

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

JUUL LABS, INC.,

IPR2024-00161

Petitioner,

Patent:
10,334,881 B1

v.

NJOY, LLC,

IPR2024-00160

Patent Owner.

Patent:
11,497,864

~~~~~

VIDEOTAPED DEPOSITION OF  
WILLIAM SINGHOSE, PH.D.

October 24, 2024

9:35 a.m.

Hilton Atlanta  
255 Courtland Street NE  
Atlanta, Georgia

Marcella Daughtry, RPR, RMR  
Georgia License No. 6595-1471-3597-5424  
California CSR No. 14315



800.211.DEPO (3376)  
EsquireSolutions.com

JUUL Ex.1035

Case No.: IPR2024-00161

Page 1 of 187

APPEARANCES OF COUNSEL

For the Petitioner:

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND  
POPEO, P.C.  
MR. REZA DOKHANCHY  
44 Montgomery Street, 36th Floor  
San Francisco, California 94104  
858.314.1596  
rdokhanchy@mintz.com

For the Patent Owner:

WEIL, GOTSHAL & MANGES LLP  
MR. W. SUTTON ANSLEY  
2001 M Street NW, Suite 600  
Washington, DC 20036  
202.682.7018  
sutton.ansley@weil.com

And

WEIL, GOTSHAL & Manges LLP  
MR. TOM YU  
767 Fifth Avenue  
New York, New York, 10153  
tom.yu@weil.com

Also Present:

Paige Brantley, videographer

INDEX OF EXAMINATION

WITNESS: WILLIAM SINGHOSE, PH.D.

| EXAMINATION         | PAGE |
|---------------------|------|
| BY MR. DOKHANCHY    | 5    |
| BY MR. ANSLEY       | 172  |
|                     |      |
| FURTHER EXAMINATION |      |
| BY MR. DOKHANCHY    | 176  |

\* \* \*

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

| INDEX TO EXHIBITS |                                                                                                 |      |
|-------------------|-------------------------------------------------------------------------------------------------|------|
| EXHIBITS          |                                                                                                 | PAGE |
| Exhibit 1         | Plaintiff Fuma International LLC's Memorandum of Law in Support of Motion to Preclude Testimony | 30   |
| Exhibit 2         | JUUL - 864 Patent, Limitation 1.2                                                               | 98   |
| Exhibit 3         | Hand-drawn diagram                                                                              | 113  |
| * * *             |                                                                                                 |      |

1 THE VIDEOGRAPHER: This is the video deposition  
2 of Dr. William Singhose taken in the matter of JUUL Labs,  
3 Inc. versus NJOY, LLC, Case Number IPR2024-00160 in Case  
4 Number IPR2024-00161.

5 Today's date is October 24th, 2024. The time  
6 on the record is 9:35 a.m. My name is Paige Brantley,  
7 and I am the videographer. The court reporter is  
8 Marcie Daughtry.

9 Counsel, please introduce yourselves, and after  
10 which the court reporter will swear in the witness.

11 MR. DOKHANCHY: Reza Dokhanchy, Mintz Levin.

12 MR. ANSLEY: Sutton Ansley, the law firm Weil,  
13 Gotshal & Manges, here on behalf of the witness and NJOY,  
14 LLC. With me is Tom Yu, also with the same law firm.

15  
16 WILLIAM SINGHOSE, Ph.D.,  
17 called as a witness herein, having been first duly sworn  
18 by the shorthand reporter to speak the truth and nothing  
19 but the truth, was examined and testified as follows:

20  
21 EXAMINATION

22 BY MR. DOKHANCHY:

23 Q Good morning, Dr. Singhose.

24 A Good morning.

25 Q Is there any reason you cannot testify

1 truthfully and accurately today?

2 A No.

3 Q Okay. Do you understand you are here to  
4 testify in the matters of IPR2024-160 and 161 regarding  
5 the '864 and '881 patents respectively?

6 A Yes, I do.

7 Q Okay. What did you do to prepare for your  
8 deposition today, if anything?

9 A Well, I guess, my entire work on the case I  
10 would say leading up to this, but you probably mean like  
11 within the last week after submitting my report and stuff  
12 like that?

13 Q Yeah, let's start there.

14 A So I would say over the last week, I reviewed  
15 my declarations in this matter and the exhibits to those  
16 declarations. I reviewed the institution decisions.

17 That may be it. That's probably the bulk of  
18 what I reviewed.

19 Q Okay. Did you meet with your counsel to  
20 prepare for your deposition?

21 A Yes, I did.

22 Q How many times?

23 A Well, we met yesterday in person, and then we  
24 met kind of briefly online, I think on Monday.

25 Q And how long were each of those meetings?

1           A    I think Monday was probably a half hour to an  
2   hour, and then yesterday was most of the day. I had to  
3   leave for a while and teach a lecture and come back, but  
4   it was -- it was most of the day.

5           Q    And was -- when you say your counsels, are the  
6   two gentlemen in the room today?

7           A    Yes, that's correct.

8           Q    All right. I understand you have some expert  
9   witness experience related to e-cigarettes; is that  
10   right?

11          A    Yes, I do.

12          Q    Aside from that expert witness work, do you  
13   have any experience in electronic cigarette design or  
14   operation?

15          A    Well, I have a lot of experience on the  
16   underlying technologies involved in there, but I have  
17   never designed a electronic cigarette or been on a team  
18   that designed a whole electronic cigarette.

19          Q    What about any part of an electronic cigarette,  
20   is that still true?

21          A    Oh, that's -- that's what I'm saying. I'm very  
22   familiar with the various parts in there. For example,  
23   these have little computers inside, and they have sensors  
24   such as the pressure sensors. Some of the prior art have  
25   essentially what's called flex sensors, so they can

1 detect the flapping of parts.

2 So that's been a huge part of my life, is  
3 dealing with small electronic components that have a  
4 small brain and sensors and make decisions about what to  
5 do based on that sensor information.

6 Q Okay. But you never, for example, designed  
7 or -- or were involved in designing a cartridge for an  
8 e-cigarette, right?

9 A Not a cartridge for an e-cigarette, no.  
10 Cartridges for other kinds of handheld electronic  
11 devices.

12 Q And what sorts of handheld electronic devices  
13 is that?

14 A I can't give you the details on that because it  
15 was my work for Google, but I can broadly say, I think  
16 comfortably, it was a smart pen.

17 Q Okay.

18 A So in those pens, you have to replace the ink  
19 cartridges.

20 Q I see.

21 And what were those cartridges made out of to  
22 the extent you can tell us? Was it just ink or anything  
23 else?

24 A I think I'm comfortable saying that we -- we  
25 made those out of plastic, for the most part. So they

1 are plastic cartridges. You have to put the ink in them,  
2 seal it back up, and then the challenging part, of  
3 course, is like snapping it in and getting it to be  
4 removable. So those would generally be like flexures,  
5 and we made those out of plastic as well.

6 Q I see.

7 What was inside the cartridges besides ink, if  
8 anything? Can you tell me?

9 A Just ink, yeah.

10 Q Okay. Can you tell me what the interface to  
11 the rest of the pen was like?

12 A Yeah, it's been a while, so I'm --

13 Q Okay.

14 A I can't remember the exact details, but  
15 essentially you would press it in. It would snap fit  
16 into place.

17 Q Okay.

18 A And during that snap fit process, you would  
19 essentially make a mate between the ink that's in there  
20 and the rest of the ink drawing part of the pen. So  
21 essentially it's like a capillary action, a small tube,  
22 if you will, and then that would allow the ink to be  
23 pulled from the cartridge down to the tip. And then when  
24 most of the ink is gone, you would essentially push --  
25 push a little knob, and it will pop back out, and you can

1 put a new one in.

2 Q Was that product ever commercialized?

3 A It was not fully commercialized. We had a very  
4 large budget, and we were well along to making it  
5 commercialized, and it got canceled sort of at the last  
6 minute.

7 Q I see.

8 When -- about when was that?

9 A I started working on that in 2015, and I think  
10 that the plug was pulled -- the plug was pulled a couple  
11 different times, right. You -- they'd cancel it for a  
12 while and then they restart it and cancel. That's the  
13 way that Google works on products. Probably the last  
14 time I really worked on it was 2018, so it was about a  
15 three-year project.

16 Q Okay. Do you have any firsthand experience  
17 using electronic cigarettes, aside from your litigation  
18 work?

19 A No.

20 MR. ANSLEY: Objection. Vague.

21 THE WITNESS: Yeah, I've never used them  
22 outside of my litigation work. Mostly I did a lot of  
23 testing on them, but the testing and usage of them, if  
24 you will, was not for my personal use.

25 Q BY MR. DOKHANCHY: Got it.

1 Do you follow the industry of electronic  
2 cigarettes aside from your litigation work?

3 A I would say, yes, I do. I mean, when -- you  
4 know, JUUL made a perfect splash, and because those  
5 founders were grad students at Stanford, and I went to  
6 Stanford as a grad student, I naturally had an interest  
7 in that. And I didn't know them personally, but I knew  
8 other people personally who were -- who were in that  
9 class and that development project.

10 Q I see.

11 A So because of that, I've always had a bit of an  
12 interest.

13 Q Okay. So one of your opinions relates to the  
14 notion that Fuma products, which you say embody the  
15 claims of the patents that we're here to talk about  
16 today, experienced commercial success.

17 Do you recall that?

18 A Yes, I do.

19 Q And you cite to some numbers of their sales.

20 A Yes, I do.

21 Q Right?

22 Do you know what the sales of the average  
23 e-cigarette company were in 2009, 2010, 2011?

24 MR. ANSLEY: Objection, vague.

25 THE WITNESS: No, I do not know that.

1 Q BY MR. DOKHANCHY: Do you know what the average  
2 sales -- withdrawn.

3 Do you know what the sales numbers were like  
4 for the leading e-cigarette company in 2009, 2010, 2011?

5 A No, I don't know that.

6 Q Okay. And you didn't analyze the sales numbers  
7 of any other e-cigarettes in rendering your opinions in  
8 this case besides those of Fuma, correct?

9 A I don't think I analyzed them per se, but I  
10 know about them, like I've -- because I've been involved  
11 in these cases before, I've seen a lot of sales numbers  
12 before, and I didn't forget that.

13 Q Okay.

14 A So I'm not sure I wrote them down on a paper  
15 and compared things, but I -- I generally am aware of how  
16 large the sales can be.

17 Q Okay. And how large can they be?

18 A Billions of dollars.

19 Q And that was in the 2009 to 2011 time frame?

20 A Oh, not in that time frame, I'm sorry. In that  
21 time frame, it was much more in its infancy, and so the  
22 numbers would be a lot smaller.

23 Q Do you know how they compared to the NJOY sales  
24 numbers?

25 A Are you ask --

1 Q Excuse me, excuse me. The Fuma sales numbers?

2 A In the same time frame or --

3 Q Yes.

4 A Oh. No, I didn't do any cross comparison. I  
5 just looked at Fuma, and I saw that they had increasing  
6 sales and they were selling over like a four-year period,  
7 which tells me that they're successful or they would have  
8 gone out of business before that. That's essentially  
9 how -- the basis of that opinion.

10 Q I see.

11 You also opine that the sales of the Fuma  
12 products were a direct result of the claim features of  
13 the patents in this case.

14 Do you recall that?

15 A Yeah, I mean, I think I was maybe not quite  
16 that specific, but I said the success of it is directly  
17 tied to these features.

18 Q Do you have your report in front of you?

19 A Yes, I do.

20 I mean, I may have used that terminology.

21 Q Yeah, I mean, you did, but --

22 A Okay.

23 Q -- just to prove it to you, let's --

24 A Sure.

25 Q Let's go to it. Paragraph 490.

1 A 490 what?

2 Q 490.

3 A Okay, 490.

4 Q Do you have it up in front of you?

5 A Oh, yes, I do.

6 Q And you say in the last sentence of paragraph  
7 490, "The sales of Fuma's cartridges and starter kits  
8 were a direct result of the claim features of the '864  
9 patent, which as described above, eliminated problematic  
10 issues in preexisting devices and enhanced the adult  
11 consumer experience," right?

12 A Yes, that's correct.

13 Q So how do you know that those sales were direct  
14 results of the claim features?

15 A Well, again, this is my opinion of the evidence  
16 that I am given. You know, having worked in these  
17 industries before, having started a couple companies  
18 myself, and I did the analysis where I looked at the '864  
19 patent, and I understood what advantages it provided. I  
20 looked at the Fuma product and saw that it embodied it,  
21 and I saw this increasing number of sales, and the sales  
22 in fact over a four-year period.

23 Putting that information together, it's my  
24 opinion that these sales are -- can be attributed to  
25 those features because they did solve problems that

1 existed in previous vaporizers. That's how I'm making  
2 the connection there.

3 Q Okay. Did you attempt to rule out whether  
4 there were any other unclaimed features that were the  
5 source of the sales of the Fuma devices?

6 A Yes, I did. I mean, I looked at that, and I  
7 looked at the Fuma products, and I -- I tried to compare  
8 them to comparable vaporizers at the time and look for  
9 features that basically were not in the '864 that may  
10 have attributed to sales, and I could not identify any  
11 such features.

12 Q What comparable vaporizers did you look at?

13 A Off the top of my head, I can't remember. I  
14 basically was looking at -- again, I can't remember the  
15 names, but I -- I had -- did examine other vaporizers  
16 coming, for example, out of China. I know some -- I had  
17 some early versions of the vaporizers that were coming  
18 out of there, and I reviewed materials indicating that  
19 they had problems such as listing a burnt taste when you  
20 got near the end of it because the -- the cotton fiber,  
21 whatever is holding it, would start burning.

22 So that's -- that's what -- that was my  
23 comparison, because I was comparing to the -- the  
24 products at about the same time that I was aware of, but  
25 I don't recall their names off the top of my head.

1 Q Did you interview any customers of Fuma and ask  
2 them why they purchased Fuma products?

3 A I did not.

4 Q Did you review any evidence that stated why a  
5 customer bought a Fuma product?

6 A I don't think so.

7 Q Okay. If you go to paragraph 499, just a few  
8 pages down. You say, "After Fuma's e-cigarette that  
9 embodies the claimed invention of the '864 patent was  
10 commercialized in 2009, other companies similarly began  
11 to introduce e-cigarettes that had cartridges that  
12 include transverse heating elements in the airflow  
13 passageways."

14 Do you see that?

15 A Yes, I do.

16 Q And then you go on to give one example in that  
17 paragraph, and then several others in paragraph 500.

18 Do you see that?

19 A Yes, I do.

20 Q Let's take the first one. When was the Bloog  
21 first introduced to the market?

22 A I don't recall that off the top of my head, but  
23 this information -- a lot of this information, like you  
24 said, in the next paragraph, is coming from a report from  
25 2013. And as I recall, again, off the top of my head

1 without looking at it, that it's reviewing vaporizers  
2 being sold from about 2010 up until 2013.

3 So none of these predate Fuma's e-cigarette,  
4 and they are all between that time period of introduction  
5 and 2013 when this report came out.

6 Q Do you have that Exhibit 2039 in your binder?

7 A I'm not sure that I do. Let me look in the  
8 table of contents for this. I didn't -- I didn't create  
9 this document.

10 I'm not seeing 2039 here. It only goes up to  
11 2036.

12 Q Okay. So if that -- if that document, the 2013  
13 Carmines Consulting report doesn't say when the Bloog  
14 product was first introduced, you don't have any  
15 knowledge or evidence when it was first introduced. Is  
16 that fair?

17 A Well, I have knowledge that it was introduced  
18 after it, but I think you are asking for the source of  
19 that knowledge, and I don't see any other citation in my  
20 report, so I think it would be in 2039 or it may be in  
21 one of the other documents that I cite, but I'm not sure  
22 which one it would be sitting here right now.

23 Q Okay. What is your knowledge as to when Bloog  
24 was first introduced to the market?

25 MR. ANSLEY: Objection. Asked and answered.

1 THE WITNESS: My knowledge is that it was  
2 introduced after Fuma's e-cigarette was commercialized in  
3 20 -- 2009.

4 Q BY MR. DOKHANCHY: And the source of that  
5 knowledge is what?

6 A That's what I say. Sitting here I'm not sure.  
7 It could be in this Exhibit 2039 or one of the other  
8 documents cited.

9 Q Okay. But you are not sure sitting here right  
10 now?

11 A That's correct.

12 Q And is the same true of all of the products  
13 listed in the table starting on page 264 of your '864  
14 report in paragraph 500?

15 A I just want to make sure I understand the  
16 question. It's the products that I've put associated  
17 with paragraph 500, not, for example, going on later on  
18 in my report to Green Smoke?

19 Q Correct.

20 A Okay, yeah. Just those ones, my source of that  
21 information is primarily Exhibit 2039. And my  
22 understanding of 2039 is that it's a report from 2013  
23 where the Carmines Consulting group made this report, and  
24 they were explaining how these things worked, and they  
25 were obviously not past 2013. And my understanding is

1 that none of those in this report predated Fuma's  
2 e-cigarette. That's my understanding based on that  
3 report and possibly one of these other documents, but I'm  
4 not sure as I sit here.

5 Q Okay. So as you sit here, you can't point me  
6 to any evidence that actually says that any of these  
7 products in the table in paragraph 500 were introduced  
8 after the Fuma product first?

9 A Yeah, again, it's -- like, they are obviously  
10 before that 2013 report, but I think you are saying what  
11 evidence do I have that they weren't from 2008, for  
12 example?

13 Q For example.

14 A Sitting here right now, I'm not sure where that  
15 evidence is.

16 Q Okay. Okay. I will hand you a copy of Exhibit  
17 1005 in the 160 matter, and it is the Wang reference.

18 MR. ANSLEY: Thank you.

19 Q BY MR. DOKHANCHY: And do you recognize that as  
20 the Wang reference that you analyzed?

21 A Yes, I do.

22 Q And if you can go to the figures at the back,  
23 you will see a figure 3.

24 A Yes, I see that.

25 Q And your opinion is that the air enters this

1 cartridge in figure 3 through aperture 106 and then goes  
2 down a gap that you say exists between this fiber 105 and  
3 the walls of the outer shell 102; is that correct?

4 A Yes.

5 Q And let's start with the -- the gap that you  
6 say exists. What is your basis for saying that there is  
7 a gap there?

8 A Well, primarily, I see it. Like when I look at  
9 figure 3, there's a clear gap between the wall of the  
10 shell of this and the ground fiber 105.

11 Q And Wang doesn't say anywhere in its text that  
12 there is a gap between fiber 105 and the wall of shell  
13 102, correct?

14 A I don't think it's that specific with this  
15 description. It does refer to -- I'm pretty sure it  
16 refers to gaps or openings.

17 Q Uh-huh.

18 A But I don't think it like goes through and  
19 points out every single place there's a gap or opening.  
20 So I read that textual description of air going into gaps  
21 while looking at figure 3 and I saw a gap, and I know as  
22 a fluid dynamic expert, that air is going to flow through  
23 a gap.

24 Q There has to be a gap for air to flow, right?

25 A Well, I would say that would -- that would be

1 the airflow passage. I mean, air can obviously flow  
2 through other materials like sort of one molecule at a  
3 time, right? You can have -- it's seeping through, if  
4 you will.

5 But at airflow where there's a -- where there's  
6 a lot of air flowing through, it's gonna have to have an  
7 opening.

8 Q In the example you said about air flowing  
9 through other materials one molecule at a time, would  
10 that be a good design for the cartridge of an  
11 e-cigarette?

12 MR. ANSLEY: Objection. Vague.

13 THE WITNESS: No, not if that was all the  
14 airflow that you had. You -- you don't want them -- the  
15 user would have to be sucking through a -- a dense fabric  
16 or something. They -- they wouldn't be able to pull much  
17 air through that. So you definitely need to have a  
18 part -- you need to have an airflow passage that tumbles  
19 freely, essentially.

20 Q BY MR. DOKHANCHY: I see.

21 And what's your basis for saying that the air  
22 flows in that gap as opposed to, for example, down the  
23 middle of figure 4?

24 A Well, I see the gap, but I've also analyzed a  
25 lot of these vaporizers, and they often have these

1 airflow passages along the shell, if you will, along the  
2 inside of the shell, and there's a good reason for that,  
3 is it provides a cooling of the vapor. You wouldn't want  
4 your user to inhale vapor directly. It's boiling, and so  
5 there has to be some part of the passageway that  
6 essentially achieves a mixing and a cooling effect.

7           So when I saw that, I immediately thought,  
8 well, it's an opening. I can see that, and that makes a  
9 lot of sense, because that's where you would essentially  
10 be able to cool the vapor and mix it with the air to make  
11 the aerosol, which is what you really want to deliver to  
12 a person.

13           Q Wang doesn't say in its text that the air flows  
14 down the side between fiber 105 and shell 102, correct?

15           A That's correct. I don't think it's that  
16 specific in its description, in the text. It's just that  
17 specific in the figure 3.

18           Q Okay. You understand Dr. Sturges's opinion is  
19 that, as you can see in figure 5, there is a channel  
20 created in the middle of the fiber 105.

21           Do you understand that?

22           A I think I understood your question, but when I  
23 see figure 5, I do not see a channel, but I do understand  
24 that's his opinion.

25           Q And you know the heating element of the coil

1 104 in figure 3, that's the component that vaporizes  
2 liquid to create vapor, right?

3 A Well, it's certainly part of the component. I  
4 mean, that's -- you're gonna drop electricity over there,  
5 and it's gonna get real hot, but that wire is gonna heat  
6 the material around it. And when that -- whatever  
7 material gets hot enough to vaporize, it's gonna be  
8 vaporizing.

9 So it's unlikely that only those specific wires  
10 are shooting off vapor. It's gonna heat up all the  
11 material around it, and that's gonna become a surface  
12 that's emitting vapor.

13 Q So you are talking about wires coming in and  
14 out of that coil. Is that what you are talking about?

15 A No, I'm talking if we just honed in on that  
16 coil, that coil is touching other material. It's  
17 touching the -- the fabric soaked in e-liquid.

18 Q Got it.

19 A That fabric, it gets hot, and it's gonna be  
20 ejecting molecules. So that fabric, that local part of  
21 the fabric is certainly going to be part of what is  
22 vaporizing --

23 Q Okay.

24 A -- the e-liquid.

25 Q The source of the fabric getting hot is the

1 coil, right?

2 A I would say the ultimate source is the battery.  
3 I mean, if I do an energy analysis, that's where the --  
4 that's where the source is. The battery is providing  
5 that energy, but yes, the coil is definitely getting hot.

6 Q Okay. So the energy is -- electrons are  
7 flowing through the coil from the battery causing the  
8 coil to get hot and causing the fiber to get hot. Is  
9 that fair?

10 A That's fair.

11 Q If there is no gap in that fiber 105, how would  
12 the vapor escape to reach the user?

13 A Sure. Well, the vapor is going to be -- the  
14 vapor is one molecule. That's what a vapor is. It's not  
15 big droplets. So these molecules get really, really hot  
16 and they vaporize it, and essentially they jump off the  
17 surface, and so there's these free molecules.

18 So because they are only one molecule at a  
19 time, they are going to be able to pass through the  
20 fiber. And so this fiber, if you looked at it and you  
21 could somehow see the molecules, you would see them  
22 coming out the sides and off the end being driven by that  
23 heat source in the middle.

24 Q So that fiber 105 is soaked in nicotine liquid,  
25 right?

1 A Yes.

2 Q Okay. So how does the vapor pass through a  
3 fiber soaked in liquid?

4 A Well, it's kind of like drinking a Sprite or a  
5 Coke, right? It's all liquid, but there's bubbles that  
6 form and flow through the liquid to get to the outside.  
7 So essentially it's a boiling operation, and gas can go  
8 through liquid as it's boiling outwards.

9 Q And you think that's the -- the method of  
10 operation, that the vapor is extracted through the liquid  
11 sitting in the fiber to reach the user's mouth?

12 A That's certainly a part of it. I mean, without  
13 having the actual device and measuring the temperature  
14 gradient, I would say that's likely what's going on. If  
15 it heats it up so much that the fiber on the very outside  
16 gets to the boiling point, then it -- yeah, the liquid  
17 would be coming right off the outer surface. But I think  
18 also because it's so hot on the outer surface, it's going  
19 to even be hotter in the middle. And it's gonna be that  
20 boiling operation that -- that again, that you see when  
21 you are boiling water or, again, taking the Coke, it's  
22 not boiling, but it's -- it's condensing in those air  
23 molecules and they're popping up and coming out.

24 Q Does Wang describe its operation as boiling the  
25 liquid that's within the fiber?

1 A No, it does not use that terminology.

2 Q It does describe creating vapor, though, right?

3 A Yes, and creating vapor is effectively a  
4 boiling operation.

5 Q But you are talking about boiling it as it's  
6 sitting in the fiber, correct?

7 A Yes. The fiber, it has to be -- there has to  
8 be some physical contact, I would think, or pretty close  
9 to this. And so, yeah, it's boiling off or vaporizing  
10 e-liquid that is in that fiber.

11 Q Is the boiling happening just in the area of  
12 the coil or is it actually boiling throughout the fiber?

13 A Again, that's what we don't know. It really  
14 depends on how hot that is. I don't think that it could  
15 possibly be boiling the entire thing. It would just be  
16 too energy inefficient. So there's probably a more  
17 localized boiling operation near there, and then like I  
18 said, the air is flowing out as bubbles would flow.

19 It seems overkill to boil the whole thing, and  
20 it would probably get kind of uncontrollable because so  
21 much would come off with a single hit. So I think it's a  
22 more localized boiling operation.

23 Q Does the -- would the air flow as quickly  
24 through the liquid in the fiber 105 as it would if there  
25 was a channel down the middle of the fiber?

1           A    Which air are you -- which air are -- just so I  
2 know, which air are you referring to flowing?

3           Q    Yeah, that's a good question. Let me clarify  
4 the question.

5                   So here's the question. After the vapor is  
6 created coming off of the coil, does that vapor reach the  
7 user's mouth through the liquid in the fiber 105 as  
8 quickly as it would if there was instead a channel so the  
9 air could flow freely through it?

10          A    Okay, I think I understand the question.

11                   So if we did actually have a channel going up  
12 through, like some kind of tube, like a physical  
13 structure and --

14          Q    Well, let me clarify.

15          A    Okay. Sure.

16          Q    It's not limited to a physical structure, my  
17 question, just if there's a gap.

18          A    Oh, I see.

19                   And the question is, would -- when it boils off  
20 or vaporizes, would it get there faster if there was a  
21 opening directly up the middle?

22          Q    Yes.

23          A    Yeah, probably. I mean, that is a little bit  
24 of a shorter path to the user's mouth.

25          Q    And not only shorter, but it doesn't have to go

1 through liquid; it just travels through air, right?

2 A Yeah, I mean, I still think some of it's gonna  
3 go through the liquid. I mean, you can't stop it. It's  
4 gonna go wherever it wants to go.

5 Yeah, so that's gonna be a shorter path.  
6 You're unfortunately more likely to burn the user with  
7 that direct path. You've got this vapor, and it doesn't  
8 have a very long distance to go.

9 And I think that's why you -- you would want it  
10 to go to the outside, cool, mix, coalesce, and then go to  
11 the user rather than a direct path into their mouth.

12 Q I see.

13 Does anything in Wang say that it is concerned  
14 with whether the vapor may be too hot for the user?

15 A You know, I didn't review Wang for that reason.  
16 I mean, I can review it for that reason if you want me  
17 to, but I -- I didn't -- I didn't do that analysis. But  
18 that's a generally well-known concern.

19 Q And you are of the view that a piece of paper  
20 or fiber can be rolled up without leaving a channel in  
21 the middle; is that right?

22 A Yes, certainly. I mean, if you -- especially  
23 if you rolled up, let's say a fiber like -- you know, a  
24 fabric, and then you poured or otherwise put e-liquid in  
25 there, it's going to actually expand the fiber and

1 everything is going to collapse. So it -- it would  
2 definitely close up any hole. Any small hole that might  
3 have been there would probably close up when you  
4 saturated it with e-liquid.

5 Q Could you design a rolled fiber that has a gap  
6 in the middle that retains the gap when you put liquid in  
7 it?

8 A Could I do that?

9 Q Yes.

10 A I think I probably could. Something like a --  
11 I'm thinking of a carpet with a stiff back, so that when  
12 we roll it up, the backing would -- would provide a lot  
13 of structural strength, and then when I loaded the liquid  
14 into the other side of the carpet, it probably wouldn't  
15 be strong enough to -- to compress the back. So I think  
16 I could do it.

17 Q What about without a stiff back? So let me ask  
18 the question like this. If you have a rolled fiber or a  
19 paper with a gap down the middle, could you have a large  
20 enough gap so that when you add liquid, the liquid stays  
21 in the fiber and doesn't flood the channel?

22 A I didn't do that design exercise, but on the  
23 fly here, I would think I couldn't do it with something  
24 like cotton.

25 Q Okay.

1           A     Right. Cotton would just all sag and get mushy  
2     and close up in a gap there.

3           You said paper. I think, again, sort of, maybe  
4     some sort of cardboard could do that. But again, this  
5     isn't a design exercise that I went through.

6           MR. DOKHANCHY: All right. I'm going to ask  
7     the court reporter to mark Exhibit 1, please.

8           (Deposition Exhibit No. 1 was marked for  
9     identification.)

10          Q     BY MR. DOKHANCHY: All right. And Exhibit 1 is  
11     Plaintiff Fuma International LLC's Memorandum of Law in  
12     Support of Motion to Preclude Testimony of Shanhong Wang  
13     at Trial from Cases Civ. No. 1:19-cv-260 and 660, in the  
14     Middle District of North Carolina. Document No. 219 on  
15     the docket.

16                 And do you have that in front of you,  
17     Dr. Singhose?

18          A     Yes, I think I do.

19          Q     Okay. And can you flip about halfway through,  
20     and you will see a -- a image, and it says Document  
21     219-6, page 5 of 5 on the bottom. You will see a -- you  
22     know, the camera won't get this, but you will see an  
23     image that looks like the Wang figure.

24          A     Halfway through the entire stack that I was  
25     given or halfway through like the first part?

1 Q This stack (indicating).

2 A Okay.

3 Q This stapled document that's Exhibit 1.

4 A So the last part of what I have seems to be a  
5 deposition transcript.

6 Q Yeah, it's just before the deposition --

7 A Okay.

8 Q -- transcript.

9 A Okay. I found a figure. Can you show that to  
10 me again?

11 Q That's it.

12 A Okay.

13 Q That's the one.

14 A I got it.

15 Q And have you seen this image before?

16 A I don't think I've seen this particular image  
17 before with this red annotation line on it, but certainly  
18 I've seen this figure 1 before.

19 Q Right. This is figure 1 from the Wang  
20 reference, right?

21 A Yes. I mean, with -- but it's got some other  
22 stuff on it.

23 Q And are you aware that Mr. Wang drew this red  
24 line in a deposition involving Fuma to indicate that the  
25 air flows through the middle of the fiber in the

1 cartridge of the Wang device?

2 MR. ANSLEY: Objection. Lacks foundation.

3 THE WITNESS: I am not aware of that. I mean,  
4 I believe you, but I'm not -- I wasn't aware of it.

5 Q BY MR. DOKHANCHY: Yeah, and we'll walk through  
6 it. I'm not asking you to just believe me.

7 But knowing that now, that that's what Mr. Wang  
8 testified to, does that change your opinion as to whether  
9 air flows down the middle of the fiber 105 in the Wang  
10 reference?

11 A No. I don't think that it flows down the  
12 middle. I think -- we can walk through it, but my guess  
13 is that he's describing some actual product that he  
14 built, which would be a variation of this, not what's  
15 actually described in the Wang document.

16 Q Well, to be clear, he drew the arrow on this  
17 figure. Just I don't know if that changes your answer,  
18 but I wanted to clarify that.

19 A I believe he drew it on it, but my guess is --  
20 or what could have been happening is, he could have been  
21 describing how his actual product worked rather than what  
22 he disclosed in this document.

23 Q Okay. Well, let's look at the deposition  
24 transcript. So if you will keep going forward, you will  
25 see a document 219-7. And you see on page 23 of the

1 transcript, which is page 9 of 38 of document 219-7, the  
2 attorney is asking Mr. Wang to identify the elements of  
3 the cartridge shown in figure 1, and --

4 A Can I get to that page? You are getting ahead  
5 of me.

6 Q Yeah, okay, of course.

7 A Okay. I see. So page -- page 23 of this  
8 deposition transcript which is 219-7. Is that what you  
9 said?

10 Q Yes.

11 A Okay. I'm there now.

12 Q Okay. So this is where the beginning of the  
13 questioning is. So the part about the line comes up a  
14 little bit later.

15 So you see on page 25, line 11, the question  
16 is, "Can the witness draw where the air flows through  
17 this device -- through the cartridge."

18 Do you see that?

19 A Yes, I do.

20 Q And he says a few lines down, "Since I'm using  
21 my cell phone, can I do that? I don't know. Is it  
22 okay?"

23 Do you see that?

24 A Yes, I do.

25 Q And if you go forward to page 27 of the

1 deposition transcript, Mr. Thomas states that the --  
2 well, there's a line of dispute over who added -- added  
3 that red line, and the witness on line 16 of page 27  
4 says, "No, actually I drew this line. I drew this line  
5 using my cell phone."

6 Now, do you see that?

7 A Yes, I do.

8 Q Okay. And then continuing on, the attorney  
9 asks on page 28, line 13, "Does that line go through the  
10 center of 101?" And the witness says, Mr. Wang says, "Of  
11 course it went through the center."

12 The next question, "Does that line go through  
13 the center of 104?" And after the objection, the witness  
14 says, "In this figure, yes, because it has to go through  
15 the airflow channel." And then onto the next page, 29,  
16 line 2, "Once it does so, it will go through the heater  
17 and bring up the smoke or fumes or vapors."

18 Do you see that?

19 A Yes, I do.

20 Q And so taking that all together, Mr. Wang is  
21 saying that the air flows through the center of the  
22 rolled fiber, picks up the smoke or fumes or vapors, and  
23 continues on straight according to that red line,  
24 correct?

25 A Yeah. Putting it all together, I think that's

1 what he's saying. But again, he's -- started off by  
2 referring to this as a device, and it's not a device.  
3 It's a picture in a drawing, so it seems very likely that  
4 he's testifying about a device that he built, and he's  
5 using this to represent the device. But there is simply  
6 no airflow pathway up the middle of that in the document  
7 in Wang.

8 Q Okay. All right. You say that one of the  
9 innovative aspects of the '864 and the '881 patents at  
10 issue here is a crosswise heating element. Is that  
11 right?

12 A Yes.

13 Q And what are the benefits of a crosswise  
14 heating element?

15 A I think one of the things that it was  
16 addressing is, is the fact that if you had a longitudinal  
17 one like Wang, and you wrapped the fiber right around it,  
18 then as we talked about, that gets really hot. And when  
19 the fiber starts to run out of e-liquid, you start to  
20 burn that fiber, and you get a burnt taste.

21 And this burnt taste has plagued this industry  
22 for a long time, and so there's been various solutions  
23 about trying to deal with it, such as windows looking in  
24 to see how much you have left and things like that.

25 But one simple way to do it is to essentially

1 physically disconnect that really hot heater element  
2 directly from the fibers, and so when the fiber does run  
3 out of liquid, you can't burn that fiber. And that's  
4 what this transverse heating element achieves, is it  
5 separates the heating element from that storage fiber.

6 Q The NJOY patents that are the subject of this  
7 case don't mention anything about a burnt taste, do  
8 they?

9 A That I'm not sure of. I -- I can't recall  
10 doing that investigation, but again, it was just a really  
11 well-known problem. So I think a person of ordinary  
12 skill in the art reading these patents would -- would  
13 know that was a problem faced by these devices.

14 Q So if the problem is that the heating element  
15 is touching the fiber, do I have that right?

16 A That's -- that's one of the problems, yeah.  
17 It's touching it, and then when it runs out of e-liquid,  
18 all of a sudden you don't have the liquid to absorb the  
19 heat.

20 Q Uh-huh.

21 A All you are doing is burning cotton or whatever  
22 the fiber is, and then now you are burning stuff, and  
23 it's a burnt taste.

24 Q So why isn't it obvious to separate the coil?

25 A Well, it's not obvious because it's a little

1 bit hard to do, like you need a much more complicated  
2 structure. You need to suspend this heating coil somehow  
3 across an open space across the airflow passage, and that  
4 means that you have to have some kind of support  
5 structure for it. Because these coils are not strong;  
6 they will break, and so you would have to support the  
7 ends, and you have to connect the ends to some structure  
8 to hold it there. You also then have to have a wicking  
9 material that does draw the liquid in.

10 So it's just a much more complicated device.  
11 The Wang is incredibly easy. You just lay down your  
12 heating coil longitudinally, and you wrap stuff around  
13 it. So it's very, very easy to do that, and so that's  
14 the temptation is, that here's an easy solution, and it  
15 works for a while.

16 To go beyond that and have it work really well  
17 and not end up like the final uses end up, you know,  
18 giving this burnt taste to the person, you have to do  
19 something quite a bit more complicated.

20 Q And the complicated part is having a structure  
21 that lets it sit horizontally?

22 A Yeah. Again, you would need to have a -- a  
23 support structure. You can't -- you couldn't just be  
24 having it float out in air. So these coils are, again,  
25 floppy and -- and not very strong, so you'd have to

1 support the ends. You'd probably have to support down  
2 the middle somehow to keep it there. And then again, you  
3 would have to have this other -- you would need an air  
4 passage down the middle so the air could get to it and  
5 then go out the other side.

6 So you are talking about several other  
7 structures that would have to be added. So it's a more  
8 complicated structure to start with. It's also harder to  
9 manufacture. Again, going back to Wang, that's just so  
10 simple to make and manufacture.

11 So yeah, you're -- you're basically making a  
12 number of more difficult design features and making it  
13 harder to manufacture.

14 Q Do you have the '864 patent in front of you?  
15 If not, I can give you a copy.

16 A It might be best if you give me a copy.

17 Q Okay. Exhibit 1001 to the 160 investigation.  
18 Okay.

19 Here, Doctor.

20 A Thank you.

21 Q Can you turn to figure 2.

22 A Okay.

23 Q Is figure 2 an embodiment of the claims of the  
24 '864 and '881 patents?

25 A Yes, it is.

1 Q Okay. So in this embodiment, that 220 that --  
2 sorry, that 222 could be a coil, right?

3 A Yes, it could.

4 Q How does the liquid reach -- well, let me take  
5 a step back.

6 That item labeled 204, that's the solution  
7 holding medium, correct?

8 A Yes.

9 Q Can that have a batting material in it?

10 A Yes.

11 Q And -- and it did in the Fuma products that  
12 you've reviewed that you say embody the claims, right?

13 A That's correct.

14 Q Okay. In this figure, how does the liquid  
15 reach item 222 from item 204?

16 A Well, this is a schematic diagram not a -- it  
17 doesn't try to accurately reproduce exactly what's in  
18 such a device, but 222, that heating element can have as  
19 a part of it a wicking material, and that wicking  
20 material would probably go through the center, maybe the  
21 center and around it to give it some structure, as we  
22 just talked about, and it would go out the left and right  
23 sides, and those wicking fibers would go out into 204.

24 Q Got it.

25 Do all the claims of these two patents -- well,

1 let's just say claim 1 -- withdrawn.

2 Claim 1 of both patents does not require a  
3 wick, correct?

4 A No, it doesn't require a wick. It does require  
5 a heating element, and the heating element could have a  
6 wick.

7 Q Right. But you are not saying that the claims  
8 require a wick, right?

9 A I'm not saying that, no.

10 Q Okay. So in the embodiment of figure 2 that  
11 does not have a wick, how does the liquid reach the  
12 heating element from item 204 to 222 to get vaporized?

13 MR. ANSLEY: Objection. Vague.

14 THE WITNESS: Well, I don't think that figure 2  
15 says there isn't a wick there. Again, it's -- it's a  
16 schematic diagram. And if you read the text that goes  
17 along with this description, it says that there could be  
18 a wick there. So I think it's most likely that there is  
19 a wick there for this to actually work.

20 Could you do it without a wick? You could try.  
21 It just wouldn't be as effective.

22 Q BY MR. DOKHANCHY: Okay. Do you think the  
23 claims cover figure 2 as depicted without a wick?

24 MR. ANSLEY: Objection to the extent it calls  
25 for a legal conclusion.

1 THE WITNESS: Yeah, I think it does cover it  
2 without a wick. Although, my limitation of concern would  
3 be the heating element being configured to vaporize at  
4 least a portion of the solution. That would be really  
5 hard to do without a wick.

6 I mean, if you had some connection, just the  
7 metal piece of the coil of the heating element going into  
8 the element, that would be -- that would have a capillary  
9 action along its surface, and so you would get a few  
10 molecules. So it would cover it; it would just be really  
11 ineffective.

12 Q BY MR. DOKHANCHY: So in your view, the method  
13 of operation would be the heating element would come in  
14 physical contact with the solution holding medium and  
15 thereby in contact with the liquid?

16 A Yeah. As we see in figure 2, there is wires  
17 coming off either side of this resistive heating element,  
18 and those wires would -- would do two things. They would  
19 get kind of warm at the very least, probably hot, and  
20 because they are going through the e-liquid container,  
21 they are gonna pull in some amount, some small amount of  
22 the e-liquid along their surface through whatever hole  
23 they are going through.

24 They have to essentially go through a hole to  
25 get out into the airflow passage. There's really gonna

1 be no way to stop some small number of molecules of  
2 e-liquid getting out there, especially when it's real  
3 hot, it's gonna be pulled out and boiled off. So it's  
4 going to work. It's just not going to be a very good  
5 one. You are not going to get a lot of vaporization in  
6 that way.

7 Q Would you get any burnt taste from such a  
8 setup?

9 A It seems very unlikely. What you would -- if  
10 you end up burning anything, you'd burn the coil out.  
11 You know, the coil itself would burn up if you -- if you  
12 put so much electricity across and it got really hot, and  
13 it didn't have any way to get rid of its heat, eventually  
14 you'd melt the coil. And I guess the melted coil would  
15 probably end up with a burnt taste, but it's not the  
16 burnt taste that we've been talking about.

17 Q So help me understand that. So 204 can have a  
18 batting material. Without a wick, item 222 needs to  
19 directly touch that batting material. Why would there  
20 not be a burnt taste?

21 MR. ANSLEY: Objection. It lacks foundation.  
22 Mischaracterizes prior testimony.

23 THE WITNESS: Yeah. I think there could be a  
24 burnt taste, but the burnt taste would be like when a  
25 light bulb blows out. Like this is kind of like a light

1 bulb, and your light bulb can blow out, which means that  
2 you overcurrented and melted your -- your resistive  
3 element there.

4 So you'd get that burnt taste, but you wouldn't  
5 get the burnt taste from the fiber because you just can't  
6 get in there and burn it, right? There's not a good  
7 connection where you could get enough thermal energy and  
8 burn that fabric. What would happen before is that the  
9 coil would -- would melt first.

10 Q BY MR. DOKHANCHY: Or --

11 A You have to -- you have to -- you know, you  
12 have to have surface area to transfer heat, and there's  
13 just not a lot of surface area between the fiber and  
14 this. You kind of isolate the coil away from the fiber.

15 Q Well, if there's enough heat transfer and  
16 enough contact to create vapor in a functional  
17 e-cigarette device, why isn't there enough heat contact,  
18 heat transfer and contact to create burnt fibers?

19 A Well, my earlier answer, remember it was, this  
20 wouldn't work very well, and it won't work very well  
21 because you can't get enough heat into the fiber to  
22 vaporize very much of the e-liquid.

23 So it's just that route of getting a lot of  
24 heat into the fiber and getting it to a burning  
25 temperature just doesn't exist because there's only two

1 little wires touching, two little ends of the wires.  
2 That's why a person of ordinary skill in the art looking  
3 at this would not think this could ever burn the fabric  
4 because it's not touching the fabric.

5 Q Well, the inventors on this patent claimed  
6 advice whereby that is the method of operation without a  
7 wick, is it not?

8 MR. ANSLEY: Objection. Lacks foundation.  
9 Vague.

10 THE WITNESS: Yeah, I mean, I think that the  
11 claim that they have had there covers both with and  
12 without the wick. So I'm not here testifying that every  
13 incarnation of their claims is a good solution.

14 Q BY MR. DOKHANCHY: And what about those wires  
15 224 and 226; you mentioned that those would heat some of  
16 the liquid that's in the batting material. Why wouldn't  
17 that create a burnt taste?

18 MR. ANSLEY: Objection. Mischaracterizes prior  
19 testimony.

20 THE WITNESS: Well, this is -- again, this is a  
21 schematic representation and it's representing a heating  
22 element, and these heating elements are designed so they  
23 have leads coming in, which is where the electricity  
24 flows. And those leads are generally made kind of a bit,  
25 let's say, thicker and less resistive, and then they

1 purposely put in a resistive part of the wire, which  
2 means that it's trying to stop the flow of electricity.  
3 And by stopping, it gets hotter. It's fighting the flow  
4 of electricity there, so that's the part that gets hot.

5 Again, it's like your light bulb. They've  
6 designed it so that current is coming in two different  
7 places in your light bulb, but those two places get a  
8 little bit warm, but the physical structure is designed  
9 so that it gets really warm, really hot, really bright in  
10 the coil portion of the light bulb. And that's the way  
11 these things are designed, too.

12 Q BY MR. DOKHANCHY: Could those wires burn the  
13 batting material?

14 A I don't think so.

15 Q Okay. Do you -- have you ever seen an  
16 e-cigarette design that has those wires insulated?

17 MR. ANSLEY: Objection. Vague.

18 THE WITNESS: That I don't know. I've seen a  
19 lot of -- of sort of scans of these devices.

20 Q BY MR. DOKHANCHY: Uh-huh.

21 A And through that scan, you -- I wouldn't be  
22 able to tell whether or not the wires were insulated.

23 Q Okay. Would one reason to insulate those wires  
24 be preventing the leads from burning the batting  
25 material?

1 A That sounds reasonable to me, yeah.

2 Q Okay. And the NJOY patents here don't describe  
3 those wires 224 and 226 as being insulated, do they?

4 A I don't recall that.

5 Q And so you know that Dr. Sturges opines that  
6 the Wang heating coil meets the claim limitations because  
7 it has a dimension that's in the crosswise direction,  
8 right? And that's the -- like we can call it the width  
9 of it, I guess?

10 A Yes, my understanding is that to meet the --  
11 what I'll call the transverse requirement, he's looking  
12 at that, and he's saying there's a width in the  
13 transverse direction.

14 Q Right.

15 A And he's saying because it has some width  
16 there, it is transverse.

17 Q And in Wang, I think you described this  
18 earlier, but the heating coil touches the fibers; is that  
19 correct?

20 A Yes.

21 Q And so if there's a channel there, the Wang  
22 heating coil spans that channel, correct?

23 MR. ANSLEY: Objection. Vague.

24 THE WITNESS: But -- okay, so I'm having  
25 trouble answering the question because there's not a

1 channel there.

2 Q BY MR. DOKHANCHY: Uh-huh.

3 A So you are asking me to assume there's a  
4 channel there. Is it the channel is some kind of  
5 structure? We talked about two different sorts of  
6 channels, like one with some kind of structure, and then  
7 one --

8 Q Sure.

9 A -- that just apparently is made by not winding  
10 that tightly.

11 Q Either kind.

12 A Okay.

13 Q Let's say there's either kind of channel in  
14 Wang in that fiber.

15 A Okay.

16 Q That heating coil, the width of it spans the  
17 channel that's there in the transverse direction, right?

18 A Certainly in the one where the fiber is wound  
19 directly around it, there is nothing else there. But if  
20 I am putting a support structure in there, then I don't  
21 think it -- I don't think we know that. Because the  
22 support structure could be wider than the coil. Again,  
23 that would lead us to an efficiency. I mean, at some  
24 point this hot coil has to touch e-liquid.

25 Q Uh-huh.

1           A    So, again, because it's not there, I'm having a  
2   tough time answering the question precisely. That's the  
3   best I can do.

4           Q    Okay. But you don't have a view that if there  
5   was a channel in Wang as Dr. Sturges says, there is some  
6   sort of gap between the heating elements and the fibers,  
7   because your view of the operation is that the heating  
8   element touches the fibers, right?

9           A    Yeah, I mean, just keeping with the invention  
10   of Wang, the heating element needs to be touching it. If  
11   we're gonna try to change Wang into something else and we  
12   put a -- sort of a physical structure in there and the  
13   coil is not touching, it's not gonna work very well, as  
14   we just talked about.

15                You would then need to add some additional  
16   component, i.e., a wicking material to pull the e-liquid  
17   from the storage through the wall of the structure and  
18   then get it to the coil.

19           Q    And would a person of skill in the art at this  
20   time know that you would need to add a wicking material?

21           A    In that second case, they would know that, yes,  
22   you couldn't just suspend the heating coil in the air  
23   passageway and have no way for the e-liquid to get there.  
24   So it might not have to be a wick; it could be -- for  
25   example, upstream you could inject droplets into the

1 flow, like in the Xia patent.

2 THE REPORTER: Like in the what of the patent?

3 THE WITNESS: X-i-a, I think. We -- we  
4 generally call that Xia.

5 Q BY MR. DOKHANCHY: And so the claim language  
6 says that the heating element extends transversely,  
7 right?

8 A Yes.

9 Q Can something extend in two dimensions or does  
10 something only have to extend -- can it only extend in  
11 one dimension?

12 A I think something could extend in three  
13 dimensions.

14 Q Okay.

15 A So, yeah, two, you could do two.

16 MR. DOKHANCHY: Okay. All right. Is now a  
17 good time for a break?

18 MR. ANSLEY: Sure.

19 THE WITNESS: Yes.

20 THE VIDEOGRAPHER: The time is 10:37 a.m. We  
21 are off the record.

22 (The deposition was at recess from 10:37 a.m.  
23 to 10:50 a.m.)

24 THE VIDEOGRAPHER: The time is 10:50 a.m., and  
25 we are back on the record.

1 Q BY MR. DOKHANCHY: All right. Welcome back,  
2 Dr. Singhose. Did you speak to your counsel during the  
3 break?

4 A Yes, I did.

5 Q And what did you talk about?

6 A We talked about --

7 MR. ANSLEY: I just caution you, Doctor --

8 THE WITNESS: Yes. Yes.

9 MR. ANSLEY: -- nothing privileged.

10 THE WITNESS: No, sir.

11 MR. ANSLEY: To the extent --

12 THE WITNESS: Just talk --

13 MR. ANSLEY: -- there was any.

14 THE WITNESS: Just talk about what I would have  
15 to do after this deposition to finish up my work.

16 MR. DOKHANCHY: Okay. I want to clarify that.  
17 I don't think those conversations would be privileged. I  
18 think if you are speaking to the witness during --  
19 there's conversations between counsel and the witness  
20 during the deposition, those are not privileged, so --

21 MR. ANSLEY: Well, not necessarily. But we  
22 didn't speak about the substance of his testimony, just  
23 to be clear.

24 Q BY MR. DOKHANCHY: Is that correct?

25 A That's correct.

1 Q Okay. All right. I'd like to go back to your  
2 statement that a piece of paper can be rolled up without  
3 leaving a channel in the middle. I would like to hand  
4 you a piece of paper and ask you to please roll it up  
5 without leaving any channel in the middle --

6 A Sure.

7 Q -- that air could flow through.

8 A Sure. Well, I might not be able to do that on  
9 the fly here without any air, but certainly, if I rolled  
10 it up and if I --

11 Q Well, let me --

12 A -- squeezed it.

13 Q Let me stop you right there. You're folding  
14 it.

15 A Oh.

16 Q I'd like you to roll it, so let me give you  
17 another piece of paper.

18 A Okay.

19 Q Your testimony is that a piece of paper can be  
20 rolled up without leaving a channel in the middle.

21 A Okay. Like I said, I might not be able to do  
22 it on the fly here. I'm not actually well practiced in  
23 rolling up. I think we need to get the Cubans who are  
24 rolling those cigars down there in Cuba to do this.

25 Q Again, Dr. Singhose, you are folding it.

1           A    Yeah, again, I think it's really hard to -- I'm  
2   trying to roll it up, but during the rolling process, I  
3   have to apply forces, and those forces are compressing  
4   the paper. So I'm trying to roll it up.

5                   Essentially you are asking me to roll it up  
6   tightly, right?

7           Q    I'm asking you to roll it up so that there is  
8   no way for air to flow through the middle.

9           A    Yeah, so to do that, I have to roll it up  
10   tightly.

11          Q    I'm happy to have you roll it up tightly, just  
12   not fold it. So if you need another piece of paper, I'm  
13   happy to give you one.

14          A    Again, I -- I think the nature of paper, when I  
15   go to roll it up, I am compressing it and it's naturally  
16   collapsing it. So I think the only way I could roll it  
17   up without -- with leaving this channel that you want me  
18   to -- or not leaving it, I would have to go very gently,  
19   but that, again, would leave a big hole, and if I tried  
20   to put a heating element down there, it wouldn't be  
21   touching.

22                   So I'm trying to roll it up in the way that it  
23   would be used in this product, and that means I would  
24   have to roll it tightly, and the minute that I start to  
25   roll it tightly, it does fold.

1 Q Okay.

2 A So I don't think I can do exactly what you are  
3 asking me to do. Although, I -- I was trying.

4 Q Okay. Thank you.

5 A Yeah.

6 Q All right. Let's talk about the -- the heating  
7 element in Wang. The -- does the air flow only on the  
8 inside of the heating element of Wang or does it flow all  
9 around it? How -- how does the air flow with respect to  
10 the coil in the Wang device?

11 MR. ANSLEY: Objection, compound. Objection,  
12 lacks foundation.

13 THE WITNESS: Well, the airflow in Wang  
14 come -- comes in the bottom, like we talked about that  
15 hole, and then it just expands out into the open areas.

16 Q BY MR. DOKHANCHY: Uh-huh.

17 A One is below the soaked fabric, and then  
18 there's that gap around the outside edges --

19 Q Okay.

20 A -- so it's gonna flow around that. Then it's  
21 gonna come back and mix up in that top gap, and it's  
22 gonna go out the hole 101. So that's what it's doing,  
23 and the heating element is in the middle of all that.

24 Q I see.

25 Let's take for the purpose of this question

1 that -- the assumption that Dr. Sturges is correct, that  
2 there is a gap, so that rolled fiber has a gap in which  
3 the heating element sits and touches the wall of the  
4 fibers.

5 Do you have that in mind?

6 A Yes.

7 Q When the air flows through that gap in  
8 Dr. Sturges's view of Wang, would the air flow around all  
9 parts of the coil or just on the inside of the coil?

10 A It would depend on the local touching of that  
11 coil to the -- to the fabric. If the fabric is pressing  
12 hard on the outside of the coil, then the majority of the  
13 airflow would have to go down the middle of the coil.  
14 Basically the -- the air is gonna go wherever it can, and  
15 more of it's gonna go in the low resistance flow.

16 Q Okay.

17 A So it would go right down the middle.

18 If there was more of a gap, like if, again,  
19 somehow he was kind of setting it up where the edges  
20 weren't touching the fabric and he was adding, I guess  
21 some kind of wick, again, the air is just gonna go  
22 wherever there's an opening.

23 Q Okay. In the example as you said where it is  
24 tightly, the -- withdrawn.

25 In the view, as you mentioned, where the fiber

1 is tightly touching the coil and the air is flowing on  
2 the inside of the coil, if you were to take that  
3 structure and rotate the coil 90 degrees so that it would  
4 be in your view transverse, would the air have more  
5 surface area to contact of the coil than in the -- what  
6 you called the longitudinal coil orientation?

7 A Okay. There's, I think, two versions coming to  
8 mind of what you just described. One is I'm taking what  
9 looks like in figure 3, this cylinder wrapped around it  
10 with a small airflow path down the middle, and I could  
11 rotate that entire thing, including a fiber. Is  
12 that what you're --

13 Q No, not including the fiber.

14 A Okay.

15 Q So the starting place is Wang as it is with the  
16 coil in, as you say, a longitudinal direction touching  
17 the fiber so that air only flows down the middle. And my  
18 question is, if you were to rotate that coil so that  
19 air -- my proposition is that air would flow over more of  
20 the coil; instead of just the inside, it flows around the  
21 outside also.

22 Do you agree with that?

23 A Okay, I think I understand your question. Let  
24 me try to understand a little bit more though.

25 So I -- I think I -- the way that Wang works is

1 we have this fabric sort of unrolled, and you have to put  
2 the heating element in there and then you roll it up. So  
3 before I start that rolling and I turn it 90 degrees,  
4 when I go to roll that up, the coil is -- I don't see how  
5 it's gonna stay straight. It's gonna be coiled up and  
6 bent along with the fabric. Probably break.

7 But in that configuration, it's hard for me to  
8 imagine because you -- you're saying I'm -- I'm still  
9 touching the -- it doesn't make sense. If I'm still  
10 touching the edges of the coil and it's turned, then the  
11 airflow down the middle would actually be going left and  
12 right rather than up and down. So I don't see how it  
13 could get out the top in that configuration. I'm just --  
14 it's hard for me to imagine the structure.

15 Q Yeah, maybe I need to add the additional  
16 clarification. I'm still talking about Dr. Sturges's  
17 view of Wang that has a channel down the middle.

18 A So I'm understanding that, but you also said  
19 that it's the -- it's the version where the fiber is  
20 touching the outside of the coil.

21 Q No.

22 A Oh, okay.

23 Q In this case it would be touching the ends of  
24 the coil or some other -- there would be some other  
25 thing.

1           A    Oh, okay. I think I understand now. So there  
2 is some sort of other structure that's supporting the  
3 ends of the coil, and I've --

4           Q    You can --

5           A    -- rotated it 90 degrees.

6           Q    You can imagine like a light bulb, right?  
7 Two -- two long things, two long leads, and then the coil  
8 is transverse to that, right?

9           A    Okay, and there's some structure that's holding  
10 that in place. In that case, given the same fluid flow,  
11 I mean, ultimately this is driven by a person. You know,  
12 it's assuming the same kind --

13          Q    All else equal.

14          A    -- of suction stuff.

15          Q    Yeah.

16          A    I think the air would go a little bit more over  
17 the coil because the outer edges of the coil are exposed  
18 in that case.

19          Q    Uh-huh.

20          A    And so the air would be flowing through there.  
21 It would hit the outer edges of the coil and the inner  
22 edges of the coil and come out the other side.

23                The first case is -- my understanding is that  
24 the outer edges of the coil are kind of touching the  
25 fabric, so the air couldn't really get to those outer

1 edges.

2 Q Right.

3 A So if your question is, can the air touch more  
4 surface area of the coil, I would say given all that  
5 setup, yes.

6 Q Okay. And is that something that a person of  
7 skill in the art would recognize as a basic principle of  
8 fluid dynamics?

9 A Yes.

10 Q Can you -- well, maybe we can do it without the  
11 figure. Oh, you have the figure in front of you.

12 In the figure 3 of Wang, the solution holding  
13 medium doesn't reach all the way to the ends of the  
14 cartridge; is that right?

15 A That's right. If you mean ends, you mean the  
16 top and the bottom, according to this --

17 Q Yeah.

18 A -- orientation? Yes.

19 Q If you were to extend that fiber or use --  
20 withdrawn.

21 If you were to use a larger fiber that did  
22 extend all the way from one end to the other, such a  
23 device would be able to hold more liquid, all else equal,  
24 than the one in Wang, right?

25 A Yes.

1 Q And that would be advantageous, right?

2 A It would be advantageous in terms of storing  
3 more liquid, but it would be disadvantageous in other  
4 ways.

5 Q Okay. All right. Let's look at the Xia, or  
6 Xia. I'm going to say Xia because that's how we've been  
7 saying it --

8 A Okay.

9 Q -- but X-i-a reference. This is Exhibit 1006  
10 in the 160 matter.

11 A Thank you.

12 So I was just handed Fang --

13 Q Oh, okay.

14 A -- not Xia.

15 Q My mistake. Let me give you the correct  
16 version. This is 1004, Exhibit 1004.

17 One of these days I will stop stepping on the  
18 microphone. Here's 1004, the Xia reference.

19 Okay. So before looking at Xia, I want to look  
20 at the '864 patent. Do you have that handy still, the --

21 A I still have --

22 Q -- Exhibit 1001?

23 A -- the '864 over here, yeah.

24 Q So let's go to claim 1. Okay. And are you  
25 there?

1 A Yes, I am.

2 Q And claim 1 states, "A cartridge configured to  
3 couple to a power source of an electronic vaporizer, the  
4 cartridge comprising."

5 And just as a preliminary matter, do you view  
6 this claim as requiring a cartridge?

7 A Yes, I do.

8 Q Okay. And what is a cartridge?

9 A Well, a cartridge is generally referred to  
10 something that's replaceable, and it has something in  
11 there that you might want to replace from time to time,  
12 like a toner cartridge or an ink cartridge. But there's  
13 not just one kind of cartridge, and this kind of  
14 industry, you might have a cartridge where you replace  
15 the e-liquid. You also might have a cartridge that you  
16 replace the -- any other parts, but, for example, the  
17 heating element might need to be replaced from time to  
18 time.

19 Those would be the two main things I think that  
20 you would have cartridges associated with it in this  
21 space.

22 Q So some of that I think is covered by the rest  
23 of the claim, so the heating element, the airflow  
24 passageway, I just want to focus on the word  
25 "cartridge."

1           When rendering your opinions, were you applying  
2 any particular definition or meaning of cartridge?

3           A    I don't think so. I was just using the sort of  
4 plain and ordinary understanding of what a cartridge is  
5 in this industry.

6           Q    Okay. And are you able to articulate what that  
7 plain and ordinary meaning is?

8           A    Again, I think I said it's basically a  
9 replaceable component.

10          Q    Okay. In a replaceable component, you may  
11 have, for example, liquid would get -- that gets depleted  
12 and must be replaced, right?

13          A    Yes.

14          Q    You may also have components that get replaced  
15 even though they don't need to be, for example,  
16 electrical leads on a printer cartridge, right?

17          A    True.

18          Q    So let's go to Xia, and let's look at figure 2.  
19 And you see in Exhibit 1004, figure 2, there's that  
20 component on the right called the generator?

21          A    Yes.

22          Q    And your view is that that is not a cartridge,  
23 correct?

24          A    Well, I think it's two cartridges connected  
25 together. So it is a -- a cartridge, but actually

1 there's two cartridges there.

2 Q But your view is that this is not covered by  
3 the scope of the claims that recite a cartridge; is that  
4 right?

5 A That's correct.

6 Q Okay. And why is that?

7 A Because my understanding of the claim is it  
8 requires a cartridge.

9 Q Uh-huh.

10 A Sort of -- it requires a singular housing, and  
11 inside of that housing it has to have both the liquid and  
12 the heating element. And that's not how the structure  
13 works. It's three parts. One part has a housing for the  
14 heating element; another one has a housing for the  
15 e-liquid part.

16 Q So the way the generator is -- is assembled is  
17 that figure 5 slides over figure 4. Is that right?

18 A Yes, that's true.

19 Q So as it's assembled, the housing in figure 5  
20 fully encompasses the housing in figure 4; is that right?

21 A I wouldn't say fully. There is some overlap  
22 there.

23 Q Okay. What part is not covered?

24 A I would say the end on the -- the left side.  
25 But that -- that housing that comes with figure 5 is an

1 opening on the left side.

2 Q Uh-huh.

3 A So when you slide it over the top, it doesn't  
4 go all the way over and around all the components shown  
5 in figure 4. And, you know, you can see that better if  
6 you look back at, say, figure 2 on the right.

7 Q Right.

8 A You can see there's a lot of the other  
9 cartridge sticking out it.

10 Q I think you are referring to the connector, the  
11 screw connector?

12 A Yes.

13 Q So that's not in figure 4, right?

14 A Yeah, that's right.

15 Q So if you just look at the dark lines from  
16 figure 4 that you say are housing, that dark line housing  
17 is fully within the housing of figure 5 as seen in figure  
18 2; is that fair?

19 A Yeah, that's correct.

20 Q Okay.

21 A But again, the left side of it is not  
22 encompassed by the housing. That's -- that was the point  
23 I was trying to make. There is some overlap there, but  
24 there's that left side which is -- which is not  
25 encompassed by housing.

1 Q When you say "left side," you mean figure 2, of  
2 the generator in figure 2?

3 A Yeah, the left side, I'm -- I'm using figure 2  
4 or 3 or 4, any of the left sides, because I think these  
5 figures are consistently shown in the same orientation.

6 Q But just to be clear, the -- the left end of  
7 figure 4 is fully covered by the housing in figure 5; is  
8 that right?

9 A The left end is covered in terms of the top and  
10 bottom.

11 Q Uh-huh.

12 A But the left -- there is no left side to this  
13 housing. I mean, there's a left side, but it's a top and  
14 a bottom. It's an open end.

15 Q Okay. You mean that there's no sort of endcap  
16 closing it off?

17 A That's correct.

18 Q Okay. But in terms of laterally, the  
19 light-colored housing in figure 5 extends laterally left  
20 of the dark lines in figure 4 once they are combined?

21 A Once they are combined, yes.

22 Q Okay. So let's go to the claim language.  
23 Where in the claim language do you see a prohibition that  
24 there is some internal, additional, what you call housing  
25 from figure 4?

1           A    I don't think the claims are written to have a  
2 prohibition. They are -- they're written to have  
3 requirements.

4           Q    So why isn't figure 2, which has -- I believe  
5 it's polypropylene in figure 5; is that right?

6           A    That's one option, I think, yeah.

7           Q    So why isn't the polypropylene shell plus the  
8 screw in figure 2 a housing that meets the claim  
9 requirements?

10          A    By "the screw," are you referring now to parts  
11 of figure 3?

12          Q    Yes, but it's probably easier to look at figure  
13 2, since figure 3 is a combined connection with the  
14 screws together. So the screw I'm referring to is  
15 labeled 5. I believe it's connecting conductor 5.

16          A    Yes, I see that 5.

17          Q    Okay. So if you take 5 and the polypropylene  
18 housing from figure 5 as combined in figure 2, why isn't  
19 that a housing that meets the claim requirements?

20          A    Well, because I think it's two housings, I  
21 guess, and the -- the way I'm reading the -- the claim is  
22 that there should be a housing, like a singular housing,  
23 and that's two housings.

24          Q    So the two housings you are referring to are  
25 item 5, the conductor, the connecting conductor, and the

1 polypropylene housing?

2 A Yes. Again, I'm not so certain what the extent  
3 of 5 is. I'm trying to go along with this, but the  
4 structure that I see in -- in figure 3 is this like  
5 endcap, and I don't think that's part of the housing. I  
6 don't think it's the housing shown in figure 5. I think  
7 that's its own housing.

8 Q Okay. So the -- the basis of your view as to  
9 why Xia's generator is in a cartridge with the required  
10 housing, is that you think the connecting conductor 5 is  
11 not considered part of the same housing?

12 A Well, that's part of my opinion. Ultimately, I  
13 think that we're skipping over figure 4, which shows the  
14 housing, and that's the housing that has the heating  
15 element in its interior.

16 So when I look at this as a person of ordinary  
17 skill in the art, I see that's a housing for that  
18 cartridge, and then I see a different housing for the  
19 other cartridge, which is the e-liquid cartridge. So I'm  
20 seeing two different housings.

21 Q Right. But as you said, there is no  
22 prohibition on having a second internal housing. So my  
23 question is, as combined in figure 2, why is there no  
24 housing that meets the claim limitations?

25 A Again, I think I -- I thought I answered

1 before, but when I look at figure 2, I'm not seeing one  
2 housing. I am seeing multiple housings.

3 Q And so I guess I'm confused. Are you saying  
4 that there is a housing that meets the claims, but  
5 there's also a second housing?

6 A No, I don't think that there is a single  
7 housing that meets these claims. I think if you are  
8 somehow to combine those multiple housings --

9 Q Uh-huh.

10 A -- I think the multiple housings, I think one  
11 of them does have the heating element interior, and I  
12 think the other one has the e-liquid storage in its  
13 interior. So there are housings that -- that have these  
14 in interiors; there's just not one housing that has them  
15 both.

16 Q And sorry, why is that polypropylene housing  
17 not housing both of them?

18 A Well, because I think the other housing is, I  
19 guess.

20 Q Well, how --

21 A I think the other housing is -- is what's  
22 housing the heating element.

23 Q The housing is the outermost structure that  
24 contains the device internals, correct?

25 A Yeah, it's the outer structure around that,

1 yes.

2 Q Right.

3 And in figure 2, the outer structure is the  
4 polypropylene shell, not the dark lines on figure 4,  
5 right?

6 A Yes, I admit that that polypropylene shell goes  
7 on the outside of -- of, you know, most of it, and I told  
8 you there's this open end over there.

9 Q Uh-huh.

10 A But what is housing the heating element is that  
11 other housing, the one with -- in the darker --

12 Q Okay.

13 A -- the steel one. The steel structure is the  
14 housing for the heating element, and the polypropylene is  
15 the housing for the e-liquid.

16 Q So the -- you can have a structure that's a  
17 housing even if it's not the outermost structure then?  
18 For example, in figure 2, generator?

19 MR. ANSLEY: Objection. Vague.

20 THE WITNESS: Yeah, certainly I'm aware of a  
21 lot of products that have nested housings, like there's a  
22 housing for one component, and then a housing is then  
23 within some other housing. But I think a person of  
24 ordinary skill in the art would look at the inner housing  
25 as the housing that's holding its internal components.

1 Q BY MR. DOKHANCHY: Okay. What would be the  
2 housing of the generator?

3 A I'm not sure the housing has to have a  
4 generator. I think it has multiple housings.

5 Q I think you may have said that backwards.

6 A The generator is the combination of those  
7 figures. Really, it's the combinations of figures 3, 4,  
8 and 5.

9 Q Right.

10 A So I think the generator has multiple housings  
11 that are used to create that assembly.

12 Q Okay. Can the claimed cartridge have multiple  
13 housings?

14 A I think it could have multiple housings, but it  
15 needs to have a singular housing that houses both the  
16 heating element and the e-liquid storage.

17 Q And so the polypropylene shell that is outside  
18 of the figure 4 shell, that doesn't house the things  
19 inside of the polypropylene shell?

20 A I mean, I see where you are going here. Yeah,  
21 I just don't think that is in the spirit of these claims.  
22 I think the housing that's housing the heating element is  
23 that internal steel structure.

24 Q Okay. And do you consider the connecting  
25 conductor 5 part of a housing of the generator?

1           A    Not really. I mean, based on figure 4, it  
2 looks like that steel tube is what we would consider to  
3 be the housing of the heating element.

4           Q    Okay. You're aware that the specification says  
5 that the endcaps of the cartridge can be considered parts  
6 of the housing?

7           A    I am aware of that, yes. It can or it doesn't  
8 have to be.

9           Q    Right.

10          A    That's an option.

11          Q    And so why is that connecting conductor 5 not  
12 considered an endcap?

13          A    I'm not sure. I didn't read it to -- to  
14 discern whether or not that was an endcap. I don't -- I  
15 don't think that was a -- an opinion put forth by  
16 Dr. Sturges. Basically, as you know, I'm responding to  
17 what he puts forth, so I try to analyze what he puts  
18 forth and respond to it. I don't go off and do all sorts  
19 of other analysis.

20          Q    Right. But I'm just responding to the opinion  
21 you gave, which is, that you don't think item 5 can be  
22 considered part of the housing of the generator.

23                  So my question is, in light of the  
24 specifications saying that the endcap of a cartridge can  
25 be part of the housing, can be considered part of the

1 housing, why don't you think that item 5 is part of the  
2 housing of the generator?

3 A Again, when I -- again, that's what I'm saying,  
4 I didn't go out and do an analysis about all the things  
5 that possibly could have been. When I did my analysis of  
6 this, I was looking for housings, and I see a housing in  
7 figure 4 for the heating element, and it's that steel  
8 dark line tube. That's the extent of my analysis. That  
9 is the housing. I didn't go off and think about what  
10 everything else could possibly be considered a housing.  
11 I found that housing.

12 Q Okay. But are you able to provide an opinion  
13 right now on why item 5 cannot be considered part of the  
14 generator housing?

15 A Well, I didn't do that analysis, and so I  
16 probably would not feel comfortable unless I read through  
17 the patent with that in mind.

18 Q Okay.

19 A I'd have to see how that's described, what its  
20 functions are, how it's used, how it's assembled, that  
21 kind of stuff.

22 Q Okay. Did you do that analysis with respect to  
23 the Fuma prototype?

24 A The prototype? What's the prototype?

25 Q The Fuma cartridge.

1 A Oh, the Fuma cartridge.

2 Q That you said embodies the claims.

3 A Yes, I did. I mean, I -- I basically did a  
4 limitation by limitation comparison to that Fuma, and in  
5 that case I was looking for a housing that --

6 Q Okay.

7 A -- that held both of those things.

8 Q And do you have your declaration with you --

9 A Yes, I do.

10 Q -- or in front of you?

11 Can you turn to paragraph 419.

12 A Okay.

13 Q And here is where you are saying why the Fuma  
14 device has a cartridge?

15 A Yes.

16 Q And actually, maybe it starts on 418, but it's  
17 all kind of in the same area.

18 And you see that, if you go to page 218 of your  
19 160 declaration, on the end of the Fuma cartridge is a  
20 threaded connector, right?

21 A Yes.

22 Q And that's how it receives power from the  
23 battery side, right?

24 A Yes.

25 Q Is that threaded connector part of the housing

1 of the Fuma cartridge?

2 A Yes, I think that's the part that is  
3 electrically connected to the -- to the battery portion.

4 Q Okay. So if the threaded conducting connector  
5 in the Fuma cartridge is part of the housing, why isn't  
6 it in the generator of the Xia reference?

7 A I'm not sure. That's what I said, I didn't do  
8 that analysis.

9 Q Okay.

10 A Like I said, I did a different kind of  
11 analysis, which is responding to Dr. Sturges's opinions.

12 Q Okay. Is it possible that the threaded  
13 conductor 5 in the generator of Xia is part of the  
14 housing?

15 MR. ANSLEY: Objection. Vague.

16 THE WITNESS: That I just don't know. Again, I  
17 wouldn't feel comfortable without doing a proper analysis  
18 of that.

19 Q BY MR. DOKHANCHY: Okay. Does that threaded  
20 conductor -- is that an outside structure containing the  
21 device internals?

22 A Just to clarify what we're -- let me pull up  
23 the figure again. We're talking about the...

24 Q The Xia reference.

25 A Sure. Let me pull that up again. Okay, I have

1 it in front of me.

2 So we're looking basically at figure 3, is that  
3 what you're --

4 Q Well, let's look at figure 2 --

5 A Okay.

6 Q -- because that's the generator.

7 A That's the one that's hard to look at. It's so  
8 small.

9 Q It is a little small. That's true.

10 A All right. I'm looking at that.

11 Q So item 5, the threaded conducting connector,  
12 is that an outside structure of the generator?

13 A Again, I'm not sure of the full extent of what  
14 5 is in -- in viewing it in terms of this question of  
15 whether or not it's a housing. But certainly there's  
16 parts of it that are on the exterior; we can obviously  
17 see that.

18 Q Would you say that 5 contains the device  
19 internals or is part of containing the device internals?

20 A Again, that's the part I'm starting to feel  
21 uncomfortable without reading exactly how 5 is described  
22 and what its function is and what it does.

23 Q Okay.

24 A Yeah.

25 Q Do you want to take a minute to look at that?

1 A If you want me to.

2 Q Yeah, let's take a look at it.

3 A Why don't you remind me of your question so  
4 I -- I have it clearly in my mind.

5 Q Sure. The question is, does the threaded  
6 conductor 5 perform the task or part of the task of  
7 containing the device internals?

8 A Okay.

9 Q So if you look at page 10 of 19 of Exhibit  
10 1004, you start to see the description of how the  
11 connecting conductor B6, which is on the battery side,  
12 connects to the connecting conductor A5 on the cartridge  
13 side.

14 A Okay.

15 Q At the bottom of page 10.

16 A All right. I will review that.

17 Q So that paragraph and onto the next page should  
18 be helpful.

19 A Just to make sure I'm clear -- you probably  
20 reviewed this more recently than I -- the conducting  
21 connector A5 is 5?

22 Q Yeah, A5 and 5. Yeah, it's --

23 A Okay. I was looking for A5. There is no A5.  
24 It's the same 5, right?

25 Q Good -- good point.

1 A Yeah.

2 Q A5 and 5 are the same, as I read it.

3 A Well, based on those two paragraphs that you  
4 directed me to, it appears that the function of the  
5 connector is to connect, not really to house. So I would  
6 think it's the connector, not the housing.

7 Q I see.

8 And so what about in the Fuma cartridge, that  
9 threaded conductor that you said is part of the housing  
10 there; the purpose there is also to connect, isn't it?

11 A That's one of the purposes. Although, this  
12 structure here I can also see it's -- it's housing as  
13 well. It's sort of holding and protecting.

14 Q Uh-huh.

15 A So that's why I think there's a -- there's a  
16 difference here.

17 Q Well, looking at figure 2, doesn't that  
18 connector form an endcap that closes off and protects the  
19 device internals?

20 A Again, I didn't analyze it to determine whether  
21 or not it was acting as the endcap, but if I look at  
22 figure 4, quite frankly, it looks like the endcap is the  
23 component 8, which is one of those liquid blocking  
24 structures in there. That seems like a person of  
25 ordinary skill in the art would think that that was the

1 endcap.

2 Q So just to clarify, the item 5 is -- doesn't  
3 exist in figure 4?

4 A That's correct, yeah.

5 Q Okay. I'm just making sure we're on the same  
6 page.

7 As constructed, the generators, if it has an  
8 endcap, the outermost part, which would be the endcap, is  
9 item 5 on the left side of the generator; wouldn't you  
10 agree?

11 A I would agree that the outermost part on the  
12 left side of the generator is that screw connector 5 or  
13 A5. But traveling back towards the heater chamber, there  
14 is that other structure there that seems like it's the  
15 endcap of the heater cartridge. Like it stands on its  
16 own, and that's shown in figure 4, and it's got its own  
17 endcap.

18 So that would seem like the endcap -- you keep  
19 adding stuff to the end, I admit that, but I think that's  
20 what would be viewed as the endcap, if in fact there is  
21 an endcap. You know, we have to review what does it --  
22 what's the meaning and function of an endcap, but it  
23 looks like it would be item number 8 in figure 4.

24 Q And in figure 2, would item 8 be the endcap of  
25 the generator?

1           A    Again, I'd want to review exactly what endcap  
2   is, but I'll go along with the line of questioning.

3           Q    Sure.

4           A    It's not the farthest end, but it's probably  
5   the -- 8 is the endcap of the cartridge that has the  
6   heater chamber. Whether or not there's another endcap  
7   end capping something else, that could be a possibility,  
8   but I'd want to review it with that in mind and think  
9   about what an endcap is supposed to do and how it  
10   functions.

11          Q    Okay. Yeah, my question is about the  
12   generator, which is labeled in figure 2.

13                Do you see that?

14          A    Yes.

15          Q    Is item 8 the endcap of the generator?

16          A    Again, I haven't reviewed exactly what the  
17   endcap is supposed to be. I mean, obviously it's a cap  
18   on the end.

19          Q    Uh-huh.

20          A    Looking at this and without reviewing what  
21   endcap is, it doesn't strike me as the endcap of the  
22   generator. It strikes me as the endcap of the cartridge  
23   that has the heating element.

24          Q    Okay. Okay. The cartridge of the claims can  
25   be a multipiece assembly; is that fair?

1 MR. ANSLEY: Objection. Vague.

2 THE WITNESS: The cartridge of the -- I missed  
3 part of the question.

4 Q BY MR. DOKHANCHY: The cartridge of the claims  
5 in the '864 and the '881 patent can be a multipiece  
6 assembly, true?

7 A Yes.

8 Q Okay. And that multipiece assembly --  
9 withdrawn.

10 We talked about the claim language earlier, and  
11 I asked whether the claims preclude having multiple  
12 housings, one within the other, and you said no, right?

13 A That's correct. I don't think there's a --  
14 it's not written like you can't have it.

15 Q Right. So as long as you find one outside  
16 structure containing the device internals that has all  
17 the things that the claim requires, that would meet the  
18 claim limitations for housing a cartridge, right?

19 A Yeah, I think so. I mean, that's what we are  
20 looking for. We would be looking for a single housing  
21 that does that.

22 Q Okay. And if one housing is outside another  
23 housing, the outermost one is the outside one, right?

24 MR. ANSLEY: Objection. Vague.

25 THE WITNESS: Yeah, there -- there certainly

1 could be nested housings, I mentioned that before, and  
2 there would be housing that's housing something, like the  
3 heating element. That housing could be inside another  
4 housing. That's certainly possible.

5 Q BY MR. DOKHANCHY: And that would be within the  
6 scope of the claims?

7 A I don't think so. I mean, I think the way the  
8 claims are written is that we need one housing that is  
9 housing or securing or holding inside the required  
10 elements, basically the heating element and the e-liquid.  
11 So I think there has to be a housing that's housing both  
12 of those.

13 In this case, we're seeing a housing -- we're  
14 seeing two different housings that accomplish that.

15 Q And so the polypropylene shell in the generator  
16 of Xia doesn't house the heating element in your view,  
17 correct?

18 A Yeah, I mean, I think when I looked at the  
19 structure, I mean, I'm looking at figure 5, and the  
20 heating element is not even in there, and I've got the  
21 whole housing.

22 Q Let's look at figure 2 as assembled in the  
23 generator of Xia. Your view is that the polypropylene  
24 shell around the outside of the generator does not house  
25 the heating element, correct?

1           A    That's right. I think the housing is the steel  
2 structure that we see in figure 4.

3           Q    And that's under the assumption that only one  
4 thing can be the housing for the heating element?

5           MR. ANSLEY: Objection. Vague.

6           THE WITNESS: I'm not sure I viewed it that  
7 way, that one thing could be the housing. Housing is --  
8 can be made of two parts. Often you have clamshell  
9 housings. But I think whatever sort of surrounded,  
10 protected was the outer structure of that device  
11 internal, in this case we're talking about the heating  
12 element, I think that structure would be the housing for  
13 that portion of the device internals.

14          Q    BY MR. DOKHANCHY: That is my point. You said  
15 it is the housing. That presumes there's only one. So  
16 my question is, could the heating element have multiple  
17 housings?

18          A    I don't think so. I mean, I think a person of  
19 ordinary skill in the art would look for whatever is  
20 housing the heating element, and they would call that the  
21 housing.

22          Q    Uh-huh.

23          A    And whether or not that that structure, its  
24 housing and heating element was put into something else,  
25 I, again, don't think they would drop it. They would

1 still be viewing that -- that external material that  
2 holds the heating element, they would view that as the  
3 heating element housing. They would acknowledge there  
4 could be other housings, but they -- it wouldn't  
5 magically change it to some other housing.

6 Q Okay. So some structure that is internal to  
7 another structure could be the housing of the heating  
8 element; is that right?

9 A Yeah.

10 MR. ANSLEY: Objection. Vague.

11 THE WITNESS: Yes, as I just explained, if --  
12 if I got -- if I got this component, which is a housing,  
13 and inside of that is the heating element, that's the  
14 heating element housing, where that is put in the device  
15 at some later time, I don't think that changes what the  
16 housing of the heating element is.

17 Q BY MR. DOKHANCHY: And when you're looking at  
18 figure 2, say like down the barrel of it, from the side  
19 of item 5 -- well, withdrawn.

20 When you are looking at the generator of figure  
21 2 from the side of item 5, can you see the dark black  
22 shell from figure 4?

23 A From that viewpoint, I don't think so. It  
24 seems to be blocked by other pieces.

25 Q You say in your report that one of your tests

1 for determining if something is housing is whether you  
2 can see it from looking at it, right?

3 A That could be a useful test, yes.

4 Q Okay. Is that the only test?

5 A No. I mean, again, we could imagine a housing  
6 being obscured from view.

7 Q Okay. So then how do I know when I'm looking  
8 at something internal, so not the outermost structure but  
9 something internal like the black lines on figure 4, and  
10 it contains something like the heating element, how do I  
11 know if that item is housing for the heating element?

12 A Well, I think if you pull that part -- portion  
13 out and you could hold it and move it around and stuff,  
14 and it's holding securely, and it's the structure around  
15 the heating element, I think that would be the housing  
16 for the heating element.

17 Q And you've used the term "outside structure,"  
18 so your definition is the housing is the outside  
19 structure containing the device internals. That's what a  
20 housing is, right?

21 A Yes.

22 Q Can something be both inside structure and  
23 outside structure?

24 A What do you mean by "inside structure"?

25 Q The opposite of outside structure.

1           A    I think for a given set of internals, you  
2 would -- you couldn't do both of those. You'd have to be  
3 the outside structure for some of the internals. Again,  
4 whether or not that becomes a subcomponent of a larger  
5 object --

6           Q    Uh-huh.

7           A    -- that it could then be inside a larger  
8 object, but it would still be the external surfaces for  
9 the thing we're talking about, the internals that we're  
10 talking about.

11          Q    Okay. Is there anyplace where you can say, no,  
12 that's too far internal that it's no longer external  
13 structure?

14               MR. ANSLEY: Objection. Vague. Incomplete  
15 hypothetical.

16               THE WITNESS: I think if we were clearly  
17 defining the internals that we were talking about. And  
18 just make it specific, we're -- we're talking about the  
19 heating element.

20          Q    BY MR. DOKHANCHY: Uh-huh.

21           A    Whatever the external structure holding that  
22 within its internals, that would be the housing of the  
23 heating element. And you could put it deep inside of a  
24 product, and it would still be recognized as the housing  
25 of that internals. Again, we -- we often see nested

1 housings.

2 Q All right. Would you like to take a break --

3 A Sure.

4 Q -- or just keep going? Take a break?

5 A Yeah.

6 Q Okay. Let's do a five-minute break.

7 THE VIDEOGRAPHER: The time is 11:39 a.m.

8 We're off the record.

9 (The deposition was at recess from 11:39 a.m.  
10 to 11:47 a.m.)

11 THE VIDEOGRAPHER: The time is 11:47 a.m.

12 We're back on the record.

13 Q BY MR. DOKHANCHY: Welcome back, Doctor.

14 A Thank you.

15 Q I have Sturges in my mind. Dr. Singhose.

16 Let's see, could you turn to paragraph 96 of  
17 your declaration in the -- in the '864 case, the 160.

18 A Okay, I've turned to paragraph 96 --

19 Q Yes.

20 A -- of the '864.

21 Q Yes.

22 A Okay.

23 Q All right. And your opinion on the VUSE Ciro  
24 device is that what is called the positive pin is part of  
25 the housing; is that right?

1 A Yeah.

2 Q And we can go to other figures if they're more  
3 helpful, but on page 45, you have one of the images of  
4 the VUSE Ciro.

5 Do you see that?

6 A Yes.

7 Q And you see that the positive pin is -- is that  
8 sort of internal structure where the green arrow is  
9 pointing in your figure, right?

10 MR. ANSLEY: Objection. Vague.

11 THE WITNESS: Yeah, I mean, one side is  
12 external to the left side, but then it does -- the  
13 structure does go into the cartridge.

14 Q BY MR. DOKHANCHY: So you can sort of see this  
15 better in the next image on page 46. The positive pin is  
16 the area in white surrounding essentially the -- the  
17 leftmost green part of the passageway; is that right?

18 MR. ANSLEY: Objection. Vague.

19 THE WITNESS: Yeah, that's certainly part of  
20 it. I'm not sure that it's fully represented, but part  
21 of that white -- part of that white portion is the  
22 positive pin.

23 Q BY MR. DOKHANCHY: Let's look at another figure  
24 that might help. This is gonna be Exhibit 1014 to the  
25 160 matter, and this is R.J. Reynolds' brief in the Fuma

1 v. RJR case, Exhibit 1014.

2 And if you go to page 22 of 52, and you will  
3 see an image of the VUSE Ciro, the bottom right  
4 numbering. Yeah, it's different page numbering.

5 A Okay.

6 Q So the -- it's internal page 15, and it's  
7 external page 22.

8 A Yeah. Okay, I have that.

9 Q So the positive pin is that gray pin that is  
10 within the larger screw, right?

11 MR. ANSLEY: Objection. Vague.

12 THE WITNESS: Yeah, I mean, there's lots of  
13 gray parts in there, but I -- I think where that positive  
14 pin label is going and having a circle, that's certainly  
15 part of it. And then -- so part of it is sticking out,  
16 you know, exposed to the left, but part of it does go  
17 into the device to the right.

18 Q BY MR. DOKHANCHY: Okay. The entirety of the  
19 positive pin is internal to the threaded conductor, both  
20 radially and axially in this image, right?

21 A Okay. Axial meaning up and down basically, is  
22 that --

23 Q I was using axial to mean along the length of  
24 the cartridge.

25 A Oh, okay. Sure.

1 Q So if you were to lay this down horizontally,  
2 the positive pin is within the threaded conductor both  
3 vertically and horizontally, right?

4 A Yes. I mean, all I would do -- sort of to  
5 clarify is that there's one end that's open. It's not  
6 covered.

7 Q Right.

8 A But the other ones essentially are -- maybe  
9 that's what you're saying, is that they are covered or  
10 obscured. But one end is not.

11 Q Right. What I am saying is the positive pin  
12 doesn't extend laterally past the end of the screw  
13 conductor. In fact, it stops short of it laterally,  
14 right?

15 A Yes, I think that's a fair characterization.

16 Q And then in the vertical direction or the  
17 radial direction outward from the center of the -- the  
18 central longitudinal axis, the positive pin is also  
19 internal in that direction to the screw conductor, right?

20 A I think given an understanding of internal in  
21 the fact that it's recessed below it in those two  
22 directions, I would say yes, that's correct.

23 Q Okay. So why is the positive pin outer  
24 structure that comprises, in your view, housing?

25 A Sure. You just have to turn and look down the

1 axle, and --

2 Q Okay.

3 A -- what you are looking at, the outermost thing  
4 that you see is that positive pin. It's not flush, but  
5 the rest of it is recessed a little bit in it, but that's  
6 exactly the same kind of structure that we see in figure  
7 2 of the '864 patent, is we see, when we look down the  
8 end, part of that end of the housing is recessed in. So  
9 this actually aligns very well with figure 2 of the '864  
10 patent.

11 Q So why is the test that -- well, let me ask you  
12 this. Is the test that when you are looking down the  
13 barrel of a cylinder, a cartridge that's a cylinder, is  
14 anything that you can see external structure?

15 A I don't think anything. There could be like a  
16 pinhole, and there are pinholes in these devices, and you  
17 could see into it.

18 Q Uh-huh.

19 A You could see things. But I think a person of  
20 ordinary skill in the art would recognize that's a big  
21 sizable surface, and it's the outermost surface, and it  
22 is -- it does have the internals inside of it, so they  
23 are gonna recognize that as the end portion of the  
24 housing.

25 And again, that comes to us very directly from

1 figure 2 of the '864 patent. If somebody saw the '864  
2 patent and looked at this, they would be saying, well,  
3 this is very similar, and that's identified as housing in  
4 the '864, so this would be the housing of this device.

5 Q Right. I'm -- I'm just trying to understand  
6 the if you can see it test, right? So what are the  
7 boundaries of that? Is it some things that you can see  
8 are external housing or external structure, or everything  
9 you can see looking down the barrel is external  
10 structure?

11 A Yeah, I don't think it would be everything.  
12 Again, I think if you could peer in through a hole and  
13 you were looking and you saw like a shiny component two  
14 centimeters in there, that's not gonna be the housing.

15 Q Okay.

16 A But certainly, the outermost part of it that  
17 you can put your finger on, you can touch, and it's --  
18 it's holding or securing those internal parts, that would  
19 be the housing.

20 Q What's the difference between the hole that you  
21 can peer through in your example and the hole in the  
22 threaded conductor in the VUSE Ciro?

23 A Which hole in the threaded conductor are you  
24 talking about?

25 Q So this threaded conductor in VUSE Ciro has a

1 hole in it, and that's where the positive pin sits,  
2 right?

3 A Yes.

4 Q And you said there are some things where if you  
5 look through a hole and you see that, that's not gonna be  
6 external structure, right?

7 A Uh-huh. Yes, I did say that.

8 Q So that to me sounds like the positive pin,  
9 because you are looking through the hole of the threaded  
10 conductor and you see the positive pin. So what's the  
11 difference between the one you said is not an external  
12 structure and the positive pin which you say is external  
13 structure?

14 A Oh, I think I understand the question.

15 Yeah, I mean, at some point you have to apply  
16 the understanding of a person of ordinary skill in the  
17 art about the very nature of housing. The housing is  
18 holding these internals, like we talked about, but also  
19 it's providing some protection and security. So that  
20 screw part from certain directions might be providing  
21 that kind of structure and support, but the positive pin  
22 is definitely providing that support and structure when  
23 viewed from that one direction.

24 Q Uh-huh.

25 A Now, if there's a hole in there, and now,

1 again, I could see far into there, and I'm seeing the  
2 internal parts, I don't think the internal part is part  
3 of the housing. I think it is what is being housed.

4 So I think that's how a person of ordinary  
5 skill in the art would view housings. It's not like you  
6 couldn't -- there's not hole -- sometimes there's holes  
7 in housings and you could peer inside, but what you see  
8 is not it. But the outermost part that is providing the  
9 structure that is holding or securing, that would be the  
10 housing.

11 Q Okay. Is the screw connector housing the  
12 positive pin?

13 A It's hard to tell from this diagram. It looks  
14 like the positive pin is being housed -- is not really  
15 being housed by it. It is the housing. I think, again,  
16 that's the -- what we talked about before, is it's a  
17 connector to another part.

18 Q Uh-huh.

19 A And you can have these cartridges with housings  
20 and you could have other things on the end, like a  
21 mouthpiece, for example. So I view it as that. It's --  
22 it's something laid over the positive pin, but the  
23 positive pin is definitely part of the housing. Because  
24 if you removed it, there would just be a huge opening,  
25 and all kinds of stuff could go in there.

1 Q Is there any structure in this image to the  
2 right of the positive pin that you would consider  
3 housing?

4 A Yeah, I mean, the outer shell, the whole outer  
5 shell that we're seeing there is the housing.

6 Q Uh-huh. What about anything internal to the  
7 outer shell to the right of the positive pin, for  
8 example, this item in blue?

9 MR. ANSLEY: I'd just object. Not clear what  
10 you are -- vague.

11 THE WITNESS: I see two things that are blue in  
12 there. There's a round blue thing and there's --

13 Q BY MR. DOKHANCHY: I'm talking about the  
14 rectangular.

15 A Okay, the rectangular, mostly rectangular blue  
16 thing?

17 Q Yeah.

18 A Do we know what that is? I'm not seeing it  
19 labeled. I mean, it kind of -- it kind of depends on  
20 what it is. But I don't think it's the housing because,  
21 again, there's this other steel metallic structure  
22 outside of that that is -- that is forming the housing of  
23 these internals that we're talking about here.

24 Q And so why does the positive pin contain or  
25 protect, I think you said, the device internals?

1           A    Well, I think if I removed it, there would be a  
2   huge opening there, and dirt and grime and all kinds of  
3   stuff can get in there. I think without it, you would  
4   say that's not -- like it's not completely housing. And  
5   when I put that on, it's sort of the end.

6           Q    Okay.

7           A    We talked about these endcaps before, so it  
8   does seem to me like it's acting as the end of the  
9   housing. They are providing support and protection for  
10  the internals.

11          Q    But debris and such can still get in. There is  
12  still a hole through the positive pin, right?

13          A    That's true. It's just a much smaller hole.  
14  So I'm not saying this is a perfect housing.

15          Q    Okay.

16          A    But if we took that out, there's gonna be a  
17  much bigger hole, and it's much more likely that the  
18  device internals would get damaged, and corrosion and  
19  debris would get in there.

20          Q    So then is there any other component that you  
21  think completes the protection of the device internals,  
22  given that there's a hole in the positive pin?

23          A    I think that's it. And we have to have holes  
24  in these things, I mean, for these products to work. So  
25  I'm not saying that the housing is airtight or

1 watertight.

2 Q Uh-huh.

3 A It should just be secure enough so that lint  
4 and dirt and all kinds of stuff doesn't get in here, but  
5 it still allows a sufficient airflow through the  
6 cartridge to perform the function that needs to be  
7 performed.

8 Q All right. You say that the end, as used in  
9 the claims, is the extrema of an object?

10 A Yes.

11 Q Do you recall that?

12 Is that extrema three-dimensional, or does it  
13 have to only be two-dimensional?

14 A I mean, I think there's -- when we're talking  
15 about real products, it's always a three-dimensional to  
16 some extent. There has to -- you can't not consider it  
17 three dimension, because the minimum thing to identify is  
18 a molecule, which has a third dimension. So it's  
19 fundamentally a three-dimensional thing, but it is the  
20 farthest away --

21 Q Okay.

22 A -- portion of the device on one side of it.

23 Q Well, there would be a range of distances from  
24 the very end somewhere inward towards the center of the  
25 cartridge that you would call the end, right?

1           A    That's correct. If you established a -- I  
2 think you are referring to a reference frame, like an  
3 origin in the middle of this. If we traveled from that  
4 origin down to one end, it's definitely not gonna be  
5 planar. These ends have interesting shapes. And again,  
6 figure 2 is a perfect example of that.

7           Q    Do you have any -- well, let me ask. What --  
8 what sort of boundaries in terms of how far down from the  
9 extreme planar end of a cartridge does the,  
10 quote/unquote, end of the cartridge extend?

11          A    I would think it would extend a minimal  
12 distance, a de minimis amount. Like, you look at the end  
13 surface, and it's that plus just a little bit in, because  
14 it's, again, a real structure with molecules. But  
15 basically it's the extreme surface.

16                If you are at any point and you could go  
17 further out, then you are not at the end. So if you  
18 were -- you know, if you went and put your finger on some  
19 piece of the device or a pin, and you are able to move  
20 further away from this origin, then you weren't at the  
21 end.

22          Q    So how is that different from an  
23 infinitesimally small two-dimensional plane definition?

24          A    Yeah, well, I think I'm not comfortable with  
25 infinitesimally small, because we're talking about real

1 products and molecules and stuff like that. So there is  
2 a third dimension --

3 Q Okay.

4 A -- but it is kind of the minimal amount that  
5 still is -- is matter that's still plastic or steel,  
6 metal, or whatever it is.

7 Q Is it more than one atom wide?

8 A I would think it would be like at least a  
9 molecule wide or -- or in the case of metals, it would  
10 probably be like the last crystalline structure or  
11 lattice structure.

12 Q Okay.

13 A I mean, I think that would be a fair  
14 assessment. I don't -- I don't think a person of  
15 ordinary skill in the art would get down to the molecular  
16 level and have to make that analysis. They would see it  
17 and touch it and feel it and say that's the end. That's  
18 as far as I can go away from the origin.

19 Q Okay. Let's say the housing of this cartridge  
20 has a -- let's just say a shell, a metal shell that goes  
21 all the way around the outside. Would the end of the  
22 cartridge extend towards the middle of the cartridge more  
23 than the thickness of the metal of the housing?

24 A I don't think so unless, again, there was some  
25 holes or some undulations or something like that. But if

1 you are just talking about like a solid rectangular  
2 shell, I think it's -- doesn't extend further in than the  
3 thickness of that.

4 Q Okay. All right. I will ask the court  
5 reporter to mark Exhibit 2.

6 (Deposition Exhibit No. 2 was marked for  
7 identification.)

8 Q BY MR. DOKHANCHY: All right. Do you recognize  
9 Exhibit 2 as a JUUL pod?

10 MR. ANSLEY: I will just object to outside the  
11 scope.

12 THE WITNESS: Well, I recognize -- I recognize  
13 it as like a slide which has some JUUL pod CAD pictures  
14 on it. It's not the actual pod, of course.

15 Q BY MR. DOKHANCHY: Of course.

16 A Yeah.

17 Q Okay. So you see the label "first end" on the  
18 first page of Exhibit 2?

19 A Yes, I do.

20 Q And so what you just testified is, that first  
21 end would not extend in the left image vertically beyond  
22 the thickness of that gray-dashed housing; is that right?

23 MR. ANSLEY: Objection. Mischaracterizes  
24 testimony.

25 THE WITNESS: I'm not exactly sure what you are

1 referring to. You were -- you were pointing to your  
2 picture.

3 Q BY MR. DOKHANCHY: Sure.

4 A And I wasn't -- I couldn't quite follow along  
5 the description.

6 Q You see the gray-dashed housing around the  
7 outside of the first -- of the JUUL pod as depicted in  
8 the first page of Exhibit 2?

9 A Yes, I do.

10 Q And I had asked you, does the first end extend  
11 toward the center of the cartridge any more than the  
12 thickness of that housing? That's what I asked you  
13 before, Exhibit 2, right?

14 A Okay. Sure.

15 Q And so in your view, the first end may have  
16 some thickness, but it doesn't go beyond the thickness of  
17 the wall, right?

18 A That's correct. I think you would go along,  
19 and you would identify that wall as the end, and it would  
20 have that weird shape. It's not a flat piece. You would  
21 come along diagonally, and then you would kind of go back  
22 into recess a little bit, and then across, and then you  
23 would jet back out a little bit more, go over and then  
24 diagonal back up to the side. I think that would be -- I  
25 think a person of ordinary skill in the art would think

1 that's the end.

2 Q Are you talking about in figure 2 or are you  
3 talking about in this image?

4 A Well, I'm talking about in Exhibit 2, what --

5 Q Yes.

6 A -- you are showing me. I was kind of trying to  
7 describe without writing on it what -- what --

8 Q Well, why don't --

9 A -- the end would be.

10 Q Why don't you just circle what you think the  
11 first end would comprise.

12 A Okay. Sure.

13 MR. ANSLEY: I would just object to this line  
14 of questioning. It's outside the scope of your  
15 declaration.

16 THE WITNESS: I don't think I can circle it.  
17 I'll actually just sketch, you know, what it is. And  
18 again, I'm using the -- sort of the basic understanding  
19 that you look back up and you establish a origin, and you  
20 see how far away you can go from the middle of the  
21 cartridge.

22 Q BY MR. DOKHANCHY: Okay.

23 A And so -- again, I'm trying to make it sort of  
24 clear here. But I think that would be (indicating) the  
25 end.

1 Q Okay. Can I take a look at that?

2 A Sure.

3 Q I will give it back to you. Okay.

4 Is it okay if I label this "first end"?

5 A Sure.

6 Q And just take a look at that to see if I -- if  
7 I am accurately reflecting your testimony.

8 MR. ANSLEY: Actually, do you mind if I take a  
9 look at it?

10 THE WITNESS: Yeah. I mean, I think the arrow  
11 is not exactly -- it's -- I think it's -- that whole  
12 thing is the first end.

13 Q BY MR. DOKHANCHY: Okay.

14 A But I'm -- with the understanding, I think you  
15 are trying to show sort of a height there, but it's that  
16 whole structure that I've written over with a pen is what  
17 I would consider the first end.

18 Q Okay. And you see those notches on the sides  
19 of the cartridge?

20 A Yeah. On the sidewall?

21 Q Yes.

22 A Yes, I -- I know those. I know those very  
23 well, actually.

24 Q Are those part of the first end?

25 MR. ANSLEY: I think I'd just object --

1 maintain my objection, outside the scope with this line  
2 of questioning.

3 THE WITNESS: I would say that for the most  
4 part, they are on the side. I didn't do this analysis  
5 before we got here today, but if I did the test where I  
6 established an origin and tried to draw a line through  
7 there, could I get any further away? Rigorously applying  
8 that, maybe part of that curvature is on the end, but I  
9 think as a first look at this, you would say those are on  
10 the side.

11 Q BY MR. DOKHANCHY: And so they are on the end  
12 or they are not on the end?

13 A My opinion is, for the most part, I think  
14 they're -- they're -- most of it is certainly on the  
15 side. I'd have to do a detailed analysis to see if there  
16 wasn't a little bit of that that could be considered the  
17 end, but it looks like they are on the sides.

18 Q Okay. So you are not able to say for sure  
19 whether the first end extends towards the middle of the  
20 cartridge far enough to encompass those notches. Is  
21 that?

22 A That's right. I think it stops before those  
23 notches.

24 Q Okay. All right. And just in case we somehow  
25 lose that, could you hold that up for the camera, and can

1 we zoom in on that?

2 MR. ANSLEY: Again, I will just object. This  
3 seems irrelevant and outside the scope of Dr. Singhose's  
4 declaration in this IPR.

5 MR. DOKHANCHY: I disagree, but fine --

6 MR. ANSLEY: The prior art --

7 MR. DOKHANCHY: -- fine to --

8 MR. ANSLEY: -- (indiscernible) seeks to  
9 identify a first end. I don't think the JUUL device has  
10 ever been introduced in this IPR, so I do think it's  
11 irrelevant.

12 MR. DOKHANCHY: Okay.

13 MR. ANSLEY: And if I need to, we just will  
14 preserve our motion to strike that.

15 Q BY MR. DOKHANCHY: All right. Do you agree  
16 that the word "end" can be defined as a part or place at  
17 or adjacent to an extremity?

18 A That sounds pretty close to right, yeah. It's  
19 definitely at it. I think the -- the part is the  
20 adjacent, and we can't go too far away, as we just talked  
21 about.

22 Q So I can't tell if that's a yes or a no.

23 A Again, it's mostly a yes. I agree with the  
24 part where it's at the end. But I think you also said  
25 something about adjacent, and I'd want to understand what

1 you mean by adjacent more. And like I said, we just --  
2 we kind of just talked about this, you can't go very far  
3 away before you leave the end.

4 Q So I just need a yes or no as to the whole  
5 thing. And if you disagree with part of it, I would say  
6 that means you disagree with the definition.

7 But my question is, do you agree with the  
8 definition of the word "end" as, quote, a part or place  
9 at or adjacent to an extremity?

10 A I would say yes, just as long as we understand  
11 adjacent to have some bounds on it.

12 Q Okay. How does the word adjacent compare to  
13 the word proximate in the '864?

14 A I know that the '864 uses the word proximate.  
15 Does it actually use adjacent in the claims?

16 Q I don't believe so.

17 A Okay.

18 Q But my question for you is, do you view one as  
19 broader than the other? Are they the same?

20 A I didn't do that analysis for this patent, but  
21 I have done that analysis in the past. So as a general  
22 view, I think that adjacent generally means next to and  
23 touching.

24 Q Okay.

25 A Proximate wouldn't have to be touching.

1 Q Okay.

2 A But again, that's from my overall experience,  
3 not from focusing on what it may mean in the exact  
4 contents of the '864.

5 Q Okay. All right. So I know we just touched on  
6 this, but the '881 claims say a first aperture proximate  
7 first -- excuse me. Withdrawn.

8 The '864 claims say a first aperture proximate  
9 of first end. In contrast, the '881 claims say a first  
10 aperture on the first end. Right?

11 A That sounds right.

12 Q I mean, we can look at it. I'm not --

13 A Yeah, I believe you.

14 Q -- trying to test your memory.

15 A Yeah.

16 Q What is the difference between an aperture on  
17 the first end and an aperture proximate the first end?

18 A Again, I think there is a difference there.  
19 And on -- you would certainly have to be right at it.  
20 You know, the aperture has to be -- we would do that  
21 exercise where I identify the end, and the aperture has  
22 to be right there.

23 Q Okay.

24 A Proximate means it could be a little bit away.

25 Q Okay. And let's look at the '864 patent. So

1 the '864 says: A housing having an interior, et cetera,  
2 et cetera. The housing having a first end and a second  
3 end that is opposite the first end. The housing having a  
4 first aperture proximate the first end.

5 Do you see that?

6 A Yes.

7 Q And your view is that the housing -- withdrawn.

8 Your view is that the aperture, to be a first  
9 aperture in the claims of the '864, the aperture has to  
10 be literally in the housing, right?

11 A Yeah, it's a little bit weird to talk about  
12 aperture in, because the aperture means that the housing  
13 is not there. It's a hole, yes. So it needs to be a  
14 hole in the housing.

15 Q Right. So if the hole has to be in the  
16 housing, why does the claim then go on to say that the  
17 first aperture is not limited to being on the end, but it  
18 can be only proximate the first end?

19 A Sure. Well, we can envision housings with  
20 weird shapes --

21 Q Uh-huh.

22 A -- where the wall of the housing bends back  
23 inside, and so that part of the housing wouldn't be the  
24 end because there's another part of the housing that is  
25 sticking out a little bit further. And so if the

1 aperture was in that part of the housing that was kind of  
2 bent back inside, that would still be proximate to the  
3 end but not on the end.

4 Q So I'm a little confused, because I thought you  
5 said earlier that as in figure 2 of the patent or the  
6 JUUL device we looked at, the housing, if it has a  
7 curvature or a nonlinear shape, would still be considered  
8 the, quote/unquote, end, right?

9 A That's correct, but we didn't -- we considered  
10 a shape that never bent back on itself more than 90  
11 degrees. Okay, but if you -- if you were following this  
12 undulating surface and it curved back into itself, let's  
13 say 180 degrees, you'd still have the housing there.

14 Q Okay.

15 A But there would be another part of the housing  
16 that's further away from this origin in the middle, and  
17 then the housing could then curl back over and continue  
18 to go on. That curled in portion wouldn't be the end,  
19 because I can go further away.

20 Q Okay.

21 A But it would still be proximate. And so that's  
22 the kind of, I think, situation envisioned by this claim.

23 Q Well, let's look back at Exhibit 2, because I  
24 think what you are describing is what happens here on the  
25 first end. The gray, you know, external structure, the

1 plastic of the JUUL pod, as it comes toward the first end  
2 goes back into itself 90 degrees, and then across.

3 Is that what you were talking about?

4 A Yes, that's correct. That's a 90-degree  
5 recess.

6 Q Okay. And so that part that goes back in  
7 towards the middle is not the end, according to you?

8 A No, that's still the end, because it's the  
9 farthest that I can go. And once I go past that, away  
10 from the middle part of the cartridge, I'm out in free  
11 space.

12 Q Right.

13 A And I just keep going and I never run into the  
14 cartridge.

15 But suppose that was curved so far in that I  
16 started traveling from the origin, I hit that end. I  
17 left the cartridge temporarily, but I keep going in the  
18 same direction, and I run into the cartridge again.  
19 That's the situation I'm talking about. There could be  
20 this recessed feature that is not the end, but it's  
21 proximate the end.

22 Q I'm having a hard time picturing what you are  
23 talking about. Could you draw something that depicts  
24 what you are talking about?

25 A Yes, I can.

1 Q Thank you.

2 A Okay. So what I'm gonna do is I'll describe  
3 what I am doing.

4 Q Okay.

5 A The first thing I'm going to do is sort of draw  
6 the general shape of what we are looking at in figure 2,  
7 so we have some context, this JUUL cartridge. Okay?

8 I wish I had kind of a thicker marker.

9 Q Let's see. I can give you a highlighter.

10 A Okay. I'll do this, and maybe if it's not  
11 clear, I'll highlight what I mean.

12 Do you want me to hold it up or do you want to  
13 see it before I hold it up?

14 Q That -- that works, as long as we can get that,  
15 and we will mark it as an exhibit.

16 A So this is where we have a recess that folds  
17 back on itself --

18 Q I see.

19 A -- internal. And so this part right here  
20 (indicating) would not be the end of it. This would be  
21 the end, but this recess is certainly proximate to the  
22 end, and you could have an aperture there.

23 Q So the horizontal part that is sort of akin to  
24 where the holes are here in the JUUL pod, is that the  
25 end?

1           A    Yes.  So this would be part of the end right  
2   here (indicating).

3           Q    Uh-huh.

4           A    And you've got over here (indicating), you --  
5   you're not no longer on the end because the end would  
6   jump down to here, and this would be the end  
7   (indicating).  So you would have these recessed features  
8   here (indicating) that aren't exactly at the end --

9           Q    Okay.

10          A    -- but they are pretty darn close, and if you  
11   had your aperture there, I think it would read on the  
12   claim as -- the version of the claim where it's not on it  
13   but proximate to it.

14          Q    Okay.  So if the aperture were on the sides,  
15   that would be covered, in your view?

16          A    Yeah, that's -- this is the kind of structure  
17   that I think would -- would -- would read on this claim  
18   where it's not exactly on but proximate.

19          Q    Okay.

20          A    But proximate could also be on, I mean.

21          Q    Well, that --

22          A    Yeah.

23          Q    I don't think anybody is disputing that.

24          A    Yeah, yeah.

25          Q    But we're discussing the full scope of the

1 claims?

2 A That's right.

3 Q Okay. Let's --

4 A Sorry. There you go.

5 Q Do you mind if I just mark where you said the  
6 aperture --

7 A Could be, yeah.

8 Q So aperture, proximate, and within claims of  
9 '864. And obviously, let me know if that's accurate.

10 A Sure. And, I mean, this is just one variation.  
11 I will just say in another variation, you could have such  
12 a recess more right in the center.

13 Q Uh-huh.

14 A And I think that's probably what we'd wanna do  
15 to read more directly on the rest of the limitations  
16 often.

17 Q Okay.

18 A Because we have some of those limitations that  
19 you know are central and axial.

20 Q Right. Some of the -- right. Okay, yeah.

21 But you are not saying that the location of the  
22 aperture would make the passageway not central and axial?

23 A Well, if these are way off to the side and, for  
24 example, you only had one aperture off to the side, I  
25 think you would now be testing the limitations of a

1 central airflow passage. You'd probably want this kind  
2 of structure basically in the center so when the air went  
3 in there, you were -- you were basically in the center  
4 to -- for the other limitations.

5 Q But in that event, if it was in the center,  
6 then it would be on the end, right? Because your whole  
7 point here is that because it's off to the side, it's  
8 proximate but not on the end; if it were a protrusion in  
9 the middle, that would be the end?

10 A Yeah, I'll make you a third drawing --

11 Q Okay.

12 A -- to explain it.

13 Q Okay. Let's -- let's see.

14 A Yeah. Yeah. Because I was just addressing  
15 that one particular limitation.

16 Q Sure.

17 A If you want to then practice the other ones,  
18 you probably need a somewhat different structure.

19 Q Uh-huh.

20 A Well, actually, I'll let you look at it first  
21 before --

22 Q Sure.

23 A -- I hold it up.

24 So I think we even need the apertures to be  
25 closer to the central if we're gonna try to read on the

1 other limitations.

2 Q And so the aperture you're proposing would be  
3 here (indicating)?

4 A Or to the sides.

5 Q Or to the sides --

6 A Yeah.

7 Q -- here (indicating)?

8 A It's basically still in the middle, but it's --  
9 it's not at the end --

10 Q Okay.

11 A -- but it's proximate at the end. But when the  
12 air went in there, everyone would consider that air is in  
13 the center of the device.

14 Q I will just draw another arrow there. Is  
15 that -- is that accurate?

16 A Yeah, I think that's --

17 Q Okay.

18 A If we're trying to make a version that reads on  
19 all the other limitations and stuff like that.

20 Q Okay. Okay. Can we mark that Exhibit 3,  
21 please.

22 A Are you giving me the thumbs-up? Okay. I  
23 don't know if you want it to mark it.

24 (Deposition Exhibit No. 3 was marked for  
25 identification.)

1 Q BY MR. DOKHANCHY: If it were a -- a simpler  
2 design, just say an ordinary cylinder with a flat endcap,  
3 could an aperture on the sides be a first aperture of the  
4 claims?

5 A Of the full -- of all the other limitations as  
6 well?

7 Q Yeah, let's just say it's a empty cylinder.

8 A Yeah.

9 Q If it's an empty cylinder, you'd agree it has a  
10 central and axial airflow passageway, right?

11 MR. ANSLEY: Objection. Vague. Incomplete  
12 hypothetical.

13 THE WITNESS: I'm trying to understand your  
14 question. Let me -- let me read the claims. You're  
15 asking me basically to look at the claims here?

16 Q BY MR. DOKHANCHY: Uh-huh.

17 A Well, I think the last limitation of claim 1  
18 that says, "Wherein the airflow passage extends centrally  
19 and axially from the first aperture to the second  
20 aperture," I think that almost precludes an air hole in  
21 the side. I think it has to be on the end so that it  
22 can -- the airflow passage can come in and be central --

23 Q So then how --

24 A -- and axial.

25 Q How would this bottom image that you said meets

1 the claims satisfy that, because the aperture is on the  
2 side?

3 MR. ANSLEY: Objection. Mischaracterizes  
4 testimony.

5 THE WITNESS: Well, the aperture that I'm  
6 indicating there is at the center, right. The left and  
7 right is the sides. It's coming in; it's not perfectly  
8 at the center, but I don't think anyone is gonna read the  
9 requirement of perfectly in the center.

10 But that bottom one I did, I put the holes.  
11 And as soon as the air gets in there, a person of  
12 ordinary skill in the art is gonna consider that to be  
13 central. That's in the center of the device.

14 Q BY MR. DOKHANCHY: Okay. So it doesn't need to  
15 be in the literal center because it's not in the literal  
16 center?

17 A Yeah, I don't think you can be exactly in the  
18 center --

19 Q Okay.

20 A -- on any of this stuff.

21 Q As long as the air gets to the center?

22 A Yeah. When it comes in, I think a person of  
23 ordinary skill in the art would look at that and say  
24 that's in the center, and now it's starting to flow. I'm  
25 assuming there's a flow path after this, and it continues

1 down the center, down the axis. That's the kind of  
2 structure that would read on this claim limitation.

3 Q Okay. All right. Well, let's talk about the  
4 central and axial airflow passageway. The claim language  
5 is, "An airflow passageway extending centrally and  
6 axially," and there's various permutations of it, but can  
7 we just shorthand that, the central and axial airflow  
8 passageway?

9 A Okay.

10 Q So you say that that is an innovative feature  
11 of the claims of the NJOY patents, right?

12 A I think so, yeah.

13 Q Okay. So in kind of plain terms, you know, why  
14 is a tube down the middle innovative?

15 A Well, one thing that's surprising about that is  
16 that a tube down the middle would often result in hot  
17 droplets being shot into the person's mouth. And that  
18 certainly would happen if you tried to do that with Xia.

19 So it's part of the innovative feature is that  
20 you can do that, but you have to then deliver the vapor  
21 in a different way or generate the vapor in a different  
22 way. I think that's what people weren't doing. They  
23 weren't generating vapor in the way that's described here  
24 with this transverse heating element in the airflow  
25 passageway and then being able to basically have that go

1 straight into the person's mouth, because the vapor and  
2 droplet generation processes of the other devices at this  
3 time would -- would create these large hot droplets, like  
4 that Xia describes, for example.

5 Q The -- you know the Fang device, do you recall  
6 that one?

7 A Yes.

8 Q That has a horizontal post around which a metal  
9 filament is wrapped.

10 Do you recall that?

11 A I do recall that structure, yeah.

12 Q So that wouldn't have this droplet problem that  
13 you are talking about, right?

14 A I'd have to review that again for that issue,  
15 but I don't think so. I think it's -- it's trying --  
16 it's trying to do something similar to this.

17 Q Right.

18 A I don't think it has the same airflow  
19 passageway, though, but that does sound kind of related.

20 Q So the -- you are saying the problem with a --  
21 with the concept of -- well, an airflow passageway down  
22 the middle is very simple. Your -- your point is, if you  
23 do it a way that lets droplets into the user's mouth,  
24 that's -- you can't -- that's nonfunctional, right?

25 A That's right. Yes.

1 MR. ANSLEY: I just object. It  
2 mischaracterizes the testimony.

3 THE WITNESS: Yeah, I think that you've got  
4 problems with it. That's certainly one of the problems  
5 with it.

6 Q BY MR. DOKHANCHY: Okay. But a person of skill  
7 in the art would know that you don't have to do the  
8 droplet method of Xia; you can use a wick that brings  
9 liquid to a coil. That's not exactly innovative, right?

10 A Yeah, I think they would -- they would know  
11 they should try to do something different in the droplet.  
12 I think coming up with the particular structure that's  
13 claimed in '864 wasn't done before. So by the fact that  
14 it wasn't done before, that's evidence of innovation  
15 right there.

16 So I'm not saying that the person of ordinary  
17 skill in the art wouldn't understand the problem. I  
18 think they understand the problem, but getting to the  
19 solution is the innovation.

20 Q But the solution is just have a fiber that  
21 brings liquid to a coil? Is that particularly innovative  
22 in your mind?

23 MR. ANSLEY: Objection. Compound.

24 THE WITNESS: I think it's innovative in the  
25 fact that you have that plus the supporting structure for



1 doing that. And the idea that you can do it in the  
2 proper way so that you don't burn the person, that's  
3 innovative. Nobody was doing that before.

4 Q BY MR. DOKHANCHY: Okay. In the Fang device,  
5 would there be any burning of any material, any burnt  
6 taste?

7 A I don't have the Fang device in front of me.  
8 Maybe I should take a look at it.

9 Q Yeah, let's --

10 A You gave it to me earlier so I will pull it up  
11 over here. I don't know if you need to move it in to an  
12 exhibit or anything.

13 Q No, it's Exhibit 1006 to the 160 --

14 A Okay.

15 Q -- proceeding.

16 So I can take you to figure 2, and we can look  
17 at the spec, but I can explain it in figure 2. So in  
18 figure 2, this item, I believe it's 15, is the horizontal  
19 part that extends into the liquid storage area, which is  
20 crosshatched with X's. It flows horizontally, and that  
21 coil 16 is wrapped around the horizontal post.

22 Do you recall that? If not, we can go to the  
23 spec.

24 A That seems right. I remember that structure,  
25 yes.

1 Q That separates the heating element from the  
2 liquid storage medium, correct?

3 A Certainly to some extent, yes.

4 Q And there is nothing in Fang that indicates  
5 that there would be a burning of the fibrous material  
6 anywhere. In fact, I don't think fibrous material is  
7 described at all.

8 A Yeah, I don't recall it addressing that issue.

9 Q So why doesn't Fang indicate that this concept  
10 of a horizontal wick in a transverse coil being used to  
11 prevent burning taste, you know, that was known in the  
12 art?

13 A Well, again, I think you -- you actually said  
14 it, it doesn't say that the structure addresses the  
15 burn -- the burning taste.

16 We also just don't know how the air is flowing  
17 here, right. We don't understand the air inlet. We  
18 don't know if it's central or axially.

19 So the problem is we just don't understand how  
20 this structure is working so that a person of ordinary  
21 skill in the art would look at this and say, oh, I  
22 understand how it's working; let me combine this idea  
23 with something else.

24 But again, I -- I'll go back to the fact that I  
25 don't think it's -- it's saying that it's addressing the

1 burning.

2 Q Neither are the NJOY patents, as we discussed  
3 earlier; the '881 and the '864 don't say that either,  
4 right?

5 A That's true. Yeah.

6 Q Would a person looking at this structure in  
7 figure 2 recognize that that heating element doesn't burn  
8 any batting material?

9 A I think you said there wasn't batting material  
10 in here, right, so I don't think it burns batting  
11 material.

12 Q Right.

13 A I'll go along with that.

14 Q Okay. And even if there were batting material  
15 in that liquid storage compartment on either side, which  
16 again, I don't think there is, but let's say that there  
17 is, that coil isn't touching that batting material and,  
18 therefore, not creating the burning taste; is that fair?

19 A Yeah, I don't think it's creating the burning  
20 taste of the batting material, but this structure was  
21 also known to have a problem when all of the liquid ran  
22 out, that you would burn the wick itself. And that's why  
23 there was -- later on people invented windows to be  
24 looking in and seeing how much was left and stuff like  
25 that.

1                   So it doesn't completely eliminate the burnt  
2 taste, but it does contribute to a reduction of the burnt  
3 taste phenomenon.

4           Q   And that burnt heating element problem, is that  
5 addressed in the NJOY patents? Or I think you said burnt  
6 wick?

7           A   Yeah, the burnt wick, you still have that  
8 problem.

9                   I don't think that the -- you said the NJOY  
10 patents. I'm gonna say '864.

11          Q   Sure, whatever you want.

12          A   I don't think the '864 eliminates all problems  
13 of that. I think it does go a long way to eliminating  
14 the burnt taste problem in general.

15          Q   Right. But the one that you say persists in  
16 the Fang structure, there's no indication that that  
17 doesn't persist in the '864 patent, right?

18          A   Right. I think you could practice the '864  
19 patent and still end up having that sub portion --

20          Q   Yeah.

21          A   -- of the burnt taste problem.

22          Q   Okay. And that's not a thing that the  
23 inventors indicated they were concerned with, right?

24          A   Yeah, I don't recall them being concerned with  
25 that.

1 Q And so I believe you -- well, withdrawn.

2 What are the benefits of a central and axial  
3 airflow passageway?

4 A Well, that's in my report, so we -- we can  
5 go -- or my declaration. We can go in there and -- and  
6 point it out.

7 But we were just talking about one where you --  
8 by having that structure and then having the transverse  
9 heating element as well, you are reducing the direct  
10 contact of the heating element with this batting material  
11 or with this carbon -- with this cotton-soaked material.  
12 So you are definitely reducing that burnt taste  
13 phenomenon. That's certainly one. That's one we were  
14 just talking about.

15 Q Well, let's look at the Xia reference. Do you  
16 have that?

17 A Yes.

18 Q And if you can go to figure 2. This is one  
19 that you say doesn't have a central and axial airflow  
20 passageway, right?

21 A That's correct.

22 Q So there's no indication that this reference,  
23 the Xia reference, would suffer from a burnt taste.  
24 There's -- because there is no contact between the  
25 heating element and the batting material?

1           A    That's right. I don't think it's gonna have  
2 the burnt taste problem that we're talking about, which  
3 is the burnt fabric.

4           Q    Right.

5           A    It's gonna have a different burnt taste problem  
6 if we don't do this right, which is the large droplets,  
7 right. Large hot droplets would obviously be a kind of  
8 burnt taste.

9           Q    Why is that?

10          A    Well, because you get hot, large droplets in  
11 your mouth, and you would taste it would be hot, and you  
12 would have the flavor of whatever the droplets have a  
13 flavor of.

14          Q    Well, when you -- when you talked about the  
15 burnt taste, you were talking about burning fibrous  
16 material?

17          A    That's right. So I'm saying it doesn't have  
18 that problem.

19          Q    Okay.

20          A    It would just have another burning problem if  
21 you didn't do it right.

22          Q    Sure. So, but your view is that Xia does not  
23 have that problem as it is, right? It doesn't have the  
24 large droplets problem; it has a solution for that?

25          A    That's right.

1 Q Right.

2 So what I am saying is, I asked you what the  
3 benefit of the central and axial airflow passageway is,  
4 and you said it solved some problems; but this doesn't  
5 have a central and axial airflow passageway, the Xia  
6 reference, and it also doesn't have those problems.

7 So my question is, why do you want a central  
8 and axial airflow passageway?

9 A Well, I think that you want it if you want to  
10 use the different structure. And quite frankly, this  
11 structure of emitting droplets and then heating them up  
12 and then trying to reabsorb the large one is very dicey  
13 and dangerous. So if you're gonna abandon the structure  
14 of Xia, which you probably should, you're gonna go to a  
15 different structure that vaporizes at the coil rather  
16 than emitting droplets upstream and then heating them.

17 Given that structure, you immediately have the  
18 concern of the burnt taste, because it would be natural  
19 to try to put the heating element right up against the  
20 fabric, which Wang did.

21 So in that operating procedure, the '864 patent  
22 solves the problem of that structure. But I admit that  
23 the Xia has a different structure, a droplet generating  
24 process, and it doesn't solve the problem -- it doesn't  
25 have that problem, as you just said.

1           Q    I guess the part I'm not understanding is you  
2   are talking about the heating element burning the fibers.  
3   That seems somewhat orthogonal to the question of, is the  
4   passageway central and axial. You could have a heating  
5   element that touches the fibers or not touches the  
6   fibers. Why does -- what's the relationship between that  
7   and a central and axial airflow passageway?

8           A    I don't exactly think the orthogonal, but I  
9   will admit that they're two separate questions. But for  
10   a number of reasons, and we just talked about one of the  
11   primary ones, you wouldn't want to set up your structure  
12   to generate a vapor where your heating element was  
13   directly touching your batting.

14          Q    Uh-huh.

15          A    Okay. In that case, the '864 tells you how to  
16   do it. It says essentially turn it sideways, get it  
17   separated from the batting, somehow draw the material  
18   towards the heating element, and flow right down the  
19   middle. So that's the solution it's suggesting, and it  
20   does solve or go a long way to solving the burnt taste  
21   problem.

22          Q    But the part that solves it is separating the  
23   heating element from the fiber. It has nothing to do  
24   with the passageway. So what's the benefit of the  
25   straight passageway?

1 MR. ANSLEY: Objection. Lacks foundation.

2 THE WITNESS: Well, the -- there's some other  
3 reasons why you don't want a passageway right down the  
4 middle, is that, again, you could deliver your aerosol to  
5 your user without a lot of draw resistance. Like it  
6 would be easy to pull through there, rather than some  
7 much more complicated path. So that's another benefit of  
8 this. It allows an easy draw. It also could be easier  
9 to manufacture than something with a much more  
10 complicated airflow path.

11 So I'm not saying the only advantage is to  
12 getting rid of the burnt, right? I've listed other  
13 advantages in my declaration, and one of them, the easier  
14 draw, is certainly in there.

15 Q And that easier draw is because the air flows  
16 more easily down a straight path than a convoluted path.  
17 Is that what you are saying?

18 A That's true.

19 Q Okay.

20 A Now, you -- you do want some mixing. I'm not  
21 saying you don't want to mix the stuff. You want to have  
22 set it up to where the vapor is emitted into the  
23 airstream, and the airstream can mix it in and create an  
24 aerosol, which means like it coalesces in droplets.

25 Q Okay.

1           A    But you want those droplets to be small, and  
2   you want them to be cooled by the time you get to the  
3   user's mouth.

4           Q    Right.

5                   And the notion of easier draw, again, a person  
6   of skill in the art at this time would know as a basic  
7   principle of fluid dynamics that a straight path has less  
8   resistance than a contorted path, right?

9           A    Given all the other variables are held  
10   constant, that is true.

11          Q    The '881 and '864 patents don't require air  
12   mixing or cooling on their claim terms, do they?

13          A    I don't think so. I don't -- I mean, there's a  
14   lot of claims in there, but I don't recall that.

15          Q    Okay. The '864 and '881 patents don't come out  
16   and say that the central and axial airflow passageway is  
17   innovative or beneficial in such terms, do they?

18          A    As I sit here, I don't recall them using that  
19   terminology, that specific description.

20          Q    All right. Why don't we break for lunch.

21          A    Okay.

22                   THE VIDEOGRAPHER: The time is 12:45 p.m.  
23   We're off the record.

24                   (The deposition was at recess from 12:45 p.m.  
25   to 1:34 p.m.)

1 THE VIDEOGRAPHER: The time is 1:34 p.m. We're  
2 back on the record.

3 Q BY MR. DOKHANCHY: Welcome back, Dr. Singhose.

4 A Thank you.

5 Q During the break, did you talk to your counsel  
6 about any of the subject matter, the patents, the NJOY  
7 patents, the references, anything like that?

8 A No.

9 Q Okay. All right. Let's talk about the central  
10 and axial airflow passageway requirement of the claims.  
11 And my questions here will refer to all of the claims in  
12 the '864 and '881 patent. If you think that there's a  
13 difference, please let me know. I think the parties have  
14 been treating them the same, but feel free to let me know  
15 if you think there's a difference.

16 A Okay. So just do I understand, I mean, I think  
17 most of them use passage of it. Some of them use  
18 chamber. So there's that --

19 Q Sure.

20 A -- difference. Okay.

21 Q For the purpose of this, let's treat it the  
22 same, the chamber equals passageway.

23 A Okay.

24 Q And we can dispute if that's true or not, but  
25 let's take that as an assumption --

1 A Okay.

2 Q -- for now.

3 And there is one of them that refers to airflow  
4 path that we can carve out. That's claim 9 of -- I think  
5 it's the '864, but may be --

6 A Okay.

7 Q -- a different one, but just to avoid the  
8 repetitiveness of the questions.

9 So your view is that obstructions are permitted  
10 in a central and axial airflow passageway but only small  
11 ones; is that right?

12 A Yes. That's approximately right. I mean,  
13 small is kind of -- a little more clearer than that.  
14 It's approximately the same as what's disclosed in the  
15 '864, which is the heating element.

16 Q Okay.

17 A So objects of that size and effect.

18 Q All right. Well, let's look at the -- well, so  
19 to be clear, is it your view that anything larger than  
20 the heating element is not permitted within a central and  
21 axial airflow passageway?

22 A I don't think I'm that strict about it in terms  
23 of anything a little bit larger, but it should be on the  
24 same order of magnitude, the same effect, you know. It  
25 shouldn't be massively diverting the airflow path -- the

1 airflow to some other direction, basically.

2 Q Okay. Let's -- and is that -- in terms of the  
3 size of the obstacle and what's permitted and what's not,  
4 is it about the length or some other dimension?

5 A It would be about the same, what we say is the  
6 cross-sectional area to the -- to the -- the  
7 cross-sectional area as -- as seen by the airflow.

8 Q Okay.

9 A So you, after making yourself going down the  
10 airflow and you are hitting an obstacle, what's slowing  
11 you down or impeding you or causing you to move a little  
12 bit is the cross-sectional area --

13 Q Okay.

14 A -- of that.

15 Q And is it that it can't be much bigger than the  
16 heating element, or is it the heating chamber? Or what's  
17 the metric?

18 A I think much bigger than the heating element.  
19 That's what the -- I mean, these patents teach you that  
20 you can have that. In fact, you have to have that for  
21 this whole thing to work.

22 So the claims are clearly not saying you can't  
23 have anything in the way. In fact, it's expecting that  
24 you have a heating element there, but it's not expecting  
25 an object so large that the airflow is moved massively

1 into the radial direction or to the outside or anything  
2 like that. It's still predominantly straight down the  
3 middle.

4 Q Okay. Let's look at claim 1 of the '864  
5 patent. If you look around column 17, line 39, the  
6 relevant claim language here states, "An airflow  
7 passageway in the housing, at least a portion of the  
8 airflow passageway extending centrally and axially with  
9 respect to the housing, wherein the airflow passageway  
10 extends centrally and axially from the first aperture to  
11 the second aperture."

12 That's the relevant language, right?

13 A Yes.

14 Q Where in there does it say small -- small  
15 obstacles are okay and large obstacles are not?

16 A Well, it doesn't say it in there, but it's  
17 actually in the previous limitation where it says -- when  
18 it's describing the heating element.

19 Q Uh-huh.

20 A And more specifically, it says that it's at  
21 least partially exposed to the airflow. So that's  
22 telling a person reading this, you have to have something  
23 in the airflow, and this heating element has to be in  
24 there.

25 Q Right. So obstacles around the size of the

1 heating element are permitted, right?

2 A Yes.

3 Q Where is the upper bound? Where is the part  
4 that says there can be something too big?

5 A Well, when you stop meeting the requirement of  
6 it being centrally and axially.

7 Q So it's just those words themselves?

8 A Yeah, I think so. I mean, at some point it  
9 gets to be so large, it diverts the airflow passage so  
10 much that no person could look at that and say, oh,  
11 that's still central and, oh, that's still flowing mostly  
12 axial.

13 Q Okay. Now, is there a difference between the  
14 location that the air flows and the airflow passageway  
15 itself, or are they one and the same?

16 A I think there's a difference there.

17 Q Okay. What's the difference?

18 A The airflow passageway would be sort of the  
19 outer boundaries, like kind of aligned with the walls of  
20 where the air could go. And then the airflow is actually  
21 where the air goes. Like the air cannot go through the  
22 coil metal.

23 Q Right.

24 A Right, that's not possible. But the coil metal  
25 is still within the passageway.

1 Q There's no requirement, other than claim 9 that  
2 we talked about, for the airflow to be central and axial  
3 in any particular place; is that right? All the claims  
4 say that the passageway is central and axial?

5 (Court reporter clarification.)

6 THE WITNESS: As I recall sitting here, I think  
7 most of the requirements are about the passageway. And I  
8 think there's just a couple of exceptions that we've  
9 talked about that don't use the passageway but use  
10 something else related to it, but not exactly the same.

11 Q BY MR. DOKHANCHY: So in claim 1, for example,  
12 there's no requirement that any particular part of the  
13 airflow be central and axial; is that right?

14 A Yeah, I don't think there's a claim on the  
15 airflow. Of course, the airflow has to be inside the  
16 airflow passageway.

17 Q Right. But what I'm saying is, you could have  
18 an airflow passageway that's central and axial within the  
19 requirements of claim 1 where the airflow in any given  
20 place may or may not be central, right?

21 A That's true. Specifically, for example, at  
22 around these obstacles. Running into the heating  
23 element, you, again, can't flow right through the heating  
24 element. You've got to bounce around it.

25 Q Okay. Do the claims put any restriction on the

1 size of the heating element?

2 A I think some of them do, where they talk -- I  
3 think some of these claims have a heating element having  
4 a maximum diameter or something like that. Some of the  
5 dependent claims I think have something like that.

6 Q What about claim 1 of the '864? Is there any  
7 limit on the size of that heating element?

8 A Not specifically stated in the claim language.

9 Q Is there any limit on the heating element claim  
10 1 -- in claim 1 in terms of how much it diverts airflow  
11 away from the center?

12 A No, there's no specific requirement like that.

13 Q Do you have Exhibit 1014 with you?

14 A What is that?

15 Q That is the Fuma brief that had the images of  
16 the Ciro.

17 A Yes, I have -- is it JUUL Exhibit 1014?

18 Q Yes.

19 A I have that.

20 Q All right. Okay. So in Exhibit 1014, we were  
21 looking at -- it's marked as internal page 15. It's page  
22 22 of 52. It's about halfway through the document.

23 A (Indicating)?

24 Q Yeah.

25 A Okay.

1 Q And so, again, you recognize this as the VUSE  
2 Ciro device?

3 A Yeah, a representation of part of it.

4 Q Yeah.

5 A Yeah.

6 Q And you know that this is the device that the  
7 judge in the Middle District of North Carolina held on  
8 summary judgment infringes the '881 patent claims; is  
9 that right?

10 A That's my understanding, yes.

11 Q And what happens in the Ciro is that air, as  
12 indicated by the red lines, enters the side, goes around  
13 the positive pin, goes through the middle hole of the  
14 positive pin, and then it hits this place that has a  
15 circle -- well, three circles in this image on -- on page  
16 22, and at that point all of the air gets diverted away  
17 from the center.

18 Is that fair?

19 A Yeah, that's pretty much fair. I mean, there  
20 is some stagnant air right there at the intersection,  
21 probably reciprocates around and stuff like a whirlpool.  
22 But yeah, eventually the airflow has to go around the  
23 right or left side and then over the -- the next -- the  
24 next blue thing, right, is the -- is the heating element,  
25 right.

1 Q And, you know, if you were to look at figure 2  
2 of the '864 patent -- and you can do it or you can  
3 visualize it -- that coil does not necessarily divert all  
4 airflow in a fully noncentral way, in contrast to the  
5 positive pin; is that fair?

6 A Well, again, this is -- this is just a  
7 schematic, and we're actually getting more details about  
8 the actual product on this page 15 or page 22, I guess.  
9 But remember that that schematic of figure 2 says that  
10 that heating element 222 could have a wick, and that  
11 would probably block all the airflow through the middle.

12 Q Right.

13 A So in that version of the figure 2 embodiment,  
14 yeah, I think all the air is gonna -- mostly, almost all  
15 the air is having to go around it, not through it.

16 Q Well, let's talk about the embodiment of figure  
17 2, which I believe you said is covered by the claims with  
18 no wick, just a coil in the middle of the passageway.

19 A Yeah, there -- there are various versions of  
20 this that could be claimed.

21 Q So in that version, the air will flow through  
22 the coil and around the coil; is that right?

23 A Yeah. I mean, generally when we say coil, we  
24 mean some open space in there. So yeah, it would -- it  
25 would flow through the center, around the top, bottom,

1 the left and right sides.

2 Q So in that embodiment, not all of the air  
3 through the passageway gets fully diverted to -- well,  
4 away from the center; is that right, by the coil?

5 A That's true. Some just kind of flow straight  
6 through.

7 Q And so the positive pin in the Ciro device  
8 diverts airflow more than the coil in the embodiment of  
9 figure 2 that we were just discussing, fair?

10 A I think more in some sense, because it looks to  
11 me like you can't flow down through the middle of that.

12 Q Right.

13 A And so that -- in that sense of it diverting to  
14 the left and right, to the extent that apparently none go  
15 right down the middle, I would agree that's in some sense  
16 more of a diversion, if that's their criteria.

17 Q And so the judge found in this case that an  
18 obstacle that diverts airflow more than a coil that  
19 satisfies the claims in that embodiment of figure 2 still  
20 infringes the claims. Is that fair?

21 A I think you're almost asking me for a legal  
22 opinion. I'm not sure I studied this case enough to know  
23 that. But it does appear to me that the judge said this  
24 obstacle is a little bit bigger than the coil, and I'm  
25 still -- he, the judge, is still considering that as a --

1 a relatively small obstacle that practices these claims.  
2 That's my understanding.

3 Q And the judge's logic in that case was that you  
4 need to distinguish the airflow from the structural  
5 component that is the airflow passageway, right?

6 A Again, I believe that was -- I believe that was  
7 part of his reasoning.

8 Q In fact, that was the core of his reasoning,  
9 wasn't it?

10 MR. ANSLEY: I just object. It calls for a  
11 legal conclusion.

12 THE WITNESS: Again, I don't -- I don't know if  
13 I can say it's the core. I know that's a component of  
14 his reasoning.

15 Q BY MR. DOKHANCHY: All right. Well, let's look  
16 at the order. This is Exhibit 1015 to the 160 matter.  
17 Okay. And this is the judge's order regarding summary  
18 judgment of infringement in the Middle District of North  
19 Carolina.

20 Do you see that, Dr. Singhose?

21 A Yes, it's -- I clearly see it's a memorandum  
22 opinion and order, and it does appear to be in regards to  
23 Fuma's motion for summary judgment --

24 Q Okay.

25 A -- for direct infringement.

1           Q    So in your -- let's talk about the -- your view  
2   as -- as to the Xia reference. You say that the liquid  
3   storage chamber is not an obstacle that is permitted in a  
4   central and airflow -- excuse me -- central and axial  
5   airflow passageway. Instead, it's a structural component  
6   that defines the passageway. Is that right?

7           A    Yes.

8           Q    And if I'm looking at an obstacle, how do I  
9   know if it's just an obstacle or if it's a structural  
10   component that defines the airflow passageway?

11          A    Well, I think if you look at -- both of those  
12   would be objects. Let's call them objects so they're not  
13   using the claim language.

14                Both of those are objects that are in the  
15   device. One of those makes a substantial change to the  
16   airflow such that the airflow is, you know, no longer  
17   central or it would not be viewed as central and axial.

18                And one of those, a person of ordinary skill in  
19   the art would say, yeah, that's an obstacle where  
20   basically the airflow is just tumbling around it, and  
21   it's sort of a temporary effect that's just, you know,  
22   causing some jumbling of the air or some mixing or some  
23   heating, which is actually required by these things.

24                So I think that's the difference is, one is --  
25   is just a sort of a temporary effect that actually is

1 something that you need, that is the tumbling or the  
2 heating. Another one is a substantial change to the  
3 airflow path that's -- that's diverting it, and if you  
4 looked at it, you are like, that's not central anymore or  
5 it's not radial -- I mean, it's not axial anymore.

6 Q Okay. So it's just sort of a judgment call  
7 that you have to look at?

8 A Yeah, I think it is a judgment call. At some  
9 point you have to rely on the person of ordinary skill in  
10 the art to -- to make that judgment.

11 Q Okay.

12 A But I think they would have guidance on how to  
13 do that judgment.

14 Q So if you can look at page 14 of Exhibit 1015,  
15 I'll read some of the judge's rationale here.

16 A Okay.

17 Q The judge said, "While the physical structure  
18 of the Ciro is not in dispute, RJR contends that the  
19 presence of certain obstructions within the Ciro's  
20 airflow passageway prevent the air from proceeding in a  
21 straight line from one end to the other.

22 "RJR conflates the airflow's path with the  
23 airflow passageway. RJR is correct that the air itself  
24 does not flow in a straight path through the Ciro, as it  
25 must travel around ... certain obstacles housed within

1 the passageway. These obstacles include a 'positive  
2 pin,' a 'silicon base,' and a 'heating element,' which  
3 both alter the air's path as it travels from the base of  
4 the airflow passageway to the opposite end. But the  
5 Court's construction ... dealt only with the structure of  
6 the airflow passageway - not with the airflow's path  
7 within that interior passageway."

8 Do you see that?

9 A Yes, I do.

10 Q Nothing in that part of the judge's order said  
11 if the air gets diverted more than X amount, then I do  
12 consider it no longer a central and axial airflow  
13 passageway.

14 MR. ANSLEY: Objection.

15 Q BY MR. DOKHANCHY: Correct?

16 MR. ANSLEY: It calls for a legal conclusion.

17 THE WITNESS: Yes, there's nothing in that  
18 paragraph that says X percent.

19 Q BY MR. DOKHANCHY: Right.

20 The distinction that the judge drew was that  
21 the path is the path, and the structural component is the  
22 structural component. Fair?

23 MR. ANSLEY: Objection. Vague. Legal  
24 conclusion.

25 THE WITNESS: I actually don't understand that

1 question.

2 Q BY MR. DOKHANCHY: Well, basically he's saying,  
3 I don't care how the air flows. As long as it has a  
4 structural path that's straight, regardless of obstacles,  
5 it's a straight airflow passageway.

6 Isn't that what he's saying?

7 MR. ANSLEY: The same objection.

8 THE WITNESS: I don't think he's saying he  
9 doesn't care. I don't see that terminology in there.  
10 But he is definitely saying that the passageway should be  
11 the focus of the analysis rather than the actual path of  
12 any individual air molecule.

13 Q BY MR. DOKHANCHY: All right. And so I think  
14 you agree -- well, withdrawn.

15 The liquid storage medium 12 in the Xia  
16 reference, that sits in the middle of the cartridge or  
17 what we are calling the cartridge, right?

18 A Yes, it is in the middle of the cartridge,  
19 yeah.

20 Q Okay.

21 A It's -- it's actually the part that's central  
22 to the cartridge.

23 Q Right. And so it's purely the size of the  
24 liquid storage medium 12 that you think causes it to be a  
25 passageway definition and not just a mere obstacle that

1 the judge said is permitted; is that right?

2 A It's predominantly the size. I mean, it's just  
3 so much bigger, but it's not -- it's not an obstacle also  
4 that you would need to perform the functions. Like, you  
5 have to have the heating element. You also might have to  
6 have some other structure that causes the tumbling and  
7 the mixing. It's not doing any required function like  
8 that. It's just a huge structure in the way that's  
9 causing the substantial change in the airflow such that  
10 it really is defining the airflow passageway.

11 Q And you said it's predominantly the size. Is  
12 there anything else besides the size of the tank that you  
13 think makes it a passageway definition and not a mere  
14 obstacle that the judge says in this case is fine?

15 A Right, that's what I tried to answer the first  
16 part of the question. It's not performing a function  
17 of an -- of an obstacle that is required to form this.  
18 We -- we have to have the heating element in there. So  
19 if the heating element was huge, I think it would still  
20 be considered acceptable to be in the airflow passageway  
21 because it's -- you have to have that.

22 So I don't think it's merely the size. It is  
23 really large, but also it's -- it's not one of the  
24 features placed by these claims within the airflow  
25 passageway as in the heating element.

1 Q Help me understand that. So whether it  
2 performs a function that you think is necessary is part  
3 of the definition of what an airflow passageway is?

4 A You said -- your question really was, is that  
5 the only reason? And I'm saying it's not the only  
6 reason. The sheer size of it is not the only reason,  
7 because we could also have a very large heating element.

8 Q Okay.

9 A And even if the heating element got really,  
10 really large, I would still think that that wouldn't  
11 cause a change to the airflow passageway.

12 So there is some small part of my analysis that  
13 is also looking at it and saying it's very large, but  
14 also it's not mentioned in the claims as an object that  
15 should be in the airflow. As the heating element is  
16 mentioned, the heating element is actually required to be  
17 in the airflow.

18 Q Okay. But the liquid storage medium does  
19 perform a function in this device, right, in the Xia  
20 device?

21 A Yes, it does.

22 Q You are just saying it doesn't need to be where  
23 it is?

24 A I'm not sure I'm saying that, but it is  
25 creating a function. That function is to hold liquid.

1 If I go to the claims, the device that holds the liquid  
2 is not claimed as being in the airflow passageway.

3 Quite frankly, it also performs the function of  
4 diverting the airflow out to the outer edges so that it  
5 can be cooled, and that's also not a claimed feature. So  
6 I'm seeing it perform functions, or I'm understanding  
7 that it's performing functions that aren't required to be  
8 within the airflow passageway.

9 Q I think you said earlier that diverting the air  
10 to the edges to cool it is beneficial; is that right?

11 A Yes, that is generally.

12 Q Okay. So it's actually better that it's in the  
13 center of the passageway, in your view, to cool --  
14 perform that cooling function?

15 A I think for this particular structure,  
16 certainly we are emitting droplets, and those droplets  
17 are getting heated to very hot and large sizes, you need  
18 things blocking those from the user's mouth. And I think  
19 that that solution holding chamber is helping that by  
20 diverting the flow out and around, causing vortexes that  
21 allow you to reabsorb the large ones, causing more  
22 cooling because you are going on the edge.

23 So yeah, I think it's -- I think it's a good  
24 feature for this particular operating mechanism.

25 Q Okay. Can you turn to paragraph 496 of your

1 declaration in the 160 matter.

2 All right. You've got an image here on page  
3 261 of what's called the VUSE Solo G1.

4 Do you see that?

5 A The G1?

6 Q Yeah.

7 A Oh, yes. Okay.

8 Q Does that have a central and axial airflow  
9 passageway?

10 A Yes, it does.

11 Q And so what about this big obstacle in the  
12 middle? Why doesn't that prevent the passageway from  
13 being central and axial?

14 MR. ANSLEY: Objection. Vague.

15 THE WITNESS: Well, when I look at this  
16 diagram, it looks like it has a very -- it may be a large  
17 obstacle in terms of the length, but as I said, what's  
18 important is the cross section --

19 Q BY MR. DOKHANCHY: Uh-huh.

20 A -- whole area, the area that's facing the  
21 airflow path. So if we look down the axial of this and  
22 we see that, I believe that's the circuit board, if I  
23 recall.

24 Q That's right.

25 A It's actually not going to be very large in

1 that point of view. Its cross section is relatively  
2 small. Its cross section looks to be roughly the same as  
3 the heater wick assembly later down. So they are roughly  
4 the same size in terms of their cross-sectional areas.

5 Q There is nothing in the claims of the asserted  
6 patents that require a PC board in the middle of the  
7 airflow passageway, correct?

8 A No, I don't think so.

9 Q And so when you said earlier that one of the  
10 factors is size and the other is -- is this item needed  
11 in the airflow passageway, this at least fails the second  
12 test; is that right?

13 A Yeah, I -- I think you don't have to have this  
14 in here, but it -- it's so small, and the size is roughly  
15 the same as the -- the heater wick combination. I think  
16 that this, again, is not defining a new airflow path.  
17 It's just kind of a smaller obstruction within it.

18 Q Okay. And so according to your test, you have  
19 one factor kind of that doesn't -- how do I -- how do I  
20 ask this? Withdrawn.

21 According to the two-prong test that you just  
22 laid out, this fails one side -- one prong of the test  
23 because it doesn't need to be there. The other prong is  
24 how much does it divert the air.

25 So is one of those prongs more important than

1 the other?

2 A Yes.

3 Q Okay.

4 A The size one is really the dominant --

5 Q Okay.

6 A -- thing you should be looking at.

7 Q Right. And that view doesn't come from  
8 anything the judge said in this case; is that right?

9 A My view is primarily from a person of ordinary  
10 skill in the art, but I did read the judge's order, and I  
11 agree with it, in that small obstacles, obstacles about  
12 the size of the heating element, should not be defining a  
13 new airflow passageway. They should just be considered  
14 as obstacles within it.

15 So that is the dominant criteria I'm looking  
16 at.

17 Q So are you aware of anywhere the judge said  
18 that small obstacles the size of the heating element are  
19 okay because they don't divert the airflow very much?

20 A I'm not sure of the second part of that, but I  
21 think he basically did say small obstacles should --  
22 should not be, you know, redefining the airflow  
23 passageway.

24 Q So I want to compare a -- a statement in your  
25 report to the statement that I think you were drawing

1 from, and so if you go to paragraph 100 of your  
2 declaration.

3 MR. ANSLEY: Did you say 100?

4 MR. DOKHANCHY: Yes.

5 THE WITNESS: Okay.

6 Q BY MR. DOKHANCHY: You say here that, "It is my  
7 opinion that the preliminary construction should be  
8 clarified to encompass obstacles within the airflow  
9 passageway that do not alter the direction of the airflow  
10 any more than the heating elements."

11 Do you see that?

12 A Yes, I do.

13 Q And is that the statement that you think  
14 mirrors what the judge said about obstacle size?

15 A Yes.

16 Q Okay. So if you look at page 16 of Exhibit  
17 1015, we saw at some length -- and there's more that we  
18 can read -- that the judge's primary concern was  
19 differentiating the passageway from the airflow  
20 direction.

21 A Okay, I'm missing -- I'm in the wrong document.  
22 Page 16 of the judge's? Okay, sorry, 16 of the judge's  
23 order on summary judgment?

24 Q Yes.

25 A Okay. I'm there.

1           Q    We discussed earlier that his rationale, as we  
2    read, was his view of the defense that RJR raised, which  
3    was that these obstacles define the passageway, was  
4    incorrect because they only divert the airflow;  
5    therefore, they don't define the passageway.

6                   Do you recall --

7           A    Yeah. It's approximately what he said, yes.

8           Q    And there's a -- there's a difference between  
9    what he said here and what you wrote that I want to ask  
10   you about.

11                   You wrote, "Obstacles that do not alter the  
12   direction of the airflow any more than the heating  
13   element are okay." And he wrote, "In addition to a  
14   heating element, the Ciro has a positive pin and a  
15   silicon base that similarly obstruct airflow. But these  
16   obstructions do not alter the direction of the airflow  
17   passageway any more than the heating element." You  
18   wrote, "It's in the scope of the claims if it doesn't  
19   obstruct the airflow any more than the heating element."

20                   And do you see the difference?

21           A    Yes, I do see the difference, yeah.

22           Q    So where are you getting the notion that it's  
23   about how much the airflow gets diverted, when his point  
24   was that it's fine to obstruct airflow as long as you  
25   don't alter the direction of the passageway?

1           A    Again, I'm -- I'm not claiming that I restated  
2   the judge's opinion. I took it into account, and I think  
3   there's an element there that's correct. But he's not a  
4   person of ordinary skill in the art, so I'm adding to  
5   that my understanding, and my understanding is what I've  
6   expressed in there, where I think that -- I'm going  
7   basically beyond what he did a little bit.

8           Q    Okay.

9           A    And I'm envisioning more options than I think  
10   he envisioned.

11          Q    Okay.

12          A    And so I'm saying what he said was fine, but I  
13   think we should clarify that. And if you have these  
14   obstacles, and they are so large that they are really  
15   defining a new airflow passageway, then I think that's  
16   how we should treat it.

17          Q    Okay. The -- and again, you don't view any  
18   limit on the size of a heating element or a wick that  
19   would cause -- let me ask a better question. That was  
20   terrible.

21                In your view, there's no wick or heating  
22   element large enough to define the passageway such that  
23   it is noncentral and nonaxial simply due to the size of  
24   the heating element and the wick?

25          A    I'm not sure I did a full investigation of that

1 issue. I think that what one would commonly expect in  
2 terms of the size and structure of the heating element  
3 wick, that would be true. Whether you could invent some  
4 really weird-shaped and large wick and heating element  
5 combination to try to get around this patent, I'd have to  
6 see that.

7 Q Well, let's say that you got a heating element  
8 and wick the size of the liquid storage medium 12 in the  
9 Xia reference. Does that cause the airflow passageway  
10 not to be central and axial?

11 A I mean, I think at that scale, I'd probably say  
12 it is redefining the passageway. That's just a really  
13 huge obstacle. I just can't also see how that's  
14 functioning in a product. I think you would push that  
15 heating element wick to such a large extreme that you  
16 wouldn't have a functioning project -- product anymore.  
17 Basically, you would get really hot liquid coming out of  
18 the person's mouth if you were heating it over that long  
19 range and so close to the mouth.

20 Q Well, to be clear, I wasn't saying it's located  
21 where the liquid storage medium is. I'm saying it's the  
22 size of it. And further, to clarify, I just mean the  
23 width, the amount that it diverts the airflow --

24 A Okay.

25 Q -- which is your key consideration.

1           A    Yeah, I think if it gets that large, I would --  
2   I would -- I'd have to say it's actually defining the  
3   airflow passageway.

4                    I mean, this actually reminds me of Wang. So  
5   if we get to the point of Wang, yeah, I think that that  
6   heater and the fiber in Wang is in fact redefining the  
7   passageway to go around the outer edges of it.

8           Q    And so if the wick spans the passageway, and  
9   the coil is some substantial portion akin to the liquid  
10  storage medium 12 in terms of how much it diverts the  
11  airflow, that would be outside of the scope of the  
12  claims?

13          A    As I understand your question, I would say yes.

14          Q    Okay. And that's even though it's performing  
15  the function that it needs to perform in the claims by  
16  being in the middle of the airflow passageway?

17               MR. ANSLEY: Objection. Vague.

18               THE WITNESS: Yeah, I mean, one of the  
19  requirements is the heating element has to be at least  
20  partially in the airflow passageway, and I think it is  
21  meeting that function, but you're describing to me, just,  
22  I think, something very different than was envisioned by  
23  the '864 patentors and the claims constructed, and I  
24  think you are actually describing almost Wang to me,  
25  because Wang is -- it is this big structure where the

1 storage, the liquid storage is the entire segment, and  
2 there is one heating element in the middle.

3 Now, I know you are suggesting that maybe it's  
4 around the outside, but what you are describing to me is  
5 something that's fundamentally creating a new passageway.  
6 It's not like a minor interruption --

7 Q BY MR. DOKHANCHY: Okay.

8 A -- of the flow.

9 Q And so you don't view it as relevant that it's  
10 sitting in the middle as opposed to being on the side,  
11 for example, of the passageway?

12 A I think sitting in the middle is important  
13 because it's -- it's blocking the middle. You know,  
14 you're impeding the ability of this to be central.

15 Q Got it.

16 So if you had an obstacle that was totally on  
17 the side, say it's not symmetrical, there's just an  
18 obstacle on the side of a cylindrical passageway, does  
19 that make the passageway noncentral and axial even though  
20 the air could still flow down the middle?

21 MR. ANSLEY: Objection. Vague.

22 THE WITNESS: I think I understand what you are  
23 saying. You are suggesting that if I'm looking at the  
24 cross section, it's not symmetrical. There's just an  
25 obstacle on one side?

1 Q BY MR. DOKHANCHY: Yeah.

2 A I think if that obstacle was big enough where  
3 it extended out to the center, and so the air couldn't  
4 really flow in the center anymore, I would say that is  
5 not practicing the claims. You essentially have a  
6 noncentral passageway.

7 Q What if the air did still flow down the center,  
8 the obstacle wasn't big enough to reach the center of the  
9 passageway?

10 A I think it's probably the critical question. I  
11 think if the airflow is still going down the center, you  
12 are probably practicing this.

13 Q Okay. Can you go to paragraph 189 of your  
14 report, please -- declaration, I mean.

15 A Okay.

16 Q If you go to page 111, you are drawing red  
17 arrows and blue arrows for what you're saying is the  
18 airflow in Xia; is that right?

19 A Yes, that's correct.

20 Q What is it that causes -- if you are going left  
21 to right, what is it that causes that first divergence  
22 away from the center of the airflow?

23 A What causes the first divergence is the -- is  
24 there's a wall there. You can kind of see the wall in a  
25 light color, but you can also see the dark wall of the

1 liquid guiding mechanism.

2 So given those are walls, the air can't flow  
3 through there, and it can't go into the liquid storage,  
4 which is that big white area. So the air has no choice  
5 but to go either left or right and go along the outside  
6 edge of this device.

7 Q Okay. Go up to paragraph 127, and it is on  
8 page 68.

9 A Okay.

10 Q And you say -- so you're addressing  
11 Dr. Sturges's propose -- proposed modifications to Xia;  
12 is that right?

13 A Yes.

14 Q And you say, "Therefore, any modifications --  
15 modifications that remove the vibrating diaphragm 7 or  
16 move it out of the airflow path would render Xia  
17 inoperable because the heater would not turn on," right?

18 A Yes.

19 Q So why couldn't you, as Dr. Sturges proposes,  
20 use a traditional suction detection diaphragm?

21 MR. ANSLEY: Objection. Lacks foundation.

22 THE WITNESS: Well, I think that is a suction  
23 detection diaphragm in some sense. It's --

24 Q BY MR. DOKHANCHY: It's a vibration detection  
25 diaphragm.

1 A Yeah, which is vibrating because of suction.

2 Q Yeah.

3 A So that is -- I don't quite understand your  
4 question because that's what it is.

5 Q Well, let's talk about the kind of more  
6 traditional one where there's a diaphragm, and when the  
7 user sucks on one end, it's -- the diaphragm senses the  
8 air pressure as in, for example, the Wang reference.

9 Do you -- do you understand what I am saying?

10 A Okay. I mean, so yeah, there are other kinds  
11 of pressure sensors, and one could be a flexible  
12 diaphragm that has some kind of resistive element in it,  
13 and as you drop the pressure on one side, it flexes  
14 out --

15 Q Right.

16 A -- and it detects the change in the resistance  
17 and it's flexed out, yeah.

18 Q Right. So I just want to ask about this -- the  
19 statement, because you said, "Any modification that  
20 removes the vibrating diaphragm or moves it out of the  
21 airflow path would render Xia inoperable."

22 You don't disagree that there are some  
23 modifications removing the diaphragm 7, which are those  
24 flaps, that would still make Xia operable, right?

25 A I guess what I'm -- I'm trying to understand

1 your question, but I'm again referring to here is the  
2 proposes -- the proposals by Dr. Sturges, and he says  
3 that we can remove these. But this is a vibrating  
4 diaphragm, and the patent Xia tells us that it uses a  
5 vibrating signal to find out -- to determine whether or  
6 not there is suction going on.

7 So this whole system, the whole integrated  
8 circuit and the algorithm on there, is looking for a  
9 certain kind of vibration signature.

10 Q Uh-huh.

11 A And it can't just be anything. It can't be  
12 like if I dropped it, if you just drop the device, that  
13 thing would vibrate.

14 Q Right.

15 A And so the algorithm knows, I'm not gonna --  
16 I'm not gonna trigger just because you set me down. So  
17 they have trained or figured out what this vibration  
18 signal looks like when somebody inhales, and that's how  
19 the whole system is set up. It uses that, and it also  
20 uses a microphone. So if it no longer has that signal,  
21 it's not gonna work.

22 Q It's not gonna work if you don't replace it  
23 with anything?

24 A That's true. It's not gonna work if you don't  
25 replace it, but even if you try to replace it with

1 something, that something has to be giving you  
2 essentially the same kind of vibrating signal. And so  
3 that's why your popping-out diaphragm generally wouldn't  
4 work because it just pops out, and it's a constant change  
5 in resistance rather than a vibration, and so you  
6 couldn't just put that kind of sensor in there. The  
7 algorithm would -- would say, I don't -- I don't know  
8 what that is. That doesn't look like inhalation to me.

9 Q Where are you getting the notion that Xia  
10 describes an algorithm that determines certain kinds of  
11 vibrations?

12 A That's in the -- that's -- the circuit diagram  
13 for that is actually in figure 6, and it actually says in  
14 the text -- and I'm not gonna be able to quote it  
15 exactly -- but it says that those signals are converted  
16 to a vibrating signal. And those two signals, the  
17 microphone and the vibrating diaphragm signal, are used  
18 to turn on the heater.

19 Q Right. The vibrating diaphragms flap. That  
20 vibration is sensed by the microphone. It sends an  
21 electrical signal that turns on the heater, right?

22 A Yeah, those two signals, while being related,  
23 would be different, and a person of ordinary skill in the  
24 art would know that you could use those two different  
25 signals to differentiate purposeful inhalation from, say,

1 dropping it or, say, flying in an airplane where the  
2 pressure would change but it wouldn't change in the same  
3 way.

4 That's why these two signals are really  
5 important, is they're two different kind of signals, and  
6 using that information in that circuit diagram, it can  
7 determine whether or not that's a purposeful inhalation  
8 or just some other kind of vibration or pressure  
9 differential.

10 Q Right. But a person of skill in the art would  
11 know how to replace that vibrating diaphragm and  
12 signaling mechanism with a -- I'll call it simpler  
13 suction detection mechanism. That would be within the  
14 skill set of a person with skill in the art, wouldn't you  
15 say?

16 A Yeah, I'm not totally comfortable with the  
17 simpler thing that you said, but a different one. I  
18 would agree that a person of ordinary skill in the art  
19 would have the ability to conduct an investigation, maybe  
20 a very challenging investigation, something like a  
21 master's thesis investigation about how to find a new  
22 kind of sensor, put it in a new place, look at a new kind  
23 of signal, combine that with the microphone that's  
24 already there, and come up with a new algorithm. But  
25 that wouldn't be straightforward.

1           That would be, in my opinion, an undue burden  
2 or undue experimentation to get that new version to work.  
3 Additionally, quite frankly, Dr. Sturges just didn't give  
4 me a hint about how I should do that.

5           Q   Well, what's so complicated about it? In the  
6 Wang device, it has a sensor on the battery side that  
7 senses suction, and then it turns on the heater. Why  
8 can't it be that simple?

9           A   Well, it's not Wang, so it's -- it's got a very  
10 different operating principle.

11          Q   Okay.

12          A   And I am not sure of all the different ways  
13 that you could change it. Again, I'm responding to what  
14 Dr. Sturges said, but what he said is not a simple  
15 change, and I think that it would require undue  
16 experimentation. I just don't know why you would do it  
17 because it already functions in this way.

18               And again, given no explanation about how I  
19 would do this, sitting here, I don't exactly know how I  
20 would do it. I think I would do a pretty thorough  
21 investigation to try to redesign this with new kinds of  
22 sensors in new locations.

23          Q   You agree it would be a simplifying change to  
24 not have the vibrating flaps and instead just directly  
25 sense suction, don't you think?

1           A    I don't understand that, because that is  
2 directly sensing suction.

3           Q    No, it's indirectly sensing suction. Suction  
4 causes the flaps to vibrate. That's not --

5           A    That's right.

6           Q    That's not sensing suction. That's sensing  
7 something caused by suction. So what I'm talking about  
8 is you suck, and the air pressure propagates to a  
9 diaphragm. That's directly sensing suction.

10                  In Xia, suction causes the flaps to vibrate,  
11 and the vibration is -- is detected. It's an  
12 intermediate step.

13                  Do you see what I am saying?

14           A    No, I don't, because they are actually  
15 essentially the same phenomenon, where a low pressure on  
16 one side of a membrane causes that membrane to move.

17           Q    Uh-huh.

18           A    And I think you're envisioning a case where it  
19 just moves one time over and just pops out due to low  
20 pressure, and so the signal coming off of the resistance  
21 in there would just be something like a ramp or a step  
22 change from one value to another, and so in some sense  
23 that's easier. But if I have these flaps that are going  
24 back and forth, I'm seeing the same kind of signal, a  
25 change in resistance, but it's going up and down and up

1 and down and up and down, so it actually has the same  
2 information. And the fact that it went up, that means  
3 that I have less pressure. But the frequencies at which  
4 it would flap actually gives me additional information  
5 about like how much suction.

6 So that actually gives me more information, and  
7 because of that more information, it might actually be  
8 easier for me to detect purposeful suction, and like I  
9 said, an accidental or incidental change in the suction.

10 So I don't view it as simpler. In fact, when I  
11 have sensors, I think a sensor that gives me more  
12 information is sometimes easier to use than a sensor that  
13 gives me less information.

14 Q Yeah, I'm not asking about what's easier to  
15 use. You're injecting these notions of need to detect  
16 accidental versus real.

17 For example, Wang doesn't talk about any of  
18 that, right? Wang has a simple suction detect --  
19 detection diaphragm that when a user sucks on the device,  
20 it detects that and sends an electrical signal to the --  
21 to the heating element, right?

22 A I thought we were talking about Xia.

23 Q I am talking about a change that you could make  
24 to Xia, to use a simpler device as in Wang.

25 A Okay.

1           Q    So my point is, if you were to dispense with  
2   the flaps and dispense with the complicated algorithm,  
3   you could instead simply have a diaphragm that detects  
4   suction and turns on the heater when that happens,  
5   couldn't you?

6           A    Yeah, I think you could do that, and you would  
7   probably have a lot of false positives. It would  
8   probably turn on when you didn't want it to or it might  
9   require an inordinate amount of suction, right? It's  
10   a -- it doesn't perform as well detecting suction.

11                  Whenever you have two sensors working together  
12   to detect a phenomenon, you're certain to get a better  
13   performance than if you just had one sensor. This is  
14   called redundancy, and we just know that's a really good  
15   idea.

16           Q    Have you ever seen a real-life product in the  
17   e-cigarette space that uses the flaps as in Xia to create  
18   vibration from suction and then detect that?

19           A    I can't recall examining a real -- like a  
20   commercial product that does that. I don't -- I don't  
21   recall doing that.

22           Q    Okay. So no company or product that you are  
23   aware of has adopted the Xia style suction detection  
24   mechanism, correct?

25           A    Not that exact structure, but there's been a

1 lot of work that's gone into properly detecting suction.  
2 It's a very important phenomenon, and that is Xia's  
3 solution to it.

4 Q But nothing with the flaps that are numbered 7  
5 or anything like that in any of the products that you've  
6 seen on the -- in the market in the e-cigarette space; is  
7 that fair?

8 A I mean, I've seen a lot -- so I'm going through  
9 my mind and thinking of all the different kinds of  
10 pressure sensors. It's a pressure sensor. I just can't  
11 remember one that's exactly an annular flap like that,  
12 but there are certainly related sensors which are trying  
13 to do the same thing, which is detect these pressures and  
14 distinguish them from accidental or purposeful fluid  
15 flows.

16 Q Okay. So in that vein, is -- withdrawn.  
17 Can manufacturing and selling more inexpensive  
18 products be advantageous to a retailer or a manufacturer?

19 A Yes, under certain conditions, certainly.

20 Q And could a manufacturer decide to use a  
21 simpler design even if there are certain drawbacks to its  
22 functionality?

23 A Yes.

24 Q And could a manufacturer decide to use a  
25 cheaper design, a design that's cheaper to manufacture,

1 even if it performs worse?

2 A Yes. That sounds like you are describing  
3 Microsoft.

4 MR. ANSLEY: Shots fired.

5 MR. DOKHANCHY: Yeah, wow.

6 Q BY MR. DOKHANCHY: And do customers sometimes  
7 prefer cheaper products even if they provide a worse user  
8 experience?

9 MR. ANSLEY: Objection. It calls for  
10 speculation.

11 THE WITNESS: I'm not sure they would prefer  
12 it, but they would definitely buy it. You know, they  
13 have to balance that trade-off to where -- their money  
14 versus what they're getting out of it.

15 So I don't know if they prefer it in terms --  
16 they don't prefer the performance because you just  
17 defined it's worse, but they prefer making that choice  
18 with their money.

19 Q BY MR. DOKHANCHY: Yeah, I guess I'm thinking  
20 of voting with your wallet.

21 A That's right.

22 Q I guess I'll ask it a little more clearly then.  
23 Do customers sometimes opt to purchase cheaper, worse  
24 performing products?

25 MR. ANSLEY: The same objection.

1 THE WITNESS: Yes, I think they do.

2 Q BY MR. DOKHANCHY: And are you aware of the  
3 proliferation of cheap, disposable e-cigarettes in the  
4 marketplace today?

5 A I'm generally aware that there's that option.

6 Q Do you have a view whether they perform equally  
7 well to the more flagship products from NJOY and JUUL?

8 A I haven't performed that kind of analysis.

9 Q Okay. Are you aware that several of those --  
10 withdrawn.

11 Are you aware that it's generally seen as a  
12 problem in those devices that they may leak or liquid may  
13 get into a user's mouth?

14 A I don't -- I don't know the specific problems  
15 associated with those, like, discount versions.

16 Q Okay. Some of the dependent claims recite a  
17 larger second aperture than the first aperture.

18 Do you recall that?

19 A Yes.

20 Q If you were to start with an e-cigarette with  
21 apertures of the same size, first aperture and second  
22 aperture of the same size, and you have a given airflow  
23 rate for a given suction force, if you then increase the  
24 size of the second aperture, you'll get greater airflow  
25 through the passageway; is that right?

1           A    Given all other things stay the same, yeah, you  
2   are essentially decreasing the flow resistance by opening  
3   up the aperture size.

4           Q    And a person of skill in the art at the time  
5   would know that as a matter of fluid dynamics?

6           A    Yes.

7           Q    Why is it not an obvious change to -- or is it  
8   an obvious change to a cartridge that has same size  
9   apertures, to increase a second aperture to get better  
10   airflow?

11          A    I mean, I think you -- the thing is, is that  
12   you would get the same effect, that is, a decrease in  
13   resistance if you opened up the first aperture larger,  
14   right, or you could open up the internal passageway a  
15   little bit. So there's literally an infinite number of  
16   ways to decrease the flow resistance.

17                So a person of ordinary skill in the art would  
18   have to search through all those and try to figure out  
19   what the best or the optimal for them to do. So I don't  
20   think it's obvious. I think you'd have to do some tests  
21   to see, given the structure I have, and I do want to  
22   decrease the resistance, what's the best way to do this?

23                One drawback with making the second or the  
24   output aperture larger is that you are going to get more  
25   contamination coming in through the mouthpiece. So

1 there's just a bunch of engineering trade-offs there, and  
2 it doesn't jump out to me as there's one thing that's  
3 obvious to do.

4 Q Certainly one of the first things you would  
5 think of is, if you want less resistance is, bigger  
6 apertures and/or bigger passageways, wouldn't you say?

7 A Yeah, but I wouldn't choose the output aperture  
8 to be larger because I would be concerned with  
9 contamination.

10 Q Okay.

11 A If in fact I made my prototype and it had too  
12 much draw resistance and I'm like, I want to make this a  
13 little easier, which isn't always the case; sometimes you  
14 actually wanna make it harder to draw.

15 Q Right.

16 A I would first say, well, let me keep the output  
17 aperture the same size and let me go inside and change  
18 the internal pathways a little bit more, so I keep that  
19 protection against debris coming in through the breathing  
20 hole.

21 Q But if the apertures are the same size, don't  
22 you have a sort of pinch point problem where if the  
23 middle is bigger, you are not gonna be getting much  
24 better airflow, are you?

25 A Having looked at the internals of these

1 devices, I think that often the pinch points are inside.  
2 Pinch points being the parts that contribute most to the  
3 draw resistance, going around corners --

4 Q Right.

5 A -- and going through fibers and around heating  
6 elements. That's actually what is probably creating a  
7 larger draw resistance than just the input and output  
8 apertures.

9 Q That wouldn't be true, though, if you have a  
10 central and axial airflow passageway, right?

11 A I think it would be -- I think the percentage  
12 of the resistance in that sign might come more from the  
13 first and second apertures.

14 Q Okay. Let's take a ten-minute break.

15 THE VIDEOGRAPHER: The time is 2:33 p.m. We're  
16 off the record.

17 (The deposition was at recess from 2:33 p.m. to  
18 2:46 p.m.)

19 THE VIDEOGRAPHER: The time is 2:46 p.m. We're  
20 back on the record.

21 MR. DOKHANCHY: All right. I pass the witness  
22 for any redirect.

23 >>>

24 >>>

25 >>>

EXAMINATION

BY MR. ANSLEY:

Q Dr. Singhose, I have a few questions. Just bear with me while I get a little organized here.

Okay. So Dr. Singhose, thank you for your time today so far.

Have you -- do you recall being asked questions about JUUL Exhibit 1004, which is the Xia reference?

A Yes, I do.

Q Okay. And do you recall being asked questions about your views on why the housing for the atomizer is different from the housing for the liquid storage in Xia's device?

A Yes, I do.

Q I want to ask you a few questions and try to understand and clarify your view on that.

Do you also recall testifying that the claims require a cartridge that has a housing? And if you'd like to look at the '864 patent, please feel free to do so.

A Yes, the cartridge does comprise a housing.

Q Okay. And so the claims require a cartridge that has a housing; is that correct?

MR. DOKHANCHY: Objection. Leading.

THE WITNESS: Yes. I mean, the preamble says,

1 a cartridge configured, blah, blah, blah, the cartridge  
2 comprising a housing.

3 Q BY MR. ANSLEY: Okay. All right. So in your  
4 opinion, in going back to Xia and focusing your attention  
5 to Xia's generator, how many cartridges are there in  
6 Xia's generator?

7 A Well, it has two cartridges.

8 Q Okay.

9 A A cartridge for the heater element, the heater  
10 portion, and another cartridge for the e-liquid solution.

11 Q And does the cartridge for the heater portion  
12 have a housing that is required -- or a housing?

13 Let me just stop there. Let me reask that.

14 Does the cartridge for the heater portion have  
15 a housing?

16 A Yes, it does.

17 Q And what is that housing?

18 A That housing -- what is shown in figure 4 is  
19 dark lines, and I believe in the text it's described as  
20 a -- as a metallic, like a cylinder or a metallic housing  
21 that goes around that.

22 Q And can I direct your attention to paragraph  
23 112 of your report. It's on page 57. There's a figure  
24 there, and could you please explain what you are  
25 identifying in that figure?

1           A    The figure there is -- well, it's the figure  
2   from this patent kind of exploded and broken into three  
3   parts. And on the left side is the power source part  
4   that has the matter in it, and then the middle part is  
5   the atomizer cartridge, and I've labeled it reusable  
6   atomizer. I relabeled it reusable because it does need  
7   to be changed -- or it doesn't need to be changed very  
8   often, compared to the right side, which is the liquid  
9   storage cartridge. That's the part that has to be  
10  changed every time the e-liquid is depleted.

11          Q    Okay. And looking at -- focusing your  
12  attention on the reusable atomizer -- and you can also  
13  look at Xia. I want to ask about component label 8,  
14  which is the liquid blocking plate.

15          A    Yes.

16          Q    Okay. Now, is component 8, the liquid blocking  
17  plate, as you have depicted on page 57 of your report, is  
18  that the leftmost structure in which you've identified is  
19  the reusable atomizer cartridge?

20          A    No, it's not.

21          Q    What is the leftmost structure?

22          A    The leftmost structure is the connector with  
23  the screw threads on it.

24          Q    Okay. And is component 8, is that the first  
25  end of the reusable atomizer that you've identified on

1 page 57 of your report?

2 A No, it's not.

3 Q Okay. And so I may have asked this, but the  
4 reusable atomizer housing, what is -- I'm sorry, the  
5 reusable atomizer cartridge, with respect to that, what  
6 is the housing of that component?

7 A Well, the housing would be the outer structure  
8 that contains the internal components that's shown there.

9 Q In looking at the second cartridge you have  
10 identified, the liquid storage cartridge, does it have  
11 its own housing?

12 A Yes, it does.

13 Q And so how does -- is there -- let me ask it  
14 this way. Is there -- actually, no, I don't need to ask  
15 that.

16 Do you recall also discussing today how Fang  
17 can reduce the likelihood of burnt taste?

18 A Yes, I do.

19 Q Okay. And if you could turn to Fang, which is  
20 Exhibit 1006, I'd like to direct your attention to figure  
21 1.

22 A Okay.

23 Q And do you recall discussing the heating  
24 element that is presented there in Fang in connection  
25 with your opinions on how Fang can reduce burnt taste?

1 A Yes.

2 Q Okay. Is Fang's heating element located in the  
3 cartridge portion of Fang's device? And if you need to  
4 refer to your report, please do.

5 A No, that's in the -- that's in the -- sort of  
6 the bottom part with the battery and everything else, so  
7 that the -- the cartridge part is the part above that  
8 that has the e-liquid in it.

9 Q And according to the claimed inventions of the  
10 '864 and '881 patents, where is the transverse heating  
11 element located, in the cartridge or another portion of  
12 the e-cigarette?

13 A Well, for the '864 claims, that transverse  
14 heating element needs to be in the cartridge, not down in  
15 the other body part of the device.

16 Q And looking at Fang again, do you see -- well,  
17 actually -- I'll stop there.

18 So I will pass the witness.

19

20 FURTHER EXAMINATION

21 BY MR. DOKHANCHY:

22 Q We can stay on paragraph 112. The thing that  
23 you've labeled Reusable Atomizer, that figure, that  
24 doesn't exist like that in -- in the Xia reference,  
25 right?

1 MR. ANSLEY: Objection. Vague.

2 THE WITNESS: Well, it does exist, but it  
3 doesn't -- I've pulled it apart to make it clear. You're  
4 right, that's part of the other figure.

5 Q BY MR. DOKHANCHY: Yeah, what I'm saying is,  
6 the thing that you've depicted in the red-dashed box  
7 that's labeled, according to you, Reusable Atomizer, that  
8 figure does not appear like that in any of the figures of  
9 Xia, right?

10 A Well, I -- I think it does appear in figure 1  
11 or 2, but I pulled it out. I've pulled it apart there.

12 Q Yeah, you manipulated the image to separate two  
13 things that are shown as one unit in figure 2, and that's  
14 the generator, right?

15 MR. ANSLEY: Object. Object to vague.

16 THE WITNESS: That's right. I took -- I think  
17 it actually was figure 2. You could do it from figure 1,  
18 but I think I used figure 2, and I did pull the generator  
19 apart to make the two components more obvious.

20 Q BY MR. DOKHANCHY: Okay. There's nowhere in  
21 Xia that says there's a reusable atomizer portion and a  
22 liquid storage portion, correct?

23 A I don't remember that exact terminology. I  
24 don't think it describes it in that way.

25 Q Okay. Xia never says the atomizer is reusable,

1 correct?

2 A Again, I don't remember it using those exact  
3 words.

4 Q How about any similar words to convey the same  
5 concept?

6 A Well, I think the specification as a whole,  
7 when you read it, you realize that the liquid storage  
8 cartridge is pulled on and off and replaced. And I think  
9 one understands that the atomizer stays there and is not  
10 replaced every time.

11 Q Where does Xia say that?

12 A Well, I'm not sure it -- again, I'm not sure it  
13 says that. That's why I said when you read the  
14 specification, you look at the figures. For example,  
15 figure 5 is clearly teaching that that part can just be  
16 pulled off and replaced, and you would push it back into  
17 place.

18 Q By the same logic, figure 4 shows that that  
19 part can be pulled off from figure 3. So why are you  
20 combining part of figure 3 and part of figure 4 and not  
21 including figure 5?

22 A Well, I think understanding how this operates,  
23 you would understand -- well, if you understand how these  
24 vaporizers work, you understand that the liquid is used  
25 up faster than the functionality of the -- the heater.

1 So you would know that you make a product, you would need  
2 to pop off and push back on the liquid storage, but you  
3 wouldn't need to replace the heater that often. You  
4 could because it's screwed on, right. It does show like  
5 a more permanent connection on that side, which is you  
6 are screwing it on and you're -- that indicates that you  
7 are keeping it on it for longer. And the other cartridge  
8 is simply like a snap foot -- a snap fit or a press fit  
9 connection.

10 Q So why isn't that the case in modern  
11 cartomizers, that the heating element doesn't go bad  
12 before the liquid runs out, right?

13 A I think when you throw away these cartridges,  
14 like the JUUL cartridge, you probably could have used the  
15 heater for quite a bit longer, but they've made a very  
16 cheap, inexpensive heating element in there, and they've  
17 made the calculations, and they may be able to make it  
18 cheap enough so it's economical to throw it away every  
19 time, but I'm pretty sure you could use that longer.

20 Q What indication do you have in Xia that the  
21 coil is more expensive than the JUUL heating element?

22 A Well, the structure that goes along with it is  
23 essentially more complicated. There's the mechanism that  
24 transfers the liquid, the liquid transfer mechanism, and  
25 then you have the secondary liquid transfer mechanism,

1 and you've got the liquid blocking wall. You've got a  
2 very different structure that's trying to be set up to  
3 emit these droplets into the airflow. That's a more  
4 complicated and difficult thing to achieve than the other  
5 route that we were just talking about.

6 Q I believe you testified to this before, but  
7 that -- that liquid storage chamber 12, that's open on  
8 the left end, right?

9 A Yeah. When you first get these cartridges,  
10 it's open so you can slide it on or snap it on to the --  
11 the atomizer cartridge that's already there attached with  
12 the screw connector.

13 Q Okay. And -- and no part of Xia says, keep the  
14 atomizer, take off that cartridge and replace it, the  
15 cartridge that you've labeled the liquid storage  
16 cartridge, right?

17 A Yeah, I don't think it says that in words. I  
18 think it explains that to me in that structure. Again,  
19 the fact that we screw on the one, which is like a much  
20 more permanent connection and -- that the cartridge for  
21 the heating element, just to make it clear, you screw  
22 that on, and the other one you just slide on and off.  
23 That tells a person of ordinary skill in the art, oh,  
24 this one is replaced more frequently and more easily than  
25 the one that I have to screw on.

1           Q    The only attachment and detachment Xia ever  
2 describes a user doing is that connector A5 can be  
3 connected by the user to the other connection on the  
4 power source B6, correct?

5           A    That I don't know. But if you say that's the  
6 only textual description, I would agree with -- I would  
7 -- I would say that sounds reasonable, that's the only  
8 textual description of it.

9           Q    And so the only description of two components  
10 being attached or detached are, as seen in figure 2, Xia  
11 says that a user can connect the generator to the  
12 controller by screwing it and likewise replace the  
13 generator by unscrewing it, correct?

14          A    That I don't know, but that could very well be  
15 the only textual description of it. But if you're  
16 looking at this and you see figure 5, and you see the  
17 shape of that cartridge and how you have a flat end, and  
18 you see it in figure 2, you can see that it's been  
19 pressed in, and that flat edge has been deformed so that  
20 the -- the liquid carrying material 12 is abutting number  
21 11, so it can be transferred on. You know that's being  
22 attached on and pulled off, by looking at those figures.  
23 You understand how it works.

24          Q    And who's to say that's not attached on by the  
25 manufacturer as opposed to the user?

1           A    I don't know. I mean, it just seems kind of  
2 weird that you would make this structure so it could be  
3 pulled on and off real easy like that and then the user  
4 couldn't pull it off. I think the user would pull it  
5 off. There's -- if you look at the structure, like  
6 figure 2, there's nothing like locking in with a screw.  
7 There's no snap fit connectors. That's the  
8 representation that we would expect to have a cartridge  
9 slide on and slide off.

10           And, you know, quite frankly, I've just seen  
11 products like this, and this is how they work; you slide  
12 them on and slide them off.

13           Q    So in order to be secure, doesn't that  
14 polypropylene shell in figure 5 need to be affixed in  
15 some way?

16           A    Yeah, it's press fit on there. I mean, the  
17 user pushes it on with a certain amount of force, and  
18 that pushing-on force is larger than the force that you  
19 would just apply sucking on it normally.

20           Q    You don't see any snap fits or anything on the  
21 polypropylene shell in figure 5, do you?

22           A    That's correct. That's why it's -- that's why  
23 it's a slide, a friction fit is what we'd call that.

24           Q    Okay. Does the Xia reference say that the  
25 connector in figure 3 is connected to the left end of

1 figure 4 before figure 5's polypropylene shell is fitted  
2 over figure 4 in the manufacturing process?

3 A I don't think it describes the manufacturing  
4 process, that I recall.

5 MR. DOKHANCHY: Okay. No more questions,  
6 pending any more redirect.

7 MR. ANSLEY: No more questions.

8 MR. DOKHANCHY: Thank you, Dr. Singhose.

9 THE VIDEOGRAPHER: This concludes the video  
10 deposition of Dr. William Singhose. We are off the  
11 record at 3:03 p.m.

12 THE REPORTER: Does anybody need a rough?

13 MR. DOKHANCHY: I will take a rough.

14 MR. ANSLEY: I will take a rough.

15 MR. DOKHANCHY: And expedited Tuesday would be  
16 great.

17 THE REPORTER: Did you want expedited as well?

18 MR. ANSLEY: Yeah, I will take whatever he  
19 gets.

20 (The deposition concluded at 3:03 p.m.)  
21  
22  
23  
24  
25

CERTIFICATE OF REPORTER

STATE OF GEORGIA     )  
                                  )  
COUNTY OF DEKALB     )

I, Marcella Daughtry, a Certified Reporter in the State of Georgia and State of California, do hereby certify that the foregoing deposition was taken before me in the County of DeKalb, State of Georgia; that an oath or affirmation was duly administered to the witness, WILLIAM SINGHOSE, PH.D.; that the questions propounded to the witness and the answers of the witness thereto were taken down by me in shorthand and thereafter reduced to typewriting; that the transcript is a full, true and accurate record of the proceeding, all done to the best of my skill and ability;

The witness herein, WILLIAM SINGHOSE, PH.D., has requested signature.

I FURTHER CERTIFY that I am in no way related to any of the parties nor am I in any way interested in the outcome hereof.

IN WITNESS WHEREOF, I have set my hand in my office in the County of DeKalb, State of Georgia, this 29th day of October, 2024.



Marcella Daughtry, RPR, RMR  
GA License No. 6595-1471-3597-5424  
California CSR No. 14315

JUUL Labs v. NJOY, LLC  
J11752897

DECLARATION UNDER PENALTY OF PERJURY

I declare under penalty of perjury that I have read the entire transcript of my deposition taken in the above-captioned matter or the same has been read to me, and the same is true and accurate, save and except for changes and/or corrections, if any, as indicated by me on the DEPOSITION ERRATA SHEET hereof, with the understanding that I offer these changes as if still under oath.

Signed on the \_\_\_\_\_ day  
of \_\_\_\_\_ 20\_\_.

\_\_\_\_\_  
WILLIAM SINGHOSE, PH.D.

DEPOSITION ERRATA SHEET  
J11752897

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Signature:\_\_\_\_\_

WILLIAM SINGHOSE, PH.D.



800.211.DEPO (3376)  
EsquireSolutions.com

JUUL Ex.1035

Case No.: IPR2024-00161

Page 186 of 187

DEPOSITION ERRATA SHEET

J11752897

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Page No.\_\_\_\_Line No.\_\_\_\_Change to:\_\_\_\_\_

\_\_\_\_\_

Signature:\_\_\_\_\_

WILLIAM SINGHOSE, PH.D.



800.211.DEPO (3376)  
EsquireSolutions.com

JUUL Ex.1035  
Case No.: IPR2024-00161  
Page 187 of 187