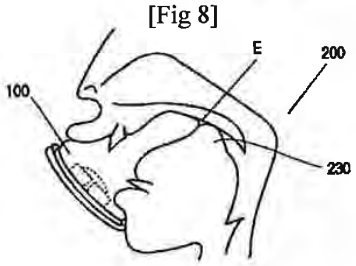
[Fig 6]



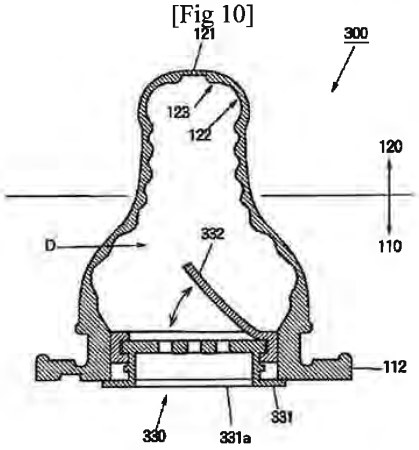
[Fig 7]



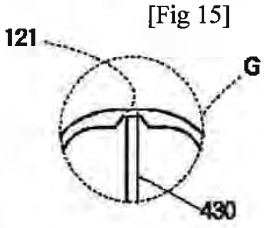
[Fig 8]



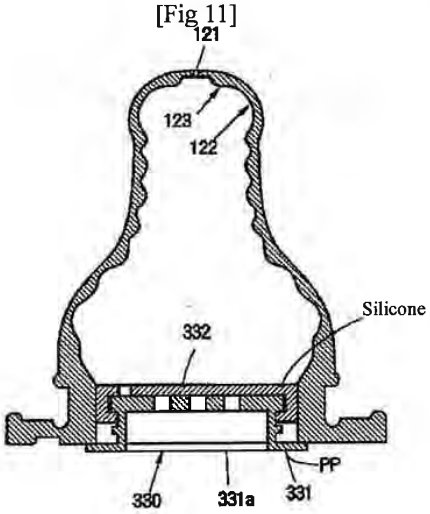
[Fig 10]



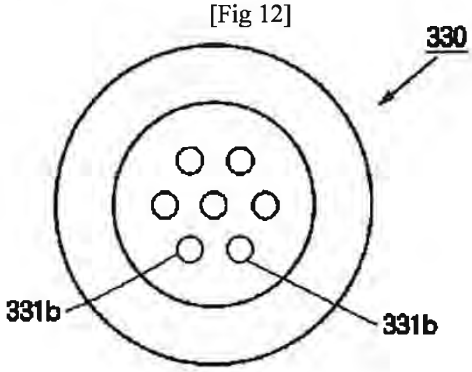
[Fig 15]



[Fig 11]

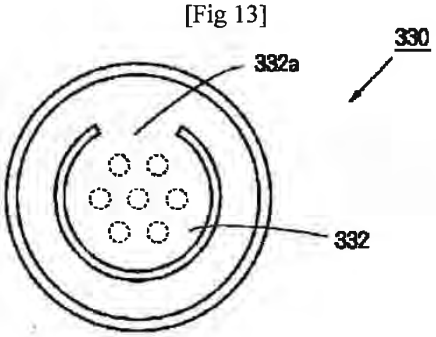


[Fig 12]

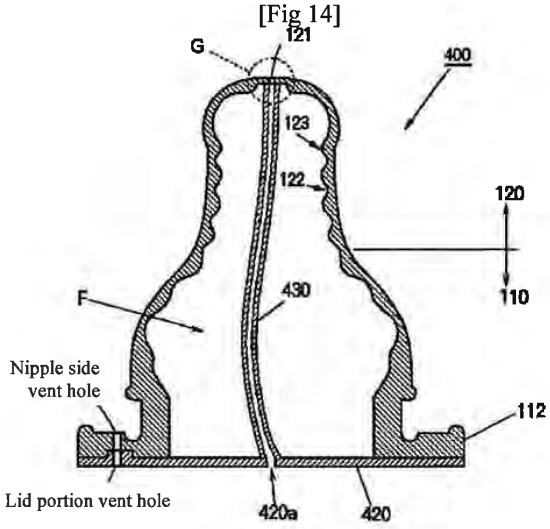


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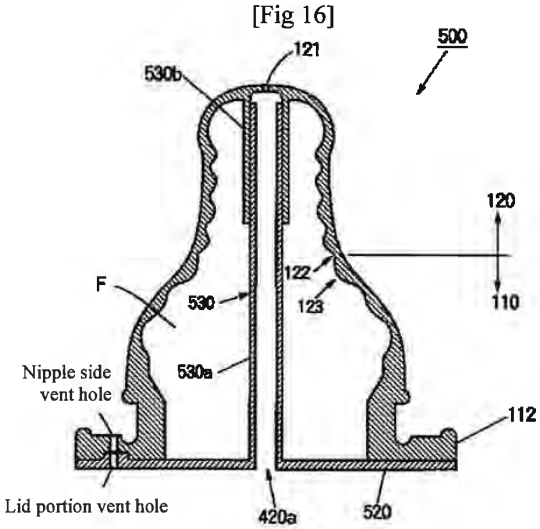
[Fig 13]



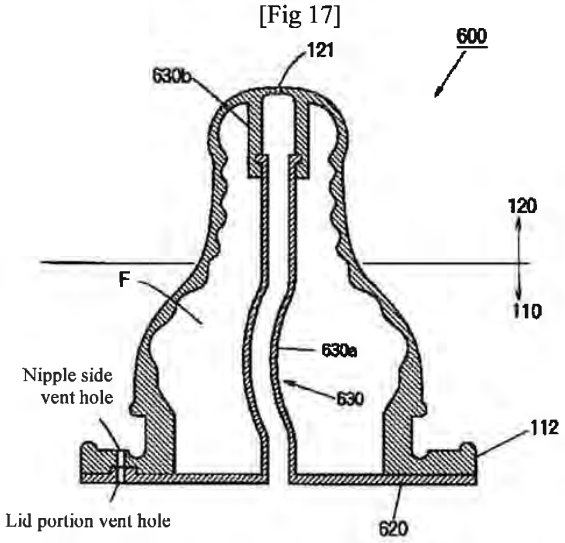
[Fig 14]



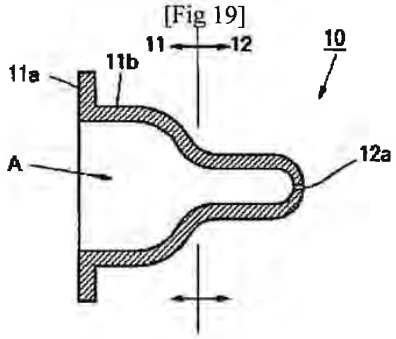
[Fig 16]



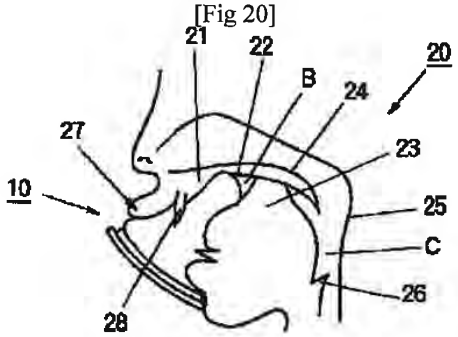
[Fig 17]



[Fig 19]

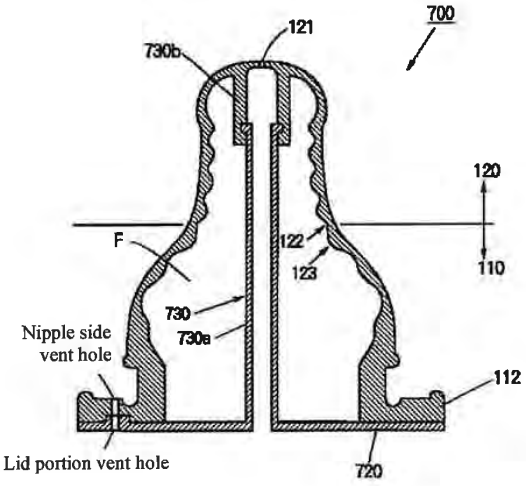


[Fig 20]



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[Fig 18]



Continuation from front page

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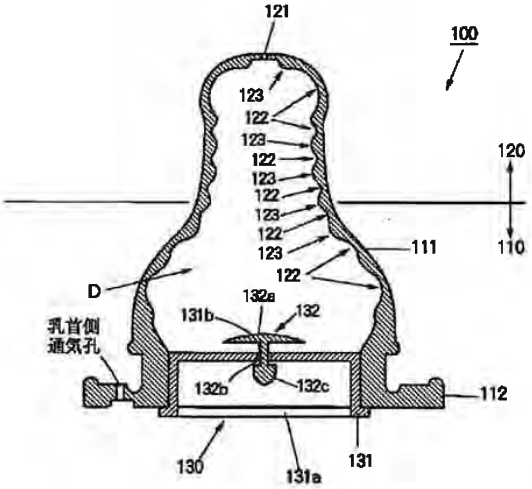
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最終頁に続く

(54)【発明の名称】　人工乳首

(57)【要約】
【課題】　母親の乳首により近似している人工乳首を提供すること。
【解決手段】　乳首胴部と、この乳首胴部から突出して形成されている乳頭部とを有する人工乳首であって、前記乳頭部１２０及び／又は前記乳首胴部１１０の一部に他の部分より伸長し易い伸長部１２２が設けられており、前記乳頭部と前記乳首胴部の内側に飲料用空間Ｄが形成されると共に、この飲料用空間の内圧を調節するための内圧調節手段１３０が前記乳首胴部に設けられていることで人工乳首１００を構成する。



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【特許請求の範囲】
【請求項１】　乳首胴部と、
この乳首胴部から突出して形成されている乳頭部とを有する人工乳首であって、
前記乳頭部及び／又は前記乳首胴部の一部に他の部分より伸長し易い伸長部が設けられており、
前記乳頭部と前記乳首胴部の内側に飲料用空間が形成されると共に、この飲料用空間の内圧を調節するための内圧調節手段が前記乳首胴部に設けられていることを特徴とする人工乳首。
【請求項２】　前記内圧調節手段が、逆止弁で形成されていることを特徴とする請求項１に記載の人工乳首。
【請求項３】　前記伸長部が人工乳首の肉厚よりも薄く形成されていることを特徴とする請求項１又は請求項２に記載の人工乳首。
【請求項４】　前記伸長部が溝により形成されていることを特徴とする請求項１又は請求項２に記載の人工乳首。
【請求項５】　前記伸長部が人工乳首の長手方向に沿って所定の間隔で形成されていることを特徴とする請求項１乃至請求項４のいずれかに記載の人工乳首。
【請求項６】　前記伸長部と他の人工乳首の内面との境界部がなだらかに形成されていることを特徴とする請求項１乃至請求項５のいずれかに記載の人工乳首。
【請求項７】　乳首胴部と、
この乳首胴部から突出して形成されている乳頭部と、
この乳頭部に形成された乳頭開口部と、を有する人工乳首であって、
前記乳頭部及び／又は前記乳首胴部の一部に他の部分より伸長し易い伸長部が設けられており、
前記乳頭部と前記乳首胴部の内側に閉空間部を形成するための蓋部が人工乳首に対して形成され、
この蓋部には、飲料用開口部が設けられていると共に、この飲料用開口部と前記乳頭用開口部とを接続するための飲料通路が設けられていることを特徴とする人工乳首。
【請求項８】　前記蓋部が前記人工乳首に対して着脱可能の形成されていることを特徴とする請求項７に記載の人工乳首。
【請求項９】　前記蓋部が前記人工乳首に対して一体に形成されていることを特徴とする請求項７に記載の人工乳首。
【請求項１０】　前記飲料通路がチューブ状部材で形成されていると共に、このチューブ状部材は、前記乳頭用開口部と前記飲料用開口部との間の距離変化に対応する長さを有していることを特徴とする請求項７乃至請求項９のいずれかに記載の人工乳首。
【請求項１１】　前記飲料通路がチューブ状部材で形成されていると共に、このチューブ状部材は、前記乳頭用開口部に設けられた第１のチューブ部材と、この第１のチューブ状部材に接合される前記飲料用開口部に設けられた第２のチューブ部材とを有していることを特徴とする請求項７乃至請求項９のいずれかにに記載の人工乳首。
【請求項１２】　前記伸長部が人工乳首の肉厚よりも薄く形成されていることを特徴とする請求項７乃至請求項１１のいずれかに記載の人工乳首。
【請求項１３】　前記伸長部が溝により形成されていることを特徴とする請求項７乃至請求項１１のいずれかに記載の人工乳首。
【請求項１４】　前記伸長部が人工乳首の長手方向に沿って所定の間隔で形成されていることを特徴とする請求項７乃至請求項１３のいずれかに記載の人工乳首。
【請求項１５】　前記伸長部と他の人工乳首の内面との境界部がなだらかに形成されていることを特徴とする請求項７乃至請求項１４のいずれかに記載の人工乳首。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、例えば乳幼児等が授乳等に際し、利用する人工乳首に関するものである。
【０００２】
【従来の技術】従来の人工乳首は、例えば哺乳瓶等に取り付けられ、乳幼児等がこの哺乳瓶等に収容されたミルク等を飲むために用いられている。このような人工乳首は、図１９に示すように構成されている。図１９は人工乳首１０の断面図である。すなわち、人工乳首１０は、シリコンゴムで形成され、その内部にミルク等が哺乳瓶等から流入する部分である中空部Ａを有している。そして、このシリコンゴムの部分は、乳首胴部１１と、乳頭部１２等から形成されている。この乳首胴部１１は、上記哺乳瓶等に取り付けられるためのベース部１１ａと母親の乳房の一部に相当する乳首胴部本体１１ｂとを有している。この乳頭部１２には、ミルク等が噴出する開口１２ａが備えられている。このような人工乳首１０が、図示しない哺乳瓶等に取り付けられ、この哺乳瓶に収容されたミルク等をこの人工乳首１０を介して飲むことになる。
【０００３】図２０は、乳幼児２０が上記人工乳首１０を使用して、図示しない哺乳瓶中のミルク等を飲んでいる状態を示す図である。図示するように、乳幼児２０は、自己の舌２３の蠕動運動によって、人工乳首１０の乳頭部１２を、自己の上口蓋２１にある哺乳窩２２に対して押しつけることになる。このとき、これら軟口蓋２４、舌２３及び乳頭部１２によって形成される密閉空間Ｂの圧力は、０（ゼロ）に近い状態となっている。その後、舌２３が蠕動運動によって、口腔の奥側（空間Ｃ側）に密閉を保ちながら移動することで、密閉空間Ｂの陰圧による吸引力が強まる。このとき、密閉空間Ｂを形成していた舌２３を上口蓋２１から離すことで、空間Ｃと連通され、これによって、上記人工乳首１０内のミル

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ク等が乳頭部１２の開口１２ａより噴出し、喉頭蓋２６方向に導かれることになる。このように口腔内に圧力を発生させることにより、乳幼児２０は人工乳首１０に接続されている哺乳瓶中のミルク等を飲むことになる。

【０００４】

【発明が解決しようとする課題】ところが、近年、乳幼児２０がミルク等を飲む際に、乳幼児２０の口腔内でどのような動作（哺乳運動）がなされているかについて、研究が行われた結果、以下のような事実が初めて明らかになった。すなわち、乳幼児２０が、人工乳首１０付き哺乳瓶中のミルク又は母親の母乳を飲む際に、これら人工乳首１０又は母親の乳首が如何なる変形をするかについて、エコーで観察した。その結果、乳幼児２０が、人工乳首１０をくわえた際、その舌２３を蠕動運動させることで、母親の乳首のうち、人工乳首２０の乳頭部１２に相当する乳頭部及び乳輪部が伸長することがわかった。これは、乳幼児２０に人工乳首１０付きのミルク入りの哺乳瓶と母親の母乳を与え、その哺乳運動中の人工乳首１０と母親の乳首の伸長状態を計測することにより、判明したものである。ところで、人工乳首１０は、ミルク等入りの哺乳瓶等に取り付けて用いられ、母親の母乳の代わりに乳幼児に与えられるものであるため、人工乳首１０は、母親の乳首に出来るだけ近似していることが望ましいが、上記の研究結果からは、従来の人工乳首１０は、母親の乳首の乳頭部や乳輪部に相当する部分が伸長せず、近似していないという問題があった。

【０００５】本発明は、以上の点に鑑み、母親の乳首により近似している人工乳首を提供することを目的としている。

【０００６】

【課題を解決するための手段】上記目的は、請求項１の発明によれば、乳首胴部と、この乳首胴部から突出して形成されている乳頭部とを有する人工乳首であって、前記乳頭部及び／又は前記乳首胴部の一部に他の部分より伸長し易い伸長部が設けられており、前記乳頭部と前記乳首胴部の内側に飲料用空間が形成されると共に、この飲料用空間の内圧を調節するための内圧調節手段が前記乳首胴部に設けられている人工乳首により、達成される。

【０００７】前記構成によれば、前記乳頭部及び／又は前記乳首胴部の一部に他の部分より伸長し易い伸長部が設けられており、前記乳頭部と前記乳首胴部の内側に飲料用空間が形成されると共に、この飲料用空間の内圧を調節するための内圧調節手段が前記乳首胴部に設けられているので、飲料が前記飲料用空間に導入されると、前記内圧調節手段により、この飲料用空間は、一定の内圧に保持される。したがって、使用者である例えば乳幼児等が前記乳頭部及び／又は前記乳首胴部をくわえて哺乳運動をすると、人工乳首は、その短手方向に圧力がかかることになる。このとき前記飲料用空間の内圧は高まり、前記伸長部が前記乳頭部及び／又は前記乳首胴部に形成されているため、圧力は人工乳首を長手方向に伸長する方向に働き、前記乳頭部及び／又は前記乳首胴部が伸長することになる。さらに、前記飲料用空間の内圧が高まっているため、乳幼児等の哺乳運動により、人工乳首の短手方向に圧力がかかっても、前記乳頭部及び／又は前記乳首胴部が潰れることはない。

【０００８】好ましくは、請求項２の発明によれば、請求項１の構成において、前記内圧調節手段が、逆止弁で形成されている人工乳首である。

【０００９】前記構成によれば、前記内圧調節手段が、逆止弁で形成されているので、一旦、前記飲料用空間内に飲料が流入すると、この飲料が逆流することなく、この飲料用空間内に留まり、一定の内圧を保持することになる。

【００１０】好ましくは、請求項３の発明によれば、請求項１又は請求項２の構成において、前記伸長部が人工乳首の肉厚よりも薄く形成されている人工乳首である。

【００１１】前記構成によれば、前記伸長部が人工乳首の肉厚よりも薄く形成されているので、乳幼児等の哺乳運動により、前記乳頭部及び／又は前記乳首胴部に圧力が加わると、この伸長部がより伸びることになる。

【００１２】好ましくは、請求項４の発明によれば、請求項１又は請求項２の構成において、前記伸長部が溝により形成されている人工乳首である。

【００１３】前記構成によれば、前記伸長部が溝により形成されているので、この溝が設けられている部分がより伸びることになる。

【００１４】好ましくは、請求項５の発明によれば、請求項１乃至請求項４のいずれかの構成において、前記伸長部が人工乳首の長手方向に沿って所定の間隔で形成されている人工乳首である。

【００１５】前記構成によれば、前記伸長部が人工乳首の長手方向に沿って所定の間隔で形成されているので、より伸びる部分である伸長部の間には、この伸長部に比べ剛性の高い部分が配置されている。したがって、前記乳頭部及び／又は前記乳首胴部全体の剛性を高くする構成となっている。

【００１６】好ましくは、請求項６の発明によれば、請求項１乃至請求項５のいずれかの構成において、前記伸長部と他の人工乳首の内面との境界部がなだらかに形成されている人工乳首である。

【００１７】前記構成によれば、前記伸長部と他の人工乳首の内面との境界部がなだらかに形成されているので、前記他の人工乳首の内面から前記伸長部にかけて、段々と剛性が低くなる。

【００１８】前記目的は、請求項７の発明によれば、乳首胴部と、この乳首胴部から突出して形成されている乳頭部と、この乳頭部に形成された乳頭開口部と、を有する人工乳首であって、前記乳頭部及び／又は前記乳首胴

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部の一部に他の部分より伸長し易い伸長部が設けられており、前記乳頭部と前記乳首胴部の内側に閉空間部を形成するための蓋部が人工乳首に対して形成され、この蓋部には、飲料用開口部が設けられていると共に、この飲料用開口部と前記乳頭用開口部とを接続するための飲料通路が設けられている人工乳首である。

【００１９】前記構成によれば、前記乳頭部と前記乳首胴部の内側に閉空間部を形成するための蓋部が人工乳首に対して形成されているので、前記閉空間内に収容された一定量の気体によって、この閉空間は一定の内圧に保持される。したがって、使用者である例えば乳幼児等が前記乳頭部及び／又は前記乳首胴部をくわえて哺乳運動をすると、人工乳首は、その短手方向に圧力がかかることになる。このとき前記飲料用空間の内圧が高まり、前記伸長部が前記乳頭部及び／又は前記乳首胴部に形成されているため、圧力は人工乳首を長手方向に伸長する方向に働き、前記乳頭部及び／又は前記乳首胴部が伸長することになる。さらに、前記飲料用空間の内圧が高まっているため、乳幼児等の哺乳運動により、人工乳首の短手方向に圧力がかかっても、前記乳頭部及び／又は前記乳首胴部が潰れることはない。また、前記蓋部には、飲料用開口部が設けられていると共に、この飲料用開口部と前記乳頭用開口部とを接続するための飲料通路が設けられているので、飲料は、この飲料通路を介して蠕動運動による圧力の変化によって、乳幼児等に供給されることになる。

【００２０】好ましくは、請求項８の発明によれば、請求項７の構成において、前記蓋部が前記人工乳首に対して着脱可能の形成されている人工乳首である。

【００２１】前記構成によれば、前記蓋部が前記人工乳首に対して着脱可能の形成されているので、使用者が前記蓋部を前記人工乳首から取り外して洗浄等を容易に行うことができる。

【００２２】好ましくは、請求項９の発明によれば、請求項７の構成において、前記蓋部が前記人工乳首に対して一体に形成されている人工乳首である。

【００２３】前記構成によれば、前記蓋部が前記人工乳首に対して一体に形成されているので、前記乳頭部と前記乳首胴部の内側に閉空間部を形成し易くなる。

【００２４】好ましくは、請求項１０の発明によれば、請求項７乃至請求項９のいずれかの構成において、前記飲料通路がチューブ状部材で形成されていると共に、このチューブ状部材は、前記乳頭用開口部と前記飲料用開口部との間の距離変化に対応する長さを有している人工乳首である。

【００２５】前記構成によれば、前記飲料通路がチューブ状部材で形成されていると共に、このチューブ状部材は、前記乳頭用開口部と前記飲料用開口部との間の距離変化に対応する長さを有しているので、乳幼児等の哺乳運動によって、前記乳頭部及び／又は前記乳首胴部が伸長しても、前記チューブ状部材は、その伸長に追随できる。

【００２６】好ましくは、請求項１１の発明によれば、請求項７乃至請求項９のいずれかの構成において、前記飲料通路がチューブ状部材で形成されていると共に、このチューブ状部材は、前記乳頭用開口部に設けられた第１のチューブ部材と、この第１のチューブ状部材に接合される前記飲料用開口部に設けられた第２のチューブ部材とを有している人工乳首である。

【００２７】前記構成によれば、前記飲料通路がチューブ状部材で形成されていると共に、このチューブ状部材は、前記乳頭用開口部に設けられた第１のチューブ部材と、この第１のチューブ状部材に接合される前記飲料用開口部に設けられた第２のチューブ部材とを有しているので、乳幼児等の哺乳運動によって、前記乳頭部及び／又は前記乳首胴部が伸長しても、前記第１のチューブ状部材と前記第２のチューブ状部材との相対的位置を変化させることで、その伸長に追随できる。また、前記蓋部を人工乳首から取り外すことができ、洗浄し易くなっている。

【００２８】好ましくは、請求項１２の発明によれば、請求項７乃至請求項１１のいずれかの構成において、前記伸長部が人工乳首の肉厚よりも薄く形成されている人工乳首である。

【００２９】前記構成によれば、前記伸長部が人工乳首の肉厚よりも薄く形成されているので、乳幼児等の哺乳運動により、前記乳頭部及び／又は前記乳首胴部に圧力が加わると、この伸長部がより伸びることになる。

【００３０】好ましくは、請求項１３の発明によれば、請求項７乃至請求項１１のいずれかの構成において、前記伸長部が溝により形成されている人工乳首である。

【００３１】前記構成によれば、前記伸長部が溝により形成されているので、この溝が設けられている部分がより伸びることになる。

【００３２】好ましくは、請求項１４の発明によれば、請求項７乃至請求項１３のいずれかの構成において、前記伸長部が人工乳首の長手方向に沿って所定の間隔で形成されている人工乳首である。

【００３３】前記構成によれば、前記伸長部が人工乳首の長手方向に沿って所定の間隔で形成されているので、より伸びる部分である伸長部の間には、この伸長部に比べ剛性の高い部分が配置されている。したがって、前記乳頭部及び／又は前記乳首胴部全体の剛性を高くする構成となっている。

【００３４】好ましくは、請求項１５の発明によれば、請求項７乃至請求項１４のいずれかの構成において、前記伸長部と他の人工乳首の内面との境界部がなだらかに形成されている人工乳首である。

【００３５】前記構成によれば、前記伸長部と他の人工乳首の内面との境界部がなだらかに形成されているの

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で、前記他の人工乳首の内面から前記伸長部にかけて、段々と剛性が低くなる。

【００３６】

【発明の実施の形態】以下、この発明の好適な実施形態を図１乃至図１８を参照しながら、詳細に説明する。尚、以下に述べる実施形態は、本発明の好適な具体例であるから、技術的に好ましい種々の限定が付されているが、本発明の範囲は、以下の説明において特に本発明を限定する旨の記載がない限り、これらの態様に限られるものではない。

【００３７】図１は、本発明の第１の実施の形態にかかる人工乳首１００を示す概略断面図である。図示するように、人工乳首１００は、母親の乳房に相当する略お碗状の乳首胴部１１０と、それに連なって設けられている、母親の乳首に相当する乳頭部１２０とを有している。また、この乳首胴部１１０の図において下側には、図示しない例えば哺乳瓶本体と接続するための鍔部である乳首側通気孔を有するベース部１１２が設けられている。このベース部１１２から径が縮径するように連続して形成されているのが乳首胴部本体１１１である。また、前記乳頭部１２０の先端には乳頭用開口部１２１が設けられている。この乳頭用開口部１２１は、人工乳首１００の乳首胴部１１０と乳頭部１２０とで形成されている飲料用空間Ｄと連通するようになっている。この飲料用空間Ｄのベース部１１２近傍には、逆止弁１３０が設けられている。この逆止弁１３０は、図１に示すように逆止弁本体１３１と弁１３２とを有している。

【００３８】この逆止弁本体１３１は、樹脂等により形成され、全体は略円筒形で成っている。したがって、この逆止弁本体１３１の下側には逆止弁開口１３１ａが形成されている。また、この逆止弁本体１３１の上側には、弁１３２を可動状態に取り付けるための取り付け用孔１３１ｂが設けられている。この取り付け用孔１３１ｂには、弁１３２が図１に示すように取り付けられている。この弁１３２には、図１に示すように円盤状の弁体１３２ａが設けられている。そして、この弁体１３２ａには、この弁体１３２ａを可動させるための弁体可動用柄部１３２ｂが設けられており、この弁体可動用柄部１３２ｂには、弁１３２が逆止弁本体１３１の取り付け用孔１３１ｂから抜け出るのを止めるためのストッパ部１３２ｃが設けられている。したがって、弁１３２の弁体１３２ａは、弁体可動用柄部１３２ｂの長さ分だけ図１において上方に移動することになる。そして、ストッパ部１３２ｃが逆止弁本体１３１の内側に当接したときに、弁１３２ａの移動が止まり、弁１３２は開の状態となる。

【００３９】一方、図２は、弁１３２の弁体１３２ａが図において下方向に移動し、弁体１３２が逆止弁本体１３１の上面に当接して移動が止まり、弁１３２が閉の状態となったことを示す図である。このように逆止弁１３０は、図１及び図２において、下方向に設けられている哺乳瓶本体からの飲料である例えばミルクは、飲料用空間Ｄ内に導くが、逆に飲料用空間Ｄ内のミルクが哺乳瓶本体側へ流れるのを防止することとなる。また、ミルクが飲料用空間Ｄ内に導かれた後は、このミルクによって逆止弁１３０は、図２に示す閉の状態となる。この状態で使用者である乳幼児等が人工乳首１００をくわえ後述する哺乳運動を行うと、図１に示す、人工乳首１００の乳首胴部１１０及び乳頭部１２０が、図において横方向に押され、人工乳首１００が変形し、内圧が高まることになる。このとき、この圧力は、逆止弁１３０が閉の状態にあるため、人工乳首１００から哺乳瓶方向に圧力が抜けることなく、人工乳首１００内の内圧は、一定に保持されることになる。このような働きをする逆止弁１３０を図１において上方から見た図が図４であり、下方から見た図が図３である。図３に示すように弁１３２のストッパ部１３２ｃの回りには３方向に取り付け用孔１３１ｂが形成されている。

【００４０】ところで、この飲料用空間Ｄを形成している人工乳首１００の斜線部分である壁面は、例えばシリコンゴム等で成っている。この人工乳首１００が、ベース部１１２を介して例えばミルク等を収容している例えば哺乳瓶と接続されると、上述のように、この哺乳瓶内部のミルクが哺乳瓶の瓶口から逆止弁１３０を経て人工乳首１００の飲料用空間Ｄに導かれることになる。そして、人工乳首１００の空間Ｄに導かれたミルクは、乳幼児等が、哺乳運動を行うと上述のように、乳頭部１２０の乳頭用開口部１２１より、人工乳首１００の外部に排出されるようになっている。

【００４１】この際、人工乳首１００を例えば乳幼児の口腔内に挿入していれば、この排出されたミルクは、乳幼児に与えることができる構造となっている。このような人工乳首１００は、母親が自己の母乳の代わりに、哺乳瓶等を用いて人工乳を乳幼児等に与える際に用いられるため、図１に示すように母親の乳房及び乳首に近似した形状となっている。ところで、本実施の形態の人工乳首１００の乳頭部１２０及び乳首胴部１１０には、図１に示すように、伸長部である肉厚の薄い肉薄部１２２、１２２、１２２が溝状に例えば７箇所、環状に形成されている。この肉薄部１２２の厚みは最も薄い部分で約０．５ｍｍ程度となっている。そして、この各肉薄部１２２は、最も薄い部分から徐々に肉厚になるように形成され、肉薄部１２２と人工乳首１００内面１２３との境界部がなだらかになるように構成され、図１に示すように波形を形成している。このときの人工乳首の内面１２３の厚みは、例えば１．６ｍｍ程度となっている。

【００４２】また、この肉薄部１２２は、所定の間隔で配置され、例えば図２に示すような間隔で形成される。すなわち、ベース部１１２から、最初の肉薄部１２２の最も薄い部分までが１２．５ｍｍ、この肉薄部１２２か

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ら次の肉薄部１２２の最も薄い部分までが４ｍｍ，次の肉薄部１２２の最も薄い部分までが４ｍｍ、次の肉薄部１２２の最も薄い部分までが３．２ｍｍとなっている。そして同様に３ｍｍ，３ｍｍそして３．９ｍｍの間隔で肉薄部１２２が配置されている。

【００４３】本実施の形態にかかる人工乳首１００は、以上のように構成されているが、以下のように使用等される。先ず、人工乳首１００は、例えばミルク等が収容された例えば哺乳瓶に取り付けられる。この哺乳瓶を母親が保持し、乳幼児の口腔内に人工乳首１００を挿入することで、乳幼児にミルクを与えることになる。図５は、母親等が人工乳首１００を乳幼児２００の口腔内に挿入し、乳幼児２００が人工乳首１００をくわえ、ミルクを人工乳首１００内に吸い上げた状態を示す図である。図５において哺乳瓶等は省略され、人工乳首１００のみが表されている。すなわち、乳幼児２００が人工乳首１００をくわえると、先ず、何回かの蠕動運動による圧力変化により、乳頭部１２０の乳頭用開口部１２１を吸引することになる。このとき、逆止弁１３０の弁１３２は、図１に示す開状態となり、逆止弁本体１３１の取り付け用孔１３１ｂより、図５の矢印で示すようにミルクが人工乳首１００内に流入することになる。

【００４４】この状態で、人工乳首１００の乳頭部１２０の先端部は、乳幼児２００の哺乳窩２２０の先端に当接され、乳幼児２００の舌２３０によって人工乳首１００は図において上方へ押しつけられることになる。すなわち、人工乳首１００の図５において上面部は、乳幼児２００の哺乳窩２２０から上口蓋２１０及び歯槽堤２８０から口唇２７０までの部分に押しつけられことになる。ところで、乳幼児２００が、人工乳首１００を介してミルク等を飲む際には、図６から図７に示されているような舌部の蠕動運動により哺乳運動を行うことになる。この図６及び図７は、乳幼児２００が哺乳運動を行っている口腔内の状態を超音波断層撮影装置用いて撮影した連続画像を図示したものである。図６（ａ）において、哺乳運動を行う乳幼児２００には、哺乳窩２２０という窪みが存在する。この哺乳窩２２０は、乳幼児２００が授乳のため哺乳運動をする期間だけ持っており、その後、成長すると無くなるものである。

【００４５】母親の乳首は、乳幼児２００の口腔内でこの哺乳窩２２０に入り込む。この状態で口腔内では乳幼児２００の舌２３０が下から乳首に当たり、さらに舌２３０の側面がせりあがって、乳首を包むように密着することになる。そして、図６（ｂ）（ｃ）に示すように、舌２３０の前方が盛り上がって、乳首を下から押し、この動きは図５（ａ）乃至（ｃ）に示すように、次第に舌２３０の後方へ波うつように移動していくことになる。この過程で、舌２３０は前方から後方にかけて波うつように蠕動運動を行い、乳首は根元から先端に向けて絞られると共に、乳首が伸びて哺乳窩２２０の先端部分に突き当たる。そして、乳首と舌２３０と上顎との間に閉空間Ｅが形成されることになる。この図６（ｂ）で示す、閉空間Ｅは、乳首等が伸びることにより、小さくなり、好ましくは、その閉空間Ｅが消滅するまで乳首等が伸びることになる。これにより、この閉空間Ｅは、圧力が０（ゼロ）に近づき、その後、舌２３０の蠕動運動により、この閉空間Ｅが密閉されたまま、舌２３０だけが奥に移動することで、この閉空間Ｅの体積が大きくなり、陰圧による吸引力が高まる。そして、高まった吸引力により、この閉空間Ｅが開放されると、母乳は勢い良く乳幼児２００の喉頭蓋２６０（図５参照）の方向へ噴出され、この噴出した母乳を飲み込むことで、哺乳運動が終了することになる。

【００４６】このように乳幼児２００は、舌２３０の蠕動運動を行い、母親の乳首を伸ばし、上記閉空間Ｅを密閉し、体積を狭め、密閉させたまま蠕動運動で、さらに舌２３０を奥に動かすことで、陰圧を効果的に発生させるようにしている。このように陰圧を効果的に発生させることで、母乳の噴出をより促し、より効果的に母乳を飲もうとするものである。本実施の形態にかかる人工乳首１００においても、図１に示すように、その乳頭部１２０及び乳首胴部１１０にわたって肉薄部１２２が７箇所設けられているため、上述の乳幼児２００の舌２３０の蠕動運動によって、これら７箇所の薄肉部１２２が伸び、乳頭部１２０及び乳首胴部１１０も乳幼児２００の口腔内で伸びることになる。このとき、肉薄部１２２が乳頭部１２０から乳首胴部１１０にかけて複数個、所定の間隔で設けられているため、乳頭部１２０及び乳首胴部１１０が、より均等に伸びることになる。また、本実施の形態では、逆止弁１３０が設けられているため、上述の図５の状態で、ミルクを人工乳首１００内に導入した後は、そのミルクが哺乳瓶側に戻ることを阻止されることになる。また、人工乳首１００内の圧力が哺乳瓶側に抜けることも阻止されることになる。

【００４７】この状態で、乳幼児２００による上述の舌２３０の蠕動運動を行うと、人工乳首１００は、図１の横方向において潰れる方向に圧力が加わり、その圧力が逆止弁１３０によって哺乳瓶側に抜けることなく保持される。したがって、人工乳首１００が乳幼児２００の蠕動運動によって潰れてしまうことがない。さらに、このように人工乳首１００内に保持された圧力は、より弱い部分である伸長部１２２に対して働き、この伸長部１２２をより伸ばす働きをすることになる。このように人工乳首１００が潰れることなく、且つより伸びることで、図８に示すように、人工乳首１００、舌２３０及び軟口蓋２４０等により形成される閉空間Ｅは、図５と比べ小さくなることになる。これによって、より体積の小さくなった閉空間Ｅ（好ましくは、閉空間Ｅが消滅した状態となる）は、図８に示すように舌２３０の蠕動運動によって、閉状態となる。この後、舌２３０を更に動かすこ

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とで、陰圧が生じ図９の矢印方向に人工乳首１００内のミルクが噴出することになる。そして、このミルクの噴出量は、図８の閉空間Ｅの体積が小さければ、その分、大きくなる。

【００４８】したがって、本実施の形態のように乳頭部１２０及び乳首胴部１１０が伸長部１２２及び逆止弁１３０による内圧の働きで伸びることで、より高い圧力を閉空間Ｅに生じさせることができ、より大量のミルクを人工乳首１００から噴出させることができることになる。そして、これにより、乳幼児２００は、より円滑に、且つより適切にミルクを飲むことができることになる。さらに、本実施の形態においては、図１に示すように、肉薄部１２２と人工乳首内面１２３の境界部がなだらかに、波形を形成しているため、シリコンゴムにより形成されている人工乳首１００の製造に当たり金型から抜き易く、製造しやすくなっている。したがって、本実施の形態の人工乳首１００は、母親の乳首と同様に伸長し、これによって、ミルクの噴出量が大きくなるとともに、母親の乳首と同様に人工乳首１００自体が潰れることなく、その剛性も維持させることもできる。なお、本実施の形態では、人工乳首１００をミルクを収容した哺乳瓶に適用した例を示したが、本発明にかかる人工乳首１００は、これに限らず乳幼児２００がジュース等の液状の飲料を哺乳瓶以外の容器で飲む際にも適用できることは、明らかである。

【００４９】また、本実施の形態では、人工乳首１００に肉薄部１２２を７ヵ所設けているが、これに限らず、何箇所設けても構わないことは、明らかである。

【００５０】図１０及び図１１は、本発明の第２の実施の形態に係る人工乳首３００を示す概略断面図である。本実施の形態に係る人工乳首３００の構成は、上述の第１の実施の形態に係る人工乳首１００と略同様であるため、相違点を中心に、以下説明し、同様の構成は同一符号を付す等して、説明を省略する。図１０において、人工乳首３００は、上述の第１の実施の形態と同様に、伸長部１２２を備える乳首胴部１１０及び乳頭部１２０、並びに乳首側通気孔を有するベース部１１２を有している。しかし、人工乳首３００は、第１の実施の形態において設けられていた逆止弁と異なる構造の逆止弁３３０を有している。この逆止弁３３０は、図１０に示すように、逆止弁本体３３１は、哺乳瓶側に逆止弁開口３３１ａを備えており、その上面には図１２に示すように導入孔３３１ｂが例えば７個形成されている。図１２は、逆止弁３３０を哺乳瓶側から見た図である。

【００５１】このように導入孔３３１ｂが設けられていることにより、哺乳瓶からミルク等の飲料が人工乳首３００内に導かれることになる。逆止弁本体３３１は、例えばポリプロピレン（ＰＰ）等により形成されるが、この逆止弁本体３３１には、例えばシリコーンより形成される弁３３２が設けられている。この弁３３２は、図１３に示すように、前記導入孔３３１ｂを塞ぐように、配置されると共に、その一端部が固定端３３２ａとなっている。したがって、この固定端３３２ａを支点として弁３３２が図１０の矢印で示すように揺動するようになっている。なお、図１３は、逆止弁３３０を人工乳首３００の内部側から見た図である。以上のように構成される逆止弁３３０は、ミルクを哺乳瓶から人工乳首３００内に導入する際には、図１０に示すように開の状態となる。そして、人工乳首３００内にミルクを導入した後、乳幼児２００の蠕動運動が行われる際は、逆止弁３３０は、図１１に示す位置になり、人工乳首３００内の内圧を第１の実施の形態と同様に、一定に保持させる働きをすることになる。

【００５２】図１４は、本発明の第３の実施の形態に係る人工乳首４００を示す概略断面図である。本実施の形態に係る人工乳首４００の構成は、上述の第１の実施の形態に係る人工乳首１００と略同様であるため、相違点を中心に、以下説明し、同様の構成は同一符号を付す等して、説明を省略する。図１４において、人工乳首４００は、上述の第１の実施の形態と同様に、伸長部１２２を備える乳首胴部１１０及び乳頭部１２０並びに乳首側通気孔を有するベース部１１２等を有している。しかし、人工乳首４００は、第１の実施の形態と異なり、ベース部１１２の図において下側に人工乳首４００と同じ材質であるシリコーンよりなる蓋部４２０が設けられている。そして、この蓋部４２０はベース部１１２にシリコーン系の接着剤により一体に接着されている。これにより後述する閉空間部Ｆの内部に空気等の気体がより閉じ込め易くすることができる。また、この蓋部４２０には、飲料用開口部４２０ａが設けられており、この飲料用開口部４２０ａと乳頭用開口部１２１とを接続するための飲料通路であるチューブ４３０が形成されている。また、この蓋部４２０には、乳首側通気孔と連通するように位置決めされた蓋部通気孔が設けられている。これら乳首側通気孔と蓋部通気孔は、哺乳瓶の中身が減っても瓶内の圧力が外気と変わらないようにもうけられている。そして、これら乳首側通気孔と蓋部通気孔は、上下に位置合わせできるように相互に嵌合可能な凹凸部に設けられている。

【００５３】このチューブ４３０は、蓋部４２０と同じ材質であるシリコーンで一体に形成されている。そして、チューブ４３０の乳頭用開口部１２１と接続する端部は、図１５に示すように、チューブ４３０の端部が乳頭用開口部１２１内に嵌入されている。さらに、チューブ４３０は、人工乳首４００の高さよりやや長く形成されている。このように構成することで、人工乳首４００には、閉空間部Ｆが形成され、その内部に空気等の気体が閉じ込められることになる。しかし、この閉空間部Ｆの中には、チューブ４３０が配置されているため、人工乳首４００と接続される哺乳瓶内のミルクは、このチュ

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ーブ４３０を通って乳頭用開口部１２１に達し、乳幼児２００がミルクを飲むことになる。以上のような構成の人工乳首４００を使用して第１の実施の形態と同様に乳幼児２００が蠕動運動を行うと、人工乳首４００の図における横方向において潰れる方向に圧力が加わっても、閉空間部Ｆには、空気等が閉じ込められているため、前記圧力を跳ね返す力が働くことになる。したがって、人工乳首４００が潰れてしまうことを有効に防止することができる。

【００５４】また、この圧力が伸長部１２２に働き、人工乳首４００を図において縦方向に伸ばすように働き、乳幼児２００の蠕動運動によりさらに伸長するように作用した場合は、人工乳首４００の伸長に応じてチューブ４３０が変形しながら追従するようになっている。したがって、人工乳首４００の伸長をチューブ４３０が阻害することがない。なお、本実施の形態では、蓋部４２０をベース部１１２に対してシリコーン系の接着剤により接着して構成したが、これに限らず、哺乳瓶に対して人工乳首２００を装着する際に用いられる図示しない着脱可能な哺乳瓶装着用キャップ（図示せず）を用いて固定してもよい。この場合、キャップを外すことで、蓋部４２０とベース部を分離できるので、洗浄等が容易にできる構成となる。

【００５５】図１６は、本発明の第４の実施の形態に係る人工乳首５００を示す概略断面図である。本実施の形態に係る人工乳首５００の構成は、上述の第３の実施の形態に係る人工乳首４００と略同様であるため、相違点を中心に、以下説明し、同様の構成は同一符号を付す等して、説明を省略する。図１６において、人工乳首５００は、上述の第３の実施の形態と同様に、伸長部１２２を備える乳首胴部１１０及び乳頭部１２０並びにベース部１１２、さらに閉空間部Ｆ等をも有している。しかし、本実施の形態においては、第３の実施の形態と異なり、蓋部５２０の材質がエラストマー又はポリプロピレン（ＰＰ）より形成されている。このように蓋部５２０が第３の実施の形態で使用したシリコーンではなく、エラストマー又はポリプロピレン（ＰＰ）により形成されていることで、蓋部５２０に硬度を持たせることができ、閉空間部Ｆ内の空気等に加えられた上述の圧力が蓋部５２０側に逃げず、より人工乳首５００を伸長する方向に働くため、より母親の乳首に近い人工乳首５００となる。また、この蓋部５２０の外周部分のみ２色成形で柔らかい樹脂で形成すれば、この蓋部５２０を哺乳瓶に円滑に装着することができることになる。

【００５６】さらに、前記蓋部５２０とベース部１１２は、必ずしも接着されている必要はなく、哺乳瓶に装着する際に重ねて装着してもよい。この場合は、蓋部５２０とベース部１１２は哺乳瓶装着用キャップ（図示せず）を使用して、哺乳瓶に固定することで、より密着される。この場合、キャップを外すことで、蓋部５２０とベース部を分離できるので、洗浄等が容易にできることになる。なお、蓋部５２０とベース部１１２には、上述の第３の実施の形態と同様に蓋部通気孔及び乳首側通気孔が相互に嵌合可能な凹凸部に設けられている。また、本実施の形態においては、第３の実施の形態と異なり、チューブの構成が異なる。すなわち、本実施の形態におけるチューブ５３０は、蓋部５２０と一体に形成された第２のチューブ部材である蓋部側チューブ５３０ａと、乳頭部１２０と一体に形成された第１のチューブ部材である乳頭部側チューブ５３０ｂとを有している。そして、この蓋部側チューブ５３０ａが例えば乳頭部側チューブ５３０ｂの内側に嵌入され、仮止め、接合される構成となっている。そして、第１の実施の形態のように人工乳首５００が伸長した場合は、これら蓋部側チューブ部材５３０ａと乳頭部側チューブ部材５３０ｂの相対的な位置がずれることで、人工乳首５００の伸長に追従することになる。すなわち、図１６において、乳頭部側チューブ５３０ｂは、図において上方向に移動することで、人工乳首５００の伸長を吸収する構成となっている。

【００５７】図１７は、本発明の第５の実施の形態に係る人工乳首６００を示す概略断面図である。本実施の形態に係る人工乳首６００の構成は、上述の第４の実施の形態に係る人工乳首５００と略同様であるため、相違点を中心に、以下説明し、同様の構成は同一符号を付す等して、説明を省略する。図１７において、人工乳首６００は、上述の第４の実施の形態と同様に、伸長部１２２を備える乳首胴部１１０及び乳頭部１２０並びにベース部１１２、さらに閉空間部Ｆ、乳首側通気孔、蓋部通気孔等をも有している。しかし、本実施の形態においては、第４の実施の形態と異なり、チューブ６３０は、蓋部６２０と一体に形成され、人工乳首６００内で曲がって配置されている蓋部側チューブ６３０ａと乳頭部１２０と一体に形成されている乳頭部側チューブ６３０ｂを有している。そして、この蓋部側チューブ６３０ａの先端部が乳頭部側チューブ６３０ｂに係合され、固定されている。この蓋部側チューブ６３０ａと乳頭部側チューブ６３０ｂは、係合固定以外に２色成型又はインサート成型で一体的に構成することも可能である。

【００５８】このようにチューブ６３０を構成することで、第１の実施の形態のように人工乳首６００が伸長した場合は、人工乳首６００内で曲がって配置されている蓋部側チューブ６３０ａが、真っ直ぐの方向に変形することで、人工乳首６００の伸長に追従するようになっている。また、本実施の形態においては、第４の実施の形態と異なり、蓋部６２０の材質がエラストマーとポリプロピレン（ＰＰ）の混合材料により形成されている。このように蓋部６２０をエラストマーとポリプロピレン（ＰＰ）の混合材料により形成したことで、哺乳瓶に装着する際、密閉性が向上すると共に、上述の蓋部側チュ

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ーブ６３０ａの撓みを可能にする柔らかさを得ることができる。また、第１の実施の形態のように乳幼児２００の蠕動運動による圧力が閉空間部Ｆに加わった場合でも、その圧力で蓋部６３０が変形等しない硬さを得ることができる。すなわち、蓋部６３０が変形しないことで、閉空間部Ｆ内の内圧を有効に利用でき、より伸長する人工乳首６００となる。なお、本実施の形態では、蓋部６２０をベース部１１２に対してシリコーン系の接着剤により接着して構成してもよいが、これに限らず、哺乳瓶に対して人工乳首６００を装着する際に用いられる哺乳瓶装着用キャップ（図示せず）を使用して固定してもよい。接着した場合は、閉空間部Ｆを形成し易く、哺乳瓶装着用キャップを用いる場合は、このキャップを外すことで、蓋部６２０とベース部１１２を分離できるので、洗浄等が容易にできる構成となっている。

【００５９】図１８は、本発明の第６の実施の形態に係る人工乳首７００を示す概略断面図である。本実施の形態に係る人工乳首７００の構成は、上述の第５の実施の形態に係る人工乳首６００と略同様であるため、相違点を中心に、以下説明し、同様の構成は同一符号を付す等して、説明を省略する。図１８において、人工乳首７００は、上述の第５の実施の形態と同様に、伸長部１２２を備える乳首胴部１１０及び乳頭部１２０並びにベース部１１２、さらに閉空間部Ｆ、乳首側通気孔、蓋部通気孔等をも有している。しかし、本実施の形態においては、第５の実施の形態と異なり、蓋部７２０がエラストマーで形成され、第５の実施の形態の蓋部より厚く形成されている。また、チューブ７３０の蓋部側チューブ７３０ａもエラストマーで形成され、且つ第５の実施の形態の蓋部側チューブ６３０ａより細く、真っ直ぐ形成されている。このように蓋部７２０が厚く形成されることにより哺乳瓶との密閉性が良好になると共に、第１の実施の形態の乳幼児２００の蠕動運動による閉空間部Ｆの圧力が蓋部７２０の変形により逃げることも有効に防止することができる。また、蓋部側チューブ７３０ａは、薄くされたことで、人工乳首７００の伸長に追随して伸びる構成となっているため、人工乳首７００の伸長を阻害することがない。

【００６０】なお、上述の各実施の形態では、伸長部として複数の肉薄部１２２等を形成したが、これに限らず螺旋状に薄肉部を形成しても構わない。また、薄肉部としてより柔らかい素材を用いても構わない。さらに、、前記各実施の形態の各構成は、その一部を省略したり、上述していない他の任意の組み合わせに変更することができる。

【００６１】

【発明の効果】以上のように、本発明によれば、母親の乳首により近似している人工乳首を提供することができる。

【図面の簡単な説明】

【図１】本発明の第１の実施の形態にかかる人工乳首を示す概略断面図である。

【図２】本発明の第１の実施の形態にかかる人工乳首を示す他の概略断面図である。

【図３】第１の実施の形態の逆止弁を示す概略底面図である。

【図４】第１の実施の形態の逆止弁を示す概略平面図である。

【図５】第１の実施の形態において逆止弁が開いた状態を示す概略図である。

【図６】乳幼児が哺乳運動を行っている口腔内の状態を超音波断層撮影装置用いて撮影した連続画像を図示したものである。

【図７】乳幼児が哺乳運動を行っている口腔内の状態を超音波断層撮影装置用いて撮影した他の連続画像を図示したものである。

【図８】第１の実施の形態において人工乳首が乳幼児の口腔内で伸長し、逆止弁が閉じた状態を示す概略図である。

【図９】第１の実施の形態の人工乳首の乳幼児の口腔内における状態を示す概略図である。

【図１０】本発明の第２の実施の形態にかかる人工乳首を示す概略断面図である。

【図１１】本発明の第２の実施の形態にかかる人工乳首を示す他の概略断面図である。

【図１２】第２の実施の形態の逆止弁を示す概略底面図である。

【図１３】第２の実施の形態の逆止弁を示す概略平面図である。

【図１４】本発明の第３の実施の形態にかかる人工乳首を示す概略断面図である。

【図１５】図１４の部分拡大図である。

【図１６】本発明の第４の実施の形態にかかる人工乳首を示す概略断面図である。

【図１７】本発明の第５の実施の形態にかかる人工乳首を示す概略断面図である。

【図１８】本発明の第６の実施の形態にかかる人工乳首を示す概略断面図である。

【図１９】従来の人工乳首の断面図を表した図である。

【図２０】乳幼児が従来の人工乳首を使用している状態を示す図である。

【符号の説明】

１００、３００、４００、５００、６００、７００・・・人工乳首

１１０・・・乳首胴部

１１１・・・乳首胴部本体

１１２・・・ベース部

１２０・・・乳頭部

１２１・・・乳頭用開口部

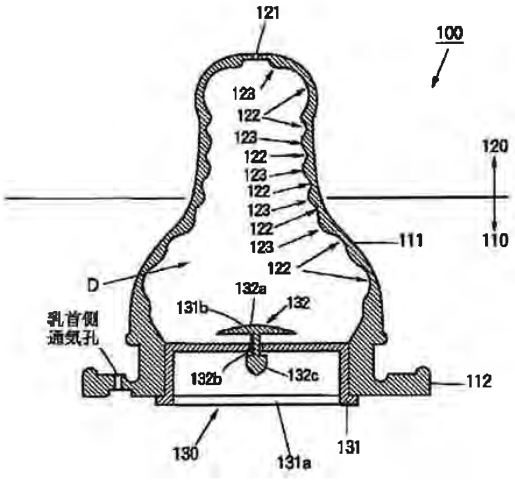
１２２・・・肉薄部

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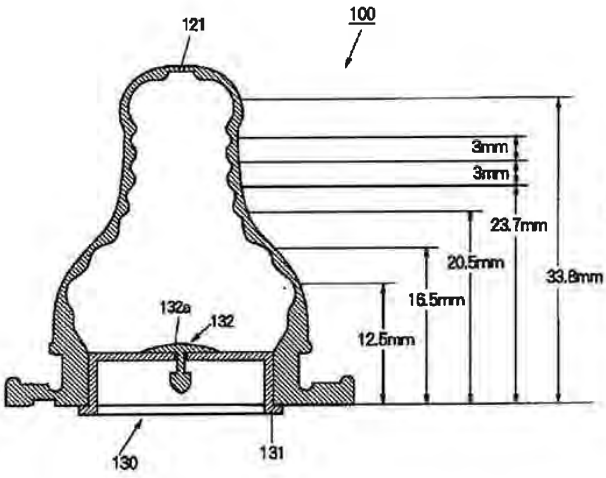
１２３・・・人工乳首内面
１３０・・・逆止弁
１３１・・・逆止弁本体
１３１ａ・・・逆止弁開口
１３１ｂ・・・取り付け用孔
１３２・・・弁
１３２ａ・・・弁体
１３２ｂ・・・弁体可動用柄部
１３２ｃ・・・ストッパ部

２００・・・乳幼児
２１０・・・上口蓋
２２０・・・哺乳窩
２３０・・・舌
２６０・・・喉頭蓋
２７０・・・口唇
２８０・・・歯槽堤
Ｄ・・・飲料用空間

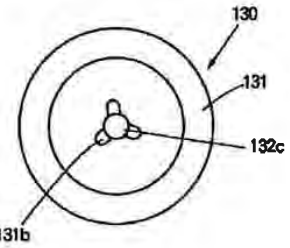
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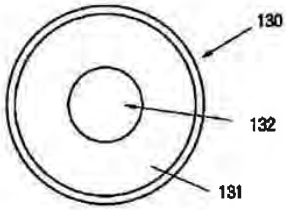
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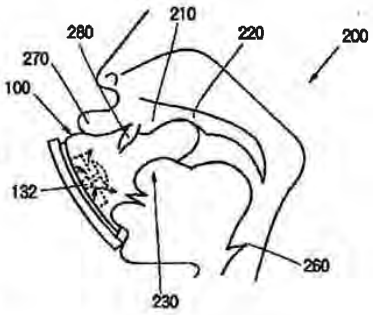
【図３】



【図４】



【図５】



【図９】

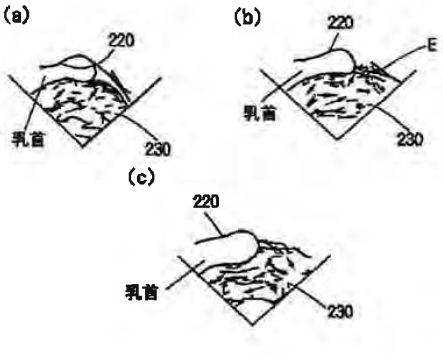


Nanobebe US Inc., Ex. 1008, Page 23

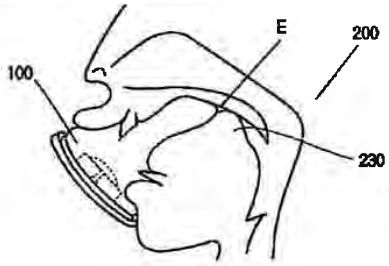
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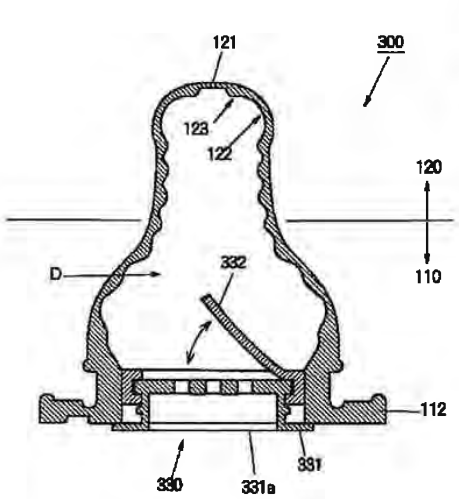
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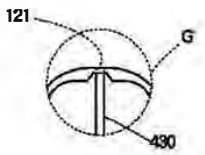
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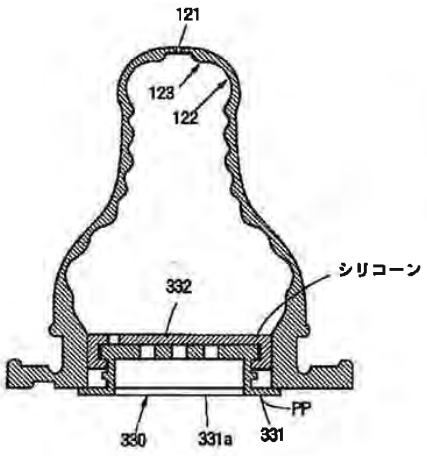
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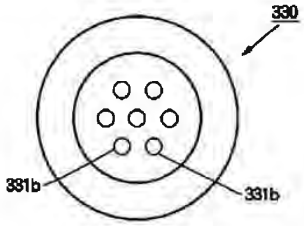
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【図１１】

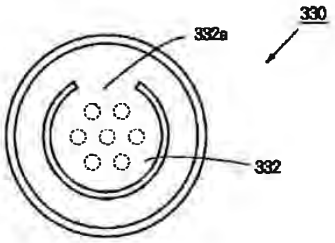


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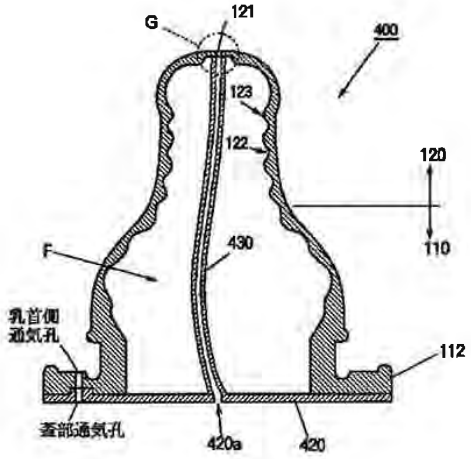


Nanobebe US Inc., Ex. 1008, Page 24

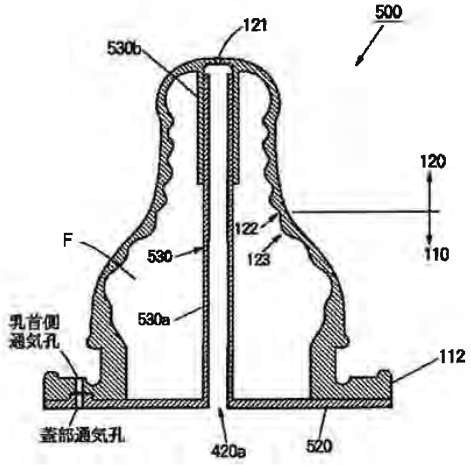
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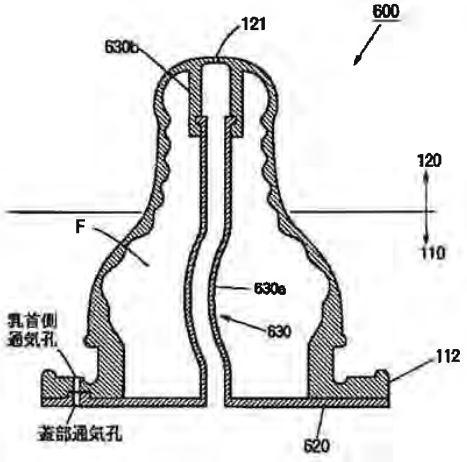
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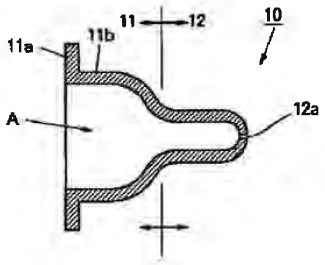
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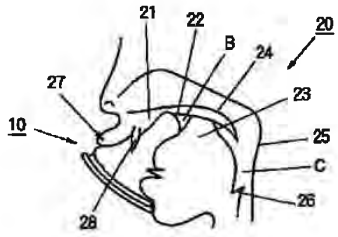
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【図１９】

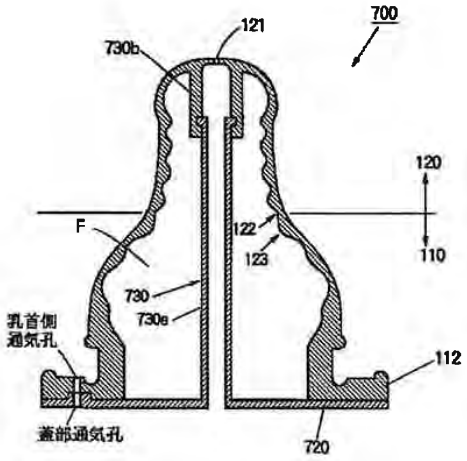


【図２０】



Nanobebe US Inc., Ex. 1008, Page 25

【図１８】



フロントページの続き

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Nanobebe US Inc., Ex. 1008, Page 26

Declaration of Harumi Morota

1. I, Harumi Morota, residing in Camas, Washington, hereby certify that I am competent to translate from Japanese into English. My qualifications are as follows:

    - 32 years full time translation experience
    - Have translated more than 50,000,000 words in my career
    - Prior to becoming a full time professional translator, worked at a patent office in Japan
    - Translate 1,500,000 - 2,000,000 words per year.

2. I hereby certify that I prepared the translation appearing as Japanese patent JP2001299877A and that it is, to the best of my knowledge and belief, a true and accurate English translation of the original.

3. All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true. I further understand that willful false statements and the like are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code. I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed on: December 29, 2022 Signed: Harumi Morota

EXHIBIT 1009

EXHIBIT
1009
09/10/12/23
PENGAD 800-631-6989

Sept. 21, 1937. Y. H. KURKJIAN 2,093,730

NURSING UNIT

Filed Aug. 23, 1935

Fig. 1.

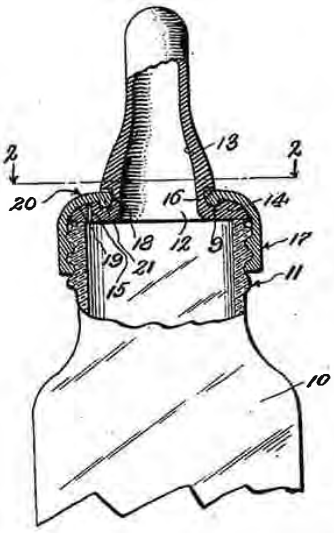


Fig. 4.

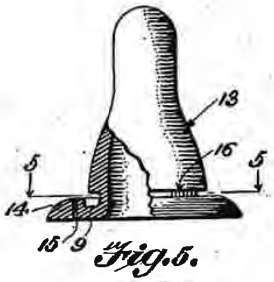


Fig. 5.

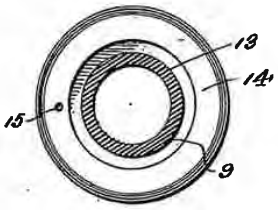


Fig. 7.

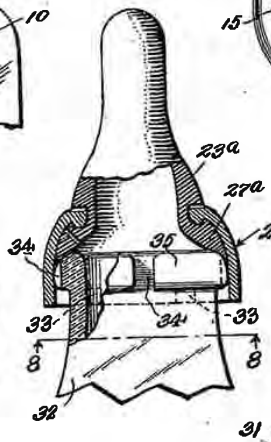


Fig. 2.

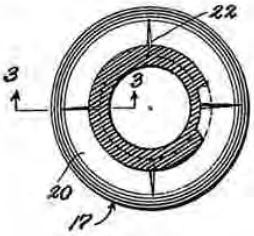


Fig. 6.

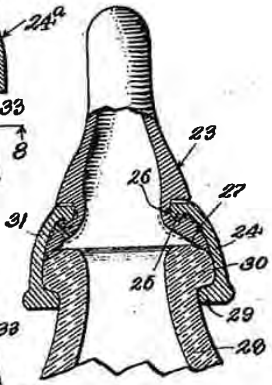


Fig. 3.

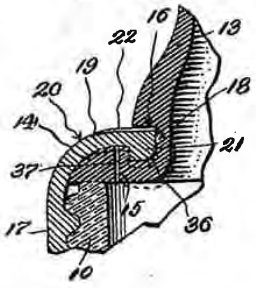
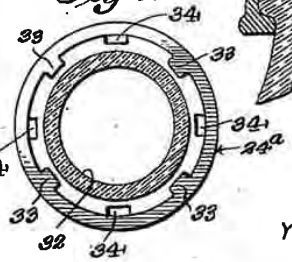


Fig. 8.



Inventor
YERVANT H. KURKJIAN

By Irving A. McCathran
Attorney

Nanobebe US Inc.. Ex. 1009. Page 1

Patented Sept. 21, 1937

2,093,730

UNITED STATES PATENT OFFICE

2,093,730

NURSING UNIT

Yervant H. Kurkjian, Clifton, N. J.

Application August 28, 1935, Serial No. 38,311

4 Claims. (Cl. 128—252)

This invention relates to nursing units, and has for one of its principal objects the production of a resilient flanged nipple which is so constructed as to permit the nipple to be secured to the mouth of a bottle by means of a retaining cap, and permit the entrance of air into the interior of the bottle, and also prevent the nipple from collapsing inwardly of the retaining cap.

A further object of this invention is the production of a nursing unit wherein a flexible nipple having a vented flexible flange is removably retained upon the neck of a bottle by means of a retaining cap which is so constructed as to resist the spreading of the vented portion of the flange in the event of excessive pull thereon.

Another object of this invention is the production of a nursing unit wherein a nipple retaining cap is constructed in a manner as to present a streamline type of connection between the bottle and the nipple.

Other objects and advantages of the present invention will appear throughout the following specification and claims.

In the drawing:

Figure 1 is a side elevation of the nursing unit, certain parts being shown in vertical section;

Figure 2 is a transverse section taken on line 2—2 of Figure 1;

Figure 3 is an enlarged section taken on line 3—3 of Figure 2;

Figure 4 is a side elevation of the nipple, partly shown in section;

Figure 5 is a transverse section taken on line 5—5 of Figure 4;

Figure 6 is a vertical section showing a modified form of the nursing unit;

Figure 7 is a vertical section showing a still further modified form of the nursing unit;

Figure 8 is a section taken on line 8—8 of Figure 7.

By referring to the drawing, it will be seen that 10 designates the nursing bottle which is preferably of the wide-mouth type, having threads 11 formed near its open or outer end.

A flexible nipple 12 is adapted to fit over the open outer end of the bottle 10, and is provided with a body portion constituting a neck 13 and a laterally extending and preferably annular flange 14. This flange 14 is preferably provided with a single venting aperture 15 and it should be understood that the flange 14 is integral with the body portion 13 of the nipple, the body portion and flange being formed of flexible material such as rubber. Should it be desired, any number of venting apertures may be inserted in the flange by merely piercing the flange with the pointed end of a needle or other instrument, thereby enabling the user to increase the flow of milk through the nipple when desired. The body portion 13 of the nipple is provided with an overhanging shoulder 16 adjacent the point of junction between the body portion 13 and the flange 14, and this shoulder 16 is spaced vertically with respect to the upper face of the flange 14. Note particularly Figure 4.

An annular channel 9 is formed in the flange 14 at the junction of the flange 14 and the body portion 13 and directly under the shoulder 16.

A retaining cap 17 is removably fitted over the outer or open end of the bottle 10, as shown in Figure 1, and is provided with screw-threads for interfitting with the threads 11. This cap 17 is provided with a centrally located aperture 18 through which the neck or body portion 13 of the nipple extends. The cap 17 is provided with an inwardly extending annular flange 19, which flange 19 is preferably curved upon its outer face 20 from the body portion 13 of the nipple toward the outer periphery of the cap 17 to provide a convex outer face upon the outer end of the cap 17 and provide a receding outer face upon the cap away from the nose of the baby while sucking. The flange 19 is provided adjacent the aperture 18 and upon its inner face with an inwardly extending bead 21, which bead 21 is adapted to fit within the channel 9 of the flange 14 directly under the shoulder 16 of the body portion 13 of the nipple and at the point of junction of the flange 14 with the body portion 13. This bead 21 will constitute an efficient means for engaging the flange adjacent the body portion 13 and inwardly of the vent opening 15 so as to prevent the spreading of the vent 15 when an excessive pull is exerted upon the body portion 13 of the nipple. The outer edge of the flange 14 is adapted to be firmly clamped between the flange 20 of the cap 17 and the extreme outer edge of the neck of the bottle 10, and this inwardly extending bead 21 will tend to hold that portion of the flange through which the vent opening 15 is formed against lateral distortion or strain, at the same time permitting the flange to properly flex inwardly when a vacuum is built up in the bottle.

The bead 21 is provided with a curved under and inner face 36 and an inner straight shoulder 37, the channel 9 being sloped to conform to the transverse contour of the bead 21, as shown clearly in Figure 3.

It should be understood that as a vacuum is built up in the bottle through the baby sucking

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upon the nipple or body portion 13 thereof, the flange 14 may flex away from the inner face of the flange 20 of the cap 17 and draw the upper face of the flange adjacent the vent 15 away from the inner face of the flange 20 of the cap 17 and allow air to pass under the shoulder 16 and between the body portion 13 of the nipple and the edge of the aperture 18, under the under face of the flange 20 of the cap 17, and through the vent opening 15 into the bottle. Under ordinary conditions it would be impossible to obtain an air-tight fit within the aperture 18 and under the shoulder 16, but to insure a proper entrance of air under the shoulder, I provide scored air channels 22 which may be in any number or design leading at a tangent across the outer face of the flange 20 to the central aperture 18.

From the foregoing description, it will be seen that a very simple and efficient means has been provided in the nature of the shoulder 16 for preventing the body portion of the nipple from collapsing inwardly of the neck of the bottle when a vacuum is built up therein, and that the bead 20 will also greatly strengthen the nipple at the junction of the body portion and flange and tend to resist the pulling or tearing of the flange adjacent the vent opening 15 when excessive pull is exerted upon the body portion 13.

In Figure 6, there is shown a modified form of the invention carrying out the same principle previously described, the same type of nipple being employed and being designated in this form by the numeral 23. However, a different type of securing cap is provided as indicated by the numeral 24, which cap 24 may be formed of soft rubber and consists of a conical body of a thimble-like structure. The cap 24 is provided with a bead 25 adjacent the central aperture 26 through which the nipple 23 extends, the bead portion gripping the flange 27 of the nipple 23 in a manner similar to that described with respect to Figure 1. The outer face of the cap 24 preferably conforms to the contour of the nipple 23 and constitutes a continuation thereof to provide a streamline type connection between the nipple 23 and the bottle 28. The cap 24 may be provided with an inwardly extending annular flange 29 for snapping under the bead 30 of the bottle 28. The flange 27 is provided with a vent opening 31 similar to the vent opening 15 previously described.

Figures 7 and 8 illustrate a further modified form of the invention wherein a nipple 23a is illustrated similar to that shown in Figure 6, and the cap 24a is preferably formed of hard or vulcanized rubber, "bakelite", or other similar material. This cap 24a may be secured in any suitable or desired manner to the neck, or to the bottle 32, but one type of connection is illustrated embodying lugs 33 formed on the inner face of the cap 24 for interfitting through the notches 34 of the flange 35, these lugs 33 being adapted to clamp under the flange 35. In this way, the flange 27a of the nipple 23a will be clamped between the upper edge of the cap 24 and the upper edge of the bottle neck 32. This cap 24a is of substantially the same contour as the cap 24, or in other words of the streamline type wherein the outer face of the cap 24 will merge into the contour of the outer face of the nipple 23.

It should be understood that certain detail changes in the mechanical construction, combination and arrangement of parts may be employed without departing from the spirit of the invention, so long as such changes fall within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In combination with a bottle having an open outer end, a cap removably fitting upon the open end of said bottle, said cap having a central aperture, a nipple having its body portion projecting through said aperture and also having a shoulder portion overhanging the cap adjacent the aperture to prevent the inward collapsing of the nipple with respect to said bottle, said nipple having a laterally extending flange adapted to be clamped between the end of said bottle and said cap, the flange having a vent opening formed therein normally covered at its outer end by said cap, and said cap having air channels extending under said shoulder portion to permit the passage of air under said shoulder portion and through said air vent as said flange is flexed away from said cap, the body portion of the nipple being slightly spaced from the cap to provide an exterior vent communicating with said air channels.

2. In a nursing unit, a bottle having an open outer end, an apertured cap removably secured to said bottle, a nipple having a body portion extending through the apertured cap and a flange clamped between said bottle and cap, said flange having a vent located under said cap, the body portion of said nipple extending through said cap and positioned to permit air to pass between the nipple and the cap into the bottle, said flange having a sunken channel located between the vent and the body portion of the nipple, and a depending bead carried by said cap and fitting in said channel for resisting lateral stretching of said flange adjacent said vent when excessive pull is exerted upon the body portion of the nipple.

3. In a nursing unit, a bottle having an open outer end, a cap removably secured to said bottle, said cap having a central aperture, a nipple extending through said aperture of said cap, said nipple having a lateral flange fitting under said cap and between the cap and end of the bottle, said flange having an aperture constituting a vent located under said cap and normally covered by the cap, said cap having a bead upon its inner face adjacent the aperture in the cap, and said flange having means located inwardly of the vent with respect to the center of the nipple and engaging said bead for resisting lateral stretching of said flange adjacent said vent when excessive pull is exerted upon the body portion of the nipple.

4. In combination with a bottle having an open outer end, a retaining cap removably connected with the open end of the bottle, an elastic nipple having a laterally extending flange adapted to be clamped between the cap and the bottle, the flange having vent openings formed therein normally covered at their outer ends by the cap, the body portion of the nipple extending outwardly through said retaining cap, and the nipple and cap having inter-engaging means intermediate the body portion of the nipple and said vents for resisting lateral stretching of said flange adjacent said vents and the distortion of the vents when excessive pull is exerted upon the body portion of the nipple.

YERVANT H. KURKJIAN.

Nanobebe US Inc., Ex. 1009, Page 3

EXHIBIT 2016

DosA
Declaration
Deposition
Claim Construction

Baker Botts
Oct 12 2023 9:00am
Eliot / Matt

30 Rockefeller Ctr
Suite 4340

IPR

Nanobeke – Ayal
Mayborn

PTAB
Fish & Richardson
John Goetz
Kenneth Darby
Via zoom
Dennis
Janzcovlac
Anthony
Holtz

10,952,930
9930 Rees
14, 16, 17, 19 Asserted Claims

- Grand 1
  Meyers / ~~Sepehr~~ Sepehr
- Grand 2
  Meyers / Sepehr / Ishimaru
- Grand 3
  Kurkjian, Sepehr, Ishimaru

~~Prosecution~~

11,207,244
1244 Rees
21-24, 26, 27

- Grand 1
  Ishimaru / Kurkjian
- Grand 2
  Ishimaru / Atkin

EXHIBIT
2016
08 10/12/23
PENGAD 800-631-6989

EXHIBIT 2017

BRIAN H. SILVER

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SUMMARY

An innovative and visionary RESEARCH AND DEVELOPMENT LEADER with extensive experience in the areas of product development, sourcing, user experience, budget management, opportunity assessments, contract management, intellectual property, technical marketing support, and patent management. Proven aptitude in using strong communication, organizational, and leadership skills to achieve goals and objectives. Creative, experienced product innovator with over 60 issued U.S. patents. Highly accomplished in delivering winning product solutions and strategies that consistently achieve stakeholder needs and contribute to long-term organizational vitality.

- Product/System Design & Development
- Strategic Planning
- Competitive Product & Technology Evaluation
- Budget Management
- Intellectual Property
- Cross-cultural Collaboration
- Research & Clinical Testing
- Contract Development & Negotiation
- Technical Marketing & Education Support
- FDA Design Controls
- Electronic Devices with Mating Disposables
- Stage-gate Product Development

EXPERIENCE

Fluid Technology Solutions, Inc., Albany, Oregon
Chief Technical Officer, Medical, June 2019 – Present
Consultant, March 2019 – June 2019

Start-up medical products venture within an established personal hydration products and industrial water treatment company. Identified, evaluated, and prioritized opportunities in medical device area for company's unique filtration technology. Assessed feasibility and provided recommendations for potential development and potential partnerships.

- Responsibilities include concept generation, product development, establishing business cases, intellectual property, regulatory compliance, securing investment partnerships, and identifying potential partnerships for development, manufacturing, sales and distribution.
- Create and refine proof of concept functional models.



MEDELA, LLC, McHenry, Illinois
Vice President, Innovation Scouting, 2015-2018

Served in global role to identify and evaluate companies, products, services, and technologies with recommended action for acquisition, partnership, integration, or organizational learning. Identified and evaluated numerous opportunities within and beyond traditional markets. Established relationships with potential partners. Led U.S. university-based research efforts. Created process for identification and evaluation of opportunities.

- Prioritized opportunities, organized by key product areas, and published monthly status updates reviewed with EVP Business and EVP Research & Innovation. Actively engaged in 20 potential opportunities.
- Recommended three external opportunities for 2018: a company acquisition, product acquisition, and a partnership for proprietary development. All were very early in their product life cycle, with future potential sales exceeding $40,000,000.
- Initiated various preliminary evaluations and clinical studies associated with breast feeding-related products and enteral feeding products, including serving as initial builder and custodian of 25-year relationship with world expert at Rush University Medical Center.
- For each product group, reviewed and identified top external opportunities, which were included in the company's strategic planning document.

BRIAN H. SILVER

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silverbrianh@gmail.com | www.linkedin.com/in/brian-h-silver

PRESENT EMPLOYER AND TITLE

Fluid Technology Solutions, Inc., Albany, Oregon
Chief Technical Officer, Medical
June 2019 – Present

PAST EMPLOYMENT

MEDELA, LLC, McHenry, Illinois
Vice President, Innovation Scouting, 2015-2018
Vice President, Innovation and Research, 2002-2015
Group Director Innovation and Research, 1999-2002
Director Product Development, 1991-1999

HUDSON RESPIRATORY CARE, INC., Arlington Heights, Illinois
Manager of Research and Development, 1989-1991
Development Engineer, 1987-1989

THE KENDALL COMPANY, Barrington, Illinois
Project Engineer, 1981-1987

CONSULTING AND NON-EMPLOYEE POSITION

Fluid Technology Solutions, Inc., Albany, Oregon
March 2019 – June 2019

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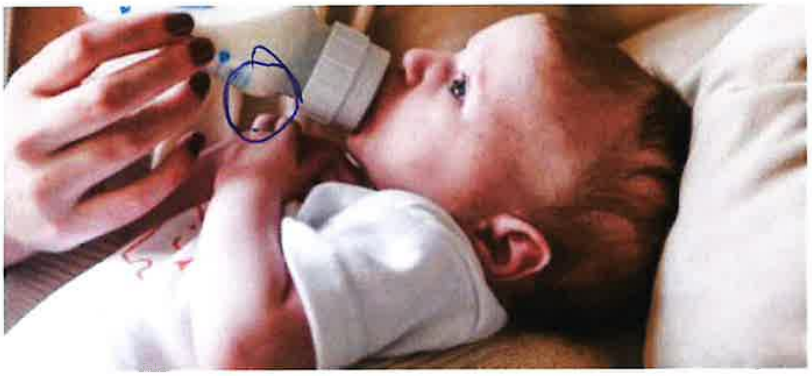
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EXHIBIT 2019

US005474193A

United States Patent [19]

Larsson et al.

[11] Patent Number: 5,474,193

[45] Date of Patent: Dec. 12, 1995



[54] **BREASTFEEDING ASSISTANCE DEVICE**

[75] Inventors: **Karl O. A. H. Larsson**, Zug, Switzerland; **Gotthilf Weniger**; **Brian Silver**, both of Cary, Ill.

[73] Assignee: **Medela, Inc.**, McHenry, Ill.

[21] Appl. No.: **396,251**

[22] Filed: **Feb. 28, 1995**

Related U.S. Application Data

[63] Continuation of Ser. No. 272,269, Jul. 8, 1994, abandoned, which is a continuation of Ser. No. 866,896, Mar. 26, 1992, abandoned, which is a continuation-in-part of Ser. No. 815,375, Dec. 31, 1991, abandoned.

[51] **Int. Cl.**[6] **A61M 37/00**

[52] **U.S. Cl.** **215/11.4**; 215/11.5; 224/148

[58] **Field of Search** ..... 215/11.4, 11.5, 215/11.1; 606/234, 235, 236, 158, 157; 604/407; 128/DIG. 6, DIG. 24; 224/148, 194, 202, 250, 257, 258

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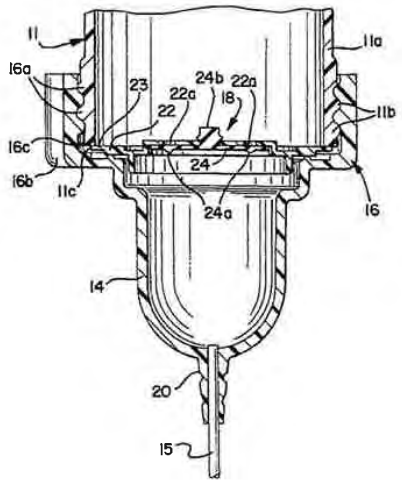
Primary Examiner—Stephen J. Castellano

Attorney, Agent, or Firm—Willian Brinks Hofer Gilson & Lione

[57] **ABSTRACT**

A compact preferably disposable device is disclosed for providing a suckling infant with a liquid diet supplement simultaneously with normal breastfeeding. The device includes a container for holding the supplement and a fluid delivery mechanism adapted to fit onto the container. The fluid delivery mechanism comprises a flexible teat, an elongated flexible tube and a valve mechanism. The flexible tube extends into the teat and is in fluid communication with the interior of the teat, with the other end of the tube sized to fit into the infant's mouth simultaneously while breastfeeding. A tubing clamp carried by the tubing having a notch into which the tubing can be wedged to pinch it closed is also advantageously provided.

10 Claims, 1 Drawing Sheet



BREASTFEEDING ASSISTANCE DEVICE

This application is a continuation of application Ser. No. 08/272,269, filed Jul. 8, 1994, abandoned, which is a continuation of application Ser. No. 07/866,896, filed Mar. 26, 1992, abandoned, which is a continuation-in-part of U.S. Ser. No. 07/815,375 filed Dec. 31, 1991, abandoned.

FIELD OF THE INVENTION

This invention relates to improvements to devices used to provide a diet supplement to a suckling child simultaneously with normal breastfeeding, that is feeding at the breast.

BACKGROUND OF THE INVENTION

There are many instances when the amount of milk which a suckling infant is receiving from the breast needs to be augmented. For instance, some babies have difficulty in learning to suckle the breast. This can lead to a reluctance to breastfeed, since the infant does not receive immediate gratification upon suckling. The mother's milk supply may also be inadequate, such as from temporary reduction in milk supply from mother-baby separation, illness or the like.

It is also possible for an adoptive mother to induce lactation. The mammary glands can be stimulated to begin to produce milk. The induction of lactation can take some time, however. Moreover, most women will not be able to exclusively breastfeed the adopted child.

While the milk supply can be supplemented in these instances by bottle feeding, it is most desirable to be able to provide the diet supplementation simultaneously with normal breastfeeding. This serves to stimulate the production of more milk, improves suckling when necessary, and further perpetuates the mother-child bonding incident to breastfeeding.

There are a number of considerations in designing a device to so supplement the milk supply during breastfeeding. First, it should deliver the supplement to the infant in an unobtrusive manner. The user should also be comfortable with the device, and be able to use it with relative ease.

The child must also be able to get the breast nipple and the supplement delivery means into its mouth simultaneously. A small diameter delivery tube can be used to this end.

One supplement delivery device which meets the foregoing objectives is disclosed in U.S. Pat. No. 4,687,466. That device has proven quite satisfactory, but in its commercial form is larger in size than is most desirable for the greatest ease in portability, where portability may be another consideration. The '466 device is also not specifically designed to be disposable after use, being made in its commercial form very durable for cleaning and reuse. The fluid delivery mechanism of the '466 device as commercialized is furthermore not particularly adapted for use with other supplement containers such as standard milk bottles.

SUMMARY OF THE INVENTION

It is a principal objective of the present invention to provide an improved breastfeeding assistance device which is easily used to supplement the user's milk supply simultaneously with normal nursing, which is comfortable for the user, and which is very compact for ease in carrying. Another objective of the invention is to provide an improved breastfeeding assistance device which is inexpensive enough to be rendered disposable in the mind of the user. Yet a further objective of the invention is to provide an improved valving and fluid delivery mechanism for a breastfeeding assistance device, and which fluid delivery mechanism may furthermore be used with a standard milk bottle, volumetric feeder or the like.

These and other objectives have been realized in the present invention which comprises a preferably compact container for holding the liquid breastfeeding supplement, and a fluid delivery mechanism adapted to fit on the container. The fluid delivery mechanism comprises a flexible teat and a one-way valve which allows for liquid supplement outflow from the container, but closes the container against backflow.

The container can take the form of a small cylindrical bottle with an open top or mouth at one end. In its preferred form disclosed herein, the container is a small (e.g., about 80 ml volume) rigid plastic bottle. The fluid delivery mechanism is attached to the bottle mouth to close the bottle opening. In this preferred form, the flexible teat is formed integral with a collar, the latter being match-threaded with the end of the bottle adjacent the bottle mouth.

A small diameter elongated flexible tube extends into the flexible teat. The tube is designed so that its other end can be located adjacent a breast nipple, so that it easily fits into the infant's mouth along with the breast nipple.

The valve device between the bottle opening and the flexible teat comprises a rigid disk-shaped base having one or more apertures, with the base being sized to be received on the lip of the bottle mouth to thereby close the bottle opening. A flexible member covers the aperture(s) in the manner of a flap valve, and is advantageously attached to the base by means of a portion (knob) extending from the member which is received in an aperture of the base.

The flexible teat has the advantage that the device can be "primed" by squeezing the teat to fill it with supplement. The flexible teat furthermore allows for the mother to force supplement into the infant's mouth by squeezing the teat.

The fluid delivery mechanism, particularly when teat and collar are integrally molded, can be made inexpensively enough to be sold as disposable. It can further be adapted for use with standard milk bottles, including collapsible bag-type milk bottles.

In keeping with the very compact nature of the present device, the disclosed embodiment also provides a clip attached to the container, as by a rubber band, for use in suspending the breastfeeding supplement device from an article of clothing, for example. A tubing clamp is also advantageously provided for use in cutting off supplement flow.

The tubing clamp is carried on the tubing itself, and is preferably formed of a substantially flat member having two apertures through which the elongated tubing is threaded. The member can be slid along the tubing via the threaded engagement provided through the apertures. A v-shaped notch is provided on a portion of the clamp which is sized so that the tubing can be pinched closed.

The foregoing features and advantages of the present invention will be further understood upon consideration of the following detailed description of an embodiment of the invention taken in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of a breastfeeding supplement device made in accordance with the teachings of the

What is claimed is:

1. A device for delivering a liquid diet supplement to a nursing infant's mouth simultaneously with normal breastfeeding comprising:

a container for holding the liquid supplement, said container having a neck portion defining an opening at one end which is downwardly directed during breastfeeding, said container being otherwise closed;

a fluid delivery mechanism mounted on said container to close said opening, said mechanism having a flexible teat with an interior and an exterior and an opening through which an elongated flexible tube extends, said teat interior defining a reservoir for liquid supplement from said container, said tube having one end extending into said teat and in fluid communication with the interior of said teat, and another end of said tube being sized to fit into the infant's mouth simultaneously with a breast nipple, and a valve device between said container and said teat which valve device permits fluid to flow from said container into said teat but substantially prevents fluid flow back into said container from said teat, said teat when squeezed applying force to liquid supplement in said reservoir and delivering liquid supplement from said reservoir through said tube.

2. The breastfeeding device of claim 1 wherein said valve comprises a disk-shaped base sized to cover the opening of the container, and having at least one aperture in said base, and a flexible member attached to and in facial engagement with said base covering said aperture.

3. The breastfeeding assistance device of claim 1 further including a tubing clamp comprising a base portion having at least two apertures through which said elongated flexible tube is threaded, and further having a portion with a notch formed therein within which notch said tube can be wedged and pinched shut when not in use.

4. A fluid delivery mechanism for use in providing a liquid diet supplement to a nursing infant's mouth simultaneously with normal breastfeeding, comprising:

a flexible teat having an interior and an exterior;

a container for holding the liquid supplement, said container having an interior and a mouth defining an outlet from said container interior;

a collar surrounding said teat and means associated with said collar for attaching said collar and teat to said container mouth with said teat over said container outlet;

a flexible tube having a small internal diameter, said tube having one end extending into said teat and in fluid communication with the interior of said teat, and another end of said tube being sized to fit into the infant's mouth simultaneously with a breast nipple, and

a valve device between said container outlet and said teat which valve permits fluid to flow from said container into said teat but substantially prevents fluid flow back into said container from said teat, said teat when squeezed applying force to liquid supplement in said reservoir and delivering liquid supplement from said reservoir through said tube.

5. The fluid delivery mechanism of claim 4 wherein said flexible teat and collar are formed integral with each other.

6. The fluid delivery mechanism of claim 5 wherein said valve comprises a disk-shaped base sized to cover said opening of said container with a plurality of apertures formed in said base, and a flexible disk-shaped member in facial engagement with the base covering said apertures, said disk-shaped member being removably attached to said base by means of a knob extending outwardly from said disk-shaped member which is received in a knob hole in said base.

7. The fluid delivery mechanism of claim 4 wherein said supplement container comprises a flexible plastic bag.

8. The fluid delivery mechanism of claim 4 wherein said supplement container comprises a noncollapsible container having a neck portion terminating in said mouth, and a vent provided to said container interior for airflow to said container interior in response to fluid flow from said container into said teat.

9. A device for feeding a liquid supplement to a nursing infant's mouth simultaneously with normal breastfeeding comprising:

a container for holding the liquid supplement therein,

a liquid delivery mechanism in fluid communication with said container through a liquid channel for controlling outflow of liquid supplement from said container and delivery of the supplement to the infant's mouth at a breast nipple, said delivery mechanism including a flexible member having a hollow interior chamber forming a reservoir for liquid supplement from said container, an elongated tube having two ends one end of which is in fluid communication with said reservoir and the other end of which is sized to fit into the infant's mouth simultaneously with the breast nipple, and a one-way valve device located between said container and said flexible member in said liquid channel which valve device permits liquid to flow from said container through said channel into said flexible member chamber but substantially prevents liquid flow back into said container from said flexible member chamber, said flexible member when squeezed applying a force to said liquid supplement in said reservoir to move said liquid supplement under pressure of said force into and through said tube to thereby deliver liquid supplement to the infant's mouth at the breast nipple.

10. A device for feeding a liquid diet supplement to a nursing infant's mouth simultaneously with the infant feeding at a woman's breast, comprising:

a container for holding the liquid supplement therein, said container having an opening forming a liquid outlet;

means for supporting said container on a mother's torso with said opening located downwardly such that liquid in said container pools at said opening under the influence of gravity;

a flexible teat having a hollow interior forming a reservoir for liquid supplement from said container, said teat having an open end to said hollow interior;

means for removably affixing said teat to said container opening such that said open end of said teat is adjacent said container opening and in fluid communication with liquid in said container to thereby admit liquid to said teat hollow interior from said container;

an elongated flexible tube configured for a reduced liquid flow therethrough under influence of suckling, said tube having two ends, one end of which extends to said teat and is in fluid communication with said reservoir and the other end of which is sized to fit into the infant's mouth simultaneously with the breast nipple;

a one-way valve device located between said container outlet and said teat open end which valve device operates to permit liquid to flow from said container through said channel into said teat but substantially prevents fluid flow back into said container from said teat, said teat when compressed applying a force to said

EXHIBIT 2020

US007712617B2

(12) **United States Patent**
Silver

(10) **Patent No.: US 7,712,617 B2**
(45) **Date of Patent: May 11, 2010**



(54) **ARTIFICIAL NIPPLE**

(75) Inventor: **Brian H. Silver**, Cary, IL (US)

(73) Assignee: **Medela Holding AG** (CH)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1167 days.

(21) Appl. No.: **10/696,910**

(22) Filed: **Oct. 29, 2003**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
A61J 11/00 (2006.01)
A61J 11/04 (2006.01)

(52) **U.S. Cl.** **215/11.1**; 215/11.5

(58) **Field of Classification Search** 215/11.1, 215/11.5; 604/234, 236; 606/234, 236
See application file for complete search history.

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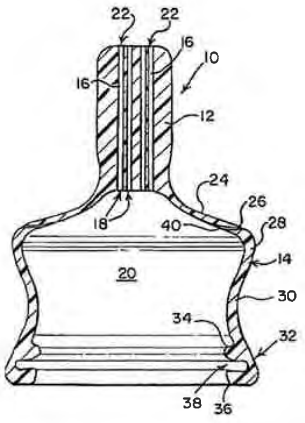
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Primary Examiner—Sue A Weaver
(74) *Attorney, Agent, or Firm*—MBHB LLP

(57) **ABSTRACT**

An artificial baby-feeding nipple including a substantially solid nipple portion with one or more ducts formed therethrough for conveying fluids through the nipple. The nipple is radially compressible so as to prevent passage of fluids through the one or more ducts when so compressed through use of a material having a low durometer material.

23 Claims, 9 Drawing Sheets



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FIG. 1

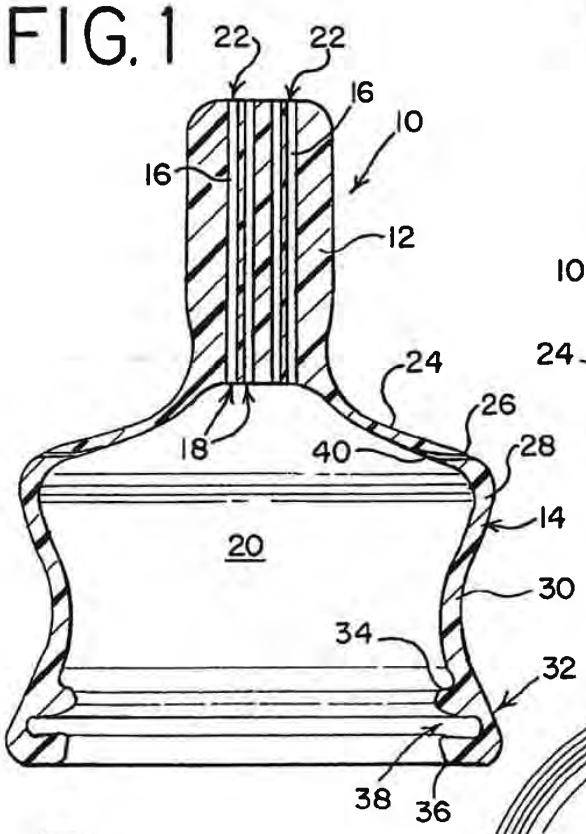


FIG. 1A

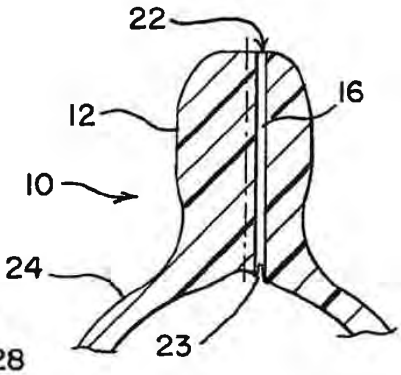


FIG. 2

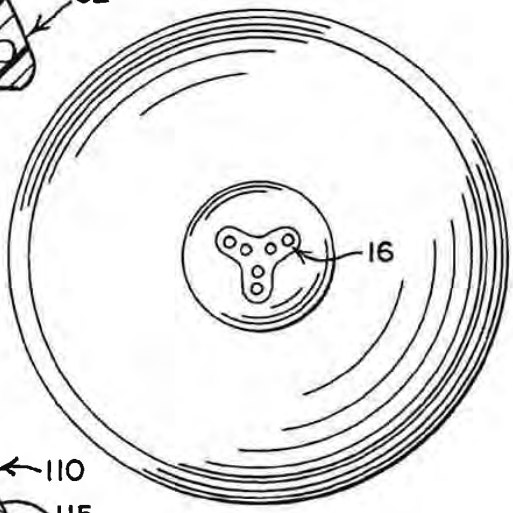


FIG. 3

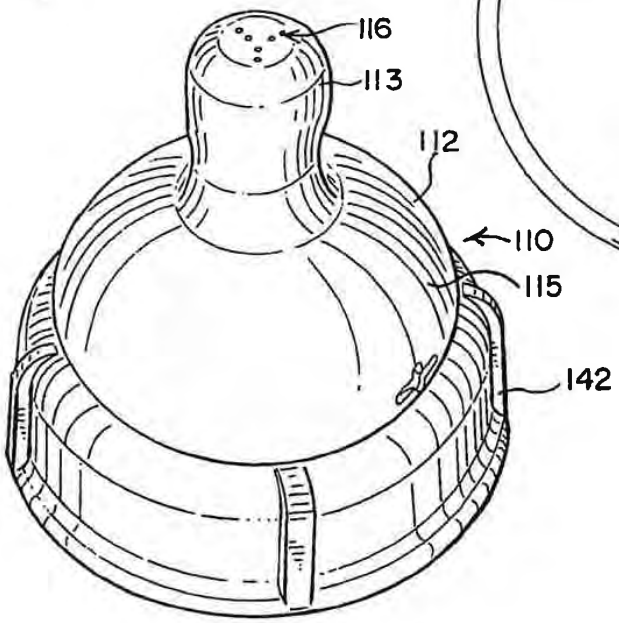


FIG. 4

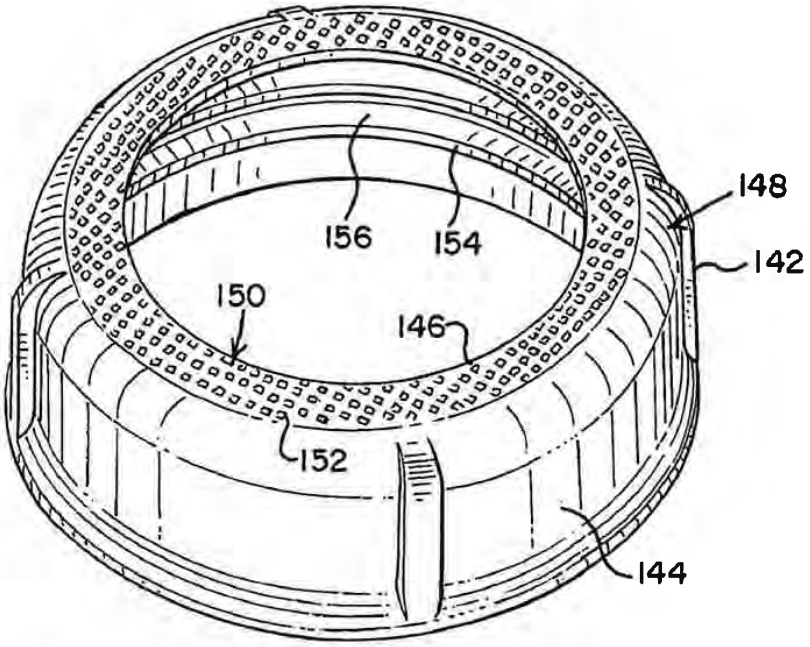


FIG. 5

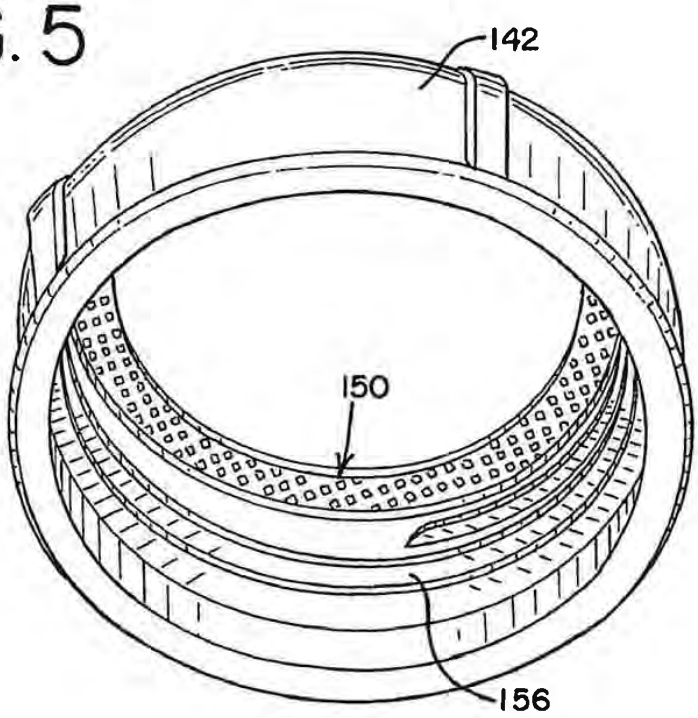


FIG.6

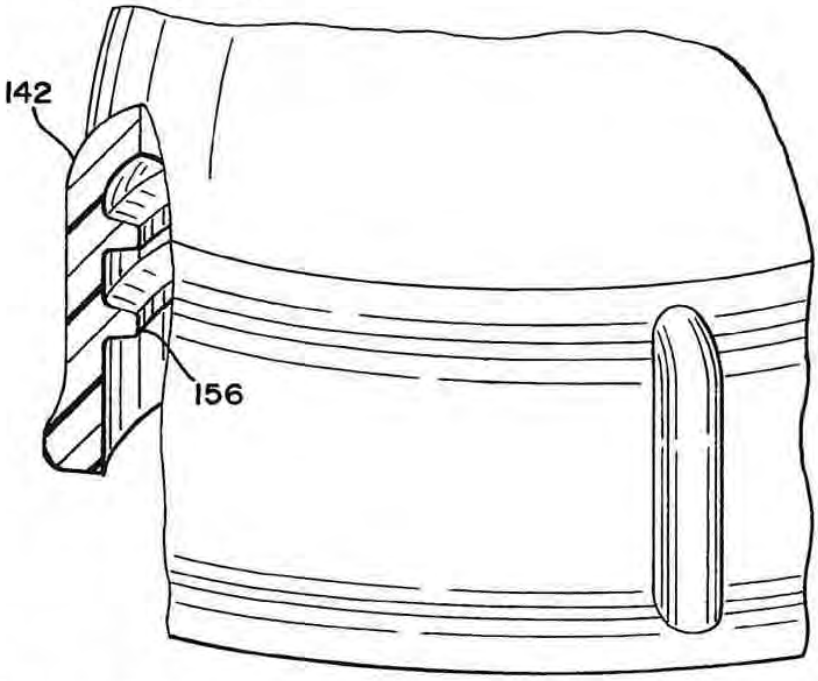


FIG.7

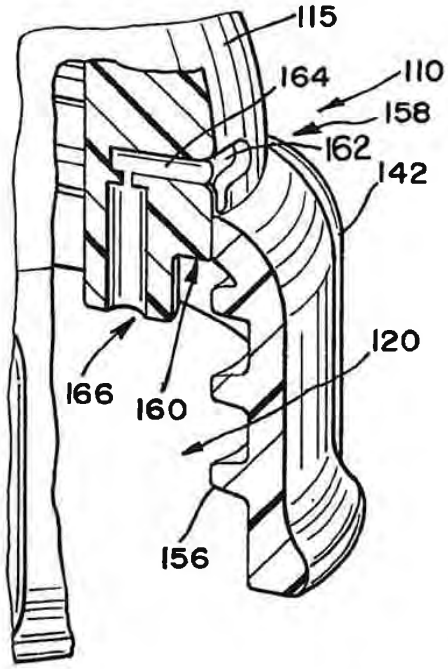
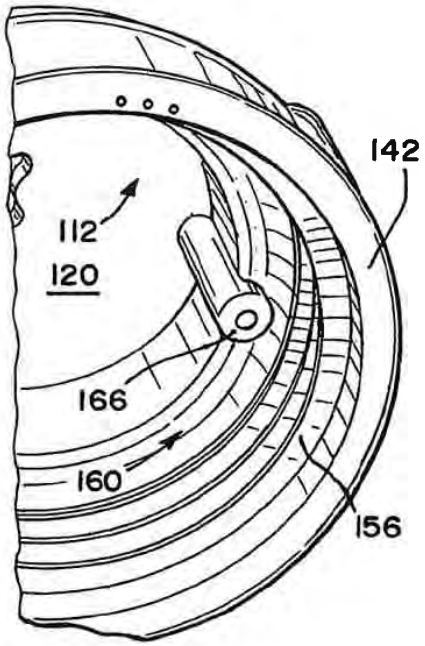


FIG.8



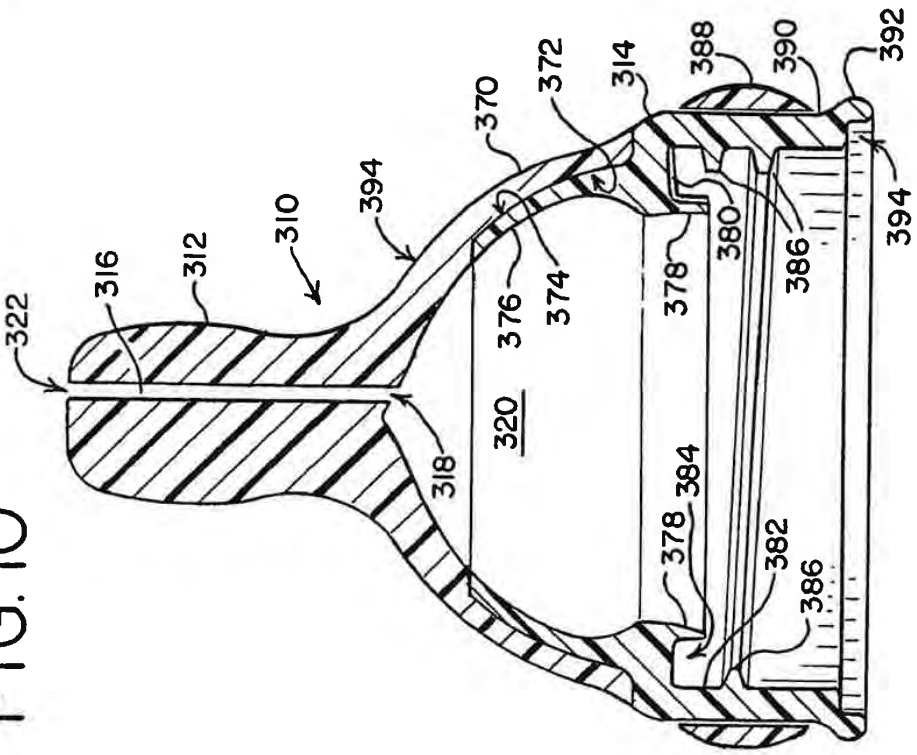

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FIG. 10

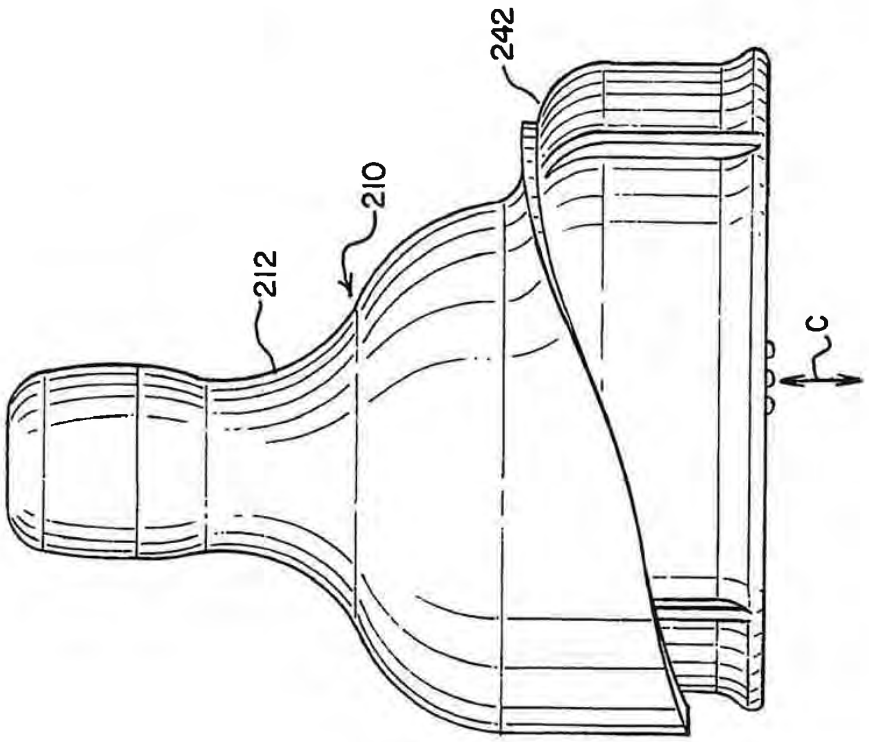

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C

FIG. 9

FIG. 11

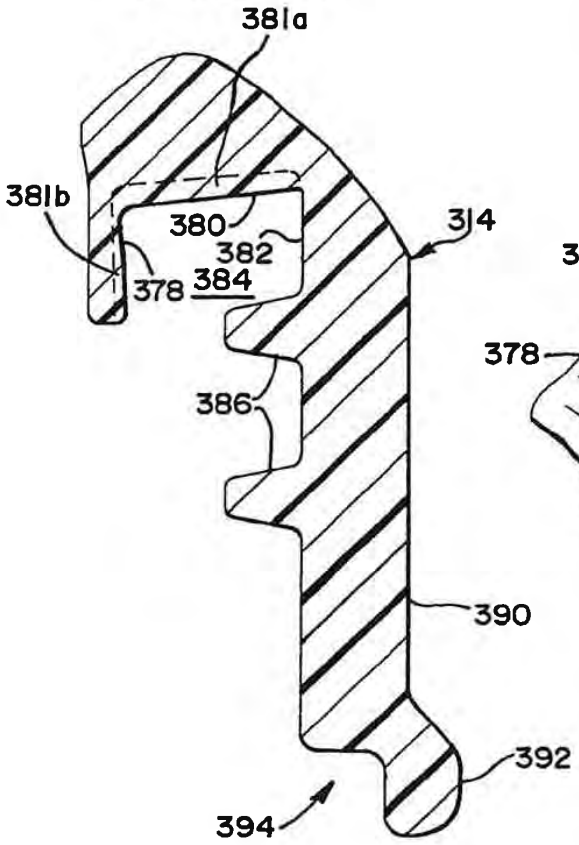


FIG. 11A

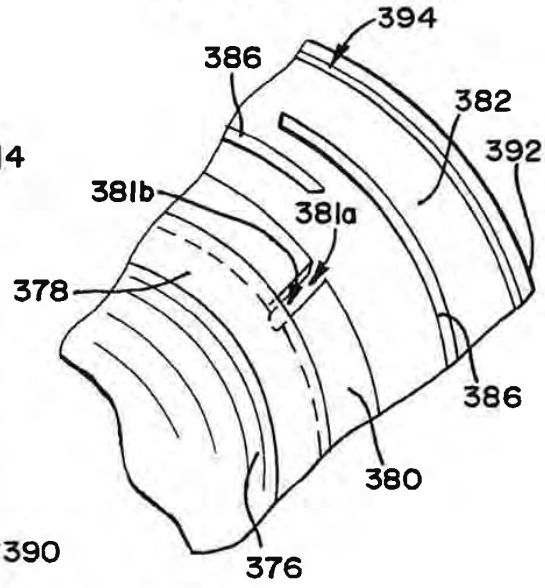


FIG. 12

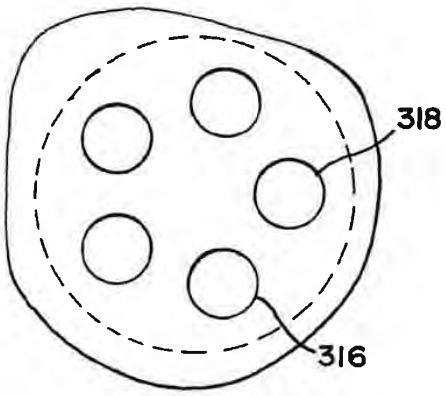


FIG. 13

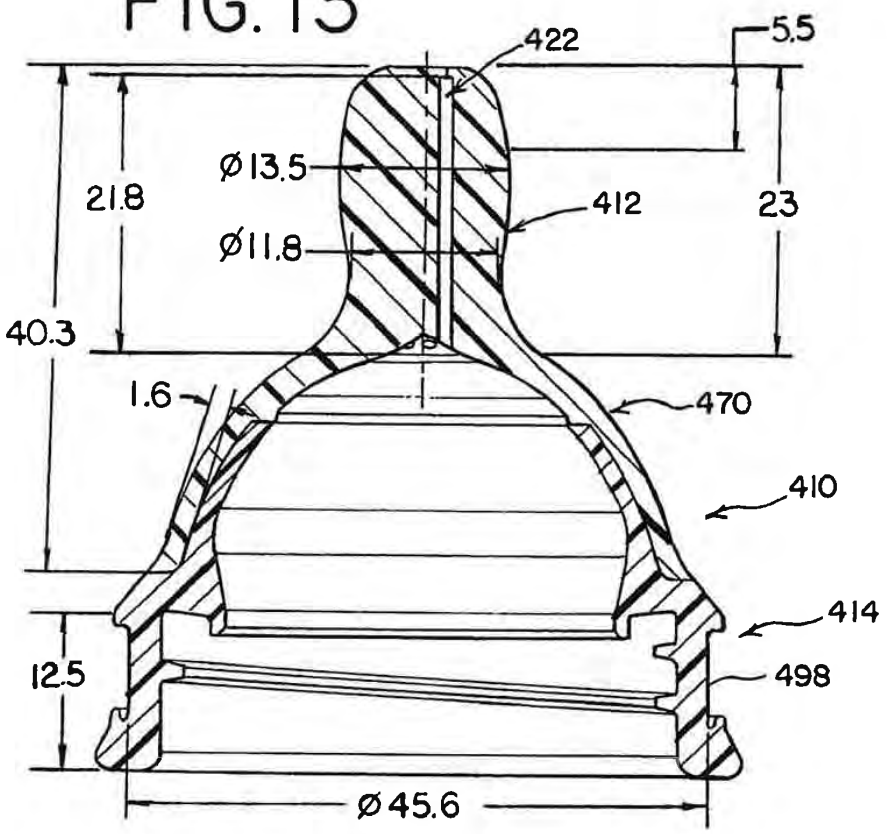


FIG. 14

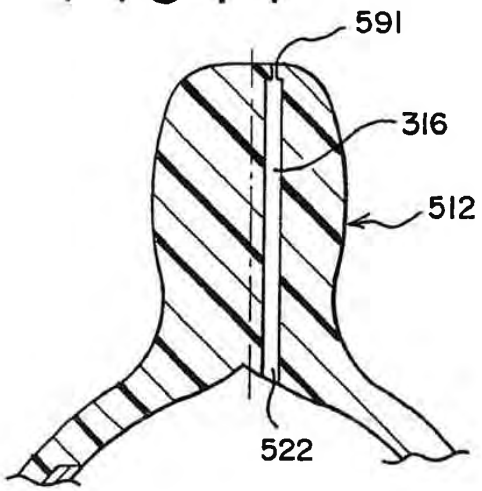


FIG. 15

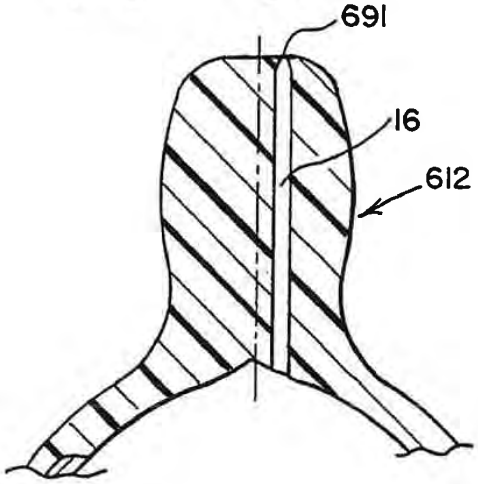


FIG. 16A

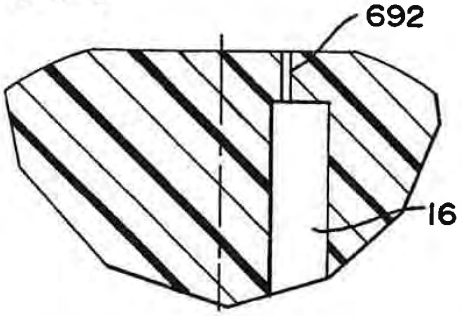


FIG. 16B

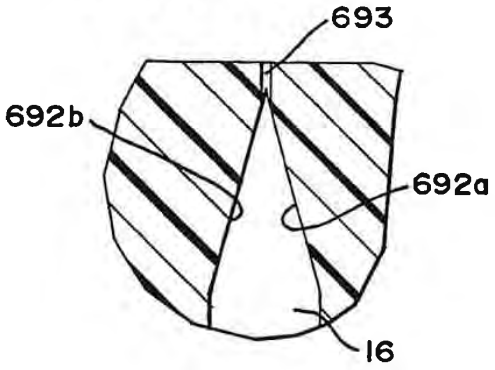


FIG. 16C

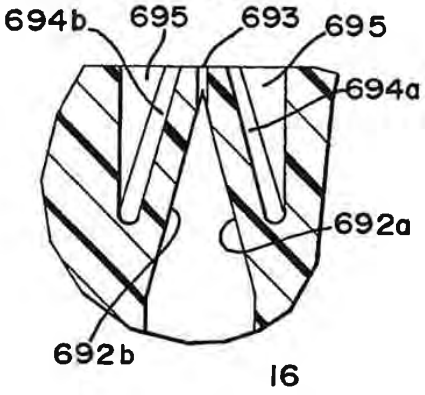


FIG. 17A

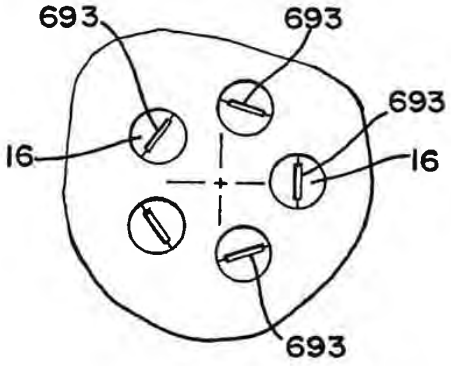
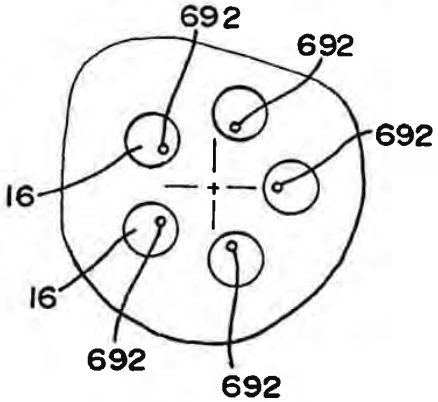


FIG. 17B



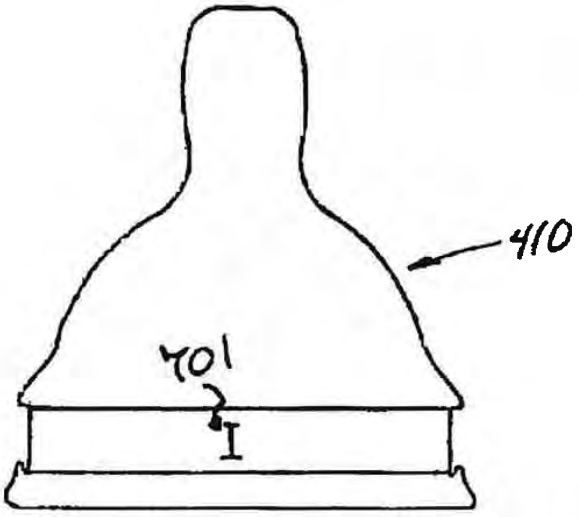


FIG.18A

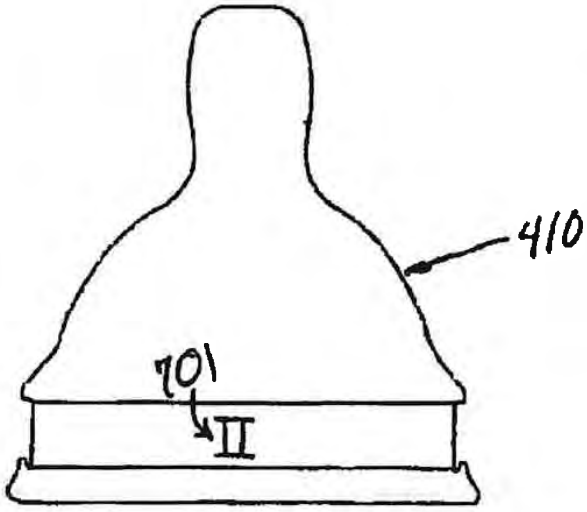


FIG.18B

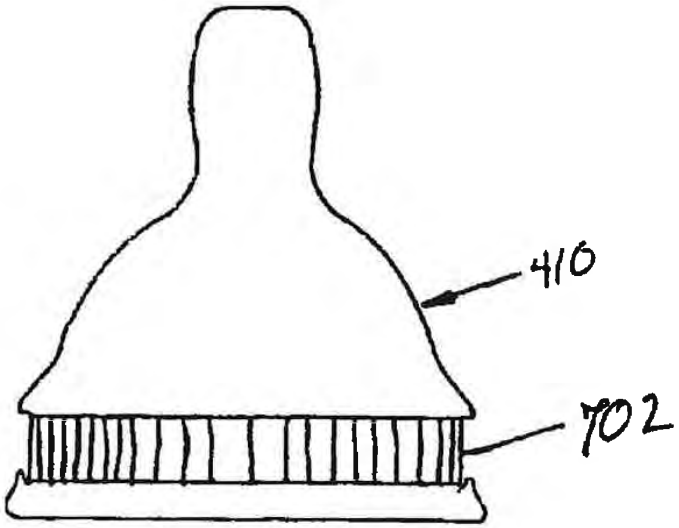


FIG.18C

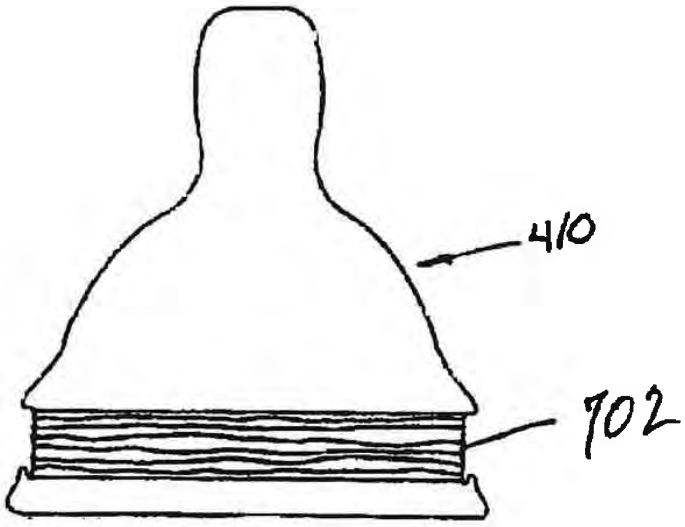


FIG.18D

ARTIFICIAL NIPPLE

This application claims the benefit of U.S. Provisional Application No. 60/424,954 filed Nov. 8, 2002.

FIELD OF THE PRESENT INVENTION

The present invention generally relates to an artificial nipple for use with a bottle for the purpose of feeding, such as an infant.

BACKGROUND OF THE INVENTION

The merits of breast-feeding are well documented in the scientific literature. A number of advantages have been noted which include nutritional, immunological, psychological and other general health advantages. A list of the merits of human breast milk as compared to artificial feed or formula would include ideal nutritional content, better absorption, fewer food related allergies, more favorable psychological development, better immunological defenses, and a substantial economic advantage. Another benefit to exclusive breast-feeding includes positive effects on development of an infant's oral cavity resulting in proper alignment of teeth and other related benefits.

For various reasons, however, exclusive breast-feeding is not always possible. An example of this would be where a nursing mother cannot produce enough breast milk to feed her infant. In such cases, an artificial feed may be used to supplement breast-feeding. A nursing mother returning to work may employ a breast pump to express milk to be given to her infant at a later time. In the event that an infant is fed with an artificial formula or previously expressed breast milk, it is conventional that a bottle provided with an artificial nipple is used to feed the infant.

The mechanical aspects of breast-feeding are significantly different compared to that of bottle-feeding. In breast-fed babies, the tongue action appears to be of rolling or peristaltic motion. However, the tongue action for bottle-fed babies is often considered to be more piston-like or a squeezing motion. In order to stop the abundant flow of milk from a bottle with an artificial nipple having a large hole in the end, infants might be forced to hold the tongue up against the hole of the nipple to prevent the formula from gushing forth. This abnormal activity of the tongue is referred to as tongue thrust or deviate swallow. When breast-fed babies are not sucking or swallowing, they may rest with the nipple moderately indented by the tongue, while bottle-fed babies rest with the teat expanded, i.e., indenting the tongue. The differences between the tongue movements and rest position of the tongue and breast-fed and bottle-fed babies are probably due to the properties of the artificial nipple.

The undesirable effects of existing artificial nipples are often permanent and correction later in life is difficult due at least in part to effected muscle development. The shape of a breast nipple is dictated by the internal geometry of the infant's mouth during breast-feeding. However, an artificial teat is already formed with a specific shape and is made from a material stiffer than breast tissue.

Recent research suggests that in the early stages of oral cavity development, the palette is almost as malleable as softened wax. As a result, children who are bottle-fed are nearly twice as likely to have malocclusions as children who are breast-fed. In the same way that finger sucking and use of a pacifier-like object has been found to increase the prevalence of malocclusions it is now believed that use of a conventional artificial nipple also impacts negatively upon formation of the oral cavity.

A demand therefore exists for an artificial nipple that more closely mimics that of a natural breast and reduces or eliminates the impact of bottle-feeding with respect to oral development. The present invention is believed to satisfy this demand.

SUMMARY OF THE INVENTION

An object of the invention is to provide an artificial nipple that is made of a material that minimally impacts infant oral development. Another object of the invention is to provide an artificial nipple that permits milk to flow therefrom at typical breast-feeding suction levels. Yet another object of the invention is to provide an artificial nipple that does not permit milk to flow through or substantially stops that flow when compressed, or constricted radially through elongation. Still yet another object of the invention is to provide an artificial nipple that is positioned in the oral cavity in a similar fashion as that of a mother's nipple. Another object of the invention is to provide an artificial nipple that permits milk or other fluids to flow therefrom in a manner and rate similar to that of a mother's nipple.

Overall, the nipple of the present invention is designed in one broad sense to encourage a suck/swallow/breathe pattern similar to that of natural breastfeeding. This reduces or eliminates the undesired forcing of breast milk to a feeding infant.

In one aspect of the present invention, a baby feeding apparatus includes a substantially solid nipple with one or more ducts formed therethrough for conveying fluids through the nipple. The nipple is radially compressible so as to prevent passage of fluids through the one or more ducts when so compressed. Similarly, the nipple constricts radially so as to prevent passage of fluids when elongated (stretched).

In a particular aspect of the foregoing invention, the nipple may be a Shore A hardness of less than about 10, and even below 1. More particularly, on the Shore 00 scale, a range of about 20 to about 45 is presently considered most desirable. The nipple may include three or more elongated ducts. The fluid ducts may further be offset radially with respect to a central axis of the nipple in another variation. Further still, the end openings of the ducts can be radially offset relative to the central axis of the ducts themselves.

In one embodiment, the nipple may include a unitary nipple portion and mounting portion. The mounting portion may be formed of a material having the same Shore A hardness as that of the nipple portion, but in this embodiment, the mounting portion may be formed of a material having a relatively higher Shore A hardness to that of the nipple portion. This provides a more rigid structure for attachment to a container, for instance.

In another form, the nipple may include a nipple end and a body portion. The body portion may include a vent formed therethrough, or multiple vents. The vent may include a horizontal passageway in communication with atmosphere, and a vertical passageway in communication at a first end to the horizontal passageway and at a second end to an inner chamber of the nipple.

Another aspect of the invention provides a baby feeding apparatus including a substantially solid nipple being formed of a material having a Shore A hardness of less than about 10, and one or more ducts at or near the nipple tip for conveying fluids through the nipple, and most preferably extending through the generally solid nipple portion.

Yet another aspect of the invention provides a baby feeding apparatus including a substantially solid nipple having one or more ducts formed therethrough for conveying fluids through the nipple, and a flow restrictive feature. One flow restrictive

feature prevents passage of fluids through the one or more ducts when the nipple is one or both of radially compressed and axially extended. Another is just the small size of the terminal hole at the end of a duct as disclosed herein, which is sufficient alone to restrict fluid flow, as well as the use of a valve or valve-like end feature. It has been observed that these flow restrictive features reduce the amount of air that could otherwise return to the fluid container. With the vented structure disclosed herein, this serves to prevent the infant (user) from taking in unwanted air with feeding. The ducts may be round in cross-section. In another embodiment, the ducts may terminate in longitudinal slits. In yet another embodiment, the ducts may terminate in "S"-shaped slits or "Y"-shaped slits.

Yet another aspect of the invention provides an integral (one-piece) nursing nipple including a substantially solid nipple formed of a material having a Shore A hardness of less than about 10, and a container attachment portion formed to be unitary with the nipple portion.

Yet another aspect of the invention provides an integral nursing nipple including a substantially solid nipple portion formed of a material having a Shore A hardness of less than about 10, and an extending elongated portion sized and shaped to be insertable into the mouth of a nursing infant. The extending portion includes a proximal portion and a base portion and one or more ducts through the solid nipple portion from the proximal portion to the base portion. The base portion has a radial flange extending outwardly therefrom, and a container attachment portion formed to be unitary with the nipple portion. The container attachment portion is generally cylindrical, and has a first end connected to the radial flange and a second end. The second end includes an internal groove formed about an internal periphery thereof. The internal groove is sized and shaped so as to be removably attachable to a container having a matching thread (although this mating thread and groove arrangement could be reversed).

Yet another aspect of the present invention provides an integral nursing nipple including a substantially solid nipple formed of a material having a Shore A hardness of less than about 10, and an extending portion sized and shaped to be insertable into the mouth of a nursing infant. The extending portion includes one or more ducts extending therethrough for conveying fluids, and a base portion. A container attachment portion is attached to the base portion. The container attachment portion is generally cylindrical and has a first end with a flange. The flange extends inwardly from the first end and includes a plurality of openings formed therethrough. In manufacture the soft base portion enmeshes with the flange through the openings. The container attachment portion includes means for attachment to a container, such as screw threads, a snap-fit, etc.

Another aspect of one embodiment of the invention is to provide as low a Durometer material for the nipple portion of the artificial nipple as possible. Preferably, a relatively higher durometer material is provided for the collar portion. The nipple portion may be molded or connected directly to the collar or mounting portion or may be a more conventional nipple/collar configuration.

Still another aspect of an embodiment of the invention is the positioning of a valve at the distal end of each duct to regulate the flow of fluids through each duct. The valve is designed to open and close depending on the suckling action.

One of the most significant attributes of the present invention is nonetheless considered to be the very low Durometer material of the nipple extending portion, and how that material behaves under manipulation by the infant in suckling, both in extension and also in compression. The elongated duct(s) in the preferred substantially solid embodiment appear to react much more like a mother's nipple than any prior art artificial nipple with this very low Durometer material. The infant also is believed to engage the soft area surrounding and extending outwardly from the distal end of the extending portion in a manner much more reminiscent of feeding at the breast. Furthermore, and unlike many prior art artificial nipples, the present invention permits the fluid flow characteristics of the nipple to respond to changes in vacuum. It is believed that the low Durometer material of the nipple, possibly in combination with other features of the present invention, can be tailored to allow a higher fluid flow rate at a relatively increased vacuum (by the infant).

As will be evident herein, the most preferred durometers are considered to be in the range at or below about Shore A 5, which would be most preferably around Shore 00 20 to 45. Even below the latter range may be useful.

Another way to look at the desired result in this nipple insofar as extension and compression under suckling, is through the elongation of the nipple material. Materials that have appeared very useful for the elongated portion of the nipple have shown a stress of approximately 40 psi or less at 300% elongation in a most preferred embodiment.

These, together with other objects and advantages will be further understood in the details of the construction and operation of the invention as more fully hereinafter described, reference being had to the accompanying drawings, forming a part hereof, wherein like numerals refer to like part throughout.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a sectional view of one embodiment of a nipple according to the present invention;

FIG. **1A** is an enlarged view of ducts with valves in a variation of the nipple of FIG. **1**;

FIG. **2** is a reduced-size bottom view of the nipple of FIG. **1**;

FIG. **3** is a perspective view of a second embodiment of an integral nipple according to the present invention;

FIG. **4** is a top perspective view of the collar portion of the nipple of FIG. **3**;

FIG. **5** is a bottom perspective view of the collar portion of FIG. **4**;

FIG. **6** is an enlarged and partially sectional illustration of a portion of the nipple of FIG. **3**;

FIG. **7** is an enlarged and partially sectional illustration of another portion of the nipple of FIG. **3**;

FIG. **8** is an enlarged bottom perspective view of the nipple of FIG. **3**;

FIG. **9** is a perspective view of a third embodiment of an integral nipple according to the present invention;

FIG. **10** is a sectional view of a fourth embodiment of a nipple according to the present invention;

FIG. **11** is an enlarged partial sectional view of a mounting portion of the nipple of FIG. **10**;

FIG. **11** A is a partial cut-away perspective view showing the vent of FIG. **11**;

FIG. **12** is a bottom view of one embodiment of an arrangement of fluid ducts according to the present invention;

FIG. **13** is a sectional view of an embodiment of a nipple similar to that shown in FIG. **10**, illustrating some of the nipple dimensions;

FIG. **14** is an enlarged partial sectional view of the nipple of FIG. **10**;

FIG. **15** is an enlarged partial sectional view of another embodiment of the nipple of FIG. **10**;

FIGS. **16A-16C** are sectional views of various types of termini for ducts;

FIGS. **17A-17B** are end views of nipples formed with the foregoing termini, and

FIGS. **18A-18D** shows indicia and color coding elements on the nipple of FIG. **13**.

DESCRIPTION OF PREFERRED EMBODIMENTS

FIG. **1** shows an embodiment of a nipple, illustrated generally at **10**, for use with a container, such as a bottle or bag. The nipple **10** may be made of any suitable material, but in a preferred form is made of a silicone material, such as silicone rubber. Preferably, the nipple material may be silicone, but could alternatively be other materials, such as thermoplastic elastomers (TPE's), such as polyisoprene, and others compatible for nursing.

It will be noted that, while described in the environment of human infant feed, the invention has broader application to animal feeding, providing fluids to non-infants, and so on.

The nipple **10** here is formed of two subparts including a substantially solid nipple portion **12** at a proximal end thereof for insertion into an infant's mouth and for conveying fluids therethrough from an attached bottle (not shown). Proximal and distal, being indicative terms, are chosen here with respect to the user (e.g., the infant). The nipple portion is a generally cylindrical substantially solid body. However, it is understood that the nipple can be in other shapes such as "orthodontic" designs. The term "substantially solid", for purposes of the present application, is broadly defined as a range from completely solid (i.e., including no voids or hollows except for the existence of one or more generally narrow ducts for conveying fluid), to having a hollow interior defined by sidewalls that include one or more ducts formed therethrough where the ducts have a significantly greater longitudinal length than radial width. As will be appreciated, there are certain functional attributes for the "solid" nipple portion **12** of this aspect of the invention that do not require a completely solid construct.

Preferably, the material of which the nipple portion **12** is fabricated has a Durometer A (or Shore A) hardness that is substantially within the range of about 1 to about 20. More preferably, the first material has a Durometer A hardness that is within the range of 1 to about 3, or switching to the Shore 00 is scale, most preferably in the range of about 20 to about 45. Below the latter range is nonetheless also considered efficacious. It will be understood that the use of the phraseology "less than x" or "less than about x" includes x.

The nipple **10** includes a second subpart or mounting portion **14** formed at a distal end thereof, which is designed to be attachable to a container in a fluid-tight manner. Alternatively, a secondary collar or like attachment piece could be used to attach the nipple **10** to the container. The material of which mounting portion **14** is fabricated preferably has a Durometer A hardness that may be formed of the same or a greater Durometer hardness than nipple portion **12**. In one embodiment, the mounting portion **14** has a Durometer A hardness that is within the range of about 1 to about 100. More preferably, the material of the mounting portion **14** has a Durometer A hardness that is substantially within the range of about 20 to about 90, or even more preferably in the range of about 70 to about 90.

The nipple portion **12** illustrated in FIGS. **1** and **2** include a plurality of ducts **16**. Any number of ducts **16** may be used, including just one. The ducts **16** are longitudinal (axial) passageways formed in the material of the nipple **12**. Each duct includes an inner opening **18** in communication with an inner chamber **20** of the nipple **10**. Each duct includes an outer opening **22** that is open to the exterior of the nipple. Fluid may flow from chamber **20**, into inner s openings **18**, through ducts **16** and out through outer openings **22**. In an alternate embodiment, the outer openings **22** may include valve devices **23** (FIG. **1A**), the function of which is at least in part to control, reduce or prevent passage of fluid therethrough in certain circumstances.

A flange-like skirt or transitional member **24** extends generally radially **10** from the nipple portion **12** to an upper annular surface **26** of the mounting portion **14**. The main body **28** of the mounting portion **14** may be formed of a gently concave cylinder **30**, although this concavity is not required. A lower part **32** of the mounting portion **14** includes an inner lip **34** and a lower lip **36** with an inner groove **38** defined therebetween. The lower part **32** may be elastically deformed so as to be received on a container (not shown) and wherein the inner groove **38** is fitted over a corresponding mating feature on the container as in a snap-fit, screw attachment, and so on.

The nipple **10** may be formed as a single unitary part, or joined together from two or more parts. In this illustrated first embodiment, the nipple **10** is formed of two parts by a scarf-type joint **40**. Adhesive bonding, heat bonding, chemical bonding, contact molding, ultrasonic welding or any suitable method may hold the joint **40** together. It will be understood that any suitable method of forming the nipple **10** may be employed, such as molding, casting, or two-shot molding, for example.

FIG. **2** illustrates one embodiment of an arrangement of the ducts **16**. The ducts **16** number six individual ducts, although any suitable number of ducts is contemplated. The ducts are arranged in a triangular pattern, each vertice of the triangle similarly spaced from a middle or central axis of the nipple. Two ducts **16** comprise a set and are positioned so as to be arranged axially outwardly in a line from the central axis. Other arrangements of ducts are contemplated that effectively convey fluids through the nipple **10**; this is just one such. As discussed above, the ducts **16** may terminate with a round hole, slit, chisel, "S"-shaped aperture or "Y"-shaped aperture (not shown), for example, or any suitable terminal aperture shape. The termination of the ducts, whether a slit or other shape, may function as a valve.

FIG. **3** shows another embodiment of the present invention. In the illustrated embodiment, the nipple **110** is formed of a two-part construction. The nipple portion **112** includes a substantially solid nipple end **113**, which extends to a hollow, dome-shaped body **115**. The nipple portion **112** is similar to that described above, i.e., a substantially solid nipple body including a plurality of ducts **116** extending therethrough. The body **115** flares outward from the base of the nipple **112** and connects to a collar **142** for connecting to a bottle (not shown).

FIG. **4** shows one embodiment of a collar **142** according to the present invention. The collar **142** here is formed of a rigid plastic material. The collar **142** includes an annular sidewall **144**. A mounting ring **146** is positioned at a top end **148** of the collar **142**. The mounting ring **146** is formed radially inwardly form the sidewall **144** and includes a foraminous configuration **150**. The configuration **150** is formed of a latticework defining openings **152** therebetween. The configuration **150** may be formed of a plurality of closely spaced openings **152** or any suitable method of providing passageways through the material of the collar. The openings **152** of the configuration **148** are provided so as to permit material of the body **115** to penetrate through the mounting ring **146** and

become securely affixed thereto in manufacture. An inner surface **154** of the collar **142** may include a device for fastening the collar **142** to a bottle, such as, for example, a set of threads **156** (see FIGS. **5**, **6**, **7** and **8**).

Referring to FIG. **7**, this view of the embodiment of the artificial nipple **110** of the present invention details the attachment of the nipple body **115** and collar **142**. In particular, a lower end **158** of the nipple body **115** is positioned by molding, casting or the like so as to be intermingled or extended through the openings **152** of the mounting ring **146**. As a result, a lowermost surface **160** (and see FIG. **8**) is created on the lower end **158**, which is oriented downwardly and positioned so as to sealingly engage a corresponding surface of a nursing bottle, container or the like.

A vent **162** is shown in FIG. **7**, for instance. As noted, the lower end **158** of the body **115** is joined to the collar **142**. A horizontal passageway **164** is formed through the sidewall material of the nipple body **115**. The passageway **164** is open to atmosphere at an outside end, and communicates at an inside end with a vertical passageway or air inlet **166** (FIG. **8**). The vertical passageway **166** is in communication with inner chamber **120** of the nipple body **115**.

FIG. **8** shows the nipple described in FIG. **3** from a bottom perspective view. The vertical passageway **166** is open to the inner chamber **120**. Also, the sealing surface **160** is shown generally at a position whereby the nipple portion **112** joins the collar **142**.

FIG. **9** shows an embodiment of the artificial nipple **210** of the present invention wherein the nipple portion **212** is offset with respect to a centerline "C" drawn along the center axis of the collar **242**. This embodiment positions the nipple lower compared to the fluid level in the bottle. This helps to position the bottle so that milk, instead of air, is at the ducts. It also can improve positioning for feeding. Also, a vent may be positioned on an opposite side from the nipple ducts so as to be higher when in use and thus, properly venting.

FIG. **10** shows still another embodiment of an artificial nipple according to the present invention. The nipple, illustrated generally at **310**, is intended for use with a container, such as a bottle or bag. As in the above-described examples, the nipple **310** may be made of any suitable material, but in a preferred form is made of a silicone material, such as silicone rubber.

The nipple **310** may be formed of two subparts including a substantially solid nipple portion **312** at an upper or proximal end thereof for insertion into an infant's mouth and for conveying fluids therethrough from an attached container (not shown) and a lower or distal end including a mounting portion **314** for attachment to the container.

The nipple portion **312** is a generally cylindrical and substantially solid body. Again, the material of which the nipple portion **312** is fabricated is of a Durometer A (or Shore A) hardness that is substantially within the previously described preferred range. Of course, other shapes besides cylindrical can be used, such as orthodontic-type nipples, and so forth.

The nipple portion **312** includes a plurality of ducts **316** (see FIG. **12**). The ducts **316** are longitudinal (axial) passageways formed in the material of the nipple **312**. Each duct includes an inner opening **318** in communication with an inner chamber **320** of the nipple **310**. Each duct **316** includes an outer opening **322** that is open to the exterior of the nipple. The ducts **316** may be arranged as shown in FIG. **2** or, in the alternate as shown in FIG. **12**, or any suitable effective arrangement which takes into account the nipple **312** material and other factors such as the length of the ducts through the nipple, and the amount of flow through desired.

During use, fluid may flow from chamber **320**, into inner openings **318**, through ducts **316** and out through outer openings **322**. In an alternate embodiment, the outer openings **322** may include valve devices (not shown in this version, but see, for instance, FIGS. **16A-16C** and related discussion thereof).

As shown in FIGS. **10** and **11**, the second subpart or mounting portion **314** extends from and is attached to the nipple portion **312**. The mounting portion **314** is attachable to a container in a secure, fluid-tight matter. The material of mounting portion **314** is fabricated of a material that may be of about the same or a greater Durometer hardness than nipple portion **312**. Here, the mounting portion **314** has a Durometer A hardness that is within the range of about 1 to about 100. More preferably, the material of the mounting portion **314** has a Durometer A hardness that is substantially within the range of about 20 to about 90. It will be understood that the mounting portion should have a Durometer A hardness sufficient to enable secure and leak-free attachment to a container. Sandblasting the mold for the mounting portion **314** to provide a matte-type finish for the molded piece in the threaded area is useful for reducing friction when screwing the nipple on a container.

The nipple portion **312** extends into a dome-like structure to form skirt **370** at a lower portion thereof. An inner face **372** of the skirt portion **370** overlaps and connects to an outer face **374** of a corresponding upper engaging section **376** of the mounting portion **314**. Adjacent and below the upper engaging section **376** of the mounting portion **314**, and shown in more detail in FIG. **11**, is an inner lip **378** positioned radially inboard from a generally horizontal land **380**, which, with inner wall **382**, define a generally open channel **384** for sealingly engaging with a container such as a top of a bottle (not shown). The inner wall **382** may be provided with a thread feature **386** to engage a corresponding feature on the container. The thread feature **386** may be a single raised thread as shown, or any suitable numbers of threads for engagement with the container. Furthermore, the horizontal land **380** and inner lip may include a channel **381***a* and **381***b* formed therein which functions as a vent.

Channel **381***a* and **381***b* is also shown in FIG. **11A**. It has a radial part **381***a* that extends across the land **380** from the inner sidewall **382** to the inner lip **378**. While inner lip **378** is relatively thin in its radial dimension, channel part **381***b* is nonetheless formed therein on its outboard facing side and mates with the inside wall of the bottle. This vent structure **281***b* does not appreciably change whether the nipple is screwed on with a small or a larger force. Radial channel part **381***a* is deep enough that it can be compressed without affecting venting.

The dome-like structure of skirt portion **370** has a lower rim section **394**. In one embodiment, the low Durometer material of the nipple portion **312** extends to the lower rim **394**. Alternatively, the lowest Durometer material stops at the bottom of the skirt **370**. The flexibility of the nipple **310** and its general exterior softness can thus be suitably modified in this simple manner.

A retaining ring **388**, preferably made of a rigid plastic, may be positioned abut the outer peripheral surface **390** of the mounting portion **314**. The retaining ring **388** reinforces the mounting portion **314** over the thread feature **386**, thereby assisting the mating of the thread feature **386** with the container, and prevents the mounting portion **314** from flexing outwardly when being attached thereto. The retaining ring **388** is held in place at least in part by a bead **392** formed at the rim section **394** of mounting portion **314**. The ring **388** can advantageously be color coded to indicate a feature of the nipple **312**, such as where a plurality of nipples are available

in different shapes, flow rates, softness and so forth. Other differentiating indicia may be used besides color-coding, of course.

In this illustrated embodiment, the nipple **310** is formed from nipple portion **312** and mounting portion **314** by co-molding, adhesive bonding, heat bonding, chemical bonding, casting or any suitable method to unite the two. Again, the mold in which the present invention is molded may be sand-blasted in order to produce a heavy matte finish on the nipple. In this manner, friction is reduced when screwing the nipple onto a container. This is particularly advantageous in a mounting portion made of silicone rubber or similar elastomer.

Turning to FIG. **13**, another embodiment of the present invention is shown to illustrate a set of dimensions of a preferred nipple. It will be understood that the dimensions, lengths, widths, radii, and so on as provided herein are changeable according to a number of variables related to the material used to form the nipple, the intended end user, manufacturing, flow and other factors. The provided dimensions are intended to illustrate a preferred embodiment and are not intended to be limiting. Structurally and dimensionally, the nipple **410** shown in FIG. **13** is similar to that shown in FIG. **10**, and therefore these dimensions may be beneficially applied to the nipple shown and described in FIG. **10**, for example, as well as other embodiments.

As above, the nipple **410** includes a nipple portion **412** and a mounting portion **414**. Preferably, the nipple portion **412** is made of a platinum cured or similar silicone rubber having a Shore A hardness in the ranges previously indicated. The nipple portion **412** of the nipple **410** has an insertable axial length of about 23 mm, a greater diameter of 13.5 mm and a lesser diameter of 11.8 mm. At times the suckling infant may also insert more of the nipple than just the first 23 mm of nipple portion **412** and may also insert some or even all of the skirt **470**. The overall length of the nipple portion is 40.3 mm. It will be noted that the flexibility, and extensibility of this transition area between the elongated nipple portion and the mounting base, is very like that of the areola of the mother. Like the elongated nipple itself, the skirt **470** area stretches and elongated in the month.

The duct **422**, formed in the nipple portion **412** is formed by a 21.8 mm pin in a molding process using platinum cured silicone rubber as the molded nipple material. The duct **422** is 1.1 mm in diameter. There may be more than one duct **422**.

The mounting portion **414** is made of a silicone rubber having a Shore A hardness of 80. The depicted embodiment differs from that shown in FIG. **10**, in that, an annular peripheral channel **498** is formed about the mounting portion for a retaining ring (not shown, e.g., ring **388**). The width of the mounting portion reaches 45.6 mm. Other features of this nipple are the same as those described, and set out in FIG. **10**.

Turning to FIG. **14**, the nipple portion **512** includes a duct **522** with a modified terminal aperture **591**. The cylindrical duct is 1.1 mm in diameter. The terminal aperture **591** is round in cross section and 0.15 mm in diameter.

The nipple portion **612** depicted in FIG. **15** has another embodiment of a modified terminal aperture or terminus **691**, which is chisel shaped to provide a slit-shaped opening. In this manner, the terminal aperture **691** may beneficially function to prohibit unintended flow through the nipple and other beneficial flow characteristics.

FIG. **16**A shows another variation on a nipple end structure wherein the duct **16** (or indeed any of the other ducts described herein) has a generally cylindrical internal cavity terminating in a small diameter outlet **692**. FIG. **17**B shows an end-view of such a structure.

FIG. **16**B shows a chisel-shaped terminus for the duct **16**, with opposed sidewalls **692***a* and **692***b* which end in a slit **693**, the latter shown in end-view in FIG. **17**A.

FIG. **16**C is yet another terminus structure for the nipple duct **16**, this also having a chisel-shape **692***a* and **692***b* ending in a slit **693**. Outboard sidewalls **694***a* and **694***b* defined within a well **695** give this structure a duck-bill configuration.

All of these terminal structures in FIGS. **16**A-**16**C, and indeed the inboard end structure of FIG. **1**A, serve as valves for allowing fluid flow out through the nipple, but generally (or substantially completely in certain structures) preventing flow back into the nipple.

FIGS. **18**A and **18**B show nipple **410** with indicia **701** indicating different features of the nipples. FIGS. **18**C and **18**D each show nipple **410** with different color coding indicating different features of the nipples. For example, nipple **410** of FIG. **18**C may be pink colored at **702** and nipple **410** of FIG. **18**D may be blue colored at **702**.

Thus, while the invention has been described with respect to certain preferred embodiments, it will be understood by those of skill in the art that there are modifications, substitutions and other changes that can be made, yet will still fall within the intended scope of the invention, as set forth in the following claims.

What is claimed is:

1. A nipple, comprising:

a substantially solid nipple portion adapted to be inserted into the mouth of a user and being formed of a material having a Shore A hardness of less than about 5;

at least one duct for conveying fluid through said nipple; said nipple in use being capable of contraction along its radius so as to restrict passage of fluids through said at least one duct.

2. The nipple of claim **1**, wherein said solid nipple portion has a Shore 00 hardness in the range of about 20 to about 45.

3. A nipple for baby feeding, comprising:

a substantially solid nipple having a Shore A hardness of less than about 5 yielding a very soft solid nipple, including one or more ducts formed therethrough for conveying fluids through said nipple and having a flow restrictive feature presented by said very soft solid nipple which in use is capable of contraction along its radius, positioned in said one or more ducts, said flow restrictive feature preventing passage of fluids through said one or more ducts.

4. The nipple of claim **3**, wherein said solid nipple portion has a Shore 00 hardness in the range of about 20 to about 45.

5. An improved feeding nipple, comprising:

a substantially solid nipple portion adapted for mouth-insertion and formed of a material having a first Shore A hardness of less than about 5, with at least one fluid conveying duct formed therethrough wherein said at least one fluid conveying duct is collapsible during use to substantially prevent the passage of fluid therethrough; and

a container attachment portion formed of a material having a second Shore A hardness, said second Shore A hardness being greater than said first Shore A hardness; said container portion and said solid nipple portion being formed in a unitary piece.

6. The nipple of claim **5**, wherein said solid nipple portion has a Shore 00 hardness in the range of about 20 to about 45.

7. An improved feeding nipple, comprising:

a substantially solid nipple including one or more ducts formed therethrough for conveying fluids through said nipple, said nipple being radially compressible so as to prevent passage of fluids through said one or more ducts

when so compressed, and wherein said solid nipple portion has a Shore A hardness of less than about 5.

8. A feeding nipple for use with a container, comprising:

a substantially solid nipple portion including one or more ducts for conveying fluids through said nipple portion wherein said one or more ducts are collapsible during use to substantially prevent the passage of fluid therethrough; and

a mounting portion, said mounting portion including a land for providing a seal with a container and an attachment feature for securing said feeding nipple to the container, and wherein said solid nipple portion has a Shore A hardness of less than about 5.

9. An improved feeding nipple wherein the improvement comprises:

an elongated nipple part having a Shore A hardness less than about 5 adapted to be insertable into a user's mouth, said elongated nipple part having at least one conduit formed therethrough for conveying fluid from a distal end to a proximal end where fluid exits the nipple into the user's mouth, said elongated nipple part being made of a soft material capable of substantially closing said conduit(s) in use under at least one of

(a) an extension force stretching said elongated part longitudinal to thereby constrict said conduit(s) or

(b) a radially inwardly compressive force to thereby pinch said conduit(s).

10. The improved nipple of claim 9, wherein said elongated nipple part has at least three conduits.

11. The improved nipple of claim 9, wherein said improved nipple further includes a mounting portion having an attachment device associated therewith capable of affixing the nipple to a container, and a transition portion between said mounting portion and said elongated nipple part, said transition portion forming a hollow dome with said mounting portion, said distal end of said elongated nipple part communicating with said dome.

12. The improved nipple of claim 11, wherein said elongated nipple part, transition portion and mounting portion are formed as one integral piece.

13. The improved nipple of claim 12, wherein said mounting portion is formed of a material that is more rigid than said soft material.

14. The improved nipple of claim 13, wherein said mounting portion has a Shore A hardness in the range of about 20 to about 90, and said elongated nipple part has a Shore A hardness less than about 5.

15. The improved nipple of claim 12, wherein said mounting portion has a sufficient rigidity to maintain its shape in use under an extension force applied to said elongated nipple part by the user's mouth.

16. The improved nipple of claim 13, wherein said mounting portion and said elongated part are co-molded together.

17. The improved nipple of claim 11, further including a rigidifying attachment ring, said ring surrounding a collar segment of said mounting portion to thereby substantially restrict radially outward movement of said mounting portion in the area of said collar segment.

18. The improved nipple of claim 17, wherein said ring is located around the exterior of said collar segment.

19. The improved nipple of claim 18, wherein the improvement further comprises a plurality of nipples having at least one differing feature, and a plurality of rings having indicia indicative of a particular different feature.

20. The improved nipple of claim 19, wherein said indicia comprises color-coding.

21. An improved feeding nipple, comprising:

a substantially solid nipple including one or more ducts formed therethrough for conveying fluids through said nipple, said nipple being radially compressible so as to prevent passage of fluids through said one or more ducts when so compressed, and wherein said solid nipple portion has a Shore 00 hardness in the range of about 20 to about 45.

22. A feeding nipple for use with a container, comprising:

a substantially solid nipple portion including one or more ducts for conveying fluids through said nipple portion wherein said one or more ducts are collapsible during use to substantially prevent the passage of fluid therethrough; and

a mounting portion, said mounting portion including a land for providing a seal with a container and an attachment feature for securing said feeding nipple to the container, and wherein said solid nipple portion has a Shore 00 hardness in the range of about 20 to about 45.

23. A nursing nipple, comprising:

a substantially solid elongated nipple portion formed of a material having a Shore 00 hardness of less than about 45 and sized and shaped to be insertable into the mouth of a nursing infant, said elongated portion having a proximal end, with at least one duct extending through said solid nipple portion;

a transition portion defining an internal volume, wherein said one or more ducts are collapsible during use to substantially prevent the passage of fluid therethrough; and

a container attachment portion, said container attachment portion being a generally cylindrical ring and having an internal shoulder adapted to engage a rim of a container mouth, said shoulder having a channel formed therein which communicates with said volume at one end and which communicates with ambient air at another end to thereby form a vent.

* * * * *

EXHIBIT 2021

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
MBHB Case No. 07-2002-G *(5297/175)*



In re Application of:
Andy Greter, Richard S. Weston, Brian H. Silver and Michael Larsson

Serial No.: 10/413,463

Filing Date: April 14, 2003

Title: Breastpump with Letdown Feature

Confirmation No.: 5254

Examiner: Elizabeth MacNeill

Group Art Unit: 3767

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION OF BRIAN H. SILVER UNDER RULE 132

I, Brian H. Silver, hereby declare and state as follows:

1. I make this Declaration on the basis of my own personal knowledge, and if I were called as a witness, I could and would testify competently to the following facts.

2. I have been employed by Medela, Inc. ("Medela") since April, 1991. I am currently employed as Vice President of Innovation & Research at Medela, and have been since May, 2002. Prior to becoming Vice President of Innovation & Research, I was employed as the Director of Innovation & Research of Medela. I began at Medela as Director of Product Development.

3. I have reviewed the Office Action of August 13, 2007, and have studied the Palmer (US 5,571,084), Nuesch (US 6,045,529) and Schlensog (WO 99/44650) references that the Examiner has combined to reject the pending claims as being obvious. I have also

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reviewed the Amendment and Response dated January 14, 2008. I was involved in generating the Remarks and arguments in response to the Examiner's rejections.

4. The present invention applies the findings of intensive research related to the development of a breastpump with a comfortable and efficient pumping pattern. While it has been long known that during breastfeeding, babies suck rapidly to stimulate the milk ejection reflex (MER) and induce milk letdown, no one to my knowledge -- and I have extensive knowledge of the prior art – has ever provided a *specific* mode of operation directed to effectively and efficiently stimulating the MER, and then also including a *different* mode of operation directed to effectively and efficiently addressing milk production. The prior art does not show or suggest the claimed invention. The achievement of this invention has been acclaimed by the mothers who now use it.

5. That nobody has previously put the letdown sequence into a breastpump for a mother to simply and easily initiate the ejection reflex, and then provided a wholly separate mechanism (or means) to express milk efficiently thereafter, is shown by the acknowledgements of this innovation by the mothers who use it. Accompanying the abovementioned Amendment were two recent brochures (Exhibits A and B) published by Medela (the assignee of the invention). These are true and correct copies of the brochures. One is of the HARMONY manual-driven breastpump; the other is of the SYMPHONY programmable (electrically-driven) breastpump.

6. We at Medela have highlighted the "Exclusive 2-Phase Expression Pumping Technology." "2-Phase" refers to the letdown and expression aspects of the invention and pending claims. As set forth in the brochures, this is the letdown sequence (also referred to as the "stimulation" or "milk ejection reflex") and the following different expression sequence, both of which are provided in the pumps. We have designed the SYMPHONY motor-driven pump, for example, so that all the mother has to do is initiate stimulation first (or the pump

can automatically begin with stimulation), then follow with expression (in the programmable version, the expression sequence can be preset to immediately follow the letdown mechanism).

7. The testimonials set forth in the brochures are real and from mothers regarding this innovation.

8. The conclusions to be drawn from these real-life appraisals are plain: the very highly desired results of not just reduced pumping time and but also higher milk production could not have been so obvious in view of the prior art, because there was a long-felt need existing in the art for either one of these achievements. We achieved both in this invention. I am a person of at least ordinary skill in this art. It was non-obvious, and the mothers of the world recognize this conclusion, as shown by the foregoing.

9. The pending claims are directly tied to the discrete letdown and expression sequences that we make available to the mom in both the motor-driven and manual versions of the commercialized invention. I have reviewed the further amended claims being submitted with this Declaration.

10. Note that Claim 12 sets out a breastpump method including providing a breastshield having a portion within which at least part of a woman's breast is received for the expression of milk. A source of pressure is provided that is electrically-driven in communication with the breastshield. The source of pressure is operated according to *a preset milk letdown sequence including rapid cycles per minute* in a manner that is specifically implemented so as to produce milk letdown prior to milk expression, and then operating the source of pressure according to *a slower milk expression sequence of fewer cycles per minute than the letdown sequence* in a manner that is specifically implemented so as to provide general milk expression.

11. Claim 13 is similar in many aspects to Claim 12, but additionally requires providing a source of pressure in communication with a breastshield which is operated by a controller. The controller (e.g., SYMPHONY) is programmed to operate the source of pressure to produce at least *a milk letdown sequence that is specifically designed to yield milk letdown* and *a slower sequence that is specific to milk expression.*

12. Claim 14 requires that a mechanism is provided which is manipulated by hand and dedicated for manually operating a source of vacuum in *a first vacuum cycle mode to produce a letdown* sequence. The source of vacuum is then manually operated by hand using *another mechanism* according to *a second vacuum cycle mode, slower than the first mode, for a milk expression* sequence. "Manipulated by hand" means a manual drive. It is not just pushing a button. Claim 31 requires that the mechanisms of the method of the apparatus in Claim 14 are respective first and second levers. Claim 32 requires that the levers are located on opposite ends of a handle. Claim 33 requires that the handle has a different pivot point for each lever.

13. Palmer shows a pump with a single non-programmable mechanism, having a fixed number of predefined settings, with none of the settings being or suggesting a letdown sequence. The Palmer device has a keypad, best shown in figure 3A at 22. The function of these keys is not specifically mentioned even briefly in the description; and in addition, there are two other keys labeled "3 min" and "7 min" which, when one is selected, presumably determine how long the device operates. Palmer's keypad is nothing more than what was achieved previously by use of a knob or knobs to control the rate and amount of vacuum.

14. Furthermore, Palmer details examples of the system having three distinct and fixed settings wherein the high vacuum setting has a high vacuum magnitude for 1.75 seconds and an off time of 1.25 seconds for a cycle time of 3 seconds or a rate of 20 cycles/min. See Col. 2, lines 25-27. The medium setting has a medium vacuum magnitude for 1.25 seconds

and an off time of 0.75 seconds for a cycle time of 2 seconds or a rate of 30 cycles/min. See Col. 2, lines 28-29. The low setting has a low vacuum magnitude for 0.75 seconds and an off time of 0.50 seconds for a cycle time of 1.25 seconds or a rate of 48 cycles/min. See Col. 2, lines 29-31. There is nothing here to provide a letdown sequence. None of these settings correspond to anything other than a conventional range of expression parameters and are not adapted to eliciting letdown. Palmer uses predefined and fixed settings for providing an intermittent vacuum which is variable as to cycle frequency and amount of vacuum only according to conventional expression.

15. Nuesch is combined in the Action with Palmer. Nuesch mentions that infants suck faster at the beginning to stimulate the breast, but fails to show or suggest a letdown sequence. It is important to note that while Nuesch mentions infants in passing, there is no mention or suggestion or any kind related to adapting a pump to perform letdown. Nuesch fails to show or suggest providing a letdown sequence or combination of operating parameters which correspond to letdown in any part of the document. While Nuesch does discuss, in the background of the invention, the concept that infants suck faster at the beginning, Nuesch fails to show or suggest a mechanism or method which corresponds to a letdown sequence. Nuesch does not reference that this "faster sucking" is for letdown. Moreover, how a baby feeds naturally is not prior art. Nuesch teaches the objective of maintaining a desired suction strength or intensity constant (Col. 1, lines 64-67) even if varying the suction frequency. Moreover, Nuesch discloses a range of frequency not adapted or suited for letdown -- namely a cycle frequency range of 15 to 60. Accordingly, Nuesch fails to supply the deficiencies of Palmer and in fact, teaches away from letdown sequences because Nuesch explicitly advises not to change suction strength and provides a range suited to expression.

16. Schlensog merely provides the broad range of 30-120 C.P.M. and from ambient to 50 mbar as parameters within which embodiments of the Schlensog device can operate. It must be noted that the Schlensog device does not operate at higher vacuums than 50 mbar.

17. Simply because Nuesch mentions in passing only that initially "infants suck faster" does not provide a reasonable basis for the leap to providing a letdown feature for a breastpump, such as in a dedicated mechanism different from the general expression sequence(s), for a mother to simply and easily activate. There is no teaching or suggestion as to what a pump would have to do to meet the limitation of providing first a letdown sequence and then a second sequence different from the first having fewer cycles. It is not proper for the Examiner to use a baby as prior art, either. The idea behind the innovation of this invention is to yield a simple way for a mother to achieve letdown using an apparatus, not a baby. It is not a trivial matter to design a machine that emulates some aspect of a human being. The mere listing of *some* operating parameters of breast pumps does not provide the motivation either to combine references or to modify the references to provide the remaining missing limitations. None of the references define letdown, or show or suggest how a breast pump can elicit letdown, then segue into an expression mode.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct. Further, I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Executed this 22nd day of February, 2008, in McHenry, Illinois.



Brian H. Silver

EXHIBIT A

The Harmony Breastpump...

2-Phase Expression® – Designed to be as comfortable as nursing your baby

Nature made babies very efficient. Their own natural nursing rhythm is the fastest way to get their mother's milk.

Harmony does something other manual pumps can't – mimic a baby's natural nursing rhythm – so it can express milk as quickly and efficiently as Nature intended.

Harmony's 2-Phase Expression pumping pattern was first researched and developed for hospital breastpumps. 2-Phase Expression reduces pumping time –



Stimulation Phase

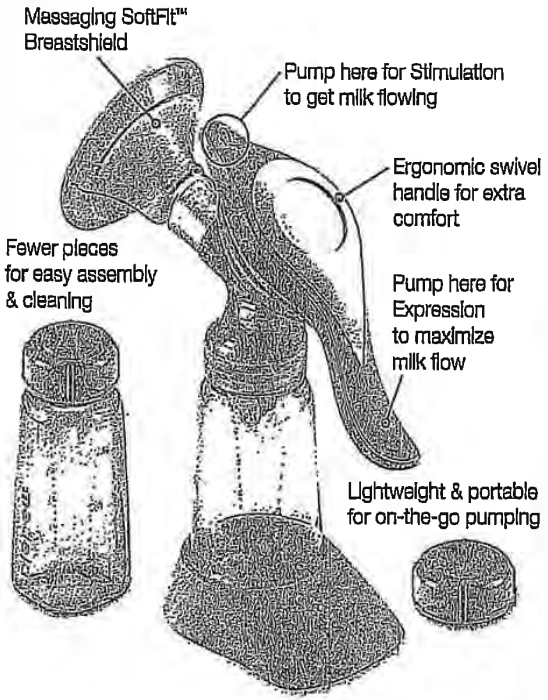
By first pumping in a rapid rhythm to get mom's milk flowing (Stimulation Phase) – just like a baby.



Expression Phase

Followed by a slower, deeper rhythm to maximize mom's milk flow (Expression Phase) – just like a baby.

Harmony provides maximum comfort and control with several unique features:



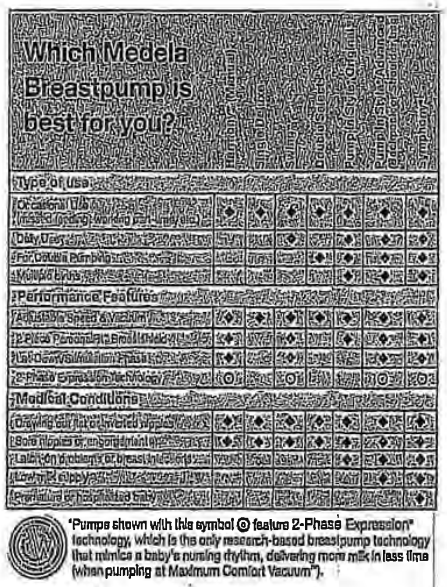
Questions?

Visit the Medela web site at www.medela.com, or call Medela Customer Service at 800-435-8316.

Ideal for Occasional Use

Harmony is an occasional use breastpump, designed for moms who nurse their babies for most feedings. If moms are away frequently, such as returning to work, a Medela daily use breastpump is recommended.

For moms with babies that cannot nurse at all, a Medela hospital-grade breastpump is recommended to initiate and maintain milk supply.



*Pumps shown with this symbol ⓜ feature 2-Phase Expression® technology, which is the only research-based breastpump technology that mimics a baby's nursing rhythm, delivering more milk in less time (when pumping at Maximum Comfort Vacuum™).

† Hospital-Grade breastpumps are used in hospitals and are available for use in home, usually on a rental basis. For the location of a Rental Station or a breastfeeding specialist in your area call 1-800-TELL YOU.

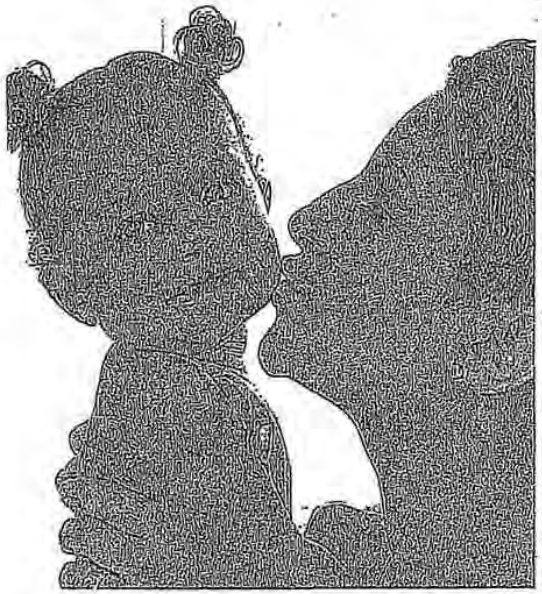
© Medela, Inc. 2006 Printed in USA Harmony and SoftFit are trademarks of Medela

Preferred by 9 out of 10 Moms over other manual pumps

"The 2-Phase Expression® feature gave me a quick let-down and I expressed more milk in a shorter time than I ever did with my other manual pump."

"The pumping time went so fast..It has the comfort, suction and fast results I need."

"The Harmony was more like my baby... a lot simpler to put together...and I expressed the most milk with Medela!"



medela

Box 660, McHenry, IL 60051-0660
www.medela.com

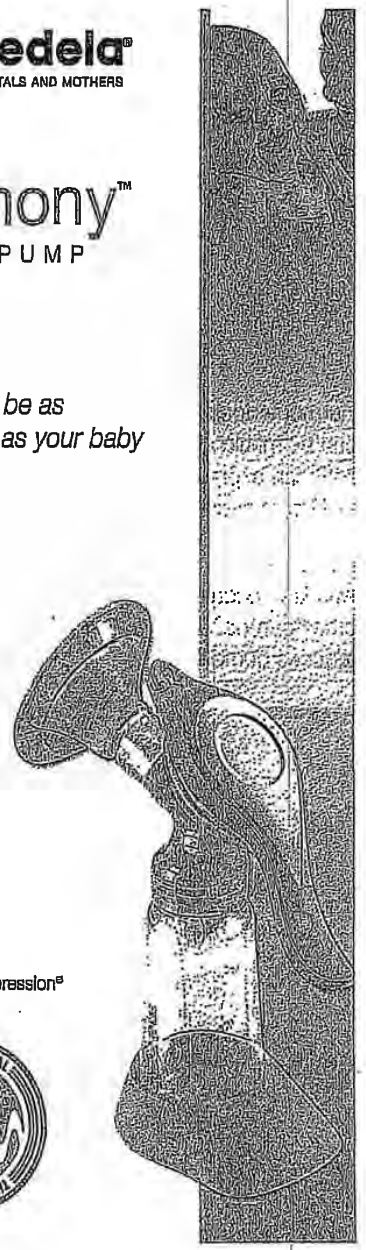
medela®

#1 CHOICE OF HOSPITALS AND MOTHERS

Harmony™

BREASTPUMP

Designed to be as comfortable as your baby



With 2-Phase Expression® pumping

THE ORIGINAL 2-PHASE EXPRESSION

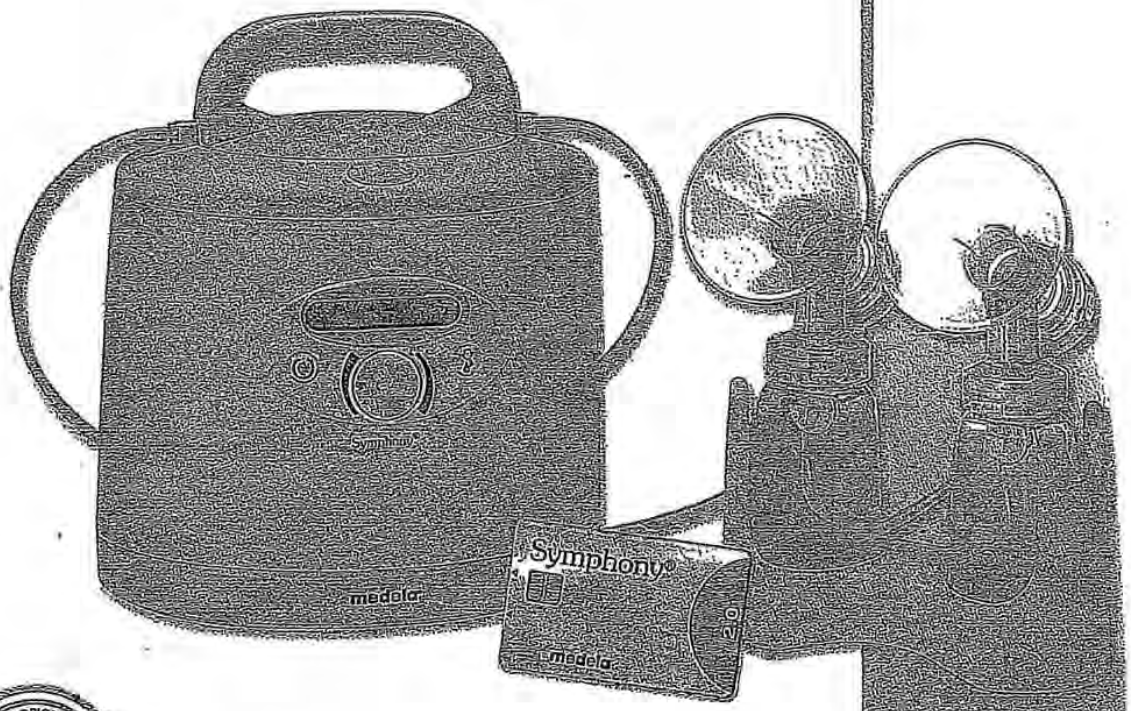
EXHIBIT B

medela®
#1 CHOICE OF HOSPITALS AND MOTHERS

Symphony®

BREASTPUMP



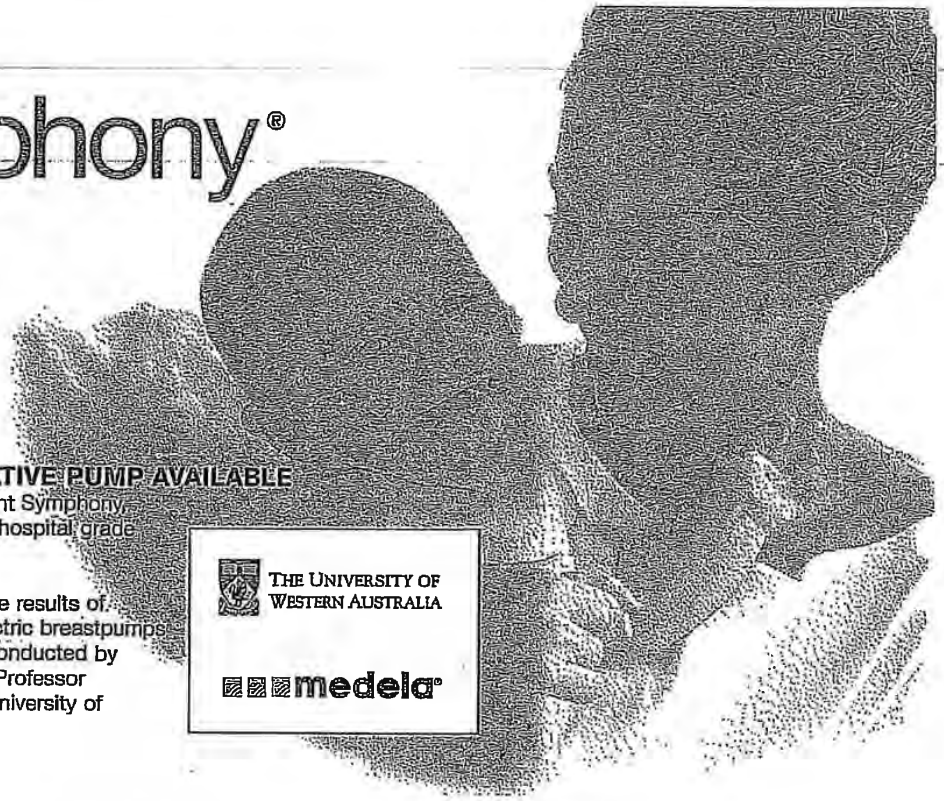


THE ORIGINAL

WITH MEDELA'S EXCLUSIVE 2-PHASE EXPRESSION® PUMPING TECHNOLOGY

COMFORTABLE • EFFICIENT • ADAPTABLE

Symphony®



THE MOST INNOVATIVE PUMP AVAILABLE

Medela is proud to present Symphony, the latest addition to our hospital grade breastpump line.

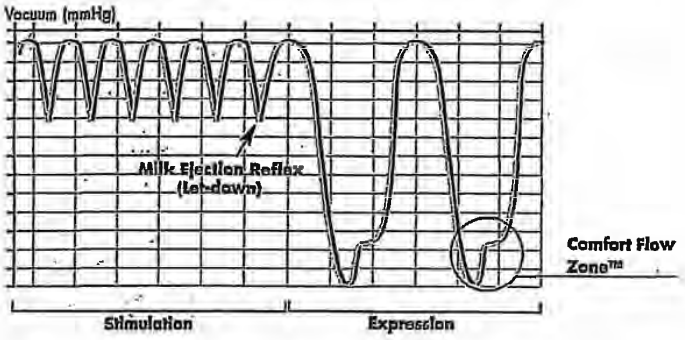
Symphony implements the results of intensive research on electric breastpumps initiated by Medela and conducted by internationally renowned Professor Peter Edwin Hartmann, University of Western Australia, Perth.

THE UNIVERSITY OF WESTERN AUSTRALIA

medela

THE 2-PHASE EXPRESSION® PUMPING PATTERN

Our goal was to develop a breastpump with a comfortable and efficient pumping pattern. During initial breastfeeding, babies suck rapidly to stimulate the milk ejection reflex (MER) and induce milk "let-down." Once the milk starts flowing, the speed of the baby's sucking decreases for the actual feeding phase[1]. The new microprocessor-controlled Symphony is the first hospital-grade breastpump to mimic a baby's two-rhythm nursing pattern, by using technology that pumps in an initial rapid Stimulation phase, then a slower Expression phase. We call this new technology 2-Phase Expression.



STIMULATION PHASE

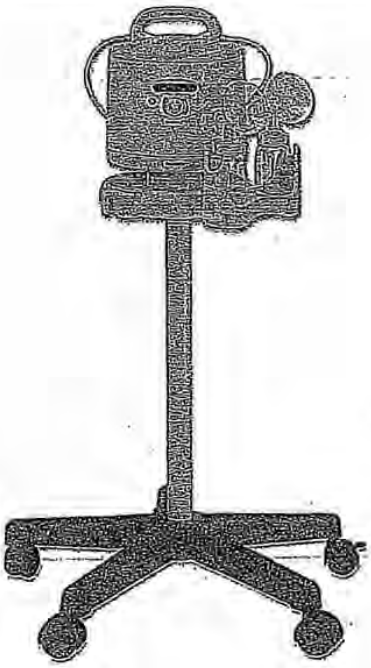
- Initiates faster milk ejection reflex
- Research-proven optimal fixed cycles per minute
- Individually adjustable vacuum for comfort

EXPRESSION PHASE

- Comfort Flow Zone™ for maximum comfort and efficiency — gentle to the breast tissue
- Adjustable preset combination of vacuum and cycles per minute
- Supports milk production

[1] *Midwifery (1986) 2; "The 'anatomy' of infant sucking," Michael W. Woolridge*

Symphony®



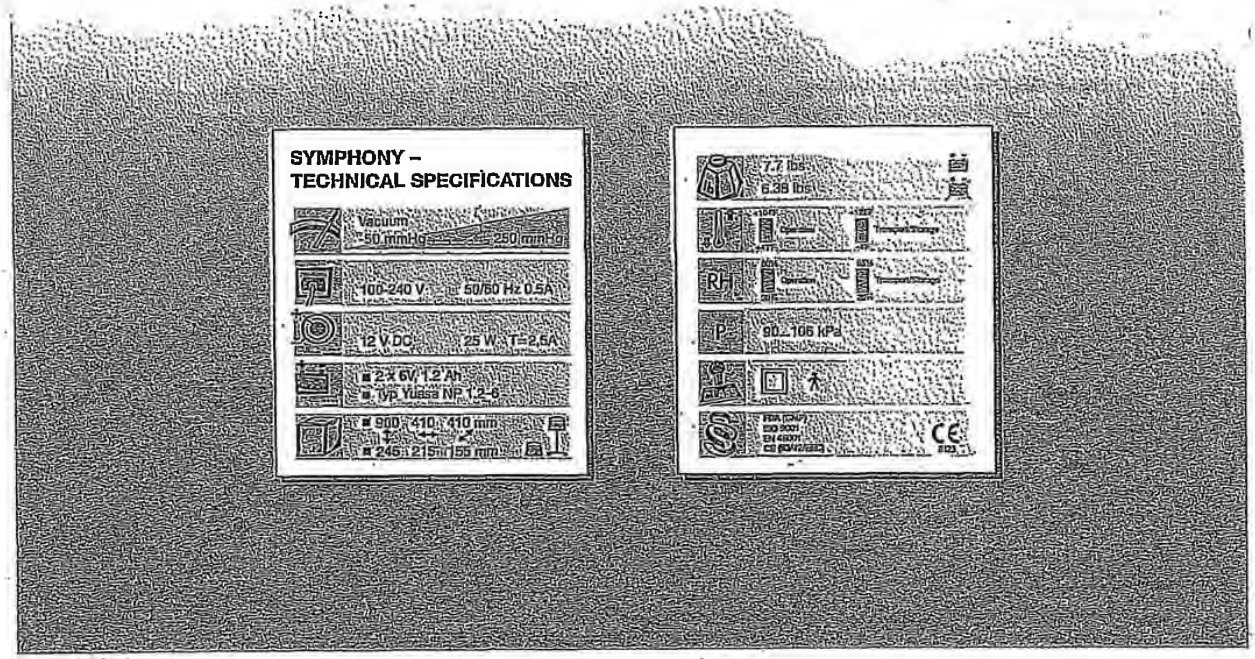
SYMPHONY BREASTPUMP

- Symphony 2.0 Program Card
- Container Stand
- Protector for Card/Cord
- Battery option (rechargeable)

ACCESSORIES

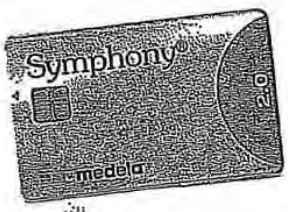
- Double Pumping System for collecting breastmilk
- Hard Case
- Trolley
- Symphony Vehicle Lighter Adapter

3-YEAR WARRANTY



MORE EFFICIENT THAN EVER

The Symphony breastpump is more versatile than ever with the Symphony 2.0 Program Card. The 2.0 program card's functional enhancements were based on market feed-back by moms and clinicians.



AUTOMATIC
Fully automatic switching from stimulation to expression phase after 2 minutes.

INDIVIDUAL
When the milk let-down occurs before the 2-minute stimulation has elapsed and mom wishes to reduce the stimulation time, she can continue with expression immediately by pressing the button.

CONVENIENT
Mom can easily return to stimulation by pressing the button.

COMFORTABLE
Symphony gently transitions from stimulation to expression with a gradual vacuum ramp-up between the two phases.

ADAPTABLE FOR THE FUTURE

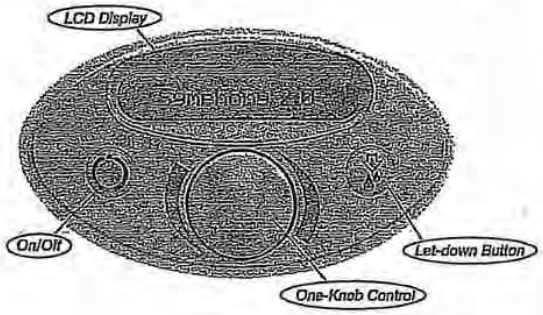
The unique 2-Phase Expression Pumping Pattern is stored on a Program Card that supplies the necessary information for the micro-processor. Through Medela's ongoing research, additional Pumping Programs may be released in the future for the Symphony breastpump simply by providing an alternate Program Card.

EXACT INFORMATION

An LCD Display indicates the pumping mode, vacuum level, battery status and other handling and service information.

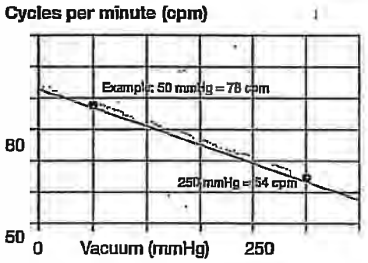
"My pumping time was reduced considerably by first stimulating let-down."

– Elke K.



ONE-KNOB COMFORT CONTROL

For mom's convenience, one knob controls the vacuum level and the number of cycles per minute in the expression phase allowing mom to achieve her Maximum Comfort Vacuum* efficiently.



"Maximum Comfort Vacuum™ is the highest vacuum setting a mom can go and still be comfortable during pumping in the expression phase."

"I achieved a higher milk production with Symphony than with any other breastpump."

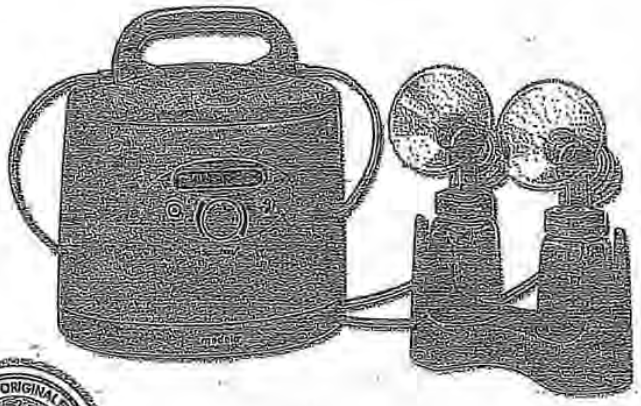
- Anne V.

"The Effect of Vacuum on the Removal of Milk Using an Electric Breast Pump;" J.C. Kent, M.D. Cregan, D. Doherty, L.R. Mitoulas, D.T. Ramsey, and P.E. Hartmann; The University of Western Australia

Symphony®

"Symphony is the most comfortable breastpump I have ever used — and I didn't even hear it was switched on!"

-Gioia F.



WITH MEDELA'S EXCLUSIVE 2-PHASE EXPRESSION® PUMPING TECHNOLOGY

UNIQUE OVERFLOW PROTECTION
The Symphony Pump Kit is separate from the pump motor and is protected by a membrane preventing any overflow into the pump, providing the highest level of hygiene without compromising vacuum capacity. Symphony is easy to clean, and the Pump Kit is autoclavable.

SINGLE OR DOUBLE PUMPING
Two separate, independent membrane units allow switching between single and double pumping simply by applying or removing the second Collection Kit to the breast. No loss of vacuum, no extra parts.

"The stimulation mode is extremely gentle and comfortable — I truly enjoyed pumping with Symphony."

-Claudia M.

medela®

www.medela.com

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EXHIBIT 2022

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International application number: PCT/GB05/002532

International filing date: 29 June 2005 (29.06.2005)

Document type: Certified copy of priority document

Document details: Country/Office: GB
Number: 0502599.4
Filing date: 08 February 2005 (08.02.2005)

Date of receipt at the International Bureau: 19 July 2005 (19.07.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse

PCT/GB2005/002532

INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Signed

Dated 11 July 2005

09FEB05 E961835-2 000056
P01/77FEE 30.00-0502599.4 CH
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Patents Form 1/77

Patents Act 1977
(Rule 16)

THE PATENT OFFICE
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Request for grant of a patent

(An explanatory leaflet on how to fill in this form is available from the Patent Office)

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

Application number GB 0502599.4

1. Your reference: *(optional)* P37686GB/GVR

2. Full name, address and postcode of the applicant or of each applicant *(underline all surnames)*:

Jackel International Limited
Dudley Lane
Cramlington
Northumberland, NE23 7RH

Patents ADP number *(if you know it)*: 7204746001

If the applicant is a corporate body, give the country/state of its incorporation: United Kingdom

3. Title of the invention:

Feeding Teat

4. Name of your agent *(if you have one)*:

Kilburn & Strode
20 Red Lion Street
London
WC1R 4PJ

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Patents ADP number *(if you know it)*: 125001

	Country	Application number *(if you know it)*	Date of filing *(day / month / year)*
5. Priority declaration: Are you claiming priority from one or more earlier-filed patent applications? If so, please give details of the application(s):			

	Number of earlier UK application	Date of filing *(day / month / year)*
6. Divisionals etc: Is this application a divisional application, or being made following resolution of an entitlement dispute about an earlier application? If so, please give the application number and filing date of the earlier application:		

7. Inventorship: (Inventors must be individuals not companies) (Please tick the appropriate boxes)

Are all the applicants named above also inventors?	YES ☐	NO ☑
If yes, are there any other inventors?	YES ☐	NO ☐

8. Are you paying the application fee with this form? YES ☑ NO ☐

Patents Form 1/77

Patents Form 1/77

9. Accompanying documents: not counting duplicates, please enter the number of pages of each item accompanying this form:

   Continuation sheets of this form:

   Description: 7

   Claim(s): 3

   Abstract: -

   Drawing(s): 2 x2

   If you are not filing a description, please give details of the previous application you are going to rely upon:

Country	Application number	Date of filing (day / month / year)

10. If you are also filing any of the following, state how many against each item.

    Priority documents:

    Statement of inventorship and right to grant of a patent (Patents Form 7/77):

    Request for search (Patents Form 9A/77): 1

    Request for substantive examination (Patents Form 10/77):

    Any other documents: (please specify)

11. I/We request the grant of a patent on the basis of this application.

    Signature(s): K. Ibuns Skrodi Date: 8.2.05

12. Name, e-mail address, telephone, Fax and/or mobile number, if any, of a contact point for the applicant: Gwilym V. Roberts
    Tel: 020 7539 4200, Fax: 020 7539 4299

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you are resident in the United Kingdom and your application contains information which relates to military technology, or would be prejudicial to national security or the safety of the public, section 23 of the Patents Act 1977 prohibits you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

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DUPLICATE

Feeding Teat

The invention relates to a feeding teat especially for an infant's feeding bottle.

Current developments in feeding teats concentrate on making them more similar to the human breast, but various problems exist in known teats. For example teats such as that described in US6745912 B2 (Pigeon) including a series of parallel annular grooves on the inner surface of the nipple which allows stretching of the nipple but only in a constrained direction, and with the risk of flow blockage if the nipple collapses.

In addition, efforts are continuing to provide valved feeding bottles, in particular to allow air ingress to the teat. It is believed that this reduces the risk of colic which can otherwise occur as a result of negative pressure building up in the feeding bottle. Various known arrangements include slit valves of various types, however these are frail and difficult to machine. In another approach described in German patent DE19716535 a teat is provided with an inner annular resilient flange at its base which rests on a bottle rim when screwed down by a collar. Upon a negative pressure building up inside the drinking vessel the flange lifts from the vessel rim and air passes up through the collar and between the flange and the vessel rim. In a similar arrangement described in European patent application EP151862 a teat includes a downwardly depending cylindrical flange at its base which seals against the inner top face of a vessel neck when deformed by being screwed down by a collar. Again a negative pressure inside the vessel lifts the flange away from the vessel neck so that air flows through the collar and between the neck and the flange into the vessel to relieve the pressure differential. Such arrangements rely on the correct amount of screw pressure being applied by the user on fixing the teat which can give rise to varied levels of valving between

uses. Furthermore the introduction of a circumferential flange increases material costs.

The invention is set out in the claims. Because of the provision of a helical flow formation on the inner face of the teat, continuous flow of liquid is allowed even when the teat collapses via the helical flow path while allowing extension of the teat and in particular a rotational or torsional extension.

Embodiments of the invention will now be described, by way of example, with reference to the drawings, of which:

Fig. 1 which is a cross-sectional side view of a teat and vessel according to the present invention;

Fig. 2a is a perspective view showing a teat valve in a first, closed configuration;

Fig. 2b is a perspective view showing a teat valve in a second, open configuration;

Fig. 3 is a partial perspective view of the underside of the teat, showing a lip valve;

Fig. 4a is an exploded perspective view showing assembly steps for a drinking vessel according to the invention;

Fig. 4b is a perspective view showing a first detail of an assembled vessel according to the present invention; and

Fig. 4c is a perspective view showing a second detail of an assembled vessel according to the present invention.

Referring to Fig. 1, it will be seen that a teat assembly 40 is mounted on an infant drinking vessel 12. The teat assembly 40 includes a teat 10 having a teat portion 14 forming a nipple having drink apertures 15 at its upper end, a base portion 16 mountable to the drinking vessel and an areola region 18

therebetween. The teat 10 is textured and shaped to mimic the human breast and can, for example have skin-like texture varying between the teat portion, areola region and base portion, similar to the human breast. The teat can indeed be coloured to mirror human skin colour including ethnic skin colours. The shape of the teat is also similar to the human breast, the base portion 16 being shaped like a breast and having a wide, domed configuration. The areola portion 18 rises from the base portion 16 to the teat portion 14 at an angle to the horizontal, that is to say, with a component of inclination parallel to the teat portion 14, allowing better pursing by the infant so that they can close their lips effectively around the teat, and again mimicking the human breast such that the experience of the infant is as similar as possible to the natural experience of breast feeding.

The teat 10 is formed from an elastomer with walls of decreasing thickness from the base portion 16 through to the teat 14 providing a more realistic flexing characteristic. The areola portion 18 further includes undulating grooves 20 forming, in cross-section, a wavy profile on the inner surface of the areola portion 18 and extending circumferentially. In the embodiments shown three such grooves are formed adjacent one another providing a bellows action as well as flexing in a direction perpendicular to the flow direction and increasing the flexibility especially in conjunction with the decreasing wall thickness providing a more natural stretching characteristic. Yet further, the teat can be textured on its outer and/or inner surface to enhance operation or realism of the teat as appropriate.

The teat portion 14 projects generally perpendicular to the mouth of the vessel 12 and is elongate for example of length 20mm, again to mimic the extension of the human nipple during breast feeding. The teat portion has a generally rectangular cross-section with wall thickness 1.8mm and diameter 13mm. A

tight pitch helical groove 22 of groove depth 0.9mm (half the wall thickness) having for example three turns and 3mm pitch is moulded or otherwise formed around the inner cylindrical vertical surface of the teat portion 14 to form a flow passage even when the teat portion is collapsed, for example under biting pressure from an infant. In addition the helical groove allows rotational or torsional extenson of the teat portion in the range of 5-6mm and flexing parallel perpendicular to the flow direction, again more closely mimicking the human breast.

At the tip of the teat portion the apertures 15 comprise a variable flow valve, where the flow can either be selected by choosing a teat with appropriate apertures or a two or three crossed slit configuration can be provided allowing the infant to regulate flow. For example referring to Figs. 2a and 2b, a teat 200 includes a teat portion 202 with a slit valve 204. As can be seen from Fig. 2b when pressure is applied in the longitudinal direction of the slit, for example bite pressure, the slit valve opens allowing fluid flow by application of compression and distortion pressure.

The teat assembly 40 is formed in a two-shot moulding process with elastomer forming the teat 10 and polypropylene forming a screw collar 30 which is integrally formed with the teat 10. As a result a resilient, cheaply and easily manufactured integral assembly is provided.

The screw collar 30 includes an internally threaded cylindrical portion 32 and a downwardly domed peripheral portion 34 surrounding it and extending from an upper end of the cylindrical portion 32. The domed portion 34 includes a horizontal outward annular flange 35 of thicker cross-section at its base. The teat 10 is over-moulded onto the screw collar 30 and the domed portion 34 terminates at a central circular orifice corresponding with an outer face of the

neck 28 of the vessel 12, the over-moulded portion of the teat extending inwardly slightly from this position and terminating in a downwardly depending cylindrical flange 41.

As a result the screw collar provides structural strength and a strong screw fit, but the resilient material of the teat portion 40 provides sealing. In particular the threaded cylindrical portion 32 of the screw collar screws on to the outwardly threaded neck 28 of the vessel 12 and the top, innermost edge of the domed portion 34 abuts the outer face of the neck 28. Because the teat material 10 overhangs the inner edge 39 of the domed portion 34, when the teat assembly 40 is screwed down, the overhanging portion seals against the top rim of the neck 28 and the downward cylindrical flange 41 forms an elastomer sealing ring sealing against the top inner face of the vessel neck 28. The teat 10 includes a vent passage 26 through the elastomer material and substantially at the periphery. A discontinuous flap or lip valve portion 23 projects down from the flange 41 in a portion of the periphery only in the vicinity of the vent passage 26.

Because of the resilience of the flange portion, when an infant sucks on the teat, reducing pressure within the vessel, the lip valve 23 will flex away from the neck 28 of the vessel 12. In the region of the vent 26 in the teat 10, this allows venting between the interior of the vessel and atmosphere through the teat. Referring to Fig. 3 the lip valve 24 can be seen viewed from the underside. In the embodiment shown it will be seen that a passage 25 actually passes through the lip valve, communicating with the vent passage 26. In that case the aperture to the passage 25 will seal against the inner face of the vessel in the sealed configuration and unseal to provide a passage. Alternatively the slit valve 24 can comprise a flap which flexes away from the interior surface to allow communication with a vent passage as described above.

The teat assembly 40 also has a positive engagement stop providing tactile feedback to ensure that the teat assembly is corrected tightened on the vessel and allows the lip valve to seal effectively. Referring to Figs. 4a to 4c, for example, it will be seen that a vessel 400 receives a handle portion 402 and a teat screw collar 404, corresponding to the screw collar 30 described above but with the elastomer teat 10 removed for the purposes of clarity of understanding.

The handle portion 402 includes a cut-out portion 406 which cooperates with projections 408a, 408b on the vessel to locate the handle portion in a predetermined position. The handle portion is placed over the vessel and located in the desired orientation and then the collar 404, including an internal thread portion allowing mounting on the vessel 400 is screwed into position as described above, securing the handle portion 402 in place.

As can best be seen in Fig. 4b, the collar portion 404 includes an internal lug 410 which projects inwardly from the inner face and engages against a stop feature on the screw threaded portion of the vessel 400 formed by the projections 408a, 408b such that the teat 10 "clicks" into a desired position. As a result a controlled compression on the lip valve 24 is obtained such that a consistent and repeatable valving action is obtained on each use. In particular the projections 408a, 408b are separated by a recess, 408c best seen in Fig. 4c. When the collar 404 is screwed into place the lug 410 passes over the projection 408b which has a ramp towards the recess 408c. After the lug 410 has ridden up the ramp it drops into the recess 408c and is obstructed from further movement by the planar face of the projection 408a. The lug 410 further prevents the collar 404 from being unscrewed by virtue of its engagement with the abutting face of the projection 408b. However the lug 410 and projection 408b have chamfered or radiussed abutting faces such that,

on application of sufficient unscrewing pressure, the lug 410 rides over the chamfered face of the projection 408b and then down the ramp allowing the collar to be fully unscrewed.

In operation the vessel is filled with drinking liquid and the teat assembly 40 is screwed on until positive engagement is detected (for example a discernable "click") meaning that it is correctly fitted. When the infant then drinks from the vessel the pressure difference pulls the lip valve 24 away from the inner face of the neck 28 of the vessel 12 allowing venting through vent passage 26 and hence reducing the risk of colic. Because of the provision of the lip valve there is no requirement for providing slits and a natural, robust and resilient valve assembly is provided. Furthermore, the valve is formed during the moulding operation and requires no secondary operation for its formation providing commercial and manufacturing benefits. Yet further as a single vent passage is provided at one point on the teat, the risk of leakage is reduced, especially as the vent passes through the teat rather than around the vessel neck.

It will be appreciated that the vessel and teat assembly can be formed from any appropriate material and in any appropriate manner, for example by co-moulding or two-shot moulding. The vessel and teat can adopt any appropriate dimensions and the teat portion can have any appropriate configuration for example an orthodontic configuration. Furthermore features can be implemented in other types of drinking vessel cover as appropriate. For example the lip valve can be implemented in a trainer cup cover, a sports bottle or other vessel closures capable of forming a partial vacuum in a vessel in use.

Claims

1. A feeding teat having a continuous helical flow formation on an inner surface thereof.

2. A teat as claimed in claim 1 in which the helical flow formation comprises a helical groove.

3. A feeding teat as claimed in claim 1 or claim 2 comprising a base portion and a teat portion, in which the helical flow formation is provided in the teat portion.

4. A teat as claimed in any preceding claim in which the flow formation is a groove and has a depth of approximately half of the wall thickness.

5. A teat as claimed in any preceding claim in which the helical flow formation pitch is approximately 3mm.

6. A feeding teat including an areola region and having a plurality of undulating grooves on an inner surface of the areola region.

7. A drinking vessel cover comprising a flange portion arranged to seal against a vessel flow orifice wall, in which the cover includes an air vent passage therethrough and the flange portion includes a deformable portion associated with the vent passage and arranged to deform away from the flow orifice wall under negative pressure to allow air venting through the vent passage.

8. A drinking vessel cover as claimed in claim 7 in which the deformable portion comprises a lip valve.

9. A drinking vessel cover as claimed in claim 8, in which the lip valve comprises a flap.

10. A drinking vessel cover as claimed in claim 8, in which the lip valve comprises a tube having a tube passage communicating with the vent passage and a tube opening closed against the orifice wall in a sealed position.

11. A drinking vessel cover as claimed in any of claims 7 to 10 in which the flange portion is arranged to engage an inner surface of the flow orifice wall.

12. A drinking vessel cover as claimed in any of claims 7 to 11 further including a positive engagement formation for indicating correct connection to a feeding vessel.

13. A drinking vessel cover as claimed in any of claims 7 to 12 comprising a feeding teat.

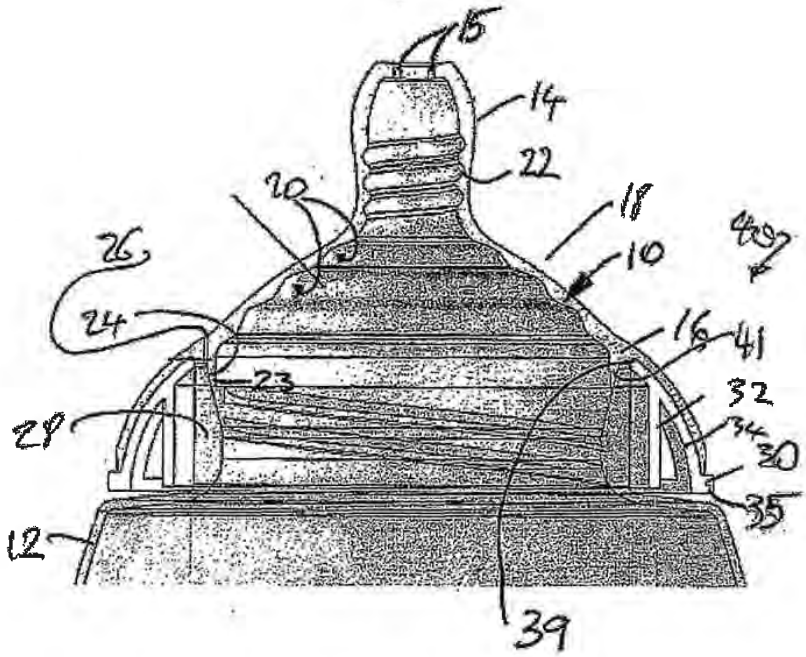
14. A drinking vessel cover comprising a peripheral rim having a circumference and a deformable portion projecting from a portion of the circumference of the rim to form a valve portion arranged to seal against a vessel flow orifice wall to close a vent passage and arranged to deform away from the flow orifice wall under negative pressure to allow air venting through the vent passage.

15. A drinking vessel cover as claimed in claim 14 having the features of a teat or drinking vessel cover as claimed in any of claims 1 to 13.

16. A vessel including a teat or drinking vessel cover as claimed in any preceding claim.

17. A teat, drinking vessel cover or vessel substantially as herein described with reference to the drawings.

FIG. 1



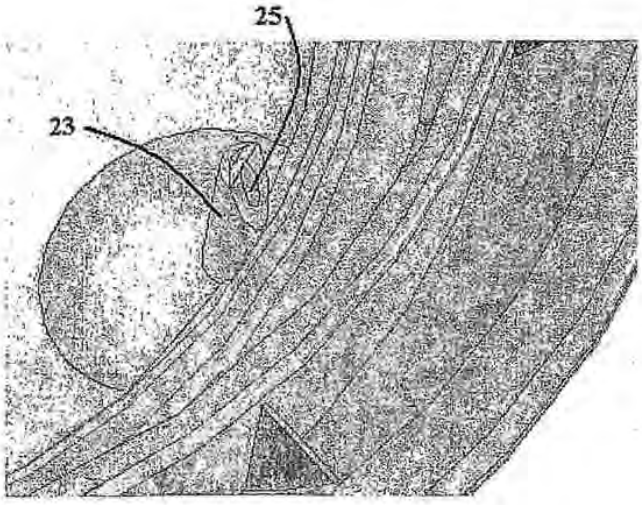


FIG. 3

FIG. 4A

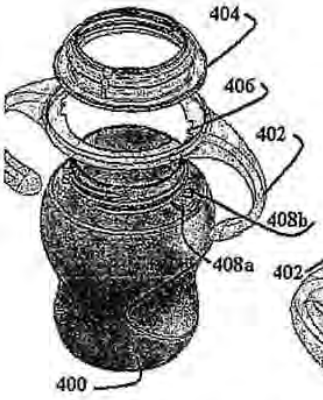
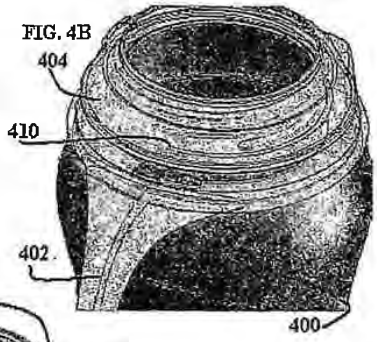


FIG. 4B



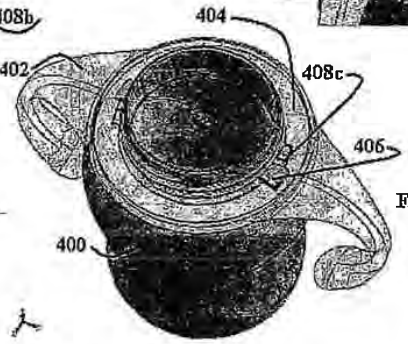


FIG. 4C

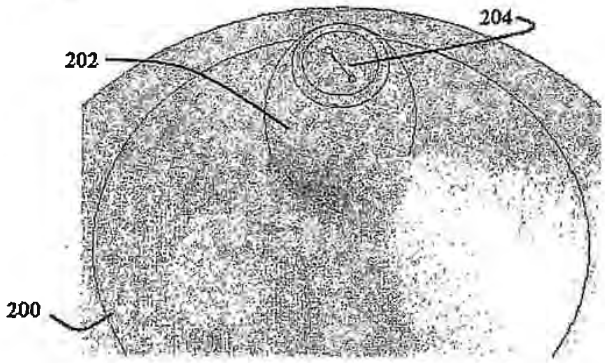


FIG. 2A

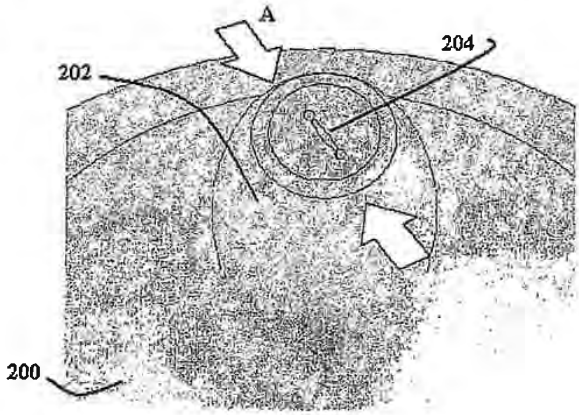


FIG. 2B

PCT GB2005/002532.

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International filing date: 29 June 2005 (29.06.2005)



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2. Patent application number *(The Patent Office will fill in this part)* 0414560.3 — 29 JUN 2004

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

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Northumberland, NE23 7RH

Patents ADP number *(if you know it)* 7204746001

If the applicant is a corporate body, give the country/state of its incorporation: United Kingdom

4. Title of the invention

Teat

5. Name of your agent *(if you have one)*

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

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DUPLICATE

Teat

The invention relates to a teat, in particular a teat or a nipple for a feeding bottle.

Various known teats have been designed to mimic the human breast in operation. One known teat is described in US6645228 and includes a stem and a base. The base has a bulbous region and an areola region from which which the stem projects. The bulbous region has an upper region with a progressively thinning wall which acts as a spring element such that as an infant sucks on the teat the areola and stem move back and forth relative to the bulbous region.

Various problems arise with this arrangement. Movement of the areola region and stem relative to the bulbous region does not closely mimic the movement of the human breast during sucking. Furthermore because flexibility is provided upon a progressively thinning wall region, the amount of flexing and the point at which flexing takes place is undefined and unpredictable.

The invention is set out in the claims. Because the flex region is provided in the areola portion allowing the teat portion and/or areola portion to move towards and away from one another a more natural feeding action is provided. Furthermore because of the inclusion of a plurality of flex channels the point of flexure is clearly defined.

Embodiments of the invention will now be described by way of example with reference to the drawings, of which:

Fig. 1 is a cross-sectional side view of a teat according to the present invention;
Fig. 2a is a side view of the teat of Fig. 1 in use in a first flexed position; and

Fig. 2b is a side view of the teat of Fig. 1 in use in a second flexed position.

Referring firstly to Fig. 1 a teat 10 includes a teat portion 12, a base portion 14 and an areola portion 16 therebetween. A flange 18 extends from the base of the base portion to allow fixing to a feeding bottle (not shown) in any appropriate known manner. The base portion may also include a one-way air-inlet valve of any appropriate type for example an integrally moulded duck-bill valve (not shown). The teat has circular symmetry around an axis A running through the centre of the teat.

The areola portion 16 includes a flex region 20 comprising three grooves or flex channels 22 extending around an inner surface of the areola portion effectively forming circular thinned regions parallel/concentric with each other about the axis A and hence surrounding the teat portion. The flex region 20 is generally provided between a transition region 24 separating the base portion 14 and the areola portion 16 and a transition region 26 separating the areola portion 16 and the teat portion 12. The flex region 20 allows flexing of the teat as described in more detail below.

The teat can be formed in any appropriate manner, for example compression or injection moulding and formed of any appropriate elastic material such as silicone, latex or thermoplastic elastomer (TPE). Injection moulded silicone provides a particularly desirable degree of elasticity in the teat portion. The teat portion 12 is preferably thinner in cross-section than the remainder of the teat or is co-moulded with a more flexible material to allow additional flexing of the teat portion relative to the teat as a whole. The teat can have a texture such as a skin-like texture moulded or otherwise patterned on to its surface.

As shown in Figs 2a and 2b, in operation an infant drinks from the teat mounted on a bottle, the infant's tongue 50 contacting the teat portion 12, the infant's teeth or gums 52 contacting the transition portion 26 and the infant's lips 54 contacting the areola portion 16 generally at the flex region 20. As a result, as the infant sucks on a teat the teat portion and areola portion flex towards and away from one another by virtue of respective collapsing and extending of the flex region around the flexed channels 22. In particular, as can be seen in Fig. 2a, reduced suction on the teat portion 12 towards the base portion 14 relaxes the flexible reduced suction whereas, as shown in Fig. 2b, suction on the teat portion 12 away from the base portion 14 collapses the flexible region 20 extending the teat portion and areola portion away from one another.

The back and forth motion of the teat portion 12 mimics very closely the natural movement of the human breast during suckling or sucking of the infant by effectively allowing the teat to move and stretch as skin moves and stretches. The grooves or channels further visually define an areola area and are placed at an area of the teat which is also a non-bite area. The flexible portion also provides a pumping action on liquid in the bottle as the teat portion oscillates or reciprocates back and forth.

It will be appreciated that the teat can be formed of any material and can be any appropriate shape which may be, for example, non-symmetrical such as a shaped or orthodontic teat or even more closely mimicking the shape of the human breast. Different teat configurations can be provided to grow with different ages of infant. For example the teat portion can be made progressively longer as the age of the infant who will be using the teat increases and/or the texture can be made less prominent, for example ranging from coarse for new-borns through fine to gloss. The flex channels in the flex

region can be of any appropriate profile for example square, semi-circular or triangular in cross-section and can be provided on the inner or outer surface of the teat and in any appropriate number. Instead of providing thinned regions the flexed channels can be formed by a concertina or bellows configurations moulded into the teat or any other appropriate hinge or fold mechanism.

Claims

1. A teat comprising a base portion, a teat portion and an areola portion therebetween from which the teat portion extends, in which the areola portion includes a flex region allowing movement of the teat portion and areola portion in a direction towards and away from one another, and in which the flex region includes a plurality of flex channels defining the flex direction.

2. A teat as claimed in claim 1 in which the flex channels comprise grooves formed in the areola region.

3. A teat as claimed in claim 2 in which the grooves surround the teat portion.

4. A teat as claimed in claim 2 or claim 3 in which the grooves are generally parallel with one another.

5. A teat as claimed in any preceding claim in which a first transition area extends between the base portion and the areola portion and a second transition area extends between the areola portion and the teat portion and in which the flex region is provided intermediate the first and second transition areas.

6. A teat as claimed in any preceding claim in which the flex region is provided in a plane generally transverse to the flex direction.

7. A teat as claimed in any preceding claim in which the teat portion material is flexible in the flex direction.

8. A teat comprising a base portion, a teat portion and an areola portion therebetween from which the teat portion extends, in which a first transition area extends between the base portion and the areola portion and a second transition area extends between the areola portion and the teat portion, the teat further comprising a flex region allowing movement of the teat portion and areola portion in a direction towards and away from one another in which the flex region is provided intermediate the first and second transition areas.

9. A teat comprising a base portion, a teat portion and an areola portion therebetween from which the teat portion extends and a flex region allowing flexing of the teat portion in a direction towards and away from the base portion, in which the flex region extends in a plane generally transverse to the flex direction.

10. A feeding bottle including a teat as claimed in any preceding claim.

11. A teat or feeding bottle substantially as herein described with reference to the drawings.

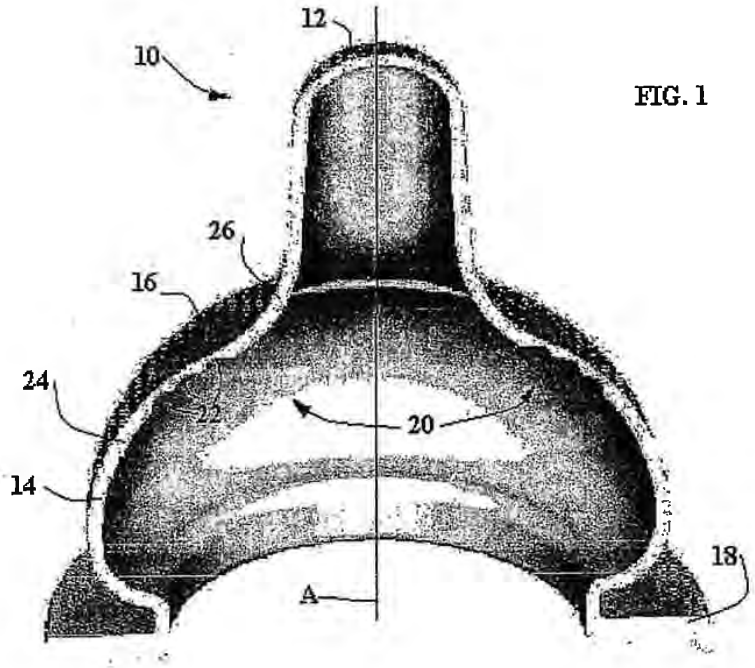


FIG. 1

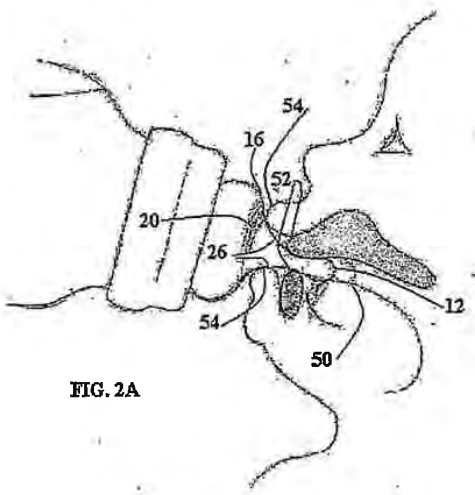


FIG. 2A

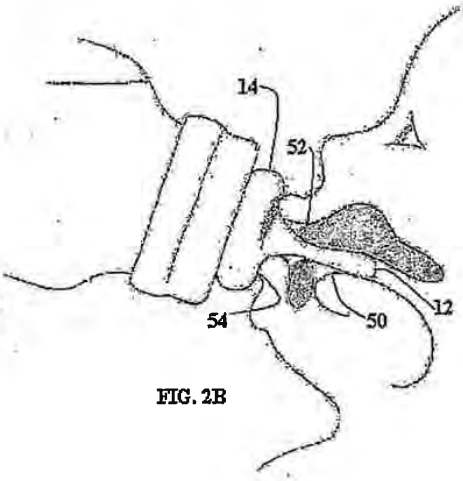


FIG. 2B

EXHIBIT 2024

US006161710A

United States Patent [19]

Dieringer et al.

[11] Patent Number: 6,161,710

[45] Date of Patent: *Dec. 19, 2000

[54] **NATURAL NIPPLE BABY FEEDING APPARATUS**

[76] Inventors: **Mary F. Dieringer**, 9315 SE. Regents Dr., Milwaukie, Oreg. 97222; **Fernando Suarez**, 1402 Morgan Cir., Tustin, Calif. 92780

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **09/181,950**

[22] Filed: **Oct. 28, 1998**

Related U.S. Application Data

[60] Provisional application No. 60/064,094, Nov. 3, 1997, and provisional application No. 60/090,114, Jun. 22, 1998.

[51] **Int. Cl.**[7] **A61J 9/00**

[52] **U.S. Cl.** **215/11.4**; 606/236

[58] **Field of Search** 215/11.3, 11.4, 215/11.5, 11.1; 606/236

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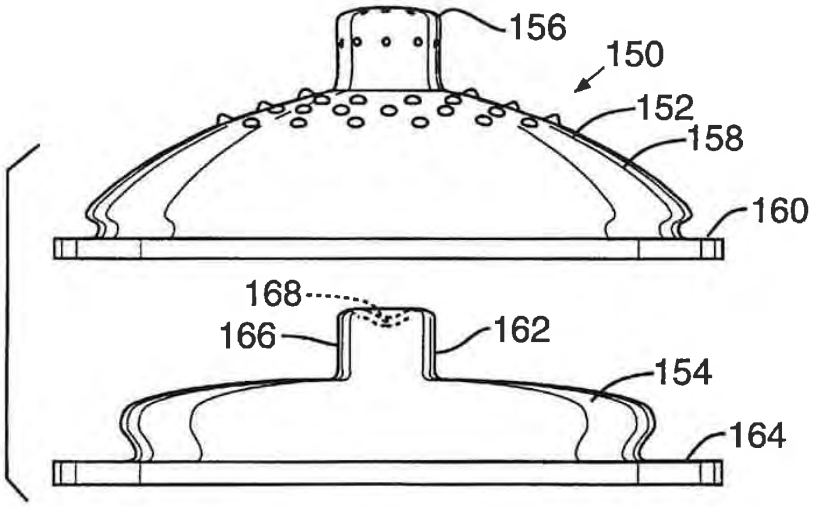


Primary Examiner—Allan N. Shoap
Assistant Examiner—Tri M. Mai
Attorney, Agent, or Firm—Ingrid McTaggart

[57] **ABSTRACT**

An improved natural nipple baby feeding apparatus includes detachable inner and outer membranes which both extend substantially across a distance larger than the diameter of a standard baby bottle to which the nipple apparatus may be attached. The membranes have a width approximately double that of the height of the nipple apparatus. The apparatus functions as a training device for an infant by requiring the infant to correctly "latch-on" to the apparatus by grasping the apparatus outwardly of the central nipple area and stretching the outer membrane upwardly so that it contacts the inner membrane which facilitates the flow of fluid from the bottle through both the membranes and out of the nipple. The nipple apparatus may be used in conjunction with, or as an alternative to, breast-feeding of an infant.

13 Claims, 8 Drawing Sheets



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FIG. 1

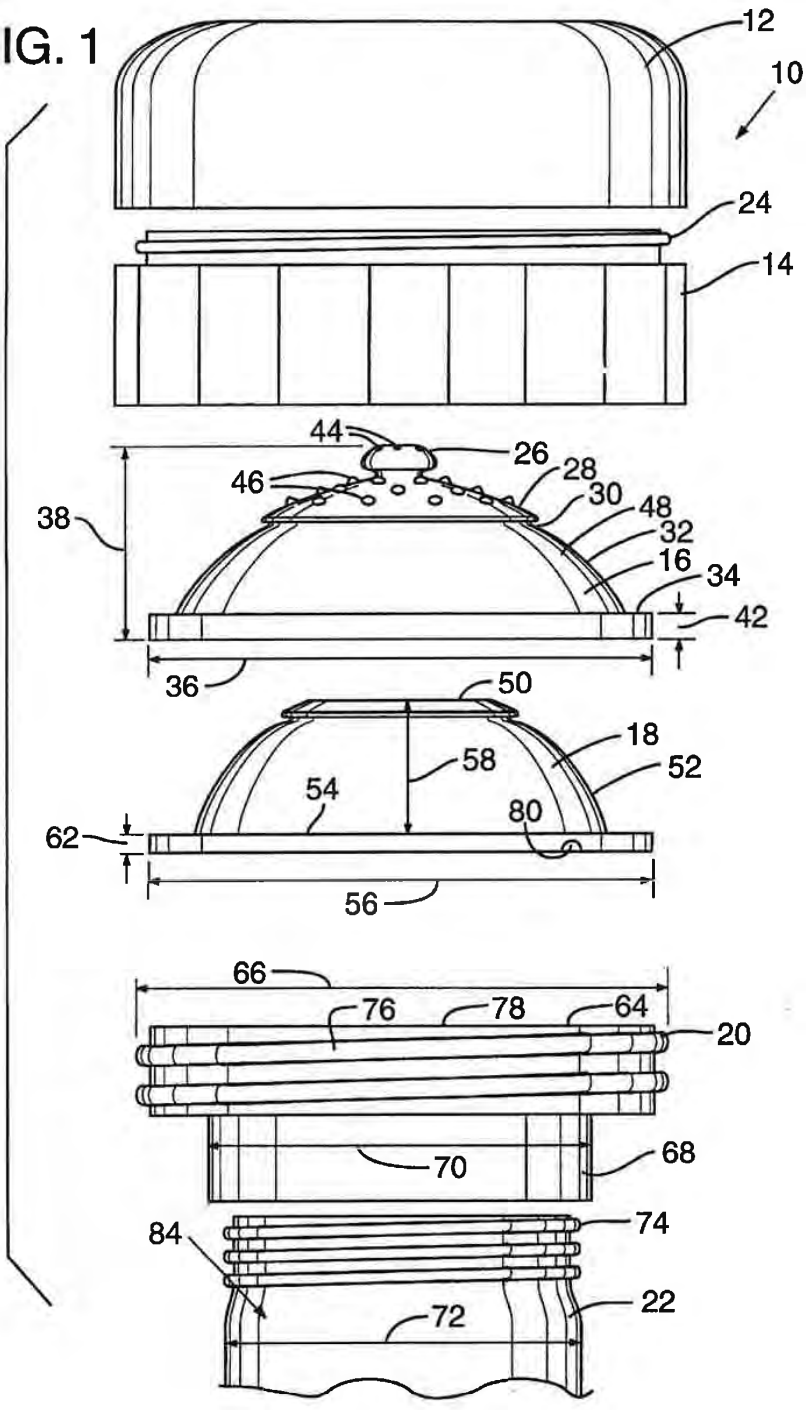

12
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22

FIG. 2

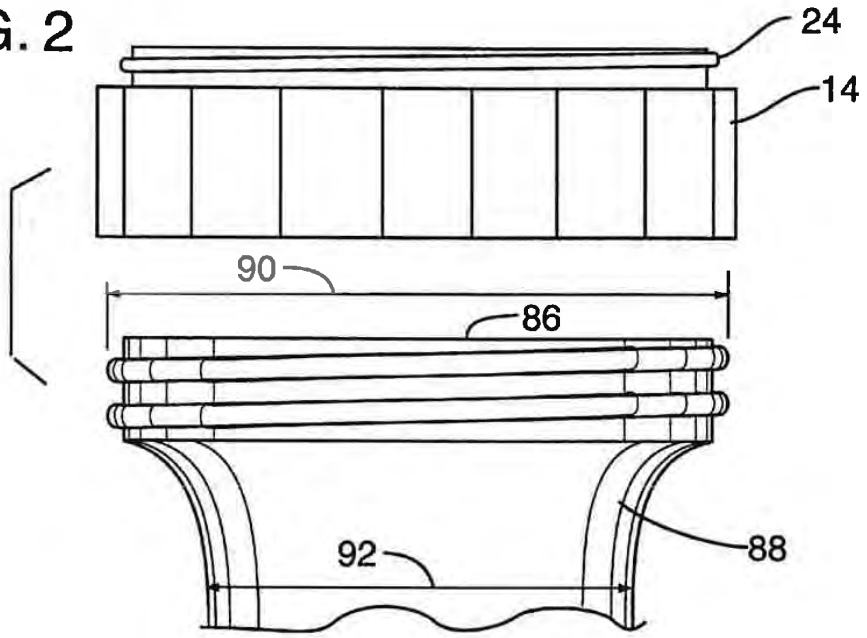


FIG. 3

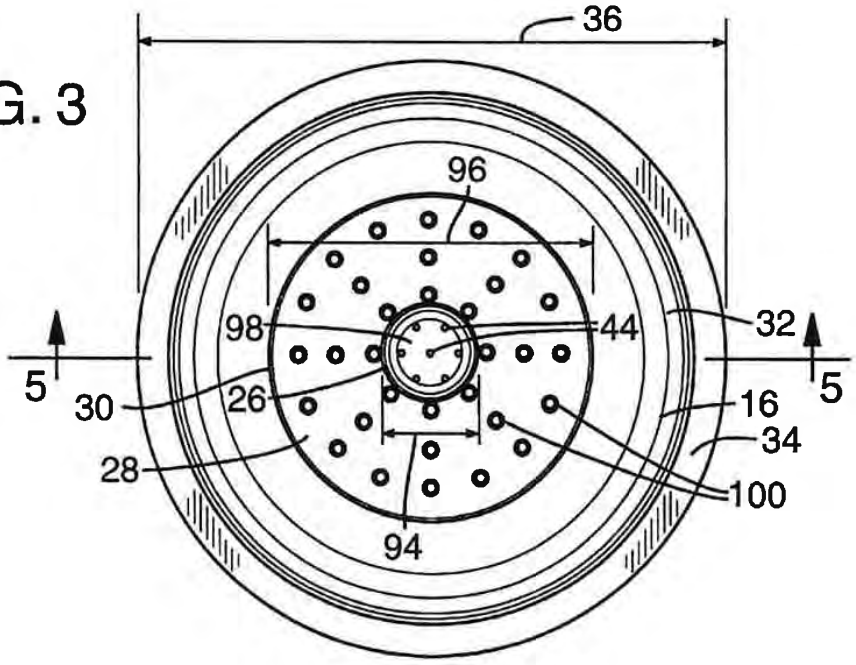


FIG. 4

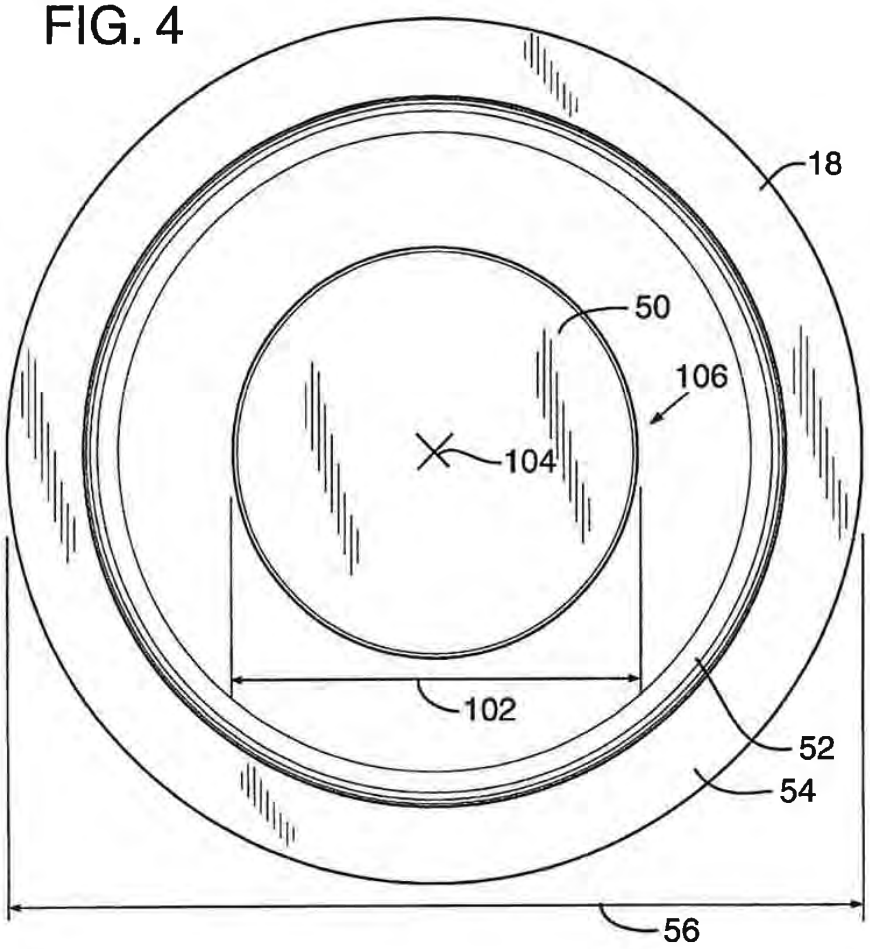

18
50
106
104
102
52
54
56

FIG. 5

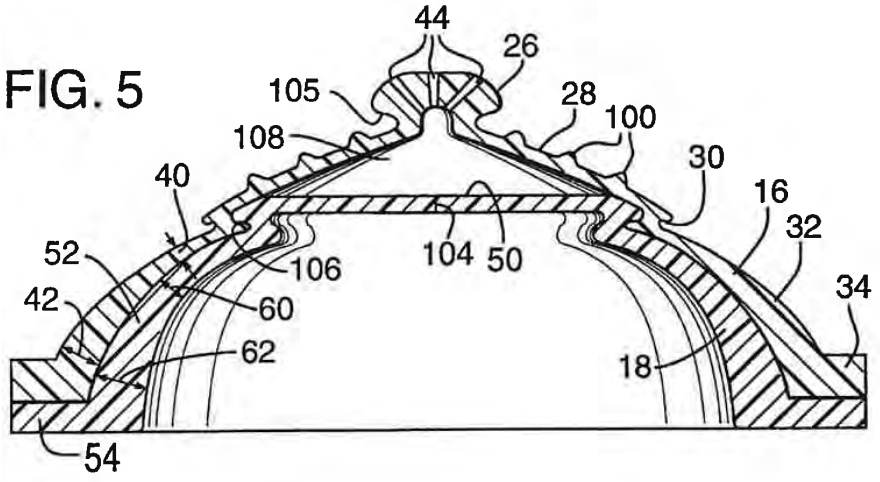

44
26
105
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108
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62
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54

FIG. 6

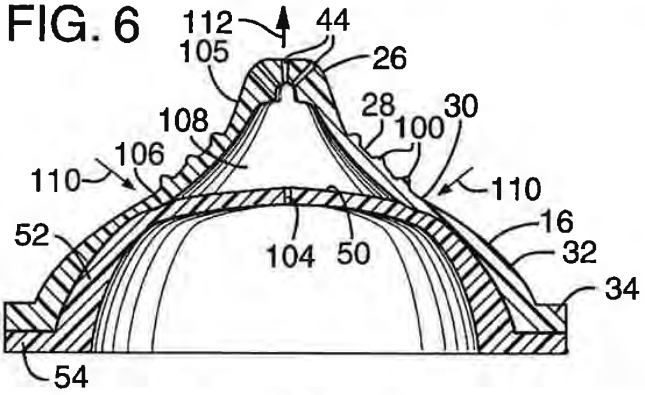


FIG. 7

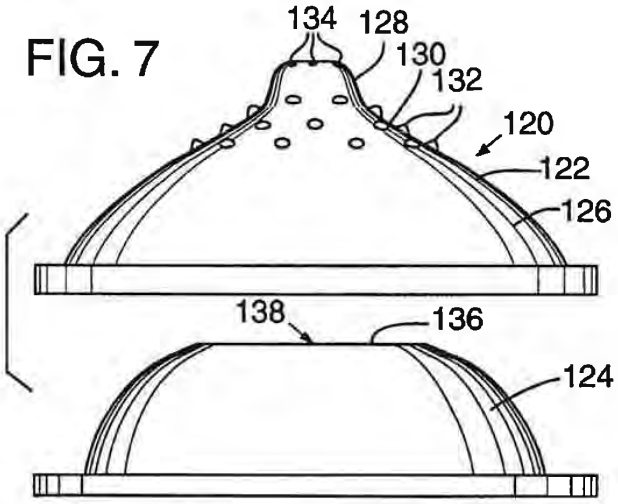


FIG. 8

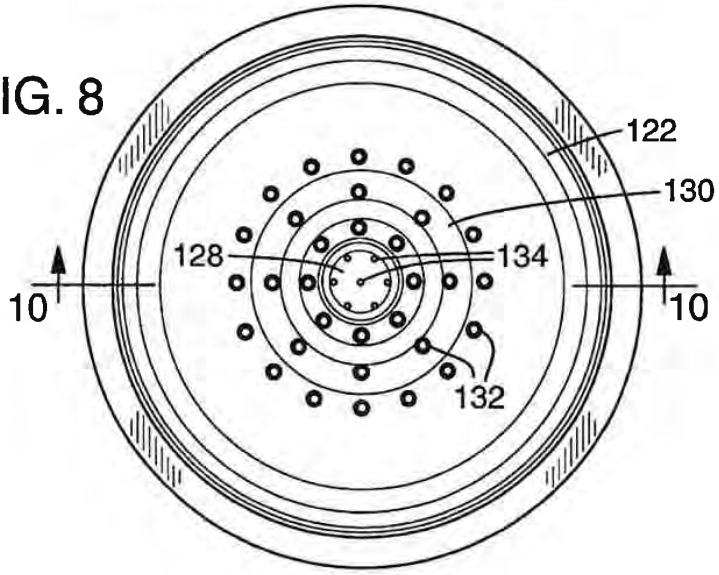


FIG. 9

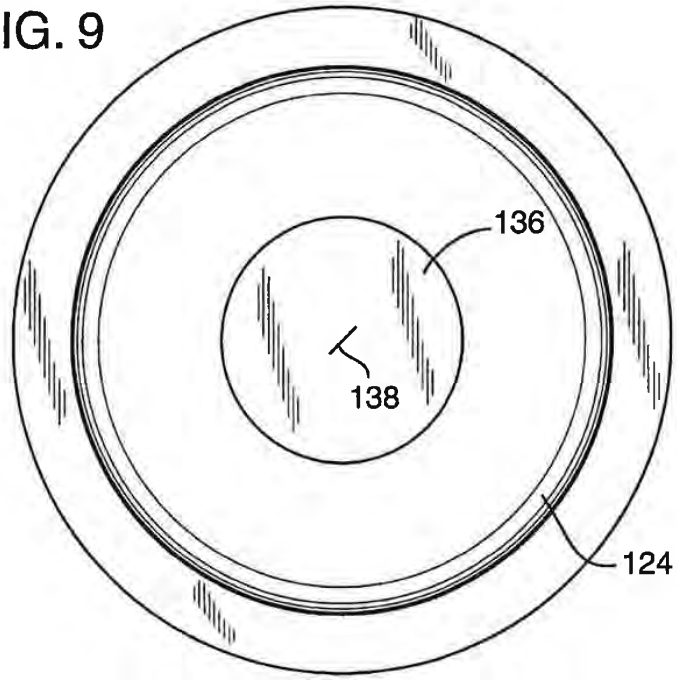


FIG. 10

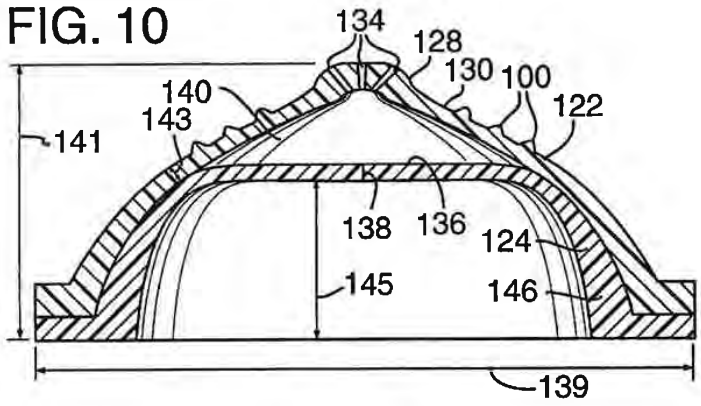


FIG. 11

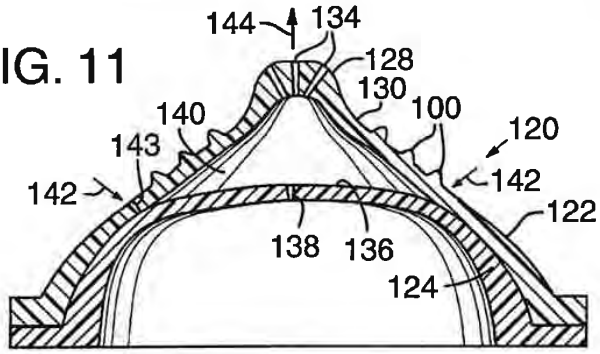


FIG. 12

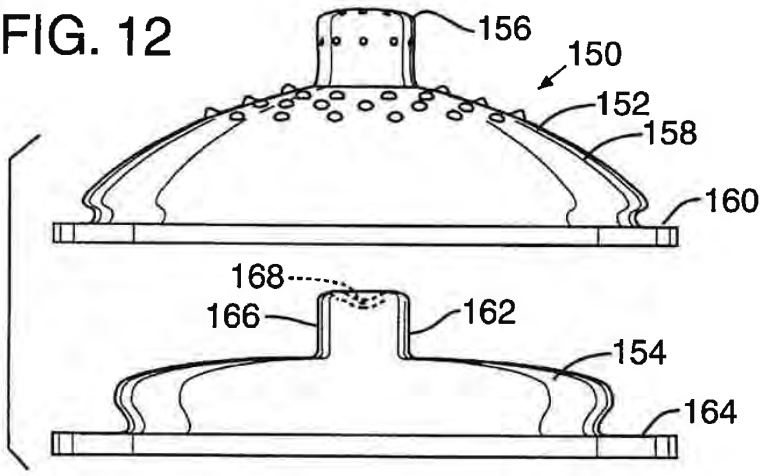


FIG. 13

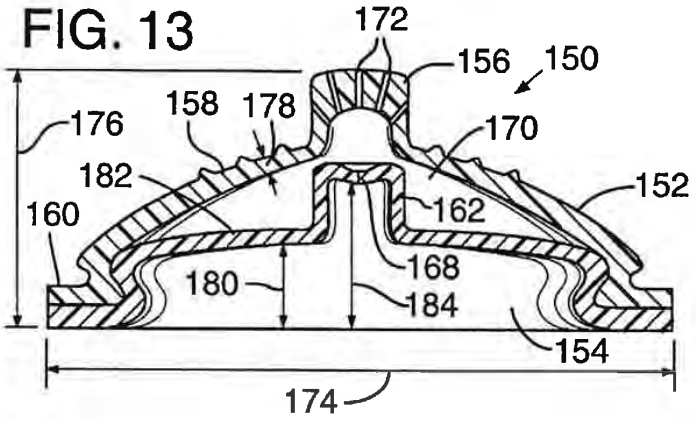


FIG. 14

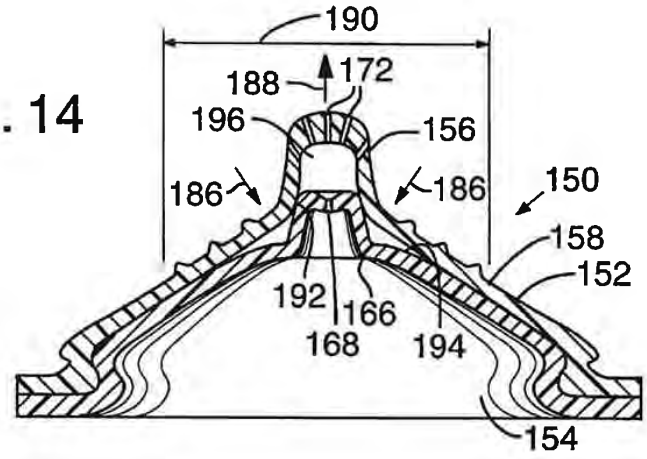


FIG. 15

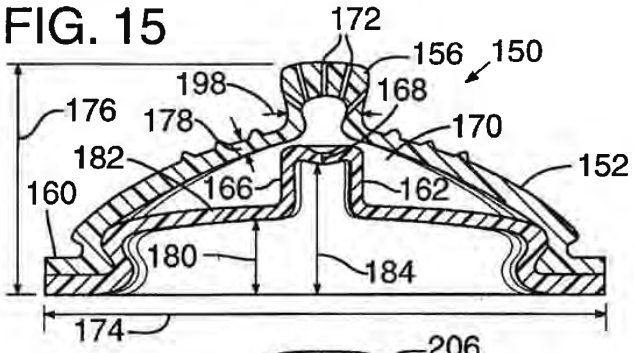


FIG. 16

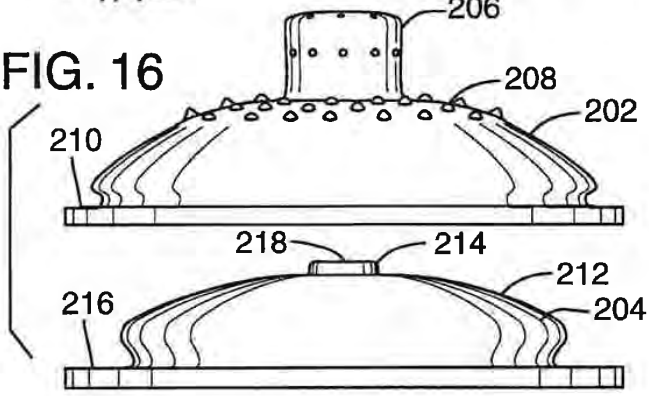


FIG. 17

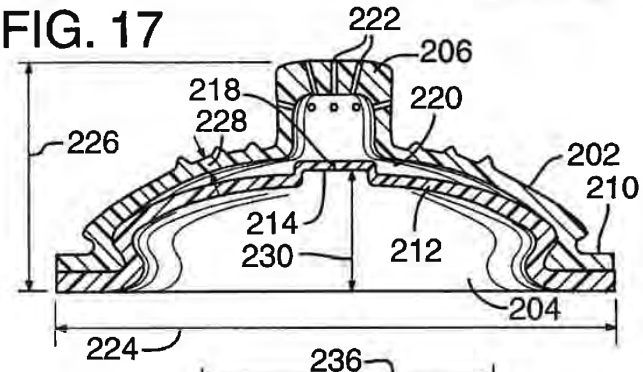


FIG. 18

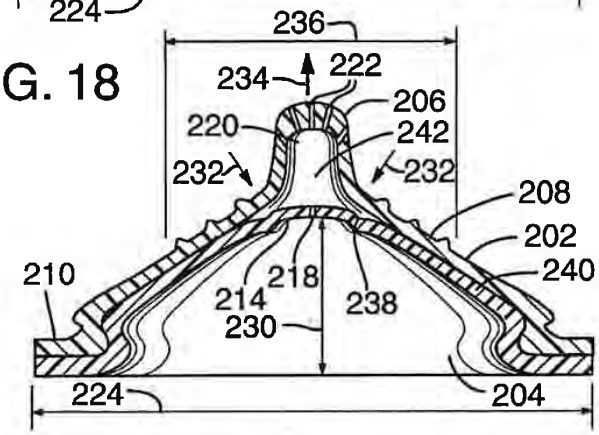


FIG. 19

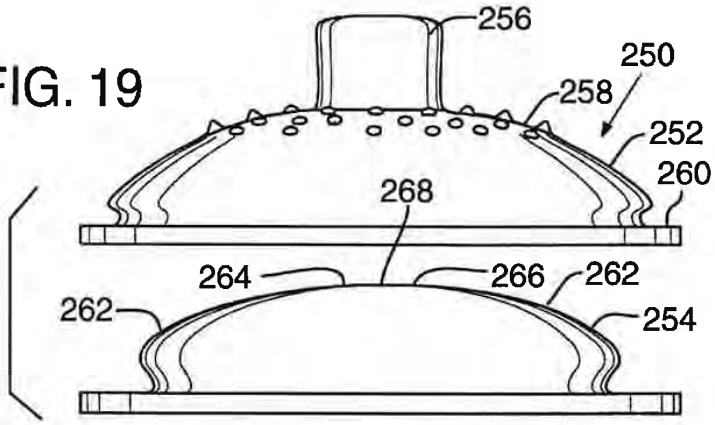


FIG. 20

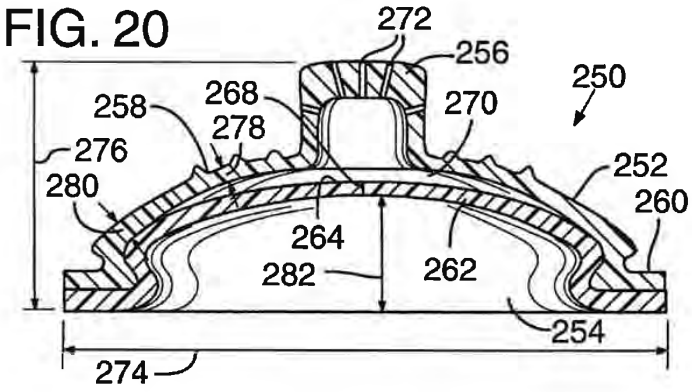
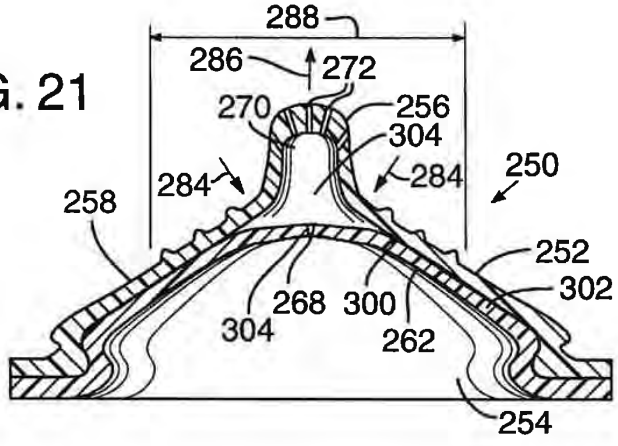


FIG. 21



NATURAL NIPPLE BABY FEEDING APPARATUS

This application claims benefit of Provisional Application Ser. No. 60/064,094 filed Nov. 3, 1997, and Provisional Application Ser. No. 60/090,114 filed Jun. 22, 1995.

TECHNICAL FIELD

The present invention relates to an improved natural nipple baby feeding apparatus, and more particularly, to an improved natural nipple baby feeding apparatus having detachable inner and outer membranes which both extend substantially across a distance larger than the diameter of a standard baby bottle to which the nipple apparatus may be attached and having a width approximately double that of the height of the nipple apparatus. The apparatus functions as a training device for an infant by requiring the infant to correctly "latch on" to the apparatus. Specifically, the device trains an infant to grasp the apparatus outwardly of the central nipple area and then to pull the central nipple area of the outer membrane so that it becomes taunt. The taut, stretched outer membrane pinches the inner membrane so as to open a valve in the inner membrane which facilitates the flow of fluid from the bottle through the nipple. The nipple apparatus may be used in conjunction with, or as an alternative to, natural breast-feeding of an infant. Accordingly, the apparatus of the present invention may be used to extend the period of time during which a child may be breast-fed.

BACKGROUND ART

Breast-feeding of newborns and infants has many important medical benefits including enhanced nutrition and immunity to certain illnesses. A mother's breast milk changes with the needs of a growing infant so as to satisfy these health needs of the infant through several development stages. Human breast milk includes immunoglobulins that increase a baby's resistance to many bacteria and viruses. Breast milk is said to inhibit the development of allergies and is rich in protein, sugars, fats, vitamins, and minerals. Recent research suggests that a breast-fed child may have a smaller incidence of ear infections and diarrhea than a non breast-fed child. Moreover, breast-feeding can be very convenient because bottles need not be prepared, transported or cleaned. Breast-feeding also has economic benefits because expensive formulas and bottles need not be purchased.

During breast-feeding an infant "latches on" by taking the entire areola of the breast, or at least a large portion thereof, in their mouth and beginning to suck. The infant's jaws should close around the areola, and not around the central teat or nipple area, which my result in soreness, bleeding and blistering of the nursing mother. By taking a large portion of the areola in their mouth, the infant's gums will form a circular seal and a vacuum on the central nipple area. The infant then stretches and presses the nipple against their palate and squeezes the milk ducts in a rhythmic motion. This releases milk from the lactiferous glands to the milk ducts and ultimately out of several fine holes in the tip of the nipple. Accordingly, some work is required of the infant to receive nourishment during breast-feeding.

Proper breast-feeding, i.e., having the infant "latch on" correctly, may require an extensive amount of training time in which the mother and infant work together to perfect the technique. This learning process is made more difficult when the newborn has been given a bottle or a pacifier. These devices can cause the infant to lick, nibble or chew with their jaws instead of using their tongue to stretch the nipple and apply suction pressure. When proper breast-feeding is achieved, mothers may worry that their baby will forget the proper technique once the baby tries a bottle. Accordingly, due to the benefits of natural breast milk, and due to these training concerns, breast-feeding mothers may be hesitant to allow their infant to try bottle-feeding.

Despite the many benefits of breast-feeding an infant and the many concerns of the mother that their infant may forget the proper breast-feeding technique, many breast-feeding mothers must return to work or otherwise be away from their infant for extended periods of time. In these situations, exclusive breast-feeding is not possible and supplementation with a bottle is needed. Moreover, nursing mothers often must breast-feed their child every two hours for thirty to forty minutes at a time. This can be physically exhausting for the mother. Accordingly, many mothers try to use baby bottles in conjunction with breast-feeding, or switch to bottle feeding altogether. In either case, the infant often will encounter problems during the transition to exclusive bottle-feeding, or with the transition to and from breast-feeding and bottle-feeding when both methods are utilized. When presented with a bottle the infant may refuse to use the bottle because it feels very different from their mother. Use of prior art bottles generally does not ease this transition. Accordingly, even though many women would like to breast feed their infant for several months or even a year, once the infant is introduced to a bottle at several months of age, the infant often will refuse to return to breast-feeding.

Prior art bottles and nipples do not look or feel like a natural breast. These nipples typically comprise an elongate, smooth single rubber nipple piece that has a width much narrower than a natural breast. These prior art nipples allow the infant to apply only suction pressure to the nipple tip to begin fluid flow from the bottle. Moreover, these nipples permit the flow of fluid from the bottle without mechanical pressure applied by the infant. In either case, the fluid is more easily obtained by the infant than during natural breast-feeding wherein the infant must grasp the entire areola in their mouth and simultaneously apply mechanical and suction pressure to the nipple. Accordingly, once the infant is comfortable with bottle feeding the infant will often encounter "nipple confusion" upon returning to breast-feeding.

"Nipple confusion" can be physically painful for the nursing mother because the infant may attempt to breast-feed by grasping only the tip portion of the nipple and therefore not grasping the entire areola in their mouth. In addition, "nipple confusion" can result in frustration to the infant because they may grow accustomed to receiving nourishment without being required to simultaneously apply mechanical and suction pressure to stretch the nipple. The difference between a natural breast and prior art nipples may lead infants to refuse to return to breast-feeding altogether. This may be psychologically and emotionally difficult for a nursing mother that is rejected by her infant who now prefers the "easy" method of bottle-feeding.

Other prior art nipples may include a single rubber piece having a valve positioned therein for preventing the spillage of fluid from the bottle if overturned. These valved prior art nipples present a sanitation problem, however, due to the difficulty of cleaning the inner cavities of the nipple. Moreover, the elongate outer shape of these valved prior art nipples presents the same "nipple confusion" issues as the non-valved prior art elongate nipples.

DISCLOSURE OF THE INVENTION

Accordingly, an object of the present invention is to provide a natural nipple baby feeding apparatus that simulates natural breast-feeding.

Another object of the present invention is to provide a natural nipple baby feeding apparatus that is manufactured from a mold of an actual woman's breast.

Yet another object of the present invention is to provide a natural nipple baby feeding apparatus that eases the transition to and from bottle feeding and natural breast-feeding.

A further object of the present invention is to provide a natural nipple baby feeding apparatus that functions as a training device for an infant by requiring the infant to correctly "latch on" to the apparatus to receive nourishment.

Yet another object of the present invention is to provide a natural nipple baby feeding apparatus that includes detachable inner and outer membranes which both extend substantially across the diameter of a baby bottle to which the nipple apparatus is attached to facilitate cleaning of the membranes.

Still another object of the present invention is to provide a natural nipple baby feeding apparatus that has a width approximately double that of the height of the nipple apparatus.

Accordingly, the nipple apparatus of the present invention includes detachable inner and outer membranes which both extend substantially across a distance greater than the diameter of a standard baby bottle to which the nipple apparatus is attached, and wherein the nipple apparatus has a width approximately double that of its height. Due to the double membrane system the apparatus is easy to clean. The nipple apparatus, in the preferred embodiment, is manufactured from a mold of an actual woman's breast. Due to the double membrane system, the apparatus functions as a training device for an infant by requiring the infant to correctly "latch on" to the apparatus. Specifically, the device trains an infant to grasp the apparatus outwardly of the central nipple area and then to pull the central nipple area of the outer membrane so that it becomes taunt. The taunt, stretched outer membrane pinches the inner membrane so as open a valve in the inner membrane which facilitates the flow of fluid from the bottle through the nipple. Accordingly, the "latching on" technique required by the nipple apparatus of the present invention is virtually identical to that required during natural breast feeding.

The subject matter of the present invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. However, both the organization and method of operation, together with further advantages and objects thereof, may best be understood by reference to the following description taken in connection with accompanying drawings wherein like reference characters refer to like elements.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a side view of the nipple apparatus, including a cap and an adapter for attaching the nipple to a standard sized baby bottle;

FIG. **2** is a side view of an attachment collar and a larger bottle sized for use with the nipple apparatus;

FIG. **3** is top view of the nipple apparatus without the cap or collar in place;

FIG. **4** is a top view of inner membrane of the nipple apparatus;

FIG. **5** is a cross sectional side view of the inner and outer membranes of the nipple apparatus in a nominal state taken along line **5**—**5** of FIG. **3**;

FIG. **6** is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **5** in a pressurized state during use;

FIG. **7** is an exploded side view of the inner and outer membranes of a second embodiment of the nipple apparatus;

FIG. **8** is a top view of the outer membrane of the nipple apparatus of FIG. **7**;

FIG. **9** is a top view of the inner membrane of the nipple apparatus of FIG. **7**;

FIG. **10** is a cross sectional side view of the inner and outer membranes of the second embodiment of the nipple apparatus in a nominal state taken along line **10**—**10** of FIG. **8**;

FIG. **11** is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **10** in a pressurized state during use;

FIG. **12** is an exploded side view of the inner and outer membranes of a third embodiment of the nipple apparatus;

FIG. **13** is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **12** in a nominal state;

FIG. **14** is a cross sectional side view of the nipple apparatus of FIG. **13** in a pressurized state during use;

FIG. **15** is a cross sectional side view of the nipple apparatus of FIG. **13** in an incorrect "latched-on" position such that the inner membrane is not contacted by the outer membrane in the central nipple region;

FIG. **16** is an exploded side view of the inner and outer membranes of a fourth embodiment of the nipple apparatus;

FIG. **17** is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **16** in a nominal state;

FIG. **18** is a cross sectional side view of the nipple apparatus of FIG. **17** in a pressurized state during use;

FIG. **19** is an exploded side view of the inner and outer membranes of a fifth embodiment of the nipple apparatus;

FIG. **20** is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **19** in a nominal state; and

FIG. **21** is a cross sectional side view of the nipple apparatus of FIG. **20** in a pressurized state during use.

BEST MODES FOR CARRYING OUT THE INVENTION

Referring to FIG. **1**, which is a side view of the nipple apparatus, including a cap and an adapter for attaching the nipple to a standard sized baby bottle, apparatus **10** comprises a cap **12**, a collar **14**, an outer membrane **16**, an inner membrane **18**, an adapter **20** and a standard sized baby bottle **22** which typically holds formula or breast milk (not shown). Cap **12** generally includes internal threads (not shown) that matingly engage external threads **24** on collar **14** so as to secure the cap in place. The cap thereby prevents damage to or desanitization of the membranes of the nipple apparatus during periods of nonuse. Collar **14** generally includes an aperture (not shown) which allows the membranes to extend upwardly there through so that the collar secures the membranes to the adapter along the edge regions of the membranes.

Outer membrane **16** includes a central nipple area **26**, an outer nipple area **28**, also called the areola, an expanding fold **30**, an outer region **32**, and an edge region **34**. Outer membrane **16** preferably is manufactured of soft, pliant rubber material having a durometer, or a measure of softness, within a range of ten to sixty, and preferably approximately forty. Outer membrane **16** typically has a diameter **36** of approximately 3 inches (in) (7.6 centimeters

(cm)), a height **38** of approximately 1.5 in (3.8 cm) and a thickness **40** (shown in FIG. **5**) in outer nipple area **28** of approximately 1/16th in (0.2 cm). The thickness and softness of the rubber material in outer nipple area **28** and in outer region **32** must allow for flexibility of the nipple apparatus during nursing, as will be described below. The thickness of the outer membrane increases toward edge region **34** such that edge region **34** typically has a thickness **42** of approximately 1/8th in (0.3 cm) (shown in FIG. **5**). The thickness of the edge region ensures that the edge region is durable enough to withstand compression between collar **14** and adapter **20** when the nipple apparatus is assembled and ensures that the outer membrane cannot easily be pulled from its secured position within the collar. Other materials and sizes may also be used as is appropriate. For example, the width of the outer membrane may be between two to five inches and the height may be between one and three inches. The height of the inner membrane would be manufactured to correspond to the outer membrane so as to facilitate correct "latching on" by the infant to the membranes, as will be described below.

Still referring to FIG. **1**, central nipple area **26** of outer membrane **16** generally extends upwardly from outer nipple area **28** and includes a plurality of tiny apertures **44** which allow fluid to flow there through so as to simulate a natural breast nipple. Outer nipple area **28** generally includes a surface texture **46** on an outer surface **48** of the membrane so as to simulate a natural areola. In the preferred embodiment, the outer membrane is manufactured from a mold taken from an actual woman's breast. Accordingly, a unique feature of the nipple apparatus of the present invention are the varying textures of the central and outer nipple areas that correspond to an actual woman's breast which consists of both different shapes and varying textures of skin. In particular, the areola area consists of different levels and thicknesses of skin along with areas that are smooth and areas that are dimpled.

Still referring to FIG. **1**, expanding fold **30** (which is an addition to an outer membrane that is manufactured from a mold of an actual woman's breast) allows the central nipple area to be stretched upwardly from outer region **32**, as will be described below. As described above, in the preferred embodiment, the shape and outer surface texture of the outer membrane is taken from a mold of an actual nursing mother's breast. Moreover, the color of the rubber may be tinted so that the outer membrane looks familiar to a nursing infant. Accordingly, due to the wide diameter, color, texture, pliancy, stretchability and shape of the outer membrane, an infant will recognize and be comfortable with the nipple apparatus of the present invention.

Inner membrane **18** includes a plateau **50**, also called a flattened area, an outer region **52** and an edge region **54**. Outer region **52** and edge region **54** generally are the same shape as outer region **32** and edge region **34** of the outer membrane so that the two membranes easily fit together along their outer and edge regions when the membranes are secured to adapter **20** by collar **14**. Similar to the outer membrane, inner membrane **18** preferably is manufactured of soft, pliant rubber material having a durometer, or a measure of softness, generally in the range of ten to sixty, and preferably approximately **40**. Inner membrane **18** typically has a diameter **56** of approximately 3 inches (in) (7.6 centimeters (cm)), a height **58** of approximately 1.0 in (2.5 cm) and a thickness **60** (shown in FIG. **5**) in outer region **52** of approximately 1/16th in (0.2 cm). The thickness and softness of the rubber material in outer region **52** must allow for flexibility of the nipple apparatus during nursing as will be described below. Edge region **54** typically has a thickness **62** of approximately 1/8th in (0.3 cm) (shown in FIG. **5**) so that the edge region is durable enough to withstand compression between collar **14** and adapter **20** when the nipple apparatus is assembled and so that the inner membrane cannot easily be pulled from its secured position within the collar.

Still referring to FIG. **1**, adapter **20** includes a top region **64** having a diameter **66** of approximately 3 inches (in) (7.6 centimeters (cm)) and a lower region **68** having a diameter **70** of approximately 1.5 inches (in) (3.8 centimeters (cm)). Diameter **70** of the lower region of the adapter is approximately the same size as a diameter **72** of a standard baby bottle **22** (which generally holds formula or breast milk) such that the internal threads (not shown) of the adapter are easily secured to external threads **74** of bottle **22**. In other embodiments, other adapters may be provided which allow the baby feeding apparatus to be attached to other sized bottles such as a standard open bottle (wherein the fluid is contained within a fluid baggie held within the bottle) having a diameter of approximately 2.0 in (5.1 cm).

To assemble the nipple apparatus, collar **14** is positioned over outer membrane **16** and inner membrane **18** and is secured to adapter **20** by engaging the internal threads of the collar with external threads **76** of adapter **20**. The collar is tightened on the adapter until the edge regions of the inner and outer membranes make an air tight seal with one another and with an upper edge **78** of the adapter. The adapter is then secured by its internal threads (not shown) to external threads **74** of bottle **22**. In the preferred embodiment, inner membrane **18** includes an air vent **80** that allows air to flow into an interior **84** of bottle **22** when fluid is withdrawn under pressure through nipple **26**, as will be described below, so that a build up of pressure in the bottle does not prevent the flow of fluid therefrom. Air vent **80** may comprise a one-way valve such that fluid cannot escape there through.

Referring to FIG. **2**, which is a side view of an attachment collar and a larger bottle sized for use with the nipple apparatus, collar **14** is shown positioned above an upper edge **86** of a bottle **88** sized to accept the collar. Accordingly, upper edge **86** of bottle **88** has a diameter **90** of approximately 3 inches (in) (7.6 centimeters (cm)). The bottle may taper to a smaller diameter **92** of approximately 2 inches (in) (5.1 centimeters (cm)) so that the body of bottle **88** is approximately the same size as an open or disposable baby bottle unit. Accordingly, bottle **88** may be carried in standard baby bags, bottle holders, and the like, and may also be grasped with both hands by an infant using the bottle. Moreover, the nipple apparatus of the present invention allows several bottles choices for the consumer. In particular, due to the adapter, the nipple apparatus can be used on a disposable unit, a closed bottle unit, or also with the invented larger sized bottle specific to the larger size nipple of the present invention. Moreover, any size adapter may be provided as is required.

Referring to FIG. **3**, which is top view of the nipple apparatus without the cap or collar in place, central nipple area **26** has a diameter **94** of approximately ½ in (1.3 cm) and outer nipple area **28** has a diameter **96** of approximately 2.0 in (5.1 cm). Apertures **44** are shown on an upper surface **98** of nipple **26** and textured protrusions **100** are shown on outer nipple area **28**.

Referring to FIG. **4**, which is a top view of inner membrane **18** of the nipple apparatus, plateau **50** has a diameter **102** of approximately 2.0 in (5.1 cm) and a valve **104** located generally centrally therein. Valve **104**, in the preferred

embodiment, comprises two slits which form an "X" shape and extend through the thickness of the inner membrane. Accordingly, when inner membrane **18** is compressed inwardly toward the valve, or when a relatively large pressure force is applied to the valve, the slits will give way thereby allowing fluid flow there through. In other embodiments, valve **104** may comprise a single slit, more than two slits, any one-way valve as known in the art, or the like.

Referring to FIG. **5**, which is a cross sectional side view of the inner and outer membranes of the nipple apparatus in a nominal state taken along line **5**—**5** of FIG. **3**, the thickness of outer region **32** of outer membrane **16** is shown to become thicker as the outer region approaches edge region **34**. This increasing thickness of the outer membrane adds stability to the nipple apparatus while allowing great flexibility in outer nipple area **28**. Expanding fold **30** comprises a recess positioned radially outwardly of outer nipple area **28** and radially inwardly of edge region **34**. Central nipple area **26** includes an indentation **105** that allows the central nipple area to be stretched upwardly, as will be described below.

Inner membrane **18** includes a recess **106** around the edge of plateau **50**, the recess generally corresponding in size to the recess that comprises expanding fold **30**. Accordingly, inner membrane **18** "snaps" into place within outer membrane **16** such that expanding fold **30** is positioned within recess **106** of the inner membrane. In this assembled position, outer region **32** of outer membrane **16** is directly adjacent outer region **52** of inner membrane **18**, and edge region **34** of outer membrane **16** is directly adjacent edge region **54** of inner membrane **18**. In this position the membranes define a hollow chamber **108** between plateau **50** and outer nipple area **28** to which communicate apertures **44** in the nipple and valve **104** in the inner membrane. In the nominal, or relaxed state, valve **104** is in a closed or flat position such that fluid does not flow there through and expanding fold **30** and indentation **105** are in non-stretched and non-elongated positions.

Referring to FIG. **6**, which is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **5** in a pressurized state during use, direct pressure is shown being applied to outer nipple area **28** of the outer membrane in a direction **110** which represents the pressure exerted uniformly around the outer nipple area by an infants mouth as the infant grasps the outer nipple area. This pressure acts to form a seal around the outer nipple area and the infant's mouth. Simultaneously, the infant applies suction and mechanical pressure to nipple **26** of the outer membrane in a direction **112** to stretch the central nipple area upwardly and away from the bottle. The inwardly applied pressure force exerted in a circular shape around outer nipple area **28** of the outer membrane and the upward stretching of the central nipple area results in stretching of the outer membrane into a taut position. The taut, stretched orientation of the outer membrane tends to inwardly compress outer region **52** of inner membrane **18** such that plateau **50** is pinched upwardly toward nipple **26**, thereby opening valve **104**.

With bottle **22** containing formula or breast milk positioned vertically above the nipple, the formula or breast milk will flow by the force of gravity through opened valve **104**, into hollow chamber **108**, and out through apertures **44**. The suction pressure applied to nipple **26** further acts to pull the formula or breast milk from hollow chamber **108** through apertures **44**. The thickness of the inner and outer membranes and the resiliency of valve **104** are chosen such that the suction pressure alone applied by the infant on nipple **26** will not result in opening of valve **104**. The infant must correctly "latch on" to the nipple apparatus by applying pressure to outer nipple area **28**, and by upwardly stretching the central nipple area, to enable fluid flow there through. In other words, an infant must take central nipple area **26** and outer nipple area **28** into its mouth and pull the nipple upwardly to receive nourishment, because merely grasping central nipple area **26** will not function to pinch or thereby open valve **104**. Accordingly, the mechanical and suction pressure applied by the infant to central nipple area **26** of the nipple apparatus causes central nipple area **26** to stretch upwardly, made possible by the flattening of indentation **105**, such that the nipple apparatus simulates the deformation of a natural nipple during natural breast-feeding.

Before use, the nipple apparatus may need to be "primed" by exerting pressure on the squeezable bottle to force fluid to flow through value **104** and into hollow chamber **108**. This will displace air initially contained within chamber **108** such that the air is not ingested by the infant. It should be understood that the pressure applied to the squeezable bottle to "prime" the nipple apparatus is much greater than the suction pressure that can be exerted by a typical infant such that the apparatus requires correct "latching on" by the infant but allows priming of the apparatus by the person providing the bottle.

Referring to FIG. **7**, which is an exploded side view of the inner and outer membranes of a second embodiment of the nipple apparatus, nipple apparatus **120** includes an outer membrane **122** and an inner membrane **124**. Outer membrane **122** includes a smooth, rounded outer region **126** that does not include an expanding fold adjacent the outer nipple area or an indentation adjacent the central nipple area, and inner membrane **124** does not include a recess.

Without the presence of an expanding fold, when the inner and outer membranes are positioned adjacent one another in the assembled position on a bottle, the membranes do not "snap" together. Due to the mating shapes of the inner surface of the outer membrane and the outer surface of the inner membrane, however, the membranes form a seal with one another around their respective edge regions. During the application of pressure to the central nipple area it will stretch upwardly due to the flexibility of the rubber material but not due an indentation positioned around the central nipple area. Accordingly, this embodiment generally is manufactured of a rubber material somewhat softer and more flexible than the material used to manufacture the embodiment shown in the previous figures. In particular, nipple apparatus **120** is generally manufactured with a twenty five to thirty durometer silicone material, and preferably a durometer of approximately **30**. The first embodiment, shown in FIG. **1**, due to the inclusion of the expanding fold and the indentation, is particularly suited to be used with approximately a forty to fifty durometer silicone material. Accordingly, the present invention may be manufactured with indentations and folds using a high durometer material, or manufactured without indentations and folds using a lower durometer material. The second embodiment shown in FIG. **7** is generally manufactured from a mold of an actual nursing mother's breast and is not modified by the inclusion of the expanding fold or indentation.

Referring to FIG. **8**, which is a top view of the outer membrane of the nipple apparatus of FIG. **7**, outer membrane **122** includes a central nipple area **128** and an outer nipple area **130** having similar texture **132** and apertures **134** as the nipple apparatus embodiment shown in FIG. **3**.

Referring to FIG. **9**, which is a top view of the inner membrane of the nipple apparatus of FIG. **7**, inner membrane **124** includes a plateau **136** and a valve **138**, similar to the embodiment shown in FIG. **4**.

Referring to FIG. **10**, which is a cross sectional side view of the inner and outer membranes of the second embodiment of the nipple apparatus in a nominal state taken along line **10—10** of FIG. **8**, outer membrane **122** and plateau **136** on inner membrane **124** define a chamber **140** to which communicate apertures **134** in central nipple area **128** and valve **138** in inner membrane **124**. Similar to the embodiment shown in FIG. **5**, the outer membrane of nipple apparatus **120** has a width **139** of approximately 3 inches (in) (7.6 centimeters (cm)), a height **141** of approximately 1.5 in (3.8 cm) and a thickness **143** in outer nipple area **130** of approximately $\frac{1}{16}^{th}$ in (0.2 cm). Inner membrane **124** has a height **145** of approximately 1.0 in (2.5 cm).

Referring to FIG. **11**, which is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **10** in a pressurized state during use, direct pressure is shown being applied to outer nipple area **130** of the outer membrane in a direction **142** which represents the pressure exerted uniformly around the outer nipple area by an infant's mouth. This pressure tends to ensure that a seal is made between the outer nipple area and the infant's mouth. Simultaneously, mechanical and suction pressure are applied to nipple **128** of the outer membrane in a direction **144** by the mouth of the infant. The pressure exerted in a circular shape around outer nipple area **130** of the outer membrane, and the upward pressure exerted on the central nipple area of apparatus, stretches the outer membrane upwardly and away from bottle **22** so that the outer membrane is taut. The stretched, taut orientation of the outer membrane pinches outer region **146** of inner membrane **124** such that plateau **136** is pinched upwardly toward nipple **128**, thereby opening valve **138**.

With a bottle containing fluid (such as formula, breast milk, juice or the like) positioned vertically above the nipple, the fluid will flow by the force of gravity through opened valve **138**, into hollow chamber **140**, and out through apertures **134**. The suction pressure applied to nipple **128** further acts to pull fluid from hollow chamber **140** through apertures **134**. The thickness of the inner and outer membranes and the resiliency of valve **138** are chosen such that the suction pressure alone applied by the infant on nipple **128** will not result in opening of valve **138**. Accordingly, the infant must correctly "latch on" to the nipple apparatus to enable fluid flow there through. In other words, the infant must take central nipple area **128** and outer nipple area **130** into its mouth to receive nourishment because merely grasping central nipple area **128** will not function to pinch or thereby open valve **138**. Moreover, the mechanical and suction pressure applied by the infant to central nipple area **128** of the nipple apparatus causes central nipple area **128** to stretch upwardly, made possible by the flexibility of the rubber material, such that the nipple apparatus simulates the deformation of a natural nipple during natural breast-feeding.

Before use, the nipple apparatus may need to be "primed" by exerting pressure on the squeezable bottle to force fluid to flow through value **138** and into hollow chamber **140**. This will displace air initially contained within chamber **140** such that the air is not ingested by the infant. It should be understood that the pressure applied to the squeezable bottle to "prime" the nipple apparatus is much greater than the suction pressure that can be exerted by a typical infant such that the apparatus facilitates correct "latching on" by the infant but allows priming of the apparatus by the person providing the bottle.

Referring to FIG. **12**, which is an exploded side view of the inner and outer membranes of a third embodiment of the nipple apparatus, nipple apparatus **150** includes an outer membrane **152** and an inner membrane **154**. Outer membrane **152** includes a central nipple area **156**, an outer nipple area **158**, and an edge region **160**. Inner membrane **154** includes a valve region **162** and an edge region **164**. Valve region **162** includes an upwardly extending projection **166** having a valve **168** therein. Valve **168** may comprise a one-way valve as known in the art or a slit or slits as shown in previous embodiments.

Referring to FIG. **13**, which is a cross sectional side view of the nipple apparatus of FIG. **12** in a nominal state, inner membrane **154** and outer membrane **152** define a hollow chamber **170** there between to which communicate apertures **172** in central nipple area **156**, and valve **168**. This embodiment has a double projection structure in that central nipple area **156** and valve region **162** both extend upwardly from a bottle positioned adjacent the inner membrane. Similar to the embodiment shown in FIG. **5**, outer membrane **152** of nipple apparatus **150** has a width **174** of approximately 3 inches (in) (7.6 centimeters (cm)), a height **176** of approximately 1.5 in (3.8 cm) and a thickness **178** in outer nipple area **158** of approximately $\frac{1}{16}^{th}$ in (0.2 cm). The thickness increases to approximately $\frac{1}{8}^{th}$ in (0.3 cm) at edge region **160** so as to add stability to the nipple apparatus. The inner and outer membranes also include mating indentations in their edge region such that the membranes matingly engage one another when attached by a collar to a bottle or fluid container.

Inner membrane **154** has a height **180** of approximately 0.5 in (1.3 cm) measured at a plateau region **182** and a height **184** of approximately 0.9 in (2.4 cm) measured at valve region **162**. Accordingly, if an infant grasps only central nipple area **156** in their mouth and applies a mechanical pressure force radially inwardly, then only the central nipple area will be compressed inwardly and will not contact upwardly extending valve region **162**. The valve, therefore, will not be opened by the pressure force of the infants's mouth such that no fluid will flow from bottle **22** into hollow chamber **170**. The double projection structure of this embodiment, therefore, facilitates correct "latching-on" of an infant using this nipple apparatus.

Referring to FIG. **14**, which is a cross sectional side view of the nipple apparatus of FIG. **13** in a pressurized state during use, direct pressure is shown being applied to outer nipple area **158** of the outer membrane in a direction **186** which represents the pressure exerted uniformly around the outer nipple area by an infant's mouth. This pressure results in a uniform seal between the infant's mouth and the outer nipple area of the apparatus. At the same time, mechanical and suction pressure are applied to central nipple area **156** of the outer membrane in a direction **188** by the mouth of the infant. The pressure force exerted in a circular shape around outer nipple area **158** of the outer membrane, and the upward pressure exerted on the central nipple area, result in upward stretching of outer membrane **152**. The taut outer membrane contacts inner membrane **154** such that upwardly extending projection **166**, and valve **168** therein, are pinched radially upwardly and inwardly, thereby opening the valve. The pressure applied to outer nipple area **158** by the infant generally must form a circular ring of pressure having a diameter **190** of approximately 2.0 in (5.0 cm) in order for the outer membrane to correctly open the valve of the inner membrane. This size diameter is the same size as is required

for correct "latching on" by the infant when breast-feeding naturally. Moreover, the amount of upward stretching of the central nipple area is the same amount of stretching as is required for correct "latching on" by the infant when breast-feeding naturally.

With a bottle containing breast milk positioned vertically above the nipple, the breast milk will flow by the force of gravity through opened valve **168**, into hollow chamber **170**, and out through apertures **172**. The suction pressure applied to nipple **156** further acts to pull breast milk from hollow chamber **170** through apertures **172**. The thickness of the inner and outer membranes and the resiliency of valve **168** are chosen such that the suction pressure alone applied by the infant on nipple **156** will not result in opening of valve **168**. Accordingly, the infant must correctly "latch on" to the nipple apparatus to enable fluid flow there through. In other words, the infant must take generally the entire diameter of central nipple area **156** and outer nipple area **158** into its mouth, and must stretch the nipple upwardly, to receive nourishment because merely grasping central nipple area **156** will not function to pinch or thereby open valve **168**. Accordingly, the suction pressure applied by the infant to outer nipple area **158** of the nipple apparatus causes central nipple area **156** to stretch upwardly, made possible by the flexibility of the rubber material, such that the nipple apparatus replicates the deformation and function of a natural nipple during natural breast-feeding.

In particular, when pressure is applied in direction **188**, an inner corner area **192** of outer membrane **152** makes contact with upwardly extending projection **166**. With this motion, the nominal shape of outer surface **194** of the inner membrane is altered wherein valve **168** is forced open thereby allowing fluid to enter the hollow chamber and then exit apertures **172** in the outer membrane. Upwardly extending projection **166**, when engaged by inner corner area **192** of the taut, stretched outer membrane, forms a smaller hollow chamber **196** with the outer membrane than chamber **170**, which facilitates a more direct route of fluid out of the nipple apparatus. Accordingly, this embodiment may not need priming or may require less priming than the embodiments previously described.

Referring to FIG. **15**, which is a cross sectional side view of the nipple apparatus of FIG. **13** in an incorrect "latched-on" position such that the inner membrane is not contacted by the outer membrane in the central nipple region, mechanical pressure is shown applied in a direction **198** to central nipple area **156**, and no upward mechanical or suction pressure is applied to the outer membrane to stretch the membrane upwardly, such that the tip of the nipple is pinched radially inwardly, above the upwardly extending projection of the inner membrane. In particular, pinching of the central nipple area does not facilitate contact of an inner surface of the outer membrane with upwardly extending projection **166** of the inner membrane such that valve **168** is not opened. Accordingly, even if suction pressure and mechanical pressure are simultaneously applied by the infant to central nipple area **156**, the outer membrane is not stretched upwardly, valve **168** is not moved to an open position, and fluid will not flow from a bottle secured to the inner membrane. The nipple apparatus of the present invention, therefore, requires an infant to correctly "latch on" by taking the entire central nipple area into their mouth, and stretching upwardly the outer membrane, to facilitate fluid flow through the device.

Referring to FIG. **16**, which is an exploded side view of the inner and outer membranes of a fourth embodiment of the nipple apparatus, nipple apparatus **200** includes an outer membrane **202** and an inner membrane **204**. Outer membrane **202** includes a central nipple area **206**, an outer nipple area **208**, and an edge region **210**. Inner membrane **204** includes a tapered region **212**, a valve region **214** and an edge region **216**. Valve region **214** includes a valve **218** that may comprise a one-way valve, a slit or slits, or any like device, as known in the art.

Referring to FIG. **17**, which is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **16** in a nominal state, inner membrane **204** and outer membrane **202** define a hollow chamber **220** there between to which communicate apertures **222** in central nipple area **206**, and valve **218**. This embodiment has what may be described as a double projection structure in that central nipple area **206** and valve **218** both extend upwardly from a bottle **22**. Similar to the embodiment shown in FIG. **13**, outer membrane **202** of nipple apparatus **200** has a width **224** of approximately 3 inches (in) (7.6 centimeters (cm)), a height **226** of approximately 1.5 in (3.8 cm) and a thickness **228** in outer nipple area **208** of approximately $\frac{1}{16}^{th}$ in (0.2 cm). The thickness increases to approximately $\frac{1}{8}^{th}$ in (0.3 cm) at edge region **210** so as to add stability to the nipple apparatus. The inner and outer membranes also include mating indentations in their edge region such that the membranes mating engage one another when attached by a collar to a bottle or fluid container.

Inner membrane **204** has a height **230** of approximately 1.0 in (2.5 cm) measured at valve region **214**. Accordingly, if an infant grasps only central nipple area **206** in their mouth and applies a pressure force radially inwardly, then only the central nipple area will be compressed inwardly and will not contact tapered region **212** or valve region **214**. The valve, therefore, will not be opened by the pressure force of the infant's mouth such that no fluid will flow from bottle **22** into hollow chamber **220**. The double projection structure of this embodiment, therefore, facilitates correct "latching-on" of an infant using this nipple apparatus.

Referring to FIG. **18**, which is a cross sectional side view of the nipple apparatus of FIG. **17** in a pressurized state during use, direct pressure is shown being applied to outer nipple area **208** of the outer membrane in a direction **232** which represents the pressure exerted uniformly around the outer nipple area by an infant's mouth. This pressure results in a seal being formed between the infant's mouth and the outer nipple area of the outer membrane. Simultaneously, mechanical and suction pressure are applied to central nipple area **206** of the outer membrane in a direction **234** by the mouth of the infant. The pressure force exerted in a circular shape around outer nipple area **208** of the outer membrane, and the upward stretching of the outer membrane results in a taut, or stretched, orientation of the outer membrane such that tapered region **212** and valve **218** of inner membrane **204** are pinched radially inwardly and upwardly toward nipple **206**, thereby opening the valve. The pressure applied to outer nipple area **208** by the infant generally must form a circular ring of pressure having a diameter **236** of approximately 2.0 in (5.0 cm), and the central nipple area must be stretched upwardly, in order for the outer nipple area of the outer membrane to correctly contact the inner membrane to open the valve. This size diameter is approximately the same diameter that is required for correct "latching-on" by the infant when breast-feeding naturally. Moreover, the amount of stretching required of the outer membrane is approximately the same amount of stretching that is required for correct "latching on" by the infant when breast-feeding naturally.

With a bottle containing formula positioned vertically above the nipple, the formula will flow by the force of

gravity through opened valve **218**, into hollow chamber **220**, and out through apertures **222**. The suction pressure applied to nipple **206** further acts to pull formula from hollow chamber **220** through apertures **222**. The thickness of the inner and outer membranes and the resiliency of valve **218** are chosen such that the suction pressure applied by the infant on nipple **206** will not result in opening of valve **218**. Accordingly, the infant must correctly "latch on" to the nipple apparatus to enable fluid flow there through. In other words, an infant generally must take the entire diameter of central nipple area **206** and outer nipple area **208** into its mouth, and must stretch the outer membrane upwardly, to receive nourishment because merely grasping central nipple area **206** will not function to pinch or thereby open valve **218**. In particular, the suction pressure applied by the infant to outer nipple area **208** of the nipple apparatus causes central nipple area **206** to stretch upwardly, made possible by the flexibility of the rubber material, such that the nipple apparatus replicates the deformation of a natural nipple during natural breast-feeding.

Stated differently, when pressure is applied in direction **232**, and when the outer membrane is stretched upwardly so that it is taut, an inner corner area **238** of outer membrane **202** makes contact with tapered region **212**. With this motion, the outer surface **240** of the tapered region is altered wherein valve **218** is forced open thereby allowing fluid to enter the hollow chamber and then exit apertures **222** in the outer membrane. Tapered region **212**, when engaged by inner corner area **238** of the outer membrane, forms a small hollow chamber **242** with the outer membrane which facilitates a direct route of fluid out of the nipple apparatus. Accordingly, this embodiment may not need priming or may require less priming than the embodiments first described. Moreover, as stated earlier, the dual membrane system of the present invention facilitates sanitary cleaning of the device such that formula, juice, breast milk or the like does not collect or dry in the hollow chamber area between the membranes.

Referring to FIG. **19**, which is an exploded side view of the inner and outer membranes of a fifth embodiment of the nipple apparatus, nipple apparatus **250** includes an outer membrane **252** and an inner membrane **254**. Outer membrane **252** includes a central nipple area **256**, an outer nipple area **258**, and an edge region **260**. Inner membrane **254** includes a tapered region **262**, a plateau **264** and a generally flat valve region **266**. Valve region **266** includes a valve **268** that may comprise a one-way valve as known in the art, or a slit or slits as shown in previously described embodiments.

Referring to FIG. **20**, which is a cross sectional side view of the inner and outer membranes of the nipple apparatus of FIG. **19** in a nominal state, inner membrane **254** and outer membrane **252** define a hollow chamber **270** there between to which communicate apertures **272** in central nipple area **256**, and valve **268**. Similar to the embodiment shown in FIG. **16**, outer membrane **252** of nipple apparatus **250** has a width **274** of approximately 3 inches (in) (7.6 centimeters (cm)), a height **276** of approximately 1.5 in (3.8 cm) and a thickness **278** in outer nipple area **258** of approximately $\frac{1}{16}^{th}$ in (0.2 cm). The thickness **280** is approximately $\frac{1}{8}^{th}$ in (0.3 cm) at edge region **260** so as to add stability to the nipple apparatus. The inner and outer membranes also include mating indentations in their edge region such that the membranes mating engage one another when attached by a collar to a bottle or fluid container.

Inner membrane **254** has a height **282** of approximately 1.0 in (2.5 cm) measured at valve region **266**. Accordingly, if an infant grasps only central nipple area **256** in their mouth and applies a pressure force, then only the central nipple area will be compressed inwardly and will not contact tapered region **262** or plateau **264**. The valve, therefore, will not be opened by the pressure force of the infant's mouth and no fluid will flow from bottle **22** into hollow chamber **270**. The double membrane structure of this embodiment, therefore, facilitates correct "latching-on" of an infant using this nipple apparatus.

Referring to FIG. **21**, which is a cross sectional side view of the nipple apparatus of FIG. **20** in a pressurized state during use, direct pressure is shown being applied to outer nipple area **258** of the outer membrane in a direction **284** which represents the pressure exerted uniformly around the outer nipple area by an infant's mouth. This pressure facilitates a seal of the outer membrane with the infant's mouth around the outer nipple area. Simultaneously, mechanical and suction pressure are applied to central nipple area **256** of the outer membrane in a direction **286** by the mouth of the infant so that the outer membrane is stretched upwardly away from bottle **22**. The inwardly applied pressure force exerted in a circular shape around outer nipple area **258** of the outer membrane and the upward stretching of the outer membrane results in outer membrane **256** contacting tapered region **262** of inner membrane **254** such that valve **268** is pinched radially inwardly and upwardly toward nipple **206**, thereby opening the valve. The pressure applied to outer nipple area **258** by the infant generally must form a circular ring of pressure having a diameter **288** of approximately 2.0 in (5.0 cm) in order for the outer nipple area of the outer membrane to correctly open the valve of the inner membrane. This size diameter is approximately the same diameter that is required for correct "latching-on" by the infant when breast-feeding naturally. Moreover, the infant must correctly stretch the outer membrane upwardly and away from the bottle for correct "latching on" to the nipple apparatus, which is the same technique that is required when the infant is breast-feeding naturally.

With a bottle containing formula positioned vertically above the nipple, the formula will flow by the force of gravity through opened valve **268**, into hollow chamber **270**, and out through apertures **272**. The suction pressure applied to nipple **256** further acts to pull formula from hollow chamber **270** through apertures **272**. The thickness of the inner and outer membranes and the resiliency of valve **268** are chosen such that the suction pressure applied by the infant to nipple **256** will not result in opening of valve **268**. Accordingly, the infant must correctly "latch on" to the nipple apparatus to enable fluid flow there through. In other words, the infant must take generally the entire diameter of central nipple area **256** and outer nipple area **258** into its mouth, and must stretch the outer membrane upwardly, to receive nourishment because merely grasping central nipple area **256** will not function to pinch or thereby open valve **268**. Accordingly, the suction pressure applied by the infant to outer nipple area **258** of the nipple apparatus causes central nipple area **256** to stretch upwardly, made possible by the flexibility of the rubber material, such that the nipple apparatus replicates the deformation of a natural nipple during natural breast-feeding.

In particular, when pressure is applied in direction **284**, an inner corner area **300** of outer membrane **252** makes contact with tapered region **262**. With this motion, the generally flat outer surface **302** of the tapered region is altered wherein valve **268** is forced open thereby allowing fluid to enter the hollow chamber and then exit apertures **272** in the outer membrane. Tapered region **262**, when engaged by inner corner area **300** of the outer membrane, forms a small

hollow chamber **304** with the outer membrane which facilitates a direct route of fluid out of the nipple apparatus. Accordingly, this embodiment may not need priming or may require less priming than the embodiments first described and also tends to lessen the amount of air in the chamber that might be swallowed by an infant, thereby lessening the chance of colic of the infant. Moreover, as stated earlier, the dual membrane system of the present invention facilitates sanitary cleaning of the device.

Accordingly, the valve of the inner membrane will open when correct mechanical movement and suction pressure are applied to the outer and inner membranes in unison. The valve will not open by mechanical movement or suction pressure alone, or by mechanical movement or suction pressure applied incorrectly to the nipple apparatus. The nipple apparatus of the present invention, therefore, will be a type of "training tool" when the infant is using the device. The infant must open their mouth and "latch-on" in the same way as with a natural mother's breast. Only when the infant "latches on" correctly will feeding occur. In this manner, the infant is required to use the same motion and amount of work as when naturally breast-feeding so that the infant will not prefer one method as opposed to the other.

Use of this apparatus makes it possible for the mother to receive a break from breast-feeding without causing nipple confusion by the infant. Specifically, the apparatus of the present invention facilitates a smooth transition to and from breast-feeding and bottle feeding thereby lessening the possibility that a child may choose breast-feeding or bottle feeding exclusively. This ease of transition to and from breast-feeding and bottle feeding may allow the nursing mother to breast-feed her infant for an extended period of time, for example, for the first year of the infant's life. As stated above, this long period of breast-feeding has many benefits for the infant's future and present health status.

While preferred embodiments of the present invention have been shown and described, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the invention in its broader aspects. The appended claims are intended to cover, therefore, all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. A natural nipple baby feeding apparatus comprising:

a container for holding fluid therein and including an open neck for the passage of fluid therethrough;

a flexible first membrane secured to said neck of said container along an outer edge of said first membrane, said first membrane including an outer surface, an inner surface, a central nipple region centrally positioned with respect to said outer edge and having in said central nipple region at least one aperture which allows the passage of fluid though said first membrane upon suction pressure being applied to said central nipple region, and an outer nipple region extending radially outwardly from said central nipple region to a distance approximately halfway between said central nipple region and said outer edge of said first membrane, and wherein said central nipple region comprises a projection that extends upwardly from said outer nipple region; and

a flexible second membrane including an outer edge and being secured between said container and said first membrane such that said outer edge of the second membrane is contiguous with said outer edge of the first membrane, said second membrane further including an outer surface, an inner surface, a central valve region positioned centrally with respect to said outer edge of the second membrane and including a valve positioned therein, said central valve region being aligned with said central nipple region and comprising a projection which extends upwardly from a remainder of said second membrane,

wherein said valve is in a closed position when said inner surface of said first membrane in said outer nipple region is spaced apart from said outer surface of said second membrane in said central valve region, and wherein said valve is moved to an open position so as to allow fluid flow therethrough when said inner surface of said first membrane in said outer nipple region is compressed inwardly against and compresses said outer surface of said second membrane completely around said central valve region.

2. The apparatus of claim **1** wherein said first membrane defines a height and a width, wherein said width is greater than said height, and wherein said outer nipple region defines an angle of approximately thirty degrees with respect to a plane defined by said outer edge of said first membrane.

3. The apparatus of claim **1** wherein said central nipple region of the first membrane is positioned upwardly from said central valve region of the second membrane such that when said central nipple region is pinched inwardly in a direction parallel to a plane defined by said outer edge of said first membrane then said central valve region is uncompressed and said valve remains in the closed position.

4. The apparatus of claim **1** wherein said outer nipple region is generally aligned with a top surface of said central valve region in a plane parallel to a plane defined by said outer edge of the first membrane such that when said outer nipple region is compressed inwardly in a direction toward said central valve region then said central valve region is compressed and said valve is moved to the open position.

5. The apparatus of claim **1** wherein said central nipple region has a diameter, said central valve region has a diameter, and wherein said diameter of said central nipple region is approximately the same as the diameter of said central valve region, and wherein said diameter of said central nipple region is less than one half a diameter of said outer edge of said first membrane.

6. The apparatus of claim **1** wherein said outer nipple region includes texture which simulates the texture of a natural areola and wherein said second membrane includes a plateau region positioned generally parallel to a plane defined by said outer edge of said second membrane.

7. A double membrane nipple apparatus comprising:

a flexible inner membrane including an edge and an upwardly extending valve region having a valve which is movable from a closed position to an open position wherein said valve allows fluid flow therethrough; and

a flexible outer membrane releasably securable to said inner membrane, said outer membrane including an edge which contacts and is aligned with said edge of said inner membrane when said outer membrane is releasably secured to said inner membrane, said outer membrane having an upwardly extending nipple region including an aperture which allows fluid flow therethrough upon a suction pressure being applied to said upwardly extending nipple region, and said outer membrane including an outer nipple region surrounding said upwardly extending nipple region and extending outwardly from said upwardly extending nipple region toward but spaced from said edge of said outer membrane,

wherein said valve moves from said closed position to said open position upon compression of said outer nipple region of the outer membrane into contact against and radially around said upwardly extending valve region of said inner membrane.

8. The apparatus of claim **7** wherein said central nipple region is positioned vertically upwardly of and nominally spaced apart from said central valve region, and wherein said valve remains in the closed position when said central nipple region is pinched radially inwardly such that said central nipple region remains spaced apart from said central valve region.

9. The apparatus of claim **7** wherein said valve is chosen from the group consisting of a slit, multiple slits, and a one-way valve, and wherein said outer nipple region extends radially approximately half way from a center of said outer membrane toward said edge of said outer membrane.

10. The apparatus of claim **7** wherein when said outer nipple region is compressed inwardly against and completely around and in contact with said upwardly extending valve region, said valve is moved to an open position and a hollow chamber is formed between said central nipple region and said central valve region so as to facilitate a straight fluid flow path through said valve, into said hollow chamber and out through said aperture in said central nipple region.

11. A method of receiving fluid through a nipple apparatus, comprising the steps of:

providing a nipple apparatus including a flexible outer sheath releasably secured to and spaced apart from a flexible inner sheath wherein an edge of said inner sheath is aligned with an edge of said outer sheath such that said sheaths contact one another nominally exclusively at said edges, said outer sheath including an upwardly extending nipple projection having an aperture extending therethrough and an areola area surrounding said upwardly extending nipple projection, said inner sheath including an upwardly extending valve projection aligned with said nipple projection and having a valve therein;

compressing said areola area of said outer sheath inwardly so as to surroundingly engage said valve projection of said inner sheath to move said valve from a closed position to an open position thereby allowing a fluid flow through said valve into a hollow chamber between said inner sheath and said outer sheath; and

simultaneous to compressing said areola area, exerting suction pressure on said nipple projection of said outer membrane so as to pull said nipple projection upwardly from a nominal position of said outer sheath, thereby allowing a fluid flow from said hollow chamber through said aperture in said nipple projection.

12. The method of claim **11** wherein said step of compressing said areola area comprises grasping said areola area uniformly and circularly in one's mouth so as to form a seal between one's mouth and said areola area of said nipple apparatus wherein said areola area of said outer sheath is spaced from said edge of the outer sheath.

13. The method of claim **11** wherein said step of exerting suction pressure comprises sucking said nipple projection between one's tongue and one's palate.

* * * * *

EXHIBIT 2025

EXHIBIT
2025
PENGAD 800-631-6989
08 10/12/23

(No Model.)

J. W. McKINNON.

NURSING BOTTLE.

No. 438,937. Patented Oct. 21, 1890.

Fig. 1.

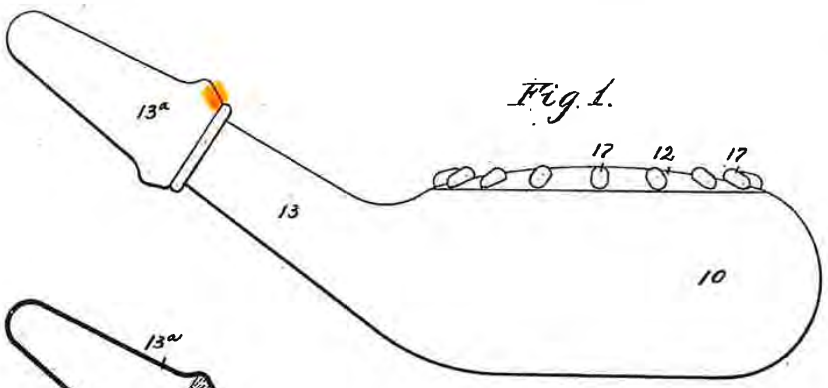


Fig. 2.

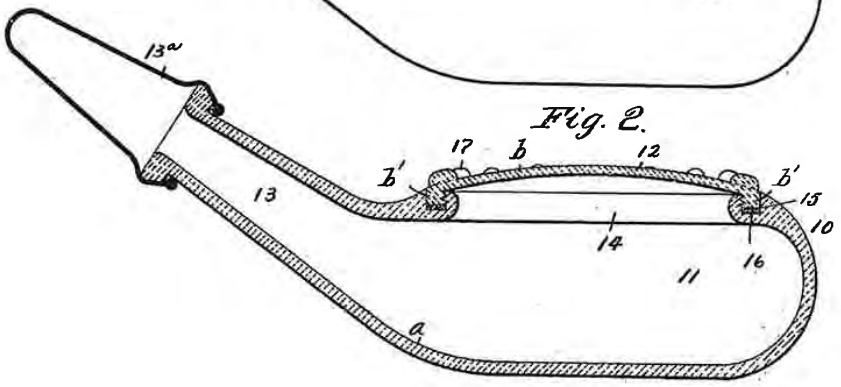
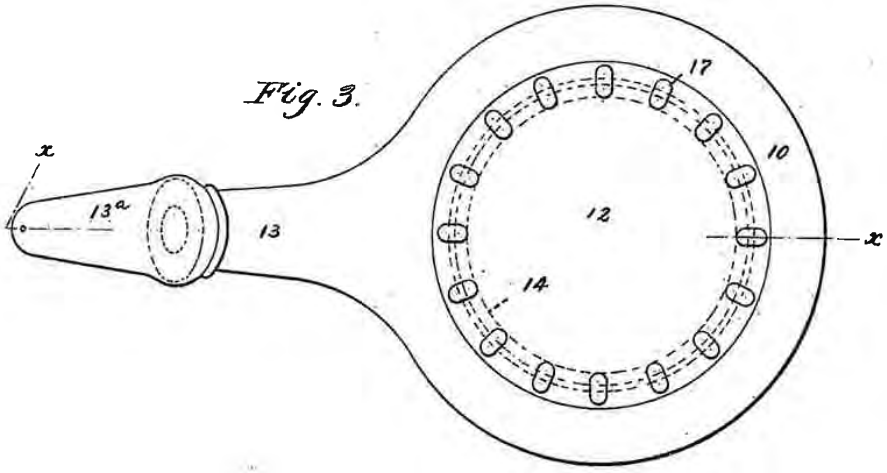


Fig. 3.



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INVENTOR:
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BY Munn & Co
ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE

JAMES W. McKINNON, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ANN M. DOWNS, OF SAME PLACE.

NURSING-BOTTLE.

SPECIFICATION forming part of Letters Patent No. 438,937, dated October 21, 1890.

Application filed August 7, 1890. Serial No. 361,283. (No model.)

To all whom it may concern:

Be it known that I, JAMES WILSON McKINNON, of New York city, in the county and State of New York, have invented a new and useful Improvement in Nursing-Bottles, of which the following is a full, clear, and exact description.

My invention relates to an improved nursing-bottle for infants, and has for its object to so construct the vessel that the interior thereof may be expeditiously, thoroughly, and conveniently cleansed with a minimum of labor, and to provide for a free circulation of air through the vessel after it has been washed, or while not in use.

Another object of the invention is to impart to the inside of the body of the vessel an approximately oval or circular contour, and thereby avoid angular surfaces—such as corners, depressions, or cavities—liable to receive milk and to retain the same in a soured or stale condition.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the bottle. Fig. 2 is a central vertical longitudinal section through the bottle, taken practically on the line x x of Fig. 3; and Fig. 3 is a plan view of the bottle.

The bottle may be made of any suitable material—annealed glass, for instance—and comprises, primarily, a body 10, containing a single chamber 11, a cap or cover 12 for the body-chamber, and a neck 13, which latter may be placed at an angle to the body, or may be practically in the same plane with the horizontal axis of the body. The neck is shaped at its outer end in any suitable or approved manner for the reception of a nipple 13^a. The body of the bottle is preferably given an approximately oval or circular exterior contour, and if in practice it is found advisable the under side may be flattened, as illustrated.

The walls of the body-chamber partake, essentially, of the same contour as the exterior of the body, and are gradually curved to meet the neck, as illustrated at a, in Fig. 2. Thus the walls of the chamber 11 are rendered free from corners, or angular recesses or depressions liable to gather and retain particles of milk to the detriment of the bulk of the article and rendering difficult any thorough cleansing operation.

The principal feature of the invention consists in providing the body with a cap or cover above mentioned, which cap or cover is intended to close an opening 14 in one side of the body, preferably at the top, when the bottle is in use, and which is also intended to be removed when the bottle is to be cleansed, or to admit air into the interior. The opening 14 is ordinarily circular, having a smooth, somewhat cylindrical inner wall, as shown in Fig. 2, and the diameter of the opening is preferably as great as the surface in which it is produced will admit of. That portion of the body surrounding the opening 14 is made sufficiently thick to admit of the formation of an annular groove or channel 15, one wall whereof is threaded, the thread being produced upon the inner wall, as shown in the drawings. The cap or cover is of corresponding diameter to the channel 15, and preferably consists of a dome-shaped body section b and a marginal flange b', produced upon or attached to its under face, the flange being of proper dimensions to enter the channel 15 and engage with a gasket or washer 16, located therein, and is also provided with a threaded surface to engage with the threaded wall of the channel.

In order that the cap or cover may be readily removed from the body, a series of studs or protuberances 17 is formed upon the outer face of the dome-like section, the said studs being preferably located near the margin, as shown; but the entire outer surface of the said dome-like section may be roughened, or provided with studs located at intervals, if so desired.

The removal of the cover is conveniently and expeditiously effected by engaging the palm of the hand with the outer surface of the cover, and as the hand is turned the studs offer sufficient resistance to compel the cap to turn also.

It is obvious that when the cap or cover 12

is removed from the body, each and every part of the chamber 11 is rendered easy of access and may be quickly and conveniently cleaned, the cleaning process being greatly facilitated by reason of the smooth circular shape of the chamber. It is also evident that when both the nipple 13^a and the cap or cover are removed, the air will freely circulate through the chamber and neck of the bottle, thereby purifying and airing the vessel. The bottle is also constructed in such manner that it may be readily made of glass or of any appropriate cast material and at little expense.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent—

As an improved article of manufacture, the herein-described nursing-bottle, consisting of a round flattened body 10, having a nipple-receiving neck 13, a large circular opening 14 in its upper side, an annular groove or channel in the upper side of the body beyond and concentric with the said opening and having one vertical wall screw-threaded, a gasket in the bottom of said groove or channel, and the slightly-curved cover 12, having a circular screw-threaded flange b' closely fitting the said groove or channel, and a circular series of projections or corrugations 17 on its outer face, substantially as set forth.

JAMES W. McKINNON.

Witnesses:
J. F. ACKER,
E. M. CLARK.

EXHIBIT 2026

(No Model.)

G. MÜLLER.

INFANT'S FEEDING BOTTLE.

No. 535,550. Patented Mar. 12, 1895.

EXHIBIT
2026
10/12/23
PENGAD 800-631-6989

Fig. 3.

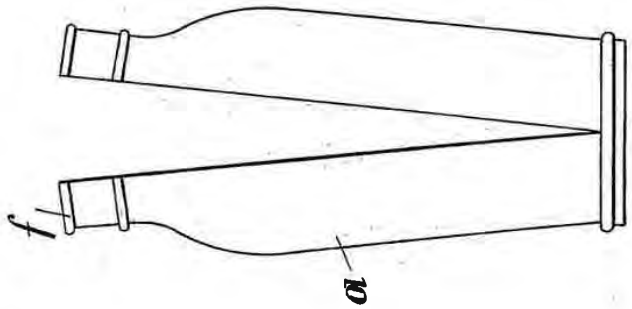


Fig. 2.

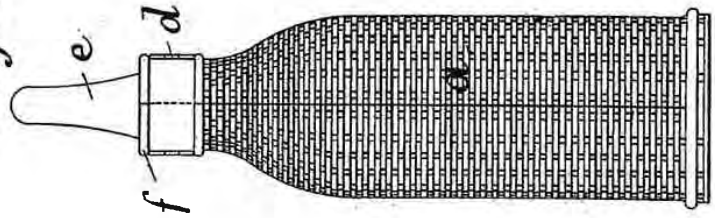
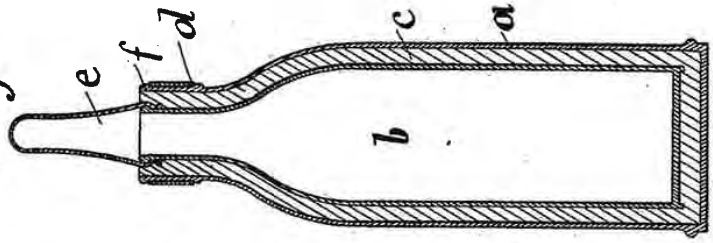


Fig. 1.



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EXHIBIT 2027

EXHIBIT
PENGAD 800-631-6989
2027
08 10/12/23

W. HOBSON.

Nursing-Bottles.

No. 139,958. Patented June 17, 1873.

Fig 1.

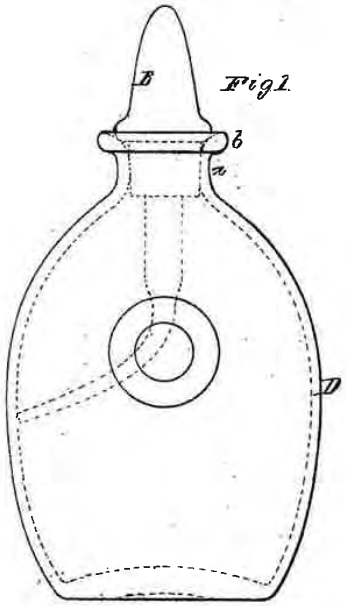


Fig 2.

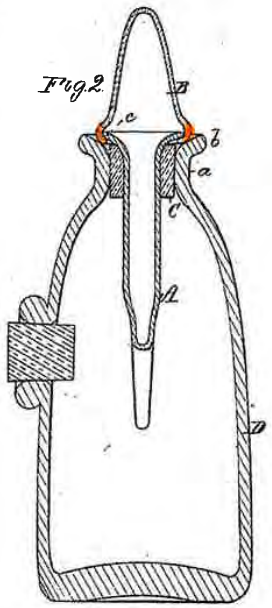
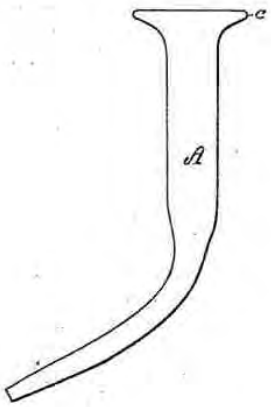


Fig 3.



Witnesses.

S. N. Piper.

L. N. Holler

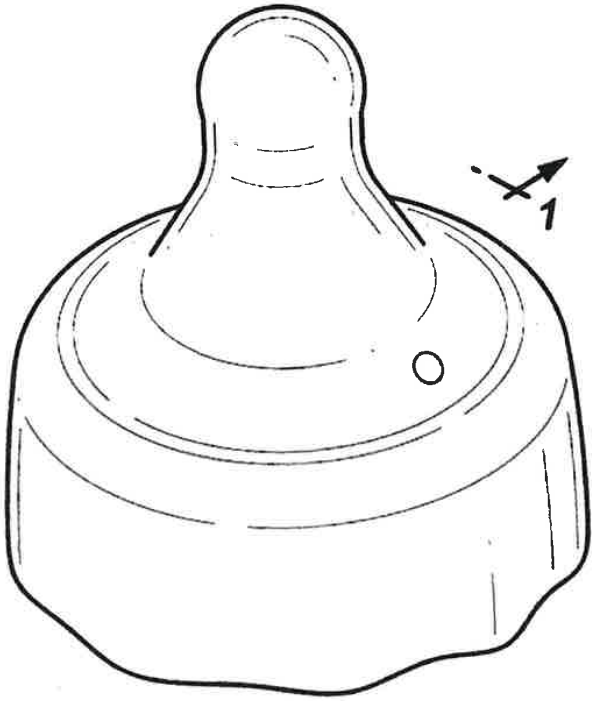
William Hobson.

by his attorney.

R. H. Eddy

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

EXHIBIT 2028



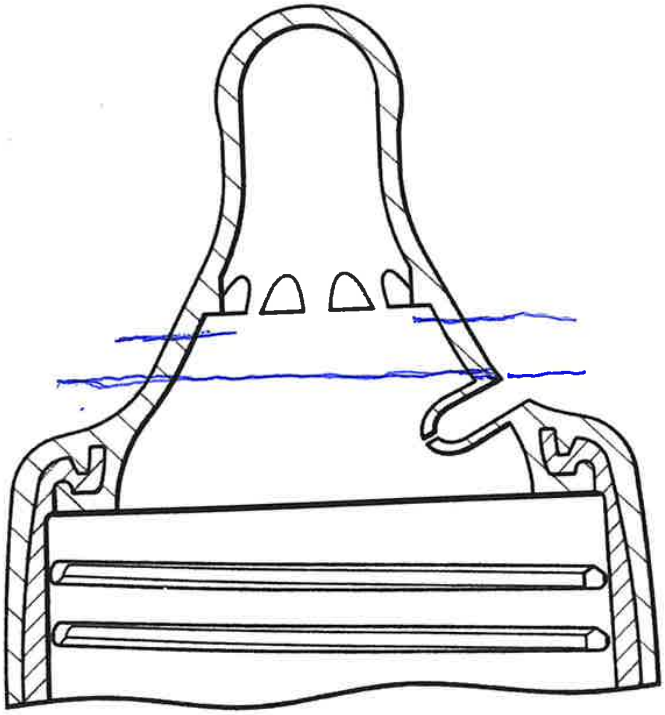


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