

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Dental Recycling North America, Inc.,

Petitioner,

v.

Solmetex, LLC,

Patent Owner.

Case No. PGR2023-00055

U.S. Patent 11,660,175

PETITION FOR POST GRANT REVIEW

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Patent Trial and Appeal Board

U.S. Patent Trademark Office

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Alexandria, VA 22313-1450

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3.	12[d]: “wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system.”	60
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1.	18[b2]: “the container top portion further including at least one radially protruding structure located below the upper generally cylindrical region, the at least one radially protruding structure having a lower surface under which the at least one retaining pin of the dental amalgam separation system is received to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward relative to the periphery of the circular upper surface; and”	65
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3. 1[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,” 74
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2. 1[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and” 80
3. 1[d]: “a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is moved toward the container outlet port due to the vacuum source.” 82
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2.	12[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”	100

3. 12[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the upper surface than the container outlet port, the container inlet port and the container outlet port both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable dental-amalgam container and the dental amalgam separation system while the vacuum source acts upon the dental amalgam separation system to move fluid from the dental amalgam effluent toward the system outlet,” 100
4. 12[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure defining a pin-receiving region therebelow for receiving the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward from the periphery of the upper surface;” 104
5. 12[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and” 107

6. 12[d]: “wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system.” 109
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3.	18[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”	118
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2.	1[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”	130
3.	1[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”	132
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2. 1[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and” 135
3. 1[d]: “a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is moved toward the container outlet port due to the vacuum source.” 136
- B. 2: “The detachable dental-amalgam container of claim 1, wherein the container inlet port and the container outlet port extend above the circular upper surface by the same height.” 137
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- F. 8: “The detachable dental-amalgam container of claim 1, wherein the at least one radially protruding structure includes a flange extending in a direction away from the generally cylindrical upper region.” 140

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 - 2. 12[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;” 143

3. 12[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the upper surface than the container outlet port, the container inlet port and the container outlet port both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable dental-amalgam container and the dental amalgam separation system while the vacuum source acts upon the dental amalgam separation system to move fluid from the dental amalgam effluent toward the system outlet,” 143
4. 12[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure defining a pin-receiving region therebelow for receiving the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward from the periphery of the upper surface;” 145
5. 12[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and” 147

6. 12[d]: “wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system.” 148
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5.	18[c]: “wherein the container inlet port is configured to transfer the dental amalgam effluent that is received by the system inlet into the interior volume of the main body; and”	155
6.	18[d]: “wherein the container outlet port is configured to be coupled to the system outlet port such that fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting on the dental amalgam separation system.”	156
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2.	5: “The detachable dental-amalgam container of claim 4, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.”	162
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TABLE OF ABBREVIATIONS

Abbreviation	Full Name
DRNA or Petitioner	Petitioner Dental Recycling North America, Inc.
Cartridge 2	DRNA Generic Cartridge 2
Solmetex or Patent Owner	Patent Owner Solmetex, LLC
NXT System	Solmetex NXT Hg5 Amalgam Separator
NXT Container	Solmetex NXT Hg5 Collection Container

EXHIBIT LIST

Exhibit No.	Document
1001	U.S. Patent No. 11,660,175 (“the ’175 patent”)
1002	File History of the ’175 patent
1003	Declaration of Dr. Jason Janét
1004	Declaration of Darwin Moreira
1005	Photos of DRNA Generic Cartridge 2 and corresponding components
1006	DRNA Generic Cartridge 2 Installation Instructions
1007	Photos of Solmetex NXT Hg5 Collection Container and corresponding components
1008	Solmetex NXT Hg5 Collection Container Replacement & Recycle Procedure
1009	Solmetex NXT Hg5 Collection Container Shipping And Recycling Information
1010	CN 102989232A to Liu et al. (“Liu”) and Certified Translation Thereof
1011	CA 2 356 902 to Boyd et al. (“Boyd”)
1012	RESERVED
1013	<i>Solmetex, LLC v. Dental Recycling North America, Inc.</i> , No. 1:23-cv-602 (D. Del.), D.I. 1, Ex. B
1014	U.S. Patent Pub. No. 2021/0106412, which is the published application of App. No. 16/941,522
1015	Vermont Dental Amalgam Separator Pilot Project, Vermont Department of Environmental Conservation, August 2004

Exhibit No.	Document
1016	Amalsed Silver Powered by Apavia
1017	Tech West Eco-Star Amalgam Separator Retail Price Index
1018	https://solmetex.com/history/ (last visited September 19, 2023)
1019	https://solmetex.com/faqs-nxt/ (last visited September 19, 2023)
1020	<i>Solmetex, LLC v. Dental Recycling North America, Inc.</i> , No. 1:23-cv-602 (D. Del.), D.I. 11
1021	<i>Solmetex, LLC v. Dental Recycling North America, Inc.</i> , No. 1:23-cv-602 (D. Del.), D.I. 14
1022	<i>Solmetex, LLC v. Dental Recycling North America, Inc.</i> , No. 1:23-cv-602 (D. Del.), D.I. 15
1023	https://drna.com/products/Generic-Amalgam-Separator-Cartridges-c130499018 (last visited September 19, 2023)
1024	https://drna.com/contact/ (last visited September 19, 2023)
1025	https://solmetex.com/hg5-series-products/#hg5 (last visited September 19, 2023)
1026	https://solmetex.com/wp-content/uploads/2021/11/NXT-Hg5-Install-Ops-Manual-11.2021_FINAL.pdf (last visited September 19, 2023)
1027	https://www.youtube.com/watch?v=WFAFuBGZH1w (last visited September 19, 2023)
1028	https://solmetex.com/contact-us/ (last visited September 19, 2023)
1029	U.S. Patent No. 10,918,982
1030	U.S. Patent No. 8,007,669
1031	U.S. Patent No. 3,615,016

Exhibit No.	Document
1032	DE 37 37 002 C1
1033	CN 107,417,069 and machine translation
1034	<i>Personal Genomics Taiwan, Inc. v. Pacific Biosciences of California, Inc.</i> , No. 19-1810 (D. Del. Sep. 15, 2022)
1035	<i>WSOU Investments, LLC d/b/a Brazos Licensing & Development v. Netgear, Inc.</i> , 21-1117 (D. Del. Nov. 30, 2022)
1036	<i>Consumeron, LLC v. Maplebear Inc. d/b/a Instacart</i> , 21-1147 (D. Del. May 12, 2023)
1037	Federal Court Management Statistics – Comparison Within Circuit (Mar. 31, 2022), <i>available at</i> https://www.uscourts.gov/statistics/table/na/federal-court-management-statistics/2022/03/31-3 .

I. INTRODUCTION

Petitioner Dental Recycling North America, Inc. (“Petitioner”) respectfully petitions, under 35 U.S.C. § 321 and 37 C.F.R. § 42.21, for post grant review (“PGR”) of claims 1-22 (“the Challenged Claims”) of U.S. Patent No. 11,660,175 (“the ’175 patent”) (EX1001) on the grounds below.¹

The ’175 patent is not entitled to priority before its filing date on October 13, 2022 because Patent Owner added substantive new material to the figures and text of the specification in response to a §112 rejection by the examiner that the specification did not support a new limitation in the claims. That is dispositive of this petition because it renders the very products that Patent Owner alleges practice the limitations in the parallel district court case prior art. Even if the ’175 patent were entitled to claim an earlier priority date (it is not), most of the Challenged Claims are still invalid over a strikingly similar prior art reference.

Accordingly, Petitioner respectfully requests that the Board cancel the Challenged Claims.

II. GROUNDS FOR STANDING UNDER 37 C.F.R. § 42.104(a)

Petitioner certifies that the ’175 patent is available for PGR and that Petitioner is not barred or estopped from requesting PGR of the challenged claims

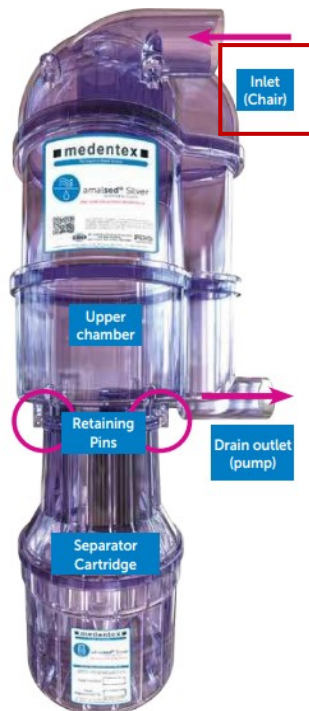
¹ Unless otherwise noted, all emphases and annotations have been added.

on the grounds in this petition. The '175 patent issued May 30, 2023, less than 9 months ago, and the earliest possible priority date on the face of the '175 patent is October 12, 2016.

III. THE '175 PATENT AND STATE OF THE ART

A. Technical Background

The '175 patent is generally in the field of waste management in dental offices. Dental offices require waste management disposal devices designed to filter out potentially toxic waste (e.g., mercury), which typically comes from patients' fillings. EX1003, ¶¶50-51. There are a number of different systems that provide dental-amalgam separation systems to perform this filtering function. In 2004, the Vermont Department of Environmental Conservation put forth a report testing six different amalgam separation products from different manufacturers, one of whom was Solmetex. EX1015, 5-6. As another example, the Amalsed Silver Powered By Apavia was available at least as of September 2016:



EX1016, 9. The Tech West Eco-Star Amalgam Separator was available at least as of 2018.



EX1017, 7.

Indeed, Patent Owner itself had an amalgam separation system called the Hg5 Amalgam Separator on the market by 1999. EX1018.

Furthermore, Patent Owner's second-generation amalgam separation system, the Solmetex NXT Hg5 Series ("NXT System"), was released in June 2017.

EX1019.



EX1008, 2.

B. The '175 Patent and Its Prosecution History

The '175 patent, which generally relates to an amalgam separation system like those described above, was filed *less than a year ago*, on October 13, 2022.

EX1001. On its face, the '175 patent claims priority to a chain of patent applications dating back to provisional applications filed in 2016. *Id.*, (60), (63).

But the '175 patent is not entitled to this earlier priority date because all three of its independent claims rely on substantive new matter—including structures, text, and

annotations—that was added to the specification during prosecution *within the last year*.

Namely, all claims recite (with minor variation):

*“at least one **radially protruding structure** located below the generally cylindrical upper region, the at least one **radially protruding structure for engaging the at least one retaining pin** of the dental amalgam separation system.”*

Id., cl. 1; see also *id.*, cls. 12, 18.

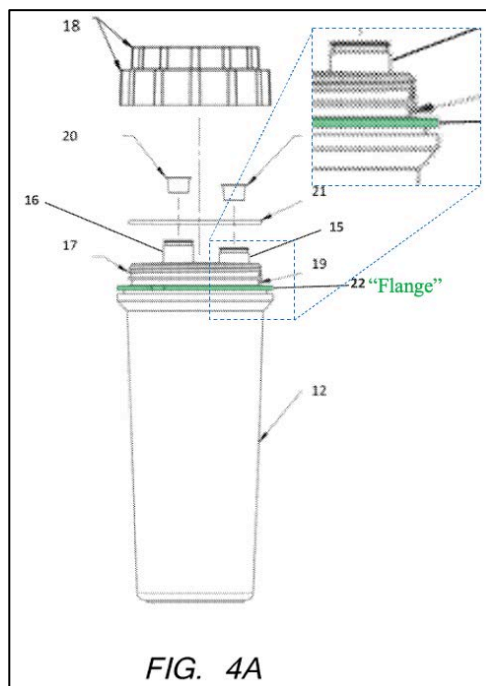
This claim language is supported by just two passages and one figure of the specification, reproduced below:

*“[The recycling container includes] a **flange structure 22 that protrudes radially** away from the central axis of the main body of the recycling container 12. The **removable retaining pins 13**, described above with respect to FIG. 2, **fit within the region below the flange structure 22.**”*

Id., 7:65-8:2.

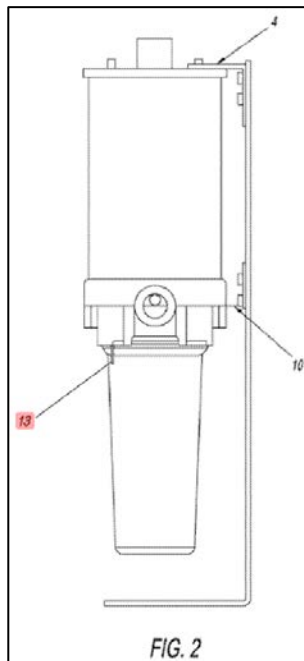
*“[The removable pins] **engage radially protruding structures** of the recycling container”*

Id., 7:30-32.



Id., Fig. 4A. This disclosure is not redundant; it is the **only** support for limitations included in every claim of the '175 patent.

This disclosure is also entirely new. The original specification of the '175 patent filed on October 13, 2022—i.e., the specification inherited from the earlier applications to which the '175 patent claims priority—does not mention the term “radially protruding structure,” nor the related term “flange.” EX1002, 203-215. Nor does it describe this structure in other terms. Fig. 4A lacked even a numeral to identify the supposed “flange.” At most, the specification mentioned once in passing that “[t]he system is provided with . . . removable retaining pins 13,” which were depicted (illegibly) only in Fig. 2. *Id.*, 213.



EX1001, Fig. 2. But the specification did not disclose the use of retaining pins in conjunction with a “radially protruding structure” or “flange” to secure a container in place, as the claims recite.

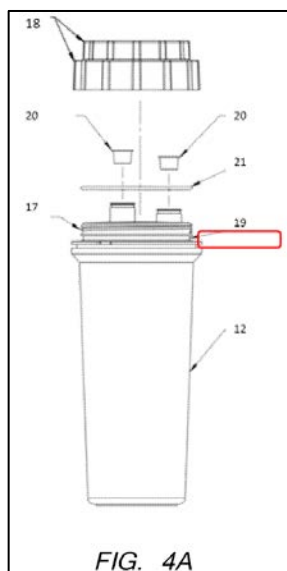
Rather, all these features were added to the specification during prosecution of the '175 patent to escape §112 rejections. Namely, in a January 20, 2023 office action (the very first office action), the examiner rejected all pending claims under 35 U.S.C. § 112 for lack of enablement. As the examiner explained:

“The specification fails to sufficiently disclose and describe the 'radially protruding structures' and the 'pair of pin engaging surfaces' (claims 13, 25, 31), the 'flange' (claims 20, 21, 28, 29), and [another feature]. It is also noted that, while disclosed in the specification, the 'pins' 13 are not sufficiently disclosed.”

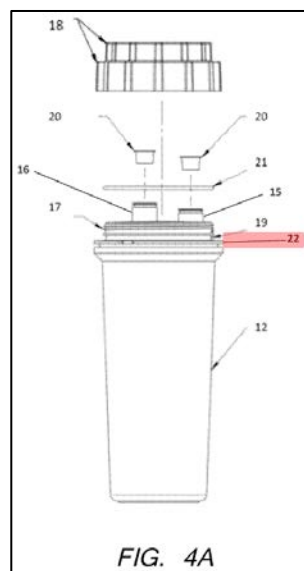
EX1002, 158. In a responsive office action on February 7, 2023, Solmetex made three significant additions to the specification to disclose these features for the first time.

First, Solmetex amended Figs. 4A and 4B to “add reference numeral[] ... '22'“ to identify—for the first time, more than six years after the claimed priority date—a blurry, indistinct, and heretofore obscure line of pixels as the purportedly novel “flange structure 22.” *Id.*, 151.

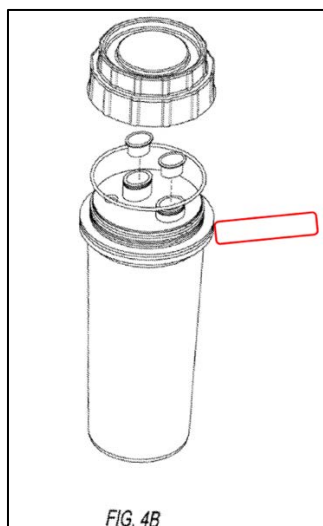
Original Fig. 4A
(No “Flange 22”) (*Id.*, 222)



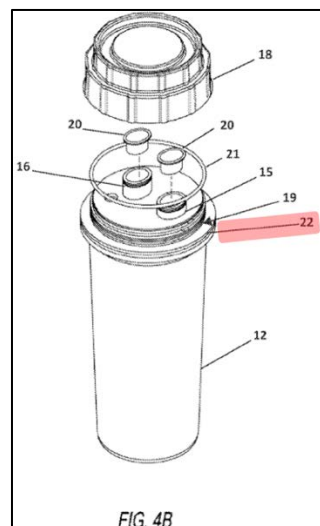
New Fig. 4A
(Adds “Flange 22”) (*Id.*, 103)



Original Fig. 4B
(No “Flange 22”) (*Id.*, 223)



New Fig. 4B
(Adds “Flange 22”) (*Id.*, 104)



Second, Solmetex “amend[ed] paragraph [0096] to describe the flange structure '22' in a manner *consistent with what is illustrated in the figures*, as follows”:

[96] **Figure 4a** shows a schematic diagram of the recycling container and cap system (see **Figure 5** for more cap **18** detail) according to the present invention. The cap **18** is a two tier shape to allow for a tight grip by both a big and smaller hand in order to achieve a strong seal as required by the invention. An O-ring **21** is provided and fits into an O-ring groove **19** on the recycling container **12** above a flange structure **22** that protrudes radially away from the central axis of the container **12**. The removable retaining pins **13**, described above with respect to **Figure 2**, fit within the region below the flange structure **22**. Plugs **20** are used to provide a first leak proof seal for the recycling container **12**. These plugs **20** are held in place by the cap **18** when the cap is threaded onto the recycling container as depicted in **Figure 5b**.

Id., 129 (underlining in original).

Third, Solmetex represented to the examiner that the barely-visible retaining pins 13 (of Fig. 2, reproduced above) were in fact “L-shaped” with a “horizontal segment . . . [that] fits within the region directly below the flange structure 22,

which radially protrudes away from the central axis of the container 12 as shown in FIGURES 4A and 4B.” *Id.*, 98. And, although the application contained no such disclosure, Solmetex assured the examiner that “[t]o remove [the container], the removable retaining pin 13 is pulled in the left direction in FIGURE 2 such that the horizontal segment of the pin 13 is removed from the region directly below the flange structure 22.” *Id.*

Then, in a March 16, 2023 office action, the examiner noted that “[t]he specification does not describe certain claim elements as recited in the claims,” including the “radially protruding structure, [and] pin engaging surface.” *Id.*, 77. Again, Solmetex responded in a March 22, 2023 office action by simply adding the missing material to the specification:

-- [0084] The system is provided with a simple back plate 1 for easy dental office placement as well as removable retaining pins 13 <u>that engage radially protruding structures of the detachable recycling container</u> to ensure the recycling container does not detach from the air-water separation tank 5 when there is no vacuum in the system. --
--

Id., 70 (underlining in original).

In short, Solmetex added the sole support for the claimed “radially protruding structure” for engaging a retaining pin—which is recited in every claim—in a series of increasingly detailed additions to the specification *this year*. On the basis of these additions, the examiner dropped his § 112 rejection, and

ultimately allowed the patent. *Id.*, 10. The '175 patent issued on May 30, 2023.

Two days later, on June 1, 2023, Solmetex filed this lawsuit.

The '175 patent has three independent claims. Claim 1, which is representative:

1. A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:
 - a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;
 - a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port, ***the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure for engaging the at least one retaining pin*** of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system when there is no pressure being applied from the vacuum source, ***the at least one radially protruding structure being located***

radially outward relative to the periphery of the circular upper surface;

a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and

a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is moved toward the container outlet port due to the vacuum source.

Independent claim 12 adds an “O-ring” on the top of the inlet and outlet ports. The dependent claims are generally directed to additional limitations about the recited structures (e.g., inlet and outlet ports are the same height) or additional structures that are added to the device (e.g., plugs, caps). *E.g., id.*, cl. 2, 3, 4.

C. Priority Date of the '175 Patent

“It is elementary patent law that a patent application is entitled to the benefit of the filing date of an earlier filed application ***only if*** the disclosure of the earlier application provides support for the claims of the later application, as required by 35 U.S.C. § 112.” *In re Chu*, 66 F.3d 292, 297 (Fed. Cir. 1995). It is not enough that a claim limitation might have been obvious to a person of skill in the art; section 112 “requires that the written description ***actually or inherently*** disclose the claim element.” *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1307

(Fed. Cir. 2008). For disclosure to be inherent, “the missing descriptive matter must *necessarily be present* in the [original] application's specification.” *Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1159 (Fed. Cir. 1998).

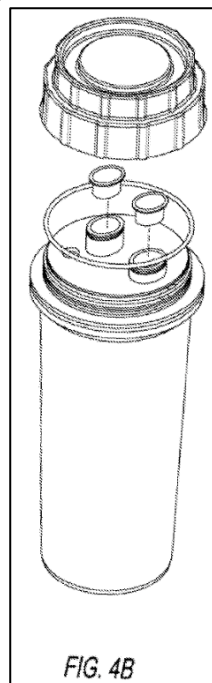
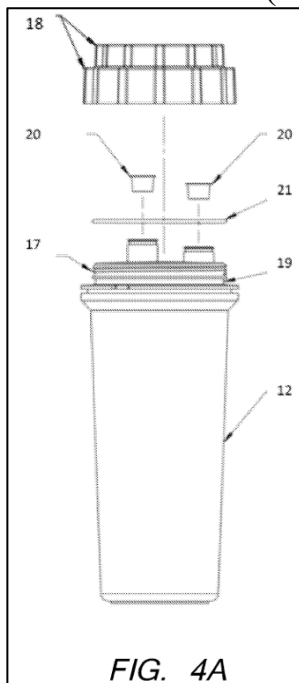
The '175 patent cannot claim priority before its October 13, 2022 filing date, because the applications that the '175 patent claims priority to—whose specifications lack the new material added during prosecution of the '175 patent—do not actually or inherently disclose the “radially protruding structure for engaging the at least one retaining pin” recited (with minor variation) in all three independent claims. *See PowerOasis*, 522 F.3d at 1307.²

Prior to the new materials added during prosecution of the '175 patent, the sole disclosure that could conceivably relate to the claimed “radially protruding structure” was the predecessor versions of Fig. 4A (which includes no corresponding description of a “radially protruding structure”) and Fig. 4B (which includes no corresponding description at all). EX1002, 222-23. And the sole disclosure that could conceivably relate to the claimed “retaining pins” was Fig. 2 and a single corresponding sentence in the specification stating that “[t]he system

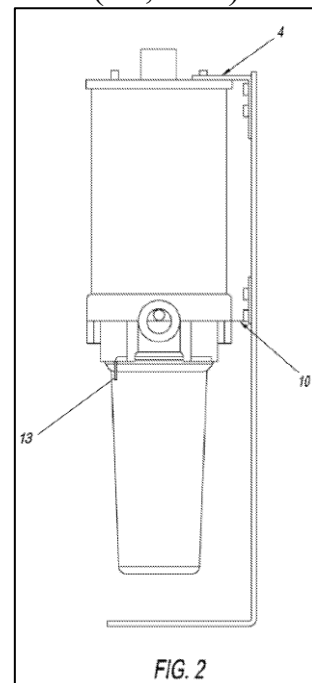
² More specifically, the '175 patent is not entitled to priority before the new material was added to the specification on February 7, 2023, and March 16, 2023. EX1002, 118-53. However, because NXT Container and Cartridge 2 were sold in the United States prior to any of these dates, the precise priority date need not be determined to grant this Petition.

is provided with ... removable retaining pins 13 to ensure the recycling container does not detach from the air-water separation tank when there is no vacuum in the system.” *Id.*, 213, 220. This universe of material—which must alone establish any priority claim before the October 13, 2022 filing date of the '175 patent—is reproduced below for reference:

**Supposed Disclosure of
“Radially Protruding Structure” or “Flange”**
(*Id.*, 222-23.)



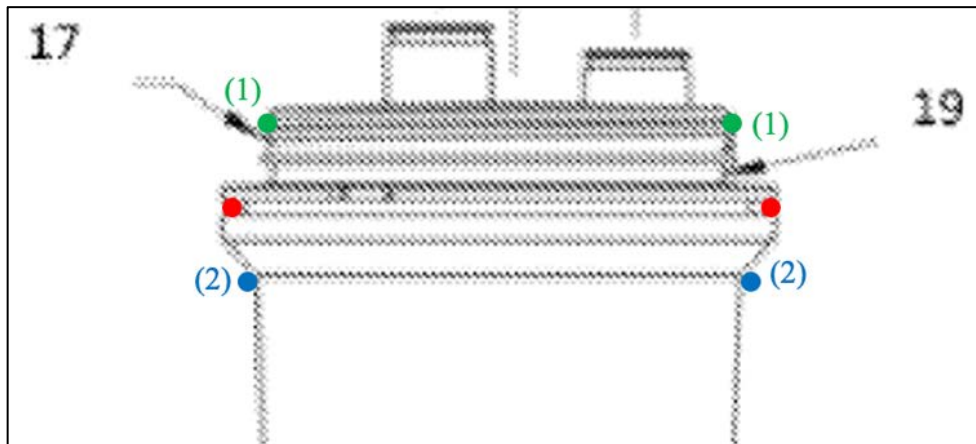
**Supposed Disclosure of
“Retaining Pins”**
(*Id.*, 220.)



But these materials do not disclose the combination of a “radially protruding structure for engaging the at least one retaining pin.” EX1003, ¶¶61-66. Indeed, the supposed “radially protruding structure” and the “retaining pin” are *never depicted together*. Rather, the former is purportedly depicted (by a thin, barely-visible, unlabeled line of pixels) only in Figs. 4A and 4B, while the latter is

depicted (though barely-visible and largely obscured) only in Fig. 2. Similarly, in the written description, these structures are *never described together* and, more to the point, these structures are certainly *never described as cooperating to secure the container in place*, as the claims require. EX1003, ¶66.

Nor do these materials inherently disclose the claimed combination of a “radially protruding structure for engaging the at least one retaining pin.” For a disclosure to be inherent, “the missing descriptive matter *must necessarily be present* in the [original] application's specification.” *Tronzo*, 156 F.3d at 1159. But here the “retaining pins” need not necessarily engage with the purported “radially protruding structure” to secure the container in place. Indeed, particularly given that the shape of the retaining pins was not specified in the priority specification or legibly depicted in Fig. 2, the pins could mate with any number of other conceivable structures on the container, including a recess, pocket, or hole. EX1003, ¶¶67-71. But even accepting Solmetex's assertion in the prosecution history that the retaining pins are L-shaped (EX1002, 98), they would not need to mate with the radially protruding structure (red below) to secure the container. EX1003, ¶¶67-71. For instance, pins could be inserted either (1) in the threading of the upper cylindrical portion (green below); or (2) below the top structure of the container entirely (blue below). *Id.*



EX1001, Fig. 4A.

Furthermore, a POSA would have understood that the retaining pin is not even the only way to keep the container attached to the air-water separation tank disclosed in the '175 patent. The specification further recites using the threads on the container to mate with the separator tank, possibly by using an adapter.

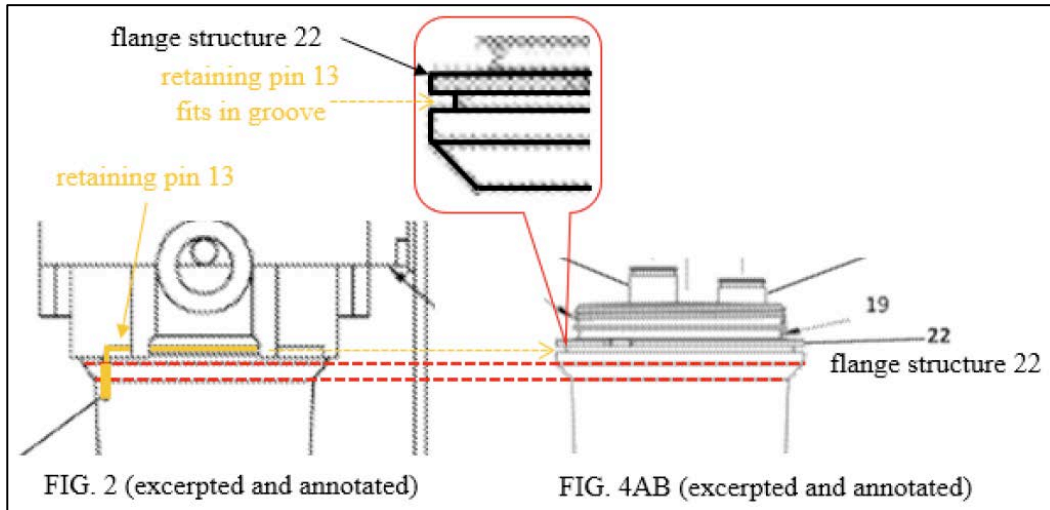
EX1001, 4:38-46. A POSA would have therefore recognized that the pins are not necessarily needed, nor is any “radially protruding structure.” EX1003, ¶64.

And of course, Solmetex had to add new matter during prosecution. As detailed above, the examiner rejected all pending claims under 35 U.S.C. § 112 for lack of enablement because the specification “fail[ed] to sufficiently disclose and describe the 'radially protruding structures' and the 'pair of pin engaging surfaces' (claims 13, 25, 31), the 'flange' (claims 20, 21, 28, 29),” and “the 'pins' 13 [were] not sufficiently disclosed.” EX1002, 158. Solmetex had could have argued against this rejection without amendment. Instead, it chose to add the new material

at issue here, tacitly admitting that the specification was deficient. *See id.*, 60, 149. Solmetex cannot now claim those additions were unnecessary because the limitation was disclosed all along. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1317 (Fed. Cir. 2005) (“Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent.”).

Bottom line: this is not a case where the patentee simply claimed preexisting disclosure using new language. There was no disclosure of the claimed “radially protruding structure for engaging the at least one retaining pin” before Solmetex's addition of new material. EX1003, ¶¶61-71. Accordingly, the claims of the '175 patent—all of which incorporate this limitation—are entitled to, at best, a priority date of October 13, 2022. *See In re NTP, Inc.*, 654 F.3d 1268, 1276 (Fed. Cir. 2011) (“[Patent claims] are not entitled to an earlier priority date merely because the patentee claims priority.”).

In response to Petitioner’s motion to dismiss in the district court that raised the issue of priority, Patent Owner responded that Figure 2 and Figure 4A fit together to show where the retaining pin would be engaged.



EX1021, 8. This argument fails for at least two reasons. First, Solmetex's markup employs the *amended* version of Fig. 4A (misabeled as “FIG. 4AB” above), not the *original* version of Fig. 4A. *Compare* EX1001, Fig. 4A with EX1002, 222.

And in support, Solmetex cites not to the patent specification, but to the very representations Solmetex made to the examiner while adding the new material at issue. *E.g.*, EX1021, 8 (Solmetex quoting itself—not the original specification—for the proposition that “the removable retaining pin 13 is pulled in the left direction in' Figure 2 such that the retaining 'pin 13 is removed from the region directly below the flange structure 22.”).

Second, on top of this inapposite foundation, Solmetex superimposes even more new disclosure: strategically aligning a cropped and resized version of Fig. 2, adding four new labels, replacing pixelated and illegible portions of Fig. 4A with

its own redrawn lines, and drawing in a retaining pin 13 that does not match the underlying figure. EX1021, 8; EX1003, ¶¶69-72.

Solmetex's need to reinvent the specification only confirms what is plain on the face of the prosecution history: there was no such disclosure prior to Solmetex's additions. Indeed, “[t]he written description requirement 'is not a question of whether one skilled in the art *might* be able to construct the patentee's device from the teachings of the disclosure. . . . Rather, it is a question whether the application *necessarily* discloses that particular device.’” *C.R. Bard, Inc. v. United States Surgical Corp.*, 102 F. Supp. 2d 199, 210 (D. Del. 2000). Whatever Solmetex's counsel might reverse engineer after prosecution, the Court need not resolve a question of fact to hold that such disclosure was not *necessarily* present in the original specification. *TurboCare Div. of Demag Delaval Turbomachinery Corp. v. GE*, 264 F.3d 1111, 1118-20 (Fed. Cir. 2001) (holding that to comply with the written description requirement the location of the spring must be actually or inherently disclosed; that the location may be obvious is not enough).

D. Lack Of Disclosure In The '522 Application

The '175 patent cannot claim priority to its parent application (the '522 application) for an independent reason. The burden is on Solmetex “to provide a clear, unbroken chain of priority.” *See Droplets, Inc. v. E*TRADE Bank*, 887 F.3d 1309, 1317 (Fed. Cir. 2018). By Solmetex’s own admission, however, the '522

application breaks the priority chain. During prosecution, Solmetex itself identified a deficiency in the disclosure of the '522 application, which is the direct parent application to which the '175 patent purports to claim priority. Specifically, the “groove” that supposedly provided support in earlier applications *was not present* in the '522 application. EX1002, 345 (“Applicant has identified a potential discrepancy between FIG. 4A in the parent application (U.S. Application No. 16/941,522), and FIG. 4A from the original drawing sets of the other four priority applications.”). Solmetex therefore effectively admitted that, even if earlier applications in the chain showed this groove, *the '522 application did not*. EX1003, ¶¶74-77; *see id.* (“*In those original drawing sets*, a groove can be seen below the generally cylindrical upper region and radially outward from the periphery of the circular upper surface at the top of the generally cylindrical upper region.”).

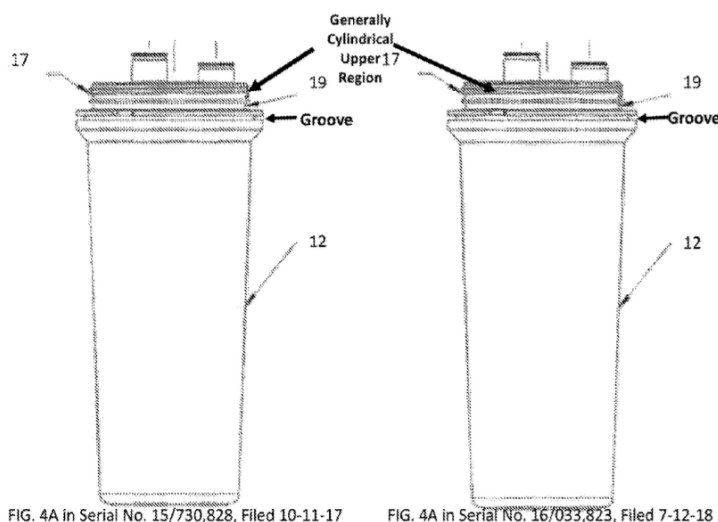


FIG. 4A in Serial No. 15/730,828, Filed 10-11-17

FIG. 4A in Serial No. 16/033,823, Filed 7-12-18

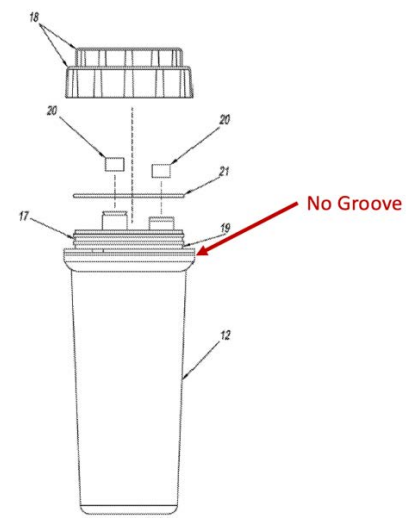
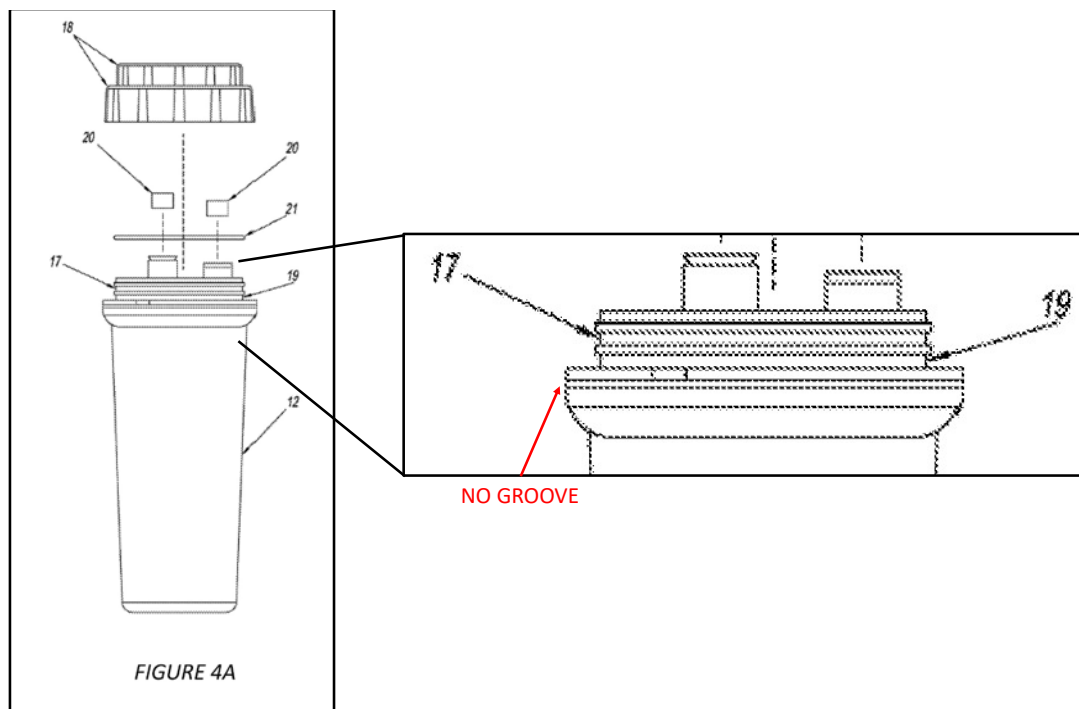


FIGURE 4A

Compare id. (annotations in original) with EX1014, Fig. 4A.



EX1014, Fig. 4A.

As discussed, Original Figure 4A does not provide written description support for the “radially protruding structures.” Even if it did, however, Figure 4A *of the ’522 application* certainly does not show the “groove.” EX1002, 345.

Without the “groove” in Figure 4A, the only alleged disclosure of the new “radially protruding structure” limitation is Figure 2, which does not depict or mention the “radially protruding structure,” much less its location on the container. *See id.*, 212-14, 220.

Because the ’522 application does not provide § 112 support for the “radially protruding structures,” the claims of the ’175 patent cannot claim priority

to the '522 application, and, by extension, any of the earlier applications. *See Droplets*, 887 F.3d at 1317. It does not matter that earlier applications in the same chain may have disclosed a “radially protruding structure.” For example, in *Hollmer v. Harari*, 681 F.3d 1351 (Fed. Cir. 2012) the Federal Circuit held that a break in the chain destroyed priority back to the earliest application even though the earliest application had the relevant disclosure. *Id.*, 1358. Therefore, even if the original application had provided adequate support—which Petitioner does not concede—the '522 application certainly did not, and Challenged Claims cannot claim priority to the '522 application.

E. Person of Ordinary Skill in the Art of the '175 Patent

The relevant art for the '175 patent is mechanical engineering, specifically, filters, vacuums, and related components. EX1003, ¶95. A person of ordinary skill in that art, as of October 2022 or October 2016, would have been an individual with at least a bachelor's degree in mechanical engineering, or at least 3 years of experience designing or manufacturing vacuums, filters, medical devices, or the related components. *Id.*, ¶¶94-95.

IV. CLAIM CONSTRUCTION

Claim terms must be given their ordinary and customary meaning, which is the meaning a POSA would have given the term at the time of the alleged invention, considering the entire patent and file history. *Phillips v. AWH Corp.*,

415 F.3d 1303, 1312-13 (Fed. Cir. 2005). All terms of the '175 patent should be given their plain and ordinary meaning as understood by a POSA for purposes of this proceeding.

In addition, DRNA submits that the preambles of the independent claims (claims 1, 12, 18) are limiting because they are “necessary to give life, meaning, and vitality” to the claim. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999). Claim 1 is representative of this issue, the preamble of which recites: “[a] detachable dental-amalgam container for use with **[1] a dental amalgam separation system**, the dental amalgam separation system having a system inlet for receiving **[2] dental amalgam effluent**, **[3] an air-water separation tank** for holding the dental amalgam effluent received from the system inlet, a system outlet, **[4] a vacuum source** acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet, and **[5] at least one retaining pin** for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising.”

As an initial matter, the preamble is often limiting when it provides the antecedent basis for terms in the body of the claim. *See Catalina Marketing Intern. v. Coolsavings.com*, 289 F. 3d 801, 808 (Fed. Cir. 2002) (“[D]ependence on a particular disputed preamble phrase for antecedent basis may limit claim scope because it indicates a reliance on both the preamble and claim body to define the

claimed invention.”). The preamble here provides the antecedent basis for the *five* terms emphasized above. These antecedent bases are necessary to give life, meaning, and vitality to the claims because they identify the structure required in the body of the claims. For example, the claims recite a “radially protruding structure for engaging *the at least one retaining pin* of the dental amalgam separation system.” EX1001, cl. 1. The necessary structure of the “radially protruding structure” is based upon the engagement of the retaining pins, which are defined as part of the preamble. Without the preamble to describe the retaining pins, the “radially protruding structure” has no life or vitality. *See Pitney*, 182 F.3d at 1305; EX1003, ¶¶80-82.

The Federal Court’s decision in *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945 (Fed. Cir. 2006) is analogous. There, the Court found that the preamble was “not limited to stating the purpose or intended use of the invention, but contains structural features of the [claimed] abutment.” *Id.* at 952. The Court reasoned that, if the claims were not limited to “the particular abutment described in the preamble,” certain limitations in the body would become meaningless. *Id.* at 953. The same is true here. Patentee here chose to describe multiple structural limitations of the entire separation system in the preamble and refer back to those limitations in the body of the claim. Just like the claim in *Bicon*, the limitations here that refer back to the structure in the preamble, like the retaining pins, would

be meaningless without the preamble. *See id.* Petitioner therefore submits that the preambles of claims 1, 12, and 18 are limiting.

V. SUMMARY OF CHALLENGE AND RELIEF REQUESTED

A. 37 C.F.R. § 42.104(b)(1): The Challenged Claims

Petitioner requests IPR and cancellation of the challenged claims (*i.e.*, claims 1-22) in view of the references discussed below.

B. 37 C.F.R. § 42.104(b)(1): Prior Art Overview and Specific Grounds of Rejection

1. Overview of Cartridge 2

DRNA started selling its Cartridge 2 in the U.S. on May 18, 2020.

EX1004, ¶11. The Cartridge 2 is compatible with NXT System and comes with installation instructions on how to connect Cartridge 2 to NXT System. EX1004, ¶12; EX1006, 1. For the purposes of this petition, Petitioner cites to photos of Cartridge 2 because Petitioner understands that the Board requires electronic exhibits absent permission. Petitioner will supply the Board with a physical Cartridge 2 upon request. Cartridge 2 is depicted below:



Cartridge 2 is designed to connect to the Solmetex NXT system as the collection container.



EX1006, 1. The Solmetex NXT system is depicted below. Cartridge 2 would replace the collection container in the picture.



EX1008, 2. When connected, Cartridge 2 receives fluid containing amalgam via an inlet port. Metals and other heavy materials within the fluid sink to the bottom of the container, and a vacuum suctions the lighter water through an outlet port. The outlet port is surrounded by a filter to prevent metals and other waste from being pulled out with the water. EX1004, ¶16-17; EX1003, ¶85.

Cartridge 2 also comes with plugs designed to seal the openings of the ports after Cartridge 2 is full to prevent spillage:



EX1006, 2.

2. Overview of NXT Container

Solmetex started selling its NXT System in the U.S. in June 2017.

EX1019; EX1004, ¶10. The NXT Container came with NXT System to collect the amalgam, and Solmetex also started selling replacement NXT Containers at the same time. EX1004, ¶10; EX1008, 2. For the purposes of this petition, Petitioner cites to photos of NXT Container because Petitioner understands that the Board

requires electronic exhibits absent permission. Petitioner will supply the Board with a physical NXT Container upon request. NXT Container is depicted below:



NXT Container is the collection container depicted below attached to the NXT System and NXT Container comes with instructions on how to attach NXT Container to NXT System:



EX1008, 2. When connected, NXT Container receives fluid containing amalgam via a port. Metals and other heavy materials within the fluid sink and collect at the bottom of the container, and a vacuum suctions the lighter water through an output port, which also has a filter to prevent metals and other waste from being pulled out of that port and through the system outlet to the vacuum. EX1004, ¶¶16-17; EX1003, ¶88.

NXT Container also comes with plugs designed to seal the openings of the inlet and outlet ports after NXT Container is full, and a cap that screws onto NXT Container to hold the plugs in place to prevent spillage:





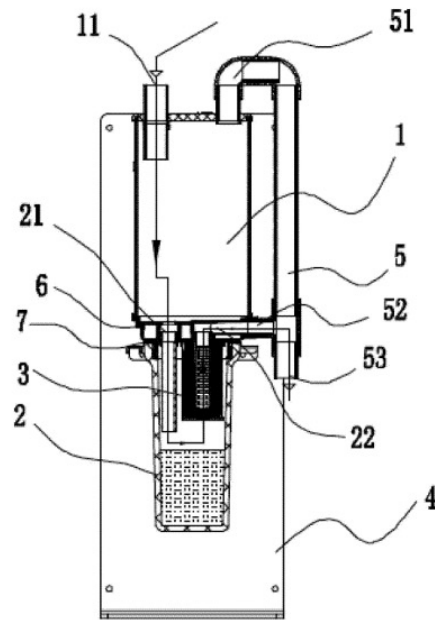
EX1008, 3-4.

3. Overview of Liu

Liu is a Chinese patent application that was filed on December 13, 2012, and published on March 27, 2013. Liu is therefore prior art to the '175 patent regardless of the proper priority date of the claims. It was not before the examiner during prosecution.

Liu discloses a “heavy metal separation device,” including a “heavy metal receiving bottle” that collects the heavy metal waste as depicted in Figure 2.

EX1010, Abstract.

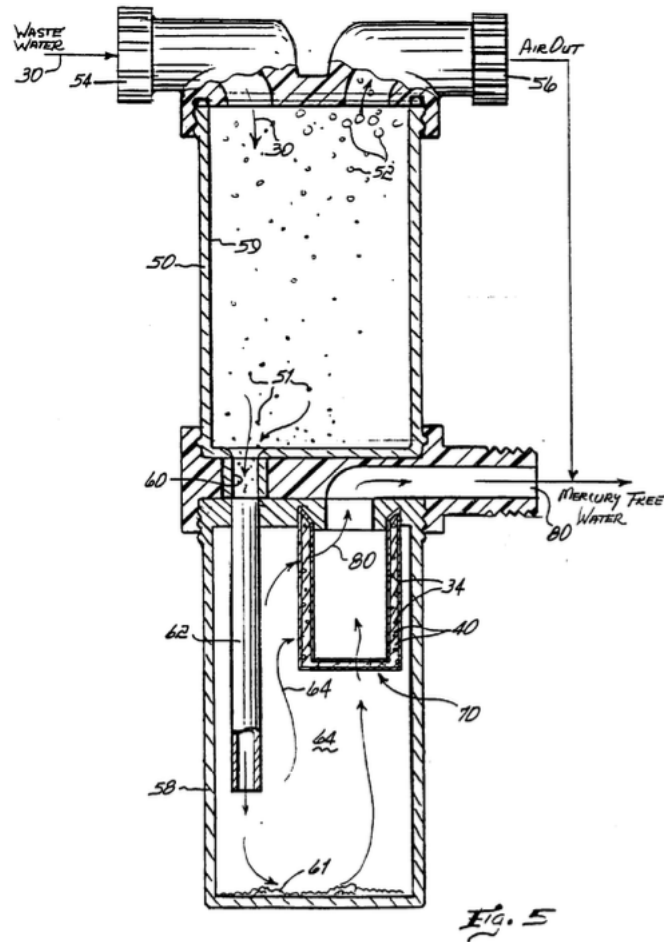


Id., Fig. 2. As depicted above, the heavy metal separation device includes a waste collection tank 1 and a heavy metal receiving bottle 2. The sewage water flows in through the inlet 11 and then through the sewage inlet 21 down into the heavy metal receiving bottle 2. The suction pipe 5 will then suction the water out of the heavy metal receiving bottle 2 through the filter 3 and the sewage discharge port 22. *Id.*, ¶¶17-20.

4. Overview of Boyd

Boyd is a Canadian patent application that was filed on October 30, 2000 and published on May 3, 2001. EX1011. Boyd is therefore prior art to the '175 patent regardless of the proper priority date of the claims.

Boyd is a patent application that was assigned to Patent Owner but was never disclosed during prosecution and therefore was not considered by the examiner. Boyd discloses a device for treating dental waste streams to remove amalgam and other contaminants from the water before the water is sent to publicly owned treatment works. EX1011, 1-2. As depicted below in Figure 5, Boyd discloses a dental amalgam separation system that includes a “settlement chamber 58” that is connected to an “air/liquid separation chamber 50.” The effluent flows from the separation chamber 50 into the settlement chamber 58 through an opening 60 and then is sucked back through a filter insert 70 that traps particles before wastewater exits via an exit line 80. *Id.*, 8-10.



Boyd further discloses that the settlement chamber 58 may be easily detached, but held in place to the separation chamber 50, “for example, by threads, pins and a gasket system.” *Id.*, 10.

Boyd also discloses a “threaded cap 39” that is “capable of hermetically sealing” the container “once it has been used and contained trapped contaminants such as amalgam.” *Id.*, 7.

C. Specific Grounds of Rejection

Petitioner asserts the following specific grounds of rejection:

Ground	Claims	Basis	Prior Art
1	1-3, 6-8, 12, 15, 17-18, 20	§102 / §103	Cartridge 2
2	1-3, 6-8, 12, 15, 17-18, 20	§103	Cartridge 2 with the NXT System
3	1, 3-22	§102 / §103	NXT Container
4	1, 3-22	§102 / §103	NXT Container with the NXT system
5	1-3, 6-8, 10, 12, 15, 17-20	§103	Liu
6	1-8, 10, 12-15, 17-20, 22	§103	Liu over Boyd

VI. GROUNDS 1 AND 2 – CLAIMS 1-3, 6-8, 12, 15, 17-18, 20 ARE ANTICIPATED BY DRNA CARTRIDGE 2, OR, IN THE ALTERNATIVE, RENDERED OBVIOUS BY CARTRIDGE 2 ALONE OR BY CARTRIDGE 2 WITH NXT SYSTEM

A. Claim 1

1. 1[pre]: “A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”

If the preamble is not limiting, Cartridge 2 renders obvious this limitation because Cartridge 2 is a “detachable dental-amalgam container.” EX1004, ¶12; EX1003, ¶99.

If the preamble is limiting, Cartridge 2 with NXT System renders obvious this limitation. Cartridge 2 is a detachable dental amalgam container for use with

the Solmetex NXT System, which is a dental amalgam separation system.

EX1004, ¶12; EX1003, ¶¶100-103; EX1006, 1.



EX1008, 2 (Solmetex Procedure Document). As shown above, the NXT system has a system inlet (“inlet from operatories”), air-water separation tank for holding the dental amalgam effluent received from the system inlet (“air water separator”), system outlet (“outlet to vacuum”), vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet (“vacuum” not pictured), and retaining pins that hold the dental-amalgam container in place. EX1004, ¶¶17-18; EX1003, ¶¶102.

It would have been obvious to combine Cartridge 2 with NXT System because Cartridge 2 is designed to be used with NXT System and users are given instructions on how to attach Cartridge 2 with NXT System. EX1006, 1; EX1003,

¶¶103; EX1023 (videos explaining how to attach Cartridge 2 to NXT System);

EX1024 (contact information for support).

2. 1[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”

Cartridge 2 has a “main body” with a “central axis” as depicted in the annotated picture below. The main body includes an “interior volume” for receiving dental amalgam effluent from the air-water separation tank of a Solmetex NXT system. EX1004, ¶16; EX1003, ¶¶104.



3. 1[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”

Cartridge 2 discloses this limitation. As depicted below, Cartridge 2 has a “container top portion” located at the top of the “main body.” The “container top portion” has a “generally cylindrical upper region” with a “circular upper surface.” EX1004, ¶¶16-17; EX1003, ¶105.



As shown from a different angle, from the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface. EX1004, ¶¶16-17; EX1003, ¶106.



4. 1[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure for engaging the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system when there is no pressure being applied from the vacuum source, the at least one radially protruding structure being located radially outward relative to the periphery of the circular upper surface;”



The “container top portion” includes a “radially protruding structure” that is located below the “generally cylindrical upper region,” as depicted above. A POSA would have understood that the “radially protruding structure” is used for engaging a retaining pin of the dental amalgam separation system because the instructions for Cartridge 2 tell the user to “[i]nsert the retaining pins into their respective openings on each side of the DNRA replacement cartridge, until it is properly affixed to the top chamber.” EX1006, 2. A POSA would have understood that the “radially protruding structure” that extends away from the container top portion is for engaging the retaining pin given the way Cartridge 2 aligns with NXT System when the ports are lined up. EX1003, ¶107. A POSA further would have understood that the retaining pins engage to keep the container connected to NXT System when the vacuum source is not on. EX1004, ¶18; EX1003, ¶107. A POSA further would have understood that, given the positioning of the inlet ports, outlet ports, and radially protruding structures, there is only one position that Cartridge 2 can be connected to NXT System. EX1003, ¶108. By examining NXT System and Cartridge 2, a POSA would have understood that the “radially protruding structure” engages the retaining pin because the “radially protruding structure” is positioned right above the holes in NXT system for the retaining pins when lined up with the ports. EX1003, ¶¶107-108.

In the alternative, it would have been obvious to a POSA that the “radially

“protruding structure” on either side of Cartridge 2 are for engaging the retaining pins for the same reasons discussed above, including that it would have been obvious to a POSA that Cartridge 2 can only be inserted in one orientation and the “radially protruding structure” would have been right above the holes for the pins. EX1003, ¶108.



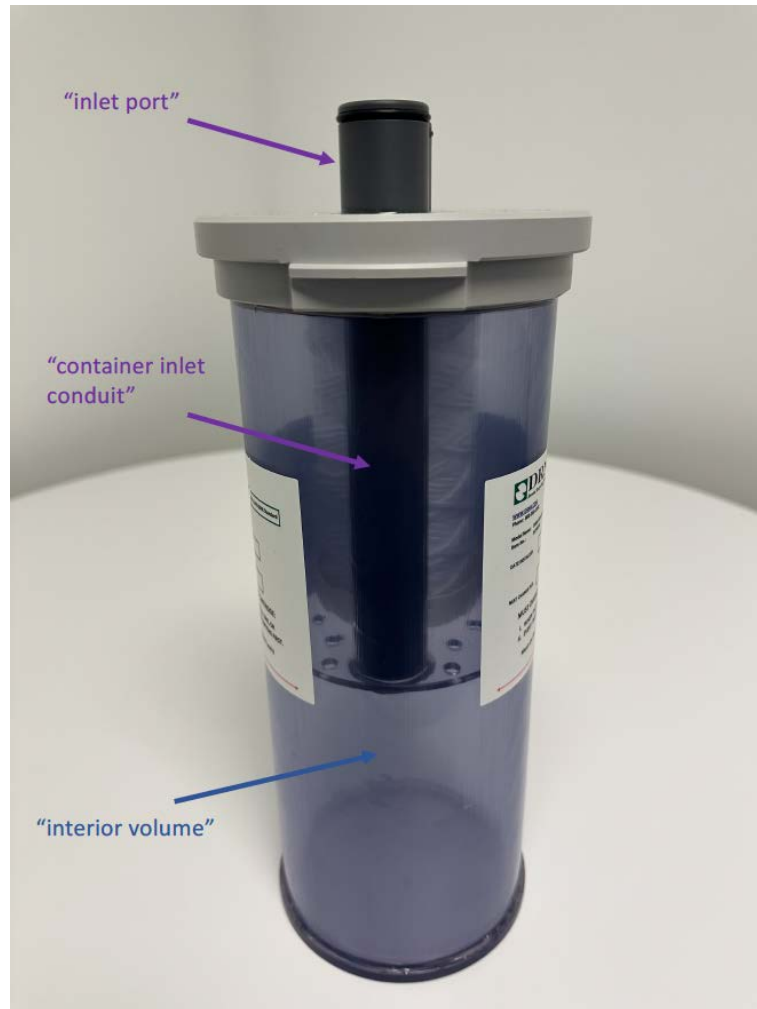
Furthermore, the “radially protruding structure” extends radially outward relative to the periphery of the “circular green surface,” as shown below.



5. 1[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and”

Cartridge 2 discloses this limitation. Cartridge 2 has a “container inlet conduit” connected to the “container inlet port.” The “container inlet conduit” extends down into the “interior volume” from the “container top portion.”

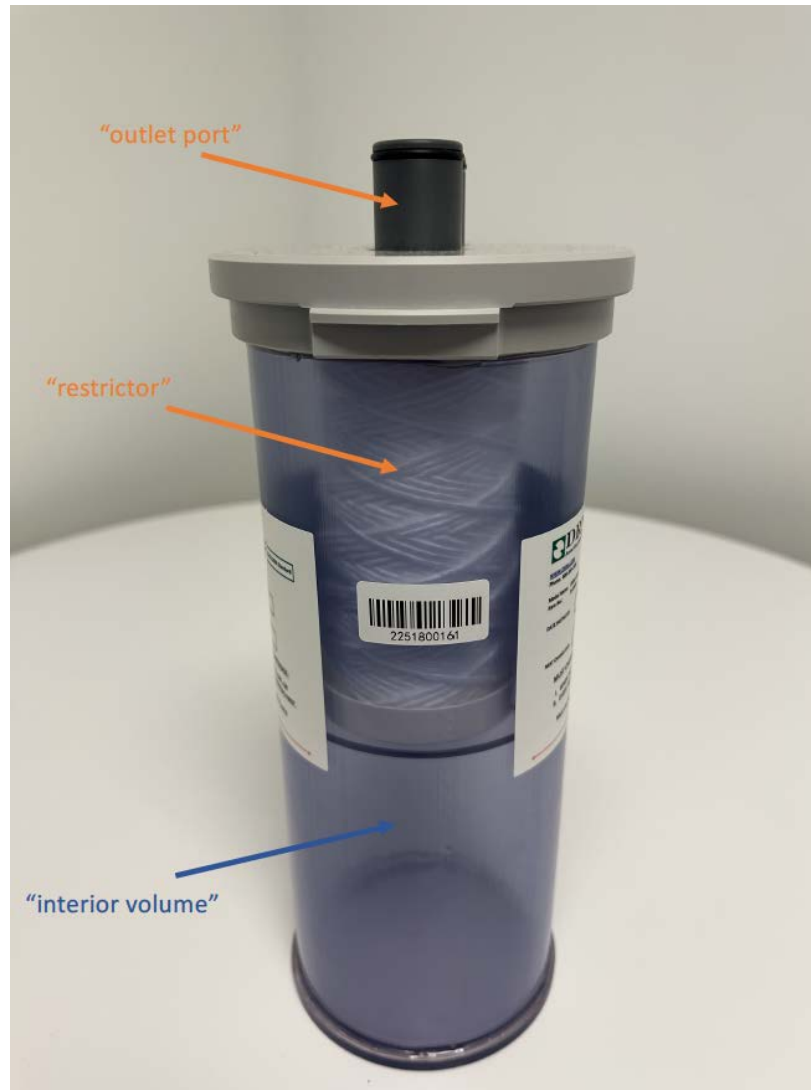
EX1004, ¶17; EX1003, ¶110.



A POSA would have understood or it would have been obvious that the inlet port and conduit are for transferring dental amalgam effluent from the air-water separation tank of NXT System *into* the interior volume of Cartridge 2 because, when connected to NXT System, a POSA could see the liquid flowing into Cartridge 2 through the inlet port and conduit. EX1003, ¶111. Furthermore, the vacuum source is attached to the other port so a POSA would have understood that the wastewater flows out the other port and naturally would have understood that amalgam comes in the other port. EX1003, ¶111.

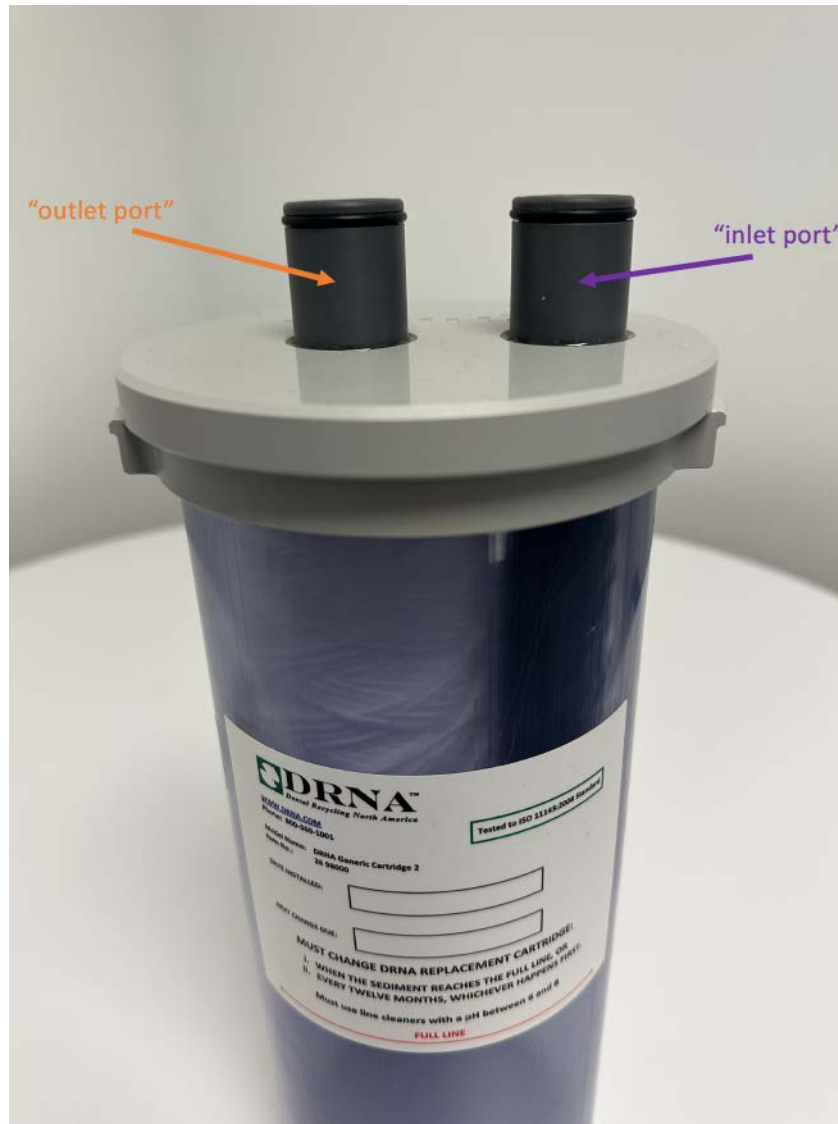
6. **1[d]: “a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is moved toward the container outlet port due to the vacuum source.”**

Cartridge 2 discloses this limitation. Cartridge 2 has a filter or “restrictor” located inside the main body of Cartridge 2 that restricts amalgam from flowing out of Cartridge 2. In other words, the “restrictor” prevents fine particles of Amalgam from flowing out the outlet port as fluid is sucked out by the vacuum source. The “restrictor” is fluidically coupled to the “container outlet port” because fluid flows through the “restrictor” to reach the “container outlet port.” EX1004, ¶17; EX1003, ¶112.



- B. 2: “The detachable dental-amalgam container of claim 1, wherein the container inlet port and the container outlet port extend above the circular upper surface by the same height.”**

As shown below, the “**container inlet port**” and “**container outlet port**” extend the same height above the upper surface of Cartridge 2. EX1004, ¶¶16-17; EX1003, ¶113.



- C. 3: “The detachable dental-amalgam container of claim 1, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container.”

Cartridge 2 comes with plugs to seal the “container inlet port” and “container outlet port” after the container is filled. The customer is instructed to locate “the two openings on the top of the filled cartridge, and seal them with the

(2) provided plugs.” EX1006, 2. The plugs are just inserted into the ports so the container may be transported without spillage. EX1004, ¶19; EX1003, ¶114.





- D. 6: “The detachable dental-amalgam container of claim 1, wherein the container top portion has a maximum outer dimension that is greater than a maximum outer diameter of the main body.”**

As shown below, the “container top portion” has a larger outer dimension (i.e., circumference) than the outer dimension of the “main body” because the “container top portion” extends outside the diameter of the “main body” on all sides of Cartridge 2. EX1004, ¶¶17-18; EX1003, ¶115.



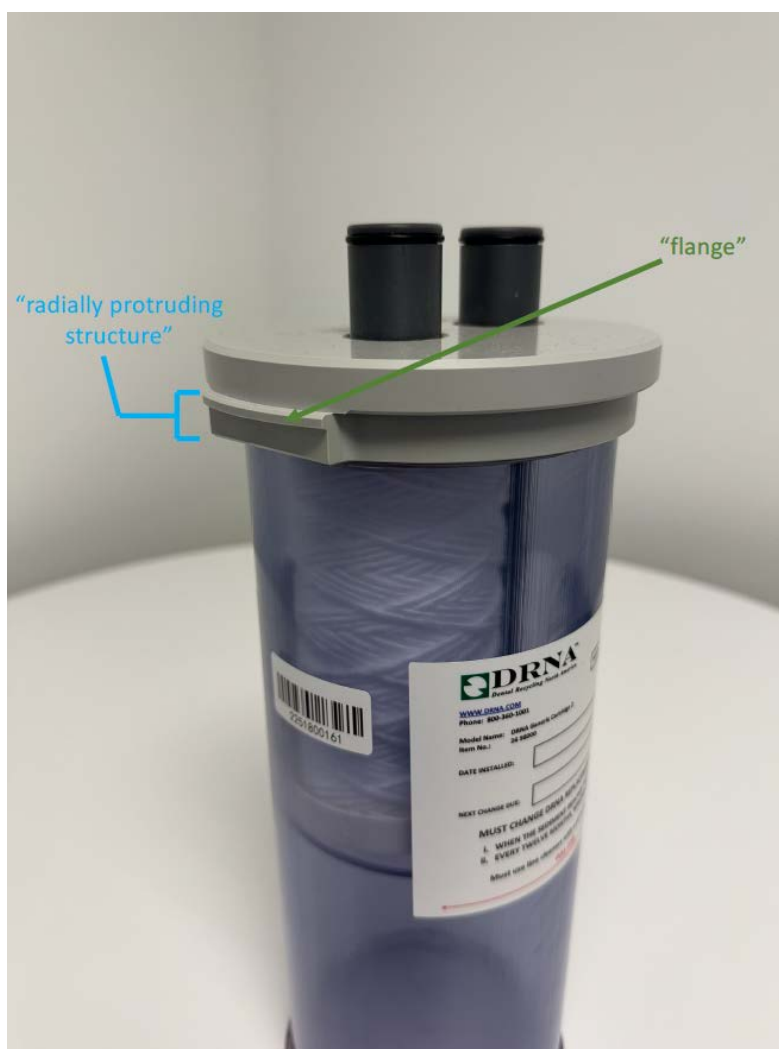
- E. 7: “The detachable dental-amalgam container of claim 1, wherein the container outlet port is configured for fluidic coupling to the system outlet of the dental amalgam separation system that transfers fluid from the dental amalgam effluent to a municipal water disposal system.”

Cartridge 2 discloses this limitation. A POSA would have understood that the container outlet port is for fluid that flows out of Cartridge 2 and heads to the municipal water disposal system because the vacuum source is attached to the outlet port. EX1004, ¶¶7, 17; EX1003, ¶116. Alternatively, it would have been obvious to a POSA that the fluid that flows out of the container outlet port gets pulled out and sent to the municipal water disposal system. That was the point of

the dental-amalgam separation system: to prevent heavy metals—e.g., mercury—from entering the municipal water system. EX1004, ¶¶7, 17; EX1003, ¶117.

F. 8: “The detachable dental-amalgam container of claim 1, wherein the at least one radially protruding structure includes a flange extending in a direction away from the generally cylindrical upper region.”

The “**radially protruding structure**” includes a “**flange**” or flat rim that extends outward from the upper region of the container, as shown below. EX1004, ¶18; EX1003, ¶118.



G. Claim 12

- 1. 12[pre]: “A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source for moving fluid from the dental amalgam effluent through the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”**

If the preamble is not limiting, Cartridge 2 renders obvious this limitation because Cartridge 2 is a “detachable dental-amalgam container.” EX1004, ¶12; EX1003, ¶119.

If the preamble is limiting, Cartridge 2 with NXT System renders obvious this limitation. Cartridge 2 is a detachable dental-amalgam container for use with the Solmetex NXT System, which is a dental amalgam separation system with the same components identified in 1[pre]. EX1004, ¶12; EX1003, ¶¶120-122; EX1006, 1.

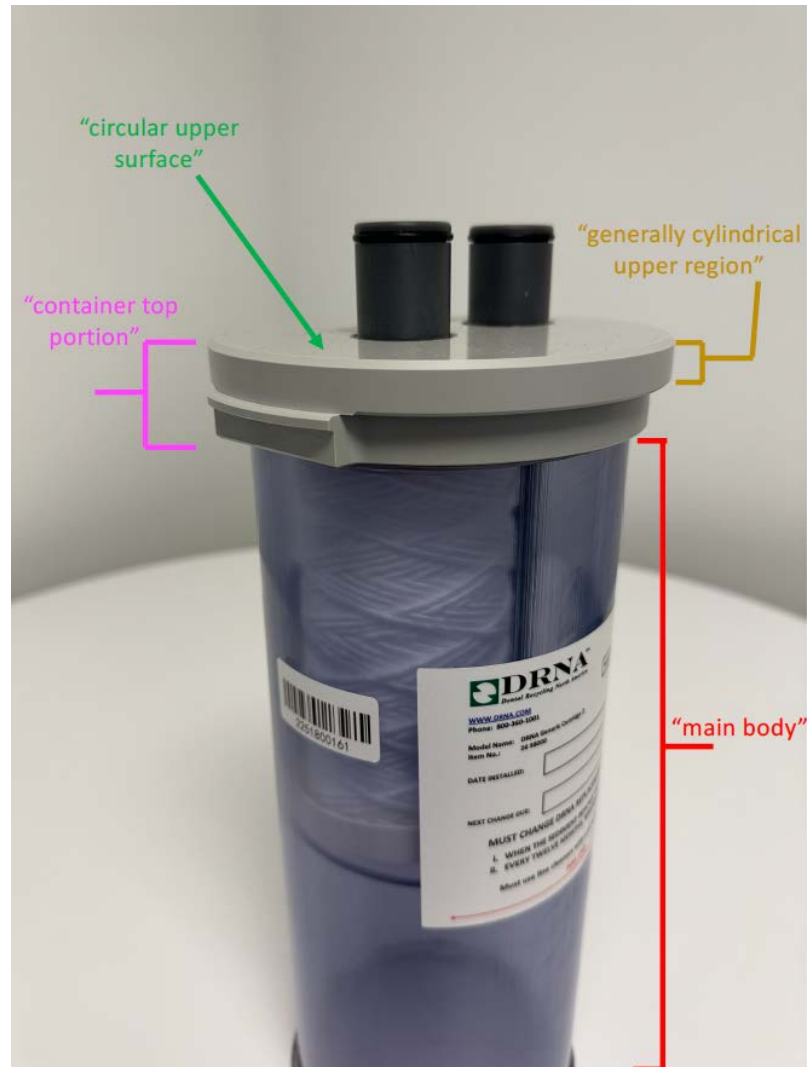
For the same reasons as in 1[pre], it would have been obvious to combine Cartridge 2 with NXT System because Cartridge 2 is designed to be used with NXT System. EX1003, ¶123.

- 2. 12[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”**

See 1[a]. EX1003, ¶124.

3. **12[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the upper surface than the container outlet port, the container inlet port and the container outlet port both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable dental-amalgam container and the dental amalgam separation system while the vacuum source acts upon the dental amalgam separation system to move fluid from the dental amalgam effluent toward the system outlet,”**

Cartridge 2 discloses this limitation. As depicted below, Cartridge 2 has a “container top portion” located at the top of the “main body.” The “container top portion” has a “generally cylindrical upper region” with a “circular upper surface.” EX1004, ¶¶16-17; EX1003, ¶125.



As shown from a different angle, from the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface. EX1004, ¶¶16-17; EX1003, ¶126. The “container inlet port” and “container outlet port” both include an external rubber “O-ring” that helps create a seal between Cartridge 2 and NXT System while the vacuum acts upon the system. EX1003,

¶127.



1. 12[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure defining a pin-receiving region therebelow for receiving the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward from the periphery of the upper surface;”

The “container top portion” includes a “radially protruding structure” that is located below the “generally cylindrical upper region.” For the same reasons as in

1[b], a POSA would POSA would have understood or found it obvious that the “radially protruding structure” the bottom of which is a pin-receiving region used for engaging a retaining pin of the dental amalgam separation system. EX1004, ¶18; EX1003, ¶128.



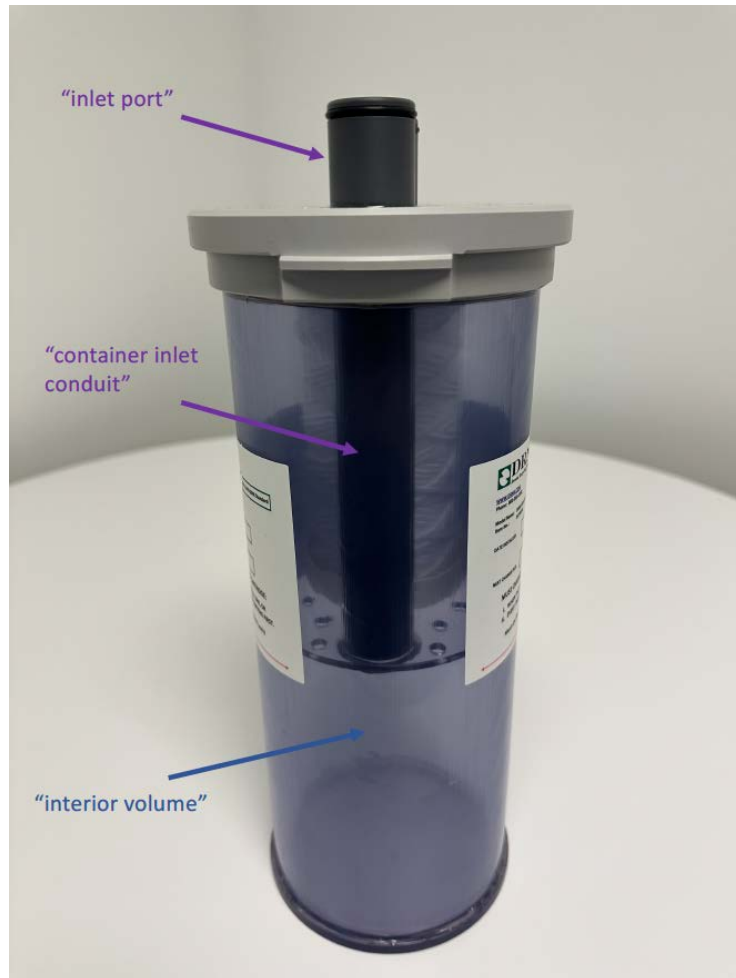
Furthermore, the “radially protruding structure” extends radially outward from the periphery of the “circular upper surface,” as shown below. EX1003, ¶129.



2. 12[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and”

Cartridge 2 discloses this limitation. Cartridge 2 has a “container inlet conduit” connected to the “container inlet port.” The “container inlet conduit” extends down into the “interior volume” from the “container top portion.”

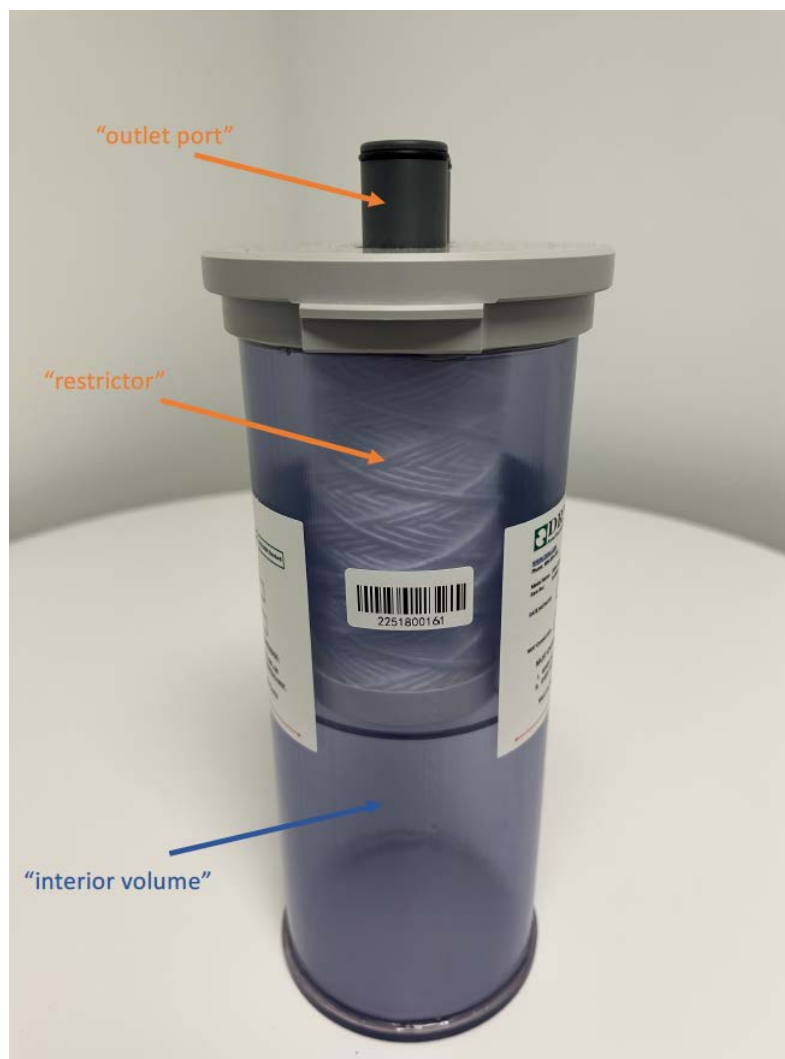
EX1004, ¶16; EX1003, ¶130.



A POSA would have understood or it would have been obvious that the inlet port and conduit are for transferring dental amalgam effluent from the air-water separation tank of NXT system *into* the interior volume of Cartridge 2 for the reasons in 1[c]. EX1003, ¶130.

3. 12[d]: “wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system.”

Cartridge 2 discloses this limitation. The “container outlet port” is coupled to an outlet port on NXT System, which has a vacuum source, that suctions effluent from the main body of the container and out the outlet port. EX1004, ¶17; EX1003, ¶131.



H. 17: “The detachable dental-amalgam container of claim 15, wherein the flange includes a curved outer surface.”

As shown below, the “flange” is curved on the outer surface, similar to the curved surface of the Cartridge 2. EX1003, ¶135; EX1004, ¶18.



I. Claim 18

- 1. 18[pre]: “A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, a system outlet, a vacuum source for moving-fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”**

If the preamble is not limiting, Cartridge 2 renders obvious this limitation because Cartridge 2 is a “detachable container.” EX1004, ¶12; EX1003, ¶136.

If the preamble is limiting, Cartridge 2 with NXT System renders obvious this limitation. Cartridge 2 is a detachable container for use with the Solmetex NXT System, which is a dental amalgam separation system with the same components identified in 1[pre]. EX1004, ¶12; EX1003, ¶¶137-39; EX1006, 1.

As in 1[pre], it would have been obvious to combine Cartridge 2 with NXT System because Cartridge 2 is designed to be used with NXT System. EX1003, ¶140.

- 2. 18[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the dental amalgam separation system;”**

See 1[a]. EX1003, ¶141.

3. **18[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”**

Cartridge 2 discloses this limitation. As depicted below, Cartridge 2 has a “container top portion” located at the top of the “main body.” The “container top portion” has a “generally cylindrical upper region” with a “circular upper surface.” EX1004, ¶17; EX1003, ¶142.



As shown from a different angle, from the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface.
EX1004, ¶17; EX1003, ¶143.



1. 18[b2]: “the container top portion further including at least one radially protruding structure located below the upper generally cylindrical region, the at least one radially protruding structure having a lower surface under which the at least one retaining pin of the dental amalgam separation system is received to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward relative to the periphery of the circular upper surface; and”

The “container top portion” includes a “radially protruding structure” that is located below the “generally cylindrical upper region.” As in 1[b], A POSA would have understood or found it obvious that the “radially protruding structure” has a

lower surface under which a retaining pin of the dental amalgam separation system is engaged to make sure Cartridge 2 does not become detached from NXT System.

EX1004, ¶18; EX1003, ¶144.

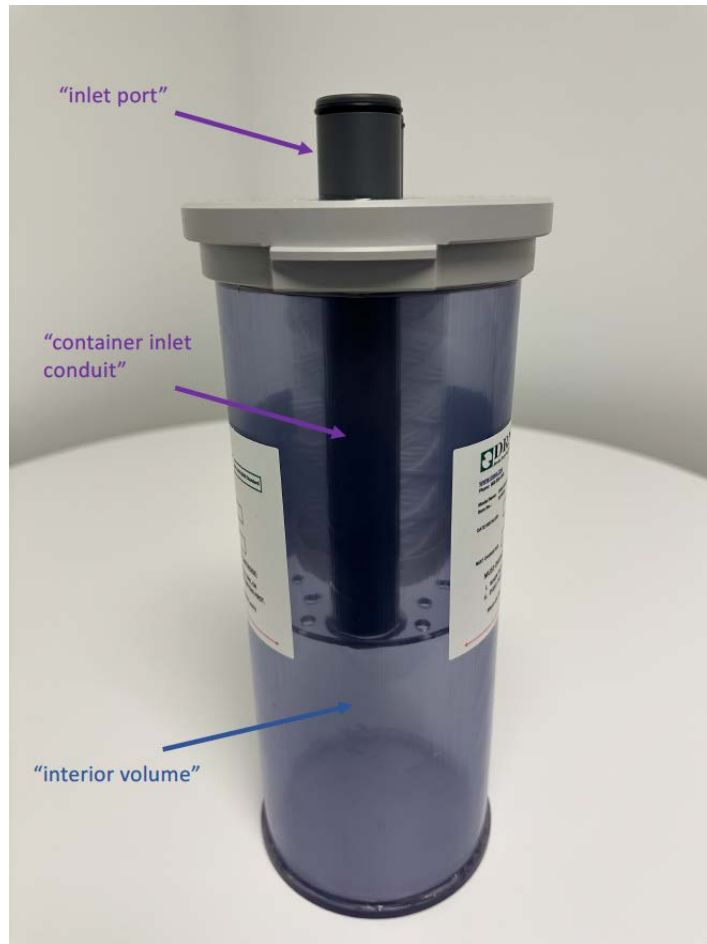


Furthermore, the “radially protruding structure” extends radially outward relative to the periphery of the “circular upper surface,” as shown below. EX1004, ¶18; EX1003, ¶145.



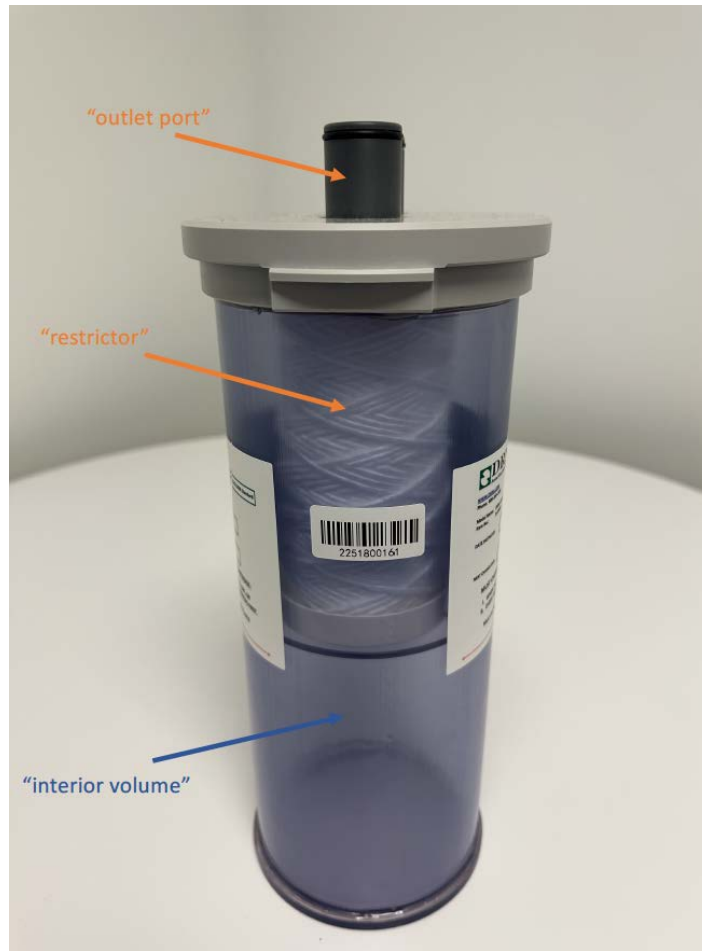
2. **18[c]: “wherein the container inlet port is configured to transfer the dental amalgam effluent that is received by the system inlet into the interior volume of the main body; and”**

Cartridge 2 discloses this limitation. A POSA would have understood or it would have been obvious that, as the word “inlet” implies, the “**container inlet port**” is for transferring dental amalgam effluent from the NXT system *into* the interior volume of Cartridge 2. EX1004, ¶17; EX1003, ¶146.



3. **18[d]: “wherein the container outlet port is configured to be coupled to the system outlet port such that fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting on the dental amalgam separation system.”**

Cartridge 2 discloses this limitation. The “**container outlet port**” is coupled to an outlet port on NXT System, which has a vacuum source, that suctions effluent from the main body of the container and out the outlet port. EX1004, ¶17; EX1003, ¶147.



J. Claims 15 and 20:

These claims are invalid for the reasons already set forth above according to the following mapping:

Claim	Corresponding analysis
15	See claim 8. EX1003, ¶133.
20	See claims 15 and 17. EX1003, ¶148.

VII. GROUNDS 3 AND 4 – CLAIMS 1, 3-22 ARE ANTICIPATED BY SOLMETEX NXT CONTAINER, OR, IN THE ALTERNATIVE, RENDERED OBVIOUS BY NXT CONTAINER ALONE OR IN

COMBINATION WITH NXT SYSTEM

A. Claim 1

1. **1[pre]: “A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”**

If the preamble is not limiting, NXT Container renders obvious this limitation because NXT Container is a “detachable dental-amalgam container.” EX1003, ¶149.

If the preamble is limiting, NXT Container with NXT System renders obvious this limitation. NXT Container is a detachable dental-amalgam container for use with the Solmetex NXT System, which is a dental amalgam separation system. EX1003, ¶¶150-151; EX1008, 2-4.



EX1008, 2 (Solmetex Procedure Document). As shown above, NXT System has a system inlet (“inlet from operatories”), air-water separation tank for holding the dental amalgam effluent received from the system inlet (“air water separator”), system outlet (“outlet to vacuum”), vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet (“vacuum” not pictured), and retaining pins that hold the dental-amalgam container in place. EX1003, ¶152.

It would have been obvious to combine NXT Container with NXT System because NXT Container is designed to be used with NXT System and is even sold with NXT System. EX1008, 2; EX1003, ¶153; EX1025 (showing NXT Container is sold with NXT System); EX1026 (manual explaining how to attach NXT Container to NXT System); EX1027 (video explaining same); EX1028 (providing

contact information for customers).

2. **1[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”**

NXT Container has a “**main body**” with a “**central axis**” as depicted in the annotated picture below. The main body includes an “**interior volume**” for receiving dental amalgam effluent from the air-water separation tank of a Solmetex NXT system. EX1003, ¶154.



3. **1[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”**

NXT Container discloses this limitation. As depicted below, NXT

Container has a “**container top portion**” located at the top of the “**main body**.” The “**container top portion**” has a “**generally cylindrical upper region**” with a “**circular upper surface**.” EX1003, ¶155.



As shown from a different angle, from the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface.

EX1003, ¶156.



1. **1[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure for engaging the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system when there is no pressure being applied from the vacuum source, the at least one radially protruding structure being located radially outward relative to the periphery of the circular upper surface;”**

The “**container top portion**” includes a “**radially protruding structure**” that is located below the “**generally cylindrical upper region.**” A POSA would have understood that the “**radially protruding structure**” is used for engaging a retaining pin of the dental amalgam separation system. The instructions for replacing an NXT Container tell the user to “[i]nsert two (2) retaining pins into their holes on each side of collection container until seated.” EX1008, 4. NXT Container instructions state that there is only one alignment that NXT Container can be connected to NXT System. EX1008, 3 (“The collection container can be installed only one way. Note the alignment of the fittings on the collection container with the receiver holes in the upper unit.”). A POSA would have therefore understood that the “**radially protruding structure**” engages the retaining pin because the “**radially protruding structure**” would be located in the correct position when aligned correctly. EX1003, ¶157.

In the alternative, it would have been obvious to a POSA that the “**radially**

“protruding structure” on NXT Container is for engaging the retaining pins for the same reasons and based upon the same instructions. EX1003, ¶158.



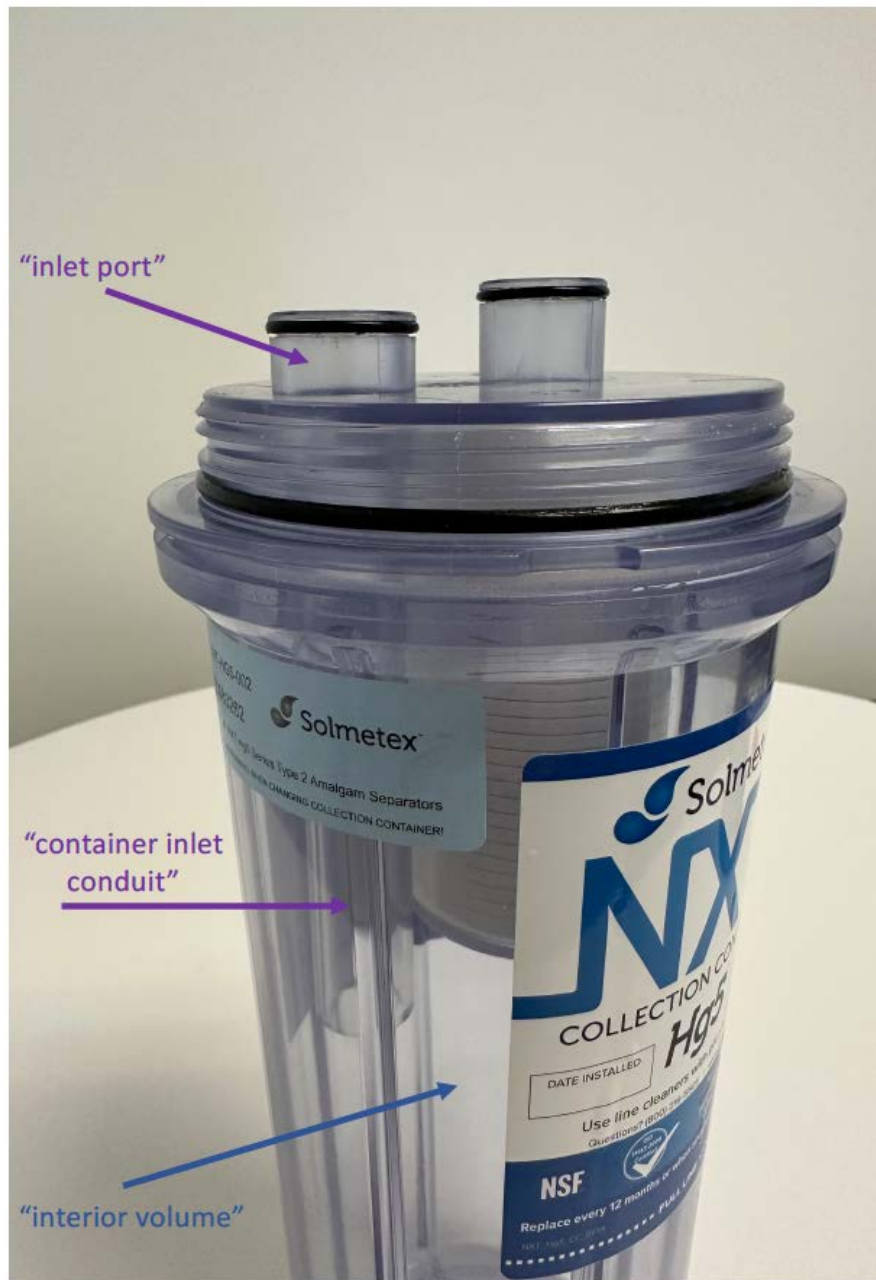
Furthermore, the “radially protruding structure” extends radially outward relative to the periphery of the “circular upper surface,” as shown below. EX1003,

¶159.



2. 1[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and”

NXT Container discloses this limitation. NXT Container has a “container inlet conduit” connected to the “container inlet port.” The “container inlet conduit” extends down into the “interior volume” from the “container top portion.” EX1003, ¶160.



A POSA would have understood or it would have been obvious that the inlet port and conduit are for transferring dental amalgam effluent from the air-water separation tank of NXT System *into* the interior volume of NXT Container because, when connected to NXT System, a POSA could see the liquid flowing

into NXT Container through the inlet port and conduit. EX1003, ¶161.

Furthermore, the vacuum source is attached to the other port so a POSA would have understood that the wastewater flows out the other port and naturally would have understood that amalgam comes in the other port. *Id.*

3. **1[d]: “a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is moved toward the container outlet port due to the vacuum source.”**

NXT Container discloses this limitation. NXT Container has a filter or “restrictor” located inside the main body of NXT Container that restricts amalgam from flowing out of NXT Container. In other words, the “restrictor” prevents fine particles of amalgam from flowing out the outlet port as fluid is sucked out by the vacuum source. The “restrictor” is fluidically coupled to the “container outlet port” because fluid must flow through the “restrictor” to get to the “container outlet port.” EX1003, ¶162.



- B. 3: “The detachable dental-amalgam container of claim 1, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container.”**

As shown below, NXT Container comes with plugs to seal the “**container inlet port**” and “**container outlet port**” after the container is filled. The plugs are just inserted into the ports so the container may be transported without spillage. EX1003, ¶163. The user is instructed to push “two red plugs into top of spent collection container.” EX1008, 4.





- C. 4: “The detachable dental-amalgam container of claim 3, further including a cap configured to retain at least one of the plugs on the filled detachable dental-amalgam container.”**

As shown below, NXT Container comes with a detachable cap that may be screwed onto the container top portion and retain or hold the plugs in place after the container is filled. The user is instructed to push “two red plugs into top of spent collection container” and then screw the cap “down tightly to the point where the O-ring seal is no longer visible and the cap is flush against the collection

container.” EX1008, 4. This further ensures the plugs do not come loose and no spillage will occur. EX1003, ¶164.

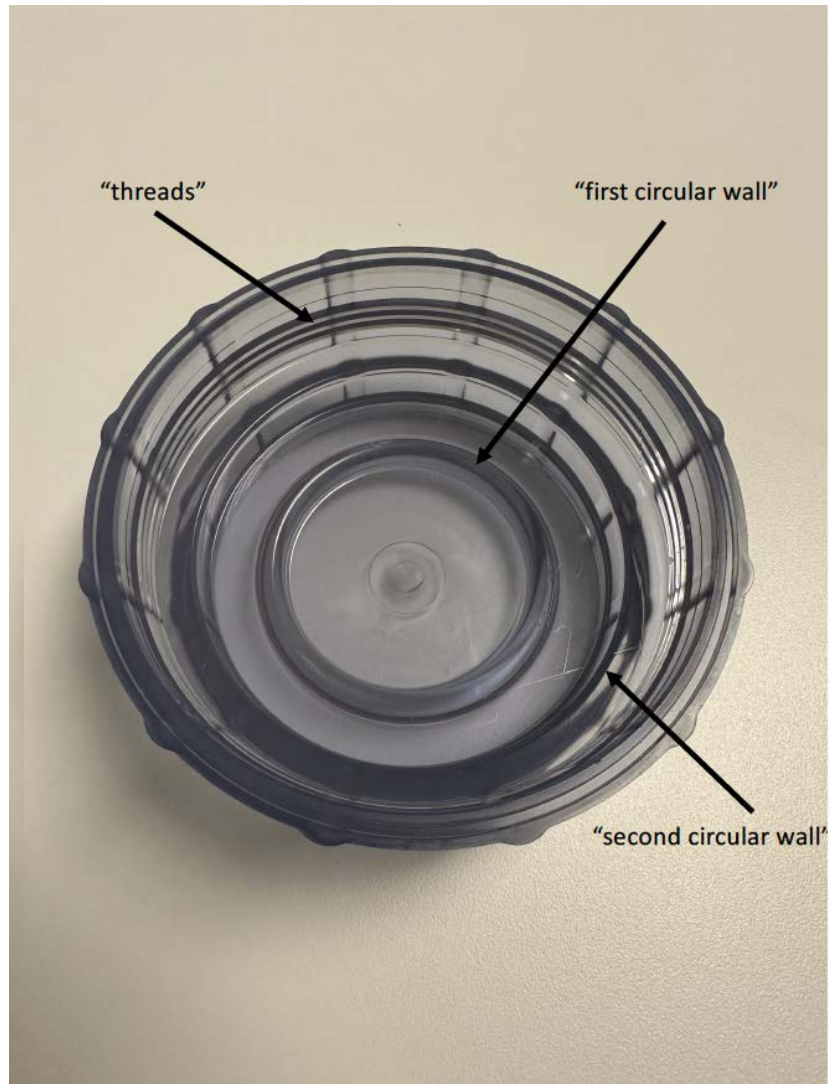




- D. 5: “The detachable dental-amalgam container of claim 4, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.”**

As shown below, the cap for NXT Container has two circular walls of different heights. The first circular wall, which is toward the outside of the cap, is

a little bit larger and is placed so as to engage the inlet port, which is toward the outside of the top surface and is a little smaller than the outlet port. EX1003, ¶165. The second circular wall, which is toward the inside of the cap, is a little bit smaller and is placed to engage the outlet port, which is toward the inside of the top surface and is a little taller than the inlet port. EX1003, ¶165. The user is instructed to push “two red plugs into top of spent collection container” and then screw the cap “down tightly to the point where the O-ring seal is no longer visible and the cap is flush against the collection container.” EX1008, 4.





- E. 6: “The detachable dental-amalgam container of claim 1, wherein the container top portion has a maximum outer dimension that is greater than a maximum outer diameter of the main body.”**

As shown below, the “container top portion” has a larger outer dimension (i.e., circumference) than the outer dimension of the “main body” because the “container top portion” extends outside the diameter of the “main body.” EX1003, ¶166.



- F. 7: “The detachable dental-amalgam container of claim 1, wherein the container outlet port is configured for fluidic coupling to the system outlet of the dental amalgam separation system that transfers fluid from the dental amalgam effluent to a municipal water disposal system.”**

NXT Container discloses this limitation. A POSA would have understood that the container outlet port, as the name implies, is for fluid that flows out of NXT Container, into the system outlet of NXT System, and then to a municipal

water disposal system. EX1003, ¶167. Alternatively, it would have been obvious to a POSA that the fluid that flows out of the container outlet port gets pulled out to the system outlet of NXT System and sent to the municipal water disposal system. That was the entire point of the dental-amalgam separation system: to prevent heavy metals—e.g., mercury—from entering the municipal water system. EX1003, ¶168.

- G. 8: “The detachable dental-amalgam container of claim 1, wherein the at least one radially protruding structure includes a flange extending in a direction away from the generally cylindrical upper region.”**

The “[radially protruding structure](#)” includes a “[flange](#),” or flat rim, that extends outward from the upper region of the container, as shown below. EX1003, ¶169.



H. 9: “The detachable dental-amalgam container of claim 8, wherein the flange extends entirely around the container top portion.”

As shown below, the “flange” extends entirely around the container top portion. EX1003, ¶170.



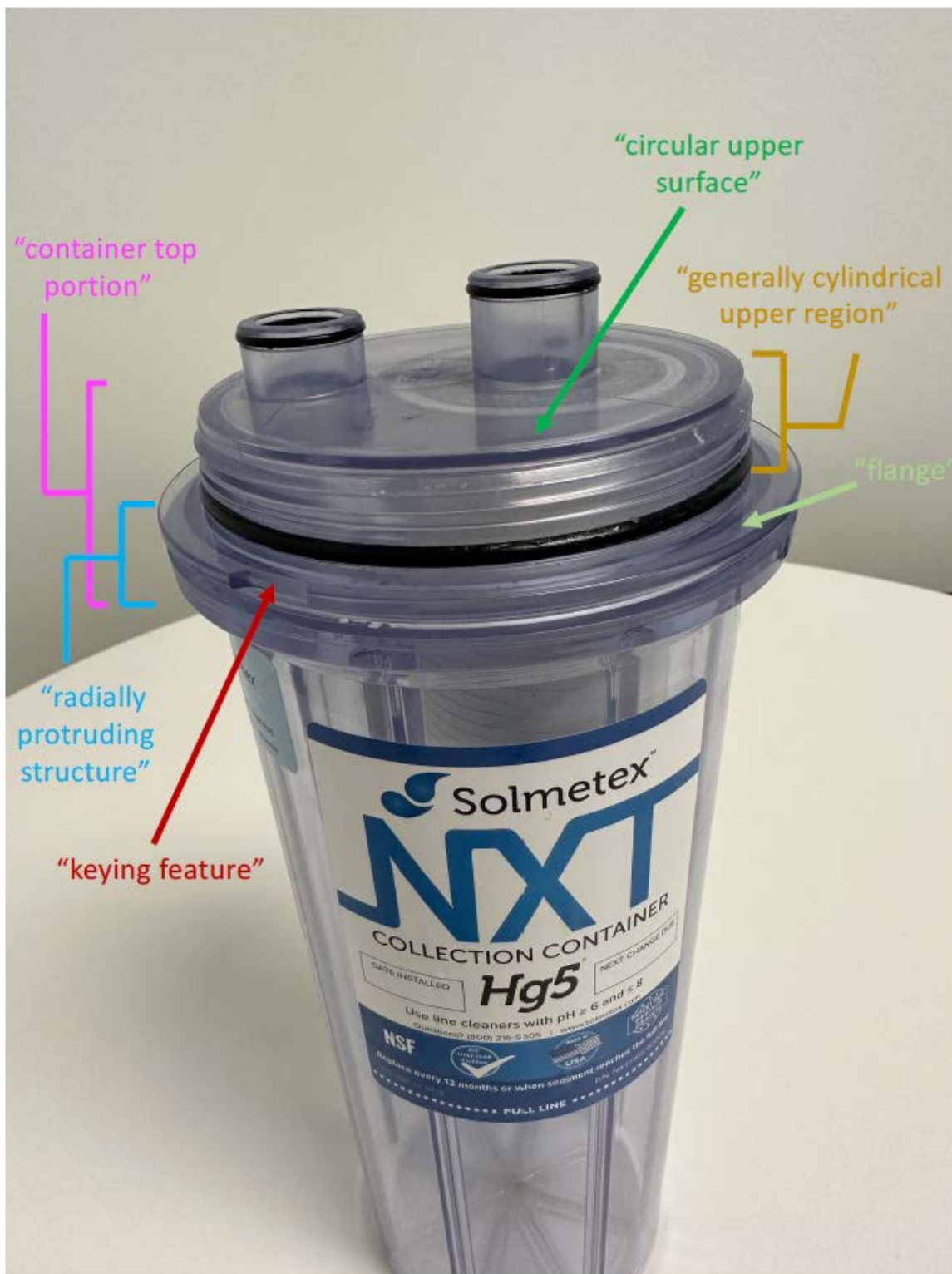
- I. **10: “The detachable dental-amalgam container of claim 1, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region and being outside the periphery of the circular upper surface, the detachable dental-amalgam container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.”**

NXT Container discloses this limitation. As shown below, the “**container top portion**” includes a “**keying feature**” that is used for mating the container securely with a corresponding “**keying feature**” of the NXT System. EX1003, ¶171; EX1008, 3 (“The collection container can be installed only one way. Note the alignment of the fittings on the collection container with the receiver holes in the upper unit.”). This “**keying feature**” is a recess, or notch, in the “**flange**,” which is located below the “**generally cylindrical upper region**” and is outside the periphery of the “**circular upper surface**.” EX1003, ¶171.



J. 11: “The detachable dental-amalgam container of claim 10, wherein the keying feature includes a recess formed in an outermost periphery of the container top portion.”

NXT Container discloses this limitation. As shown below, the “keying feature” is a recess formed in the “flange,” which is the outermost periphery of the “container top portion.” EX1003, ¶172.



This is just like the “irregular keyways 23” that are depicted, but never explained, in Figure 10A of the ’175 patent. EX1003, ¶173.

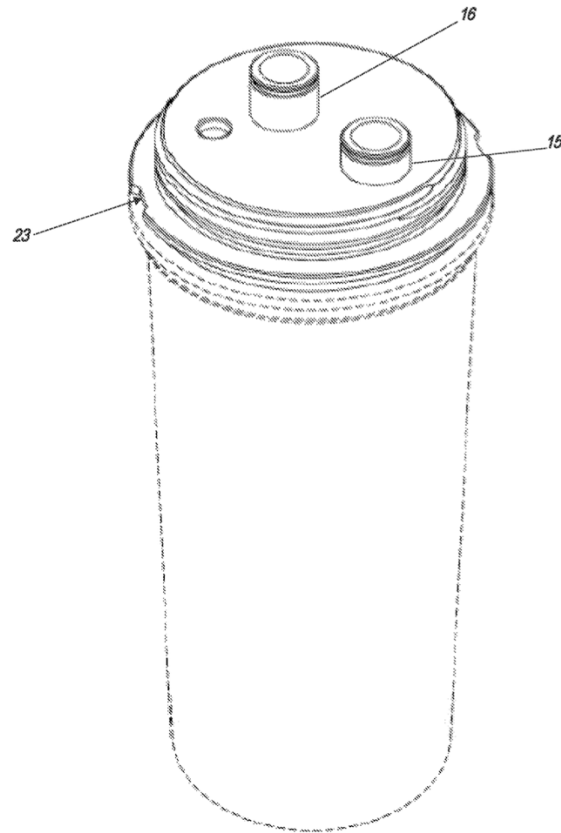


FIGURE 10A

K. Claim 12

1. 12[pre]: “A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source for moving fluid from the dental amalgam effluent through the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”

If the preamble is not limiting, NXT Container renders obvious this limitation because NXT Container is a “detachable dental-amalgam container.”

EX1003, ¶174.

If the preamble is limiting, NXT Container with NXT System renders obvious this limitation. NXT Container is a detachable dental-amalgam container for use with the Solmetex NXT System, which is a dental amalgam separation system with the same components identified in 1[pre]. EX1003, ¶175; EX1008, 2-4.

As in 1[pre], it would have been obvious to combine NXT Container with NXT System. EX1003, ¶¶176-178.

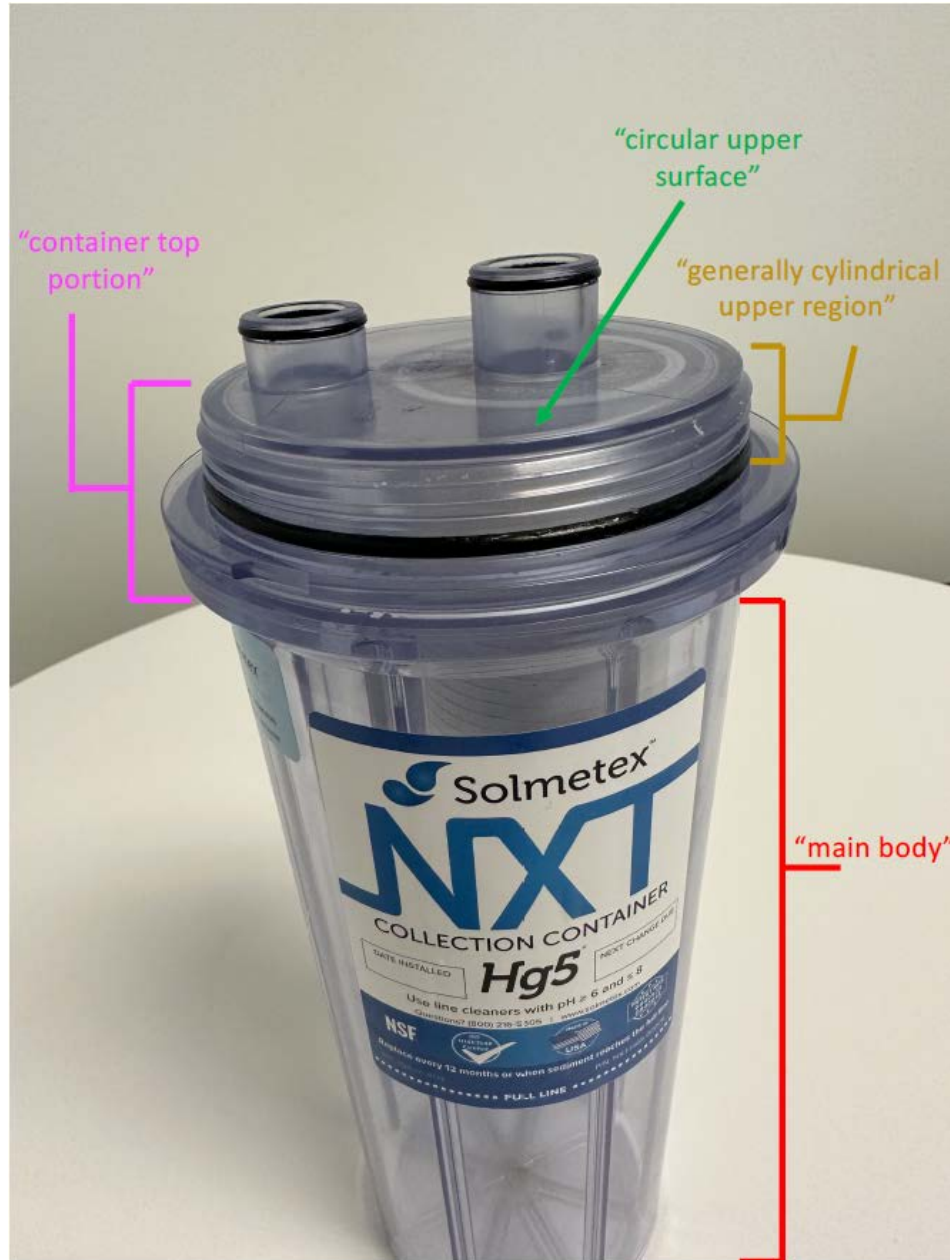
2. **12[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”**

See 1[a]. EX1003, ¶179.

3. **12[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the upper surface than the container outlet port, the container inlet port and the container outlet port both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable dental-amalgam container and the dental amalgam separation system while the vacuum source acts upon the dental amalgam separation system to move fluid from the dental amalgam effluent toward the system outlet,”**

NXT Container discloses this limitation. As depicted below, NXT

Container has a “container top portion” located at the top of the “main body.” The “container top portion” has a “generally cylindrical upper region” with a “circular upper surface.” EX1003, ¶180.



As shown from a different angle, from the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main

body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface.

EX1003, ¶181. The “container inlet port” and “container outlet port” both include an external rubber “O-ring” that helps create a seal between NXT Container and NXT System while the vacuum acts upon the system. EX1003, ¶181.



4. **12[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure defining a pin-receiving region therebelow for receiving the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward from the periphery of the upper surface;”**

The “**container top portion**” includes a “**radially protruding structure**” that is located below the “**generally cylindrical upper region.**” As in 1[b], a POSA would have understood or found it obvious that the “**radially protruding structure**” has a pin-receiving region toward the bottom that is used for engaging a retaining pin of the dental amalgam separation system to prevent it from becoming detached.

EX1003, ¶182.



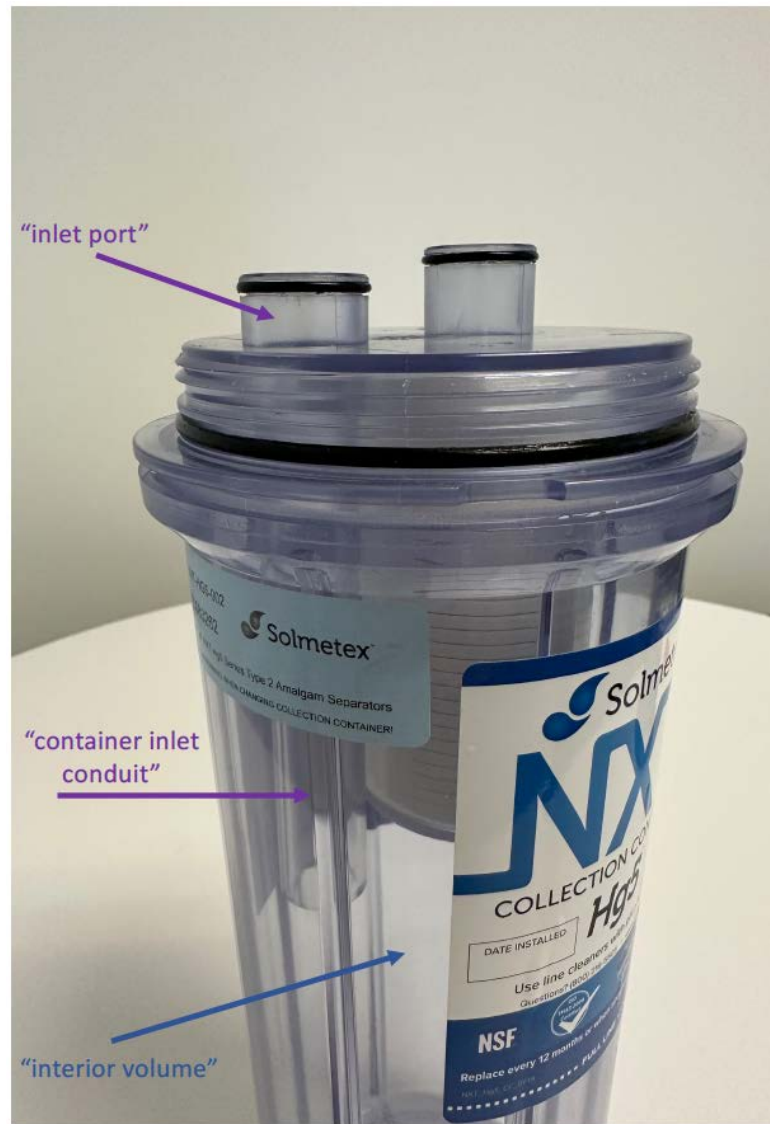
Furthermore, the “radially protruding structure” extends radially outward from the periphery of the “circular upper surface,” as shown below. EX1003,

¶183.



5. **12[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and”**

NXT Container discloses this limitation. NXT Container has a “container inlet conduit” connected to the “container inlet port.” The “container inlet conduit” extends down into the “interior volume” from the “container top portion.” EX1003, ¶184.



A POSA would have understood or it would have been obvious that the inlet port and conduit are for transferring dental amalgam effluent from the air-water separation tank of NXT System *into* the interior volume of Cartridge 2 for the same reasons as 1[c]. EX1003, ¶185.

6. 12[d]: “wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system.”

NXT Container discloses this limitation. The “container outlet port” is coupled to an outlet port on NXT System, which has a vacuum source, that suctions effluent from the main body of the container and out the outlet port.

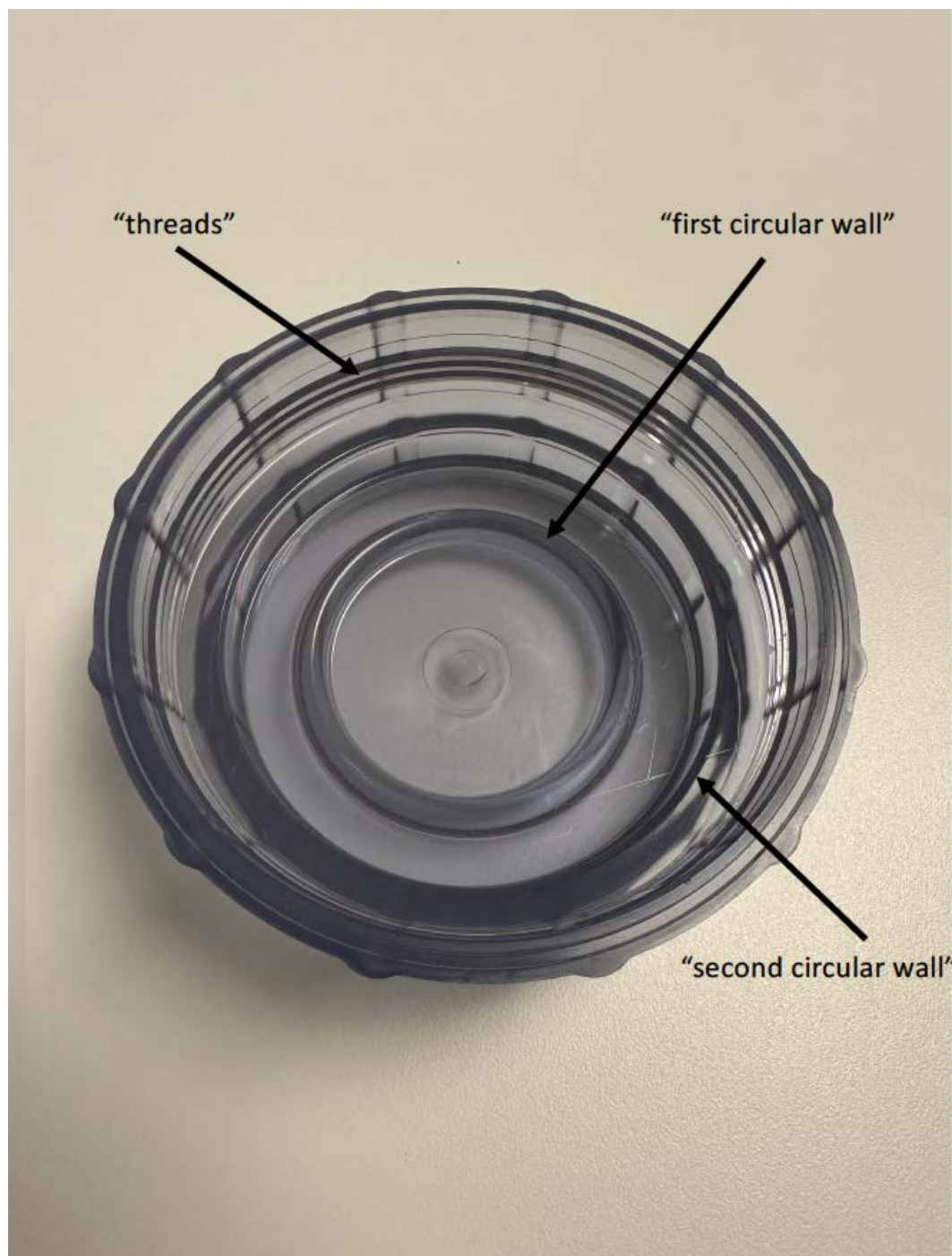
EX1003, ¶¶186-187.



- L. 14: “The detachable dental-amalgam container of claim 13, wherein the cap has internal threads that threadably mate with corresponding threads on the generally cylindrical upper region of the container top portion to retain the pair of plugs on the detachable dental-amalgam container.”

As depicted below the cap that comes with NXT Container includes internal threads that screw on (“threadably mate”) with corresponding threads on the

container top portion. Screwing the cap onto the container retains the plugs in the ports on a filled container. EX1008 (“[P]lace recycle cap onto collection container and screw down tightly to the point where the O-ring seal is no longer visible and the cap is flush against the collection container.”); EX1003, ¶189.







**M. 17: “The detachable dental-amalgam container of claim 15,
wherein the flange includes a curved outer surface.”**

As shown below, the “flange” is curved on the outer surface all the way
around the curve surface of NXT Container. EX1003, ¶192.



N. Claim 18

- 1. 18[pre]: “A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, a system outlet, a vacuum source for moving-fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”**

If the preamble is not limiting, NXT Container renders obvious this limitation because NXT Container is a “detachable container.” EX1003, ¶193.

If the preamble is limiting, NXT Container with NXT System renders obvious this limitation. NXT Container is a detachable container for use with the Solmetex NXT System, which is a dental amalgam separation system with the same components identified in 1[pre]. EX1003, ¶¶194-196; EX1008, 2-4.

As in 1[pre], it would have been obvious to combine NXT Container with NXT System. EX1003, ¶¶197.

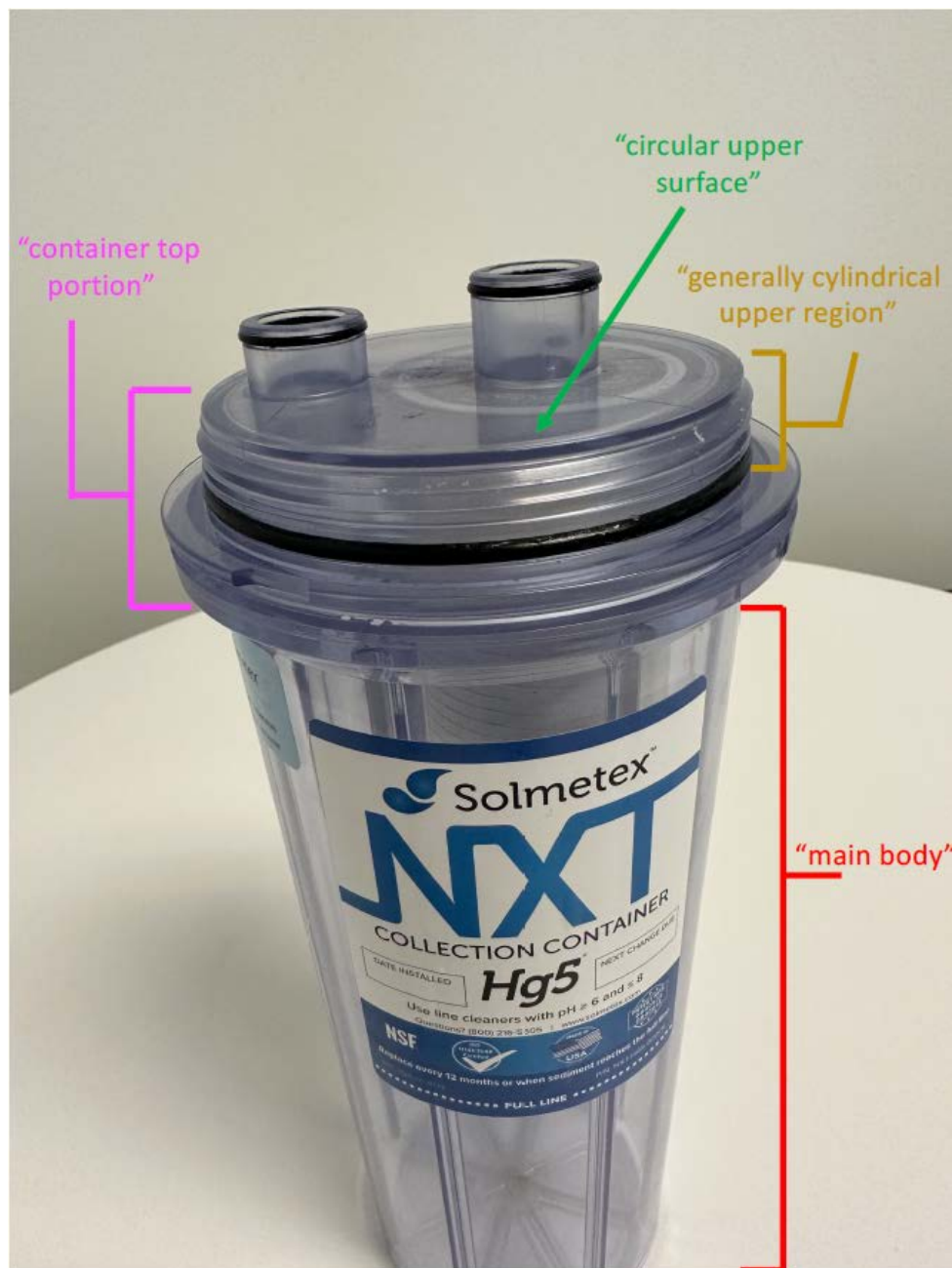
- 2. 18[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the dental amalgam separation system;”**

See 1[a]. EX1003, ¶198.

3. **18[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”**

NXT Container discloses this limitation. As depicted below, NXT

Container has a “**container top portion**” located at the top of the “**main body**.” The “**container top portion**” has a “**generally cylindrical upper region**” with a “**circular upper surface**.” EX1003, ¶199.



As shown from a different angle, from the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface.

EX1003, ¶200.

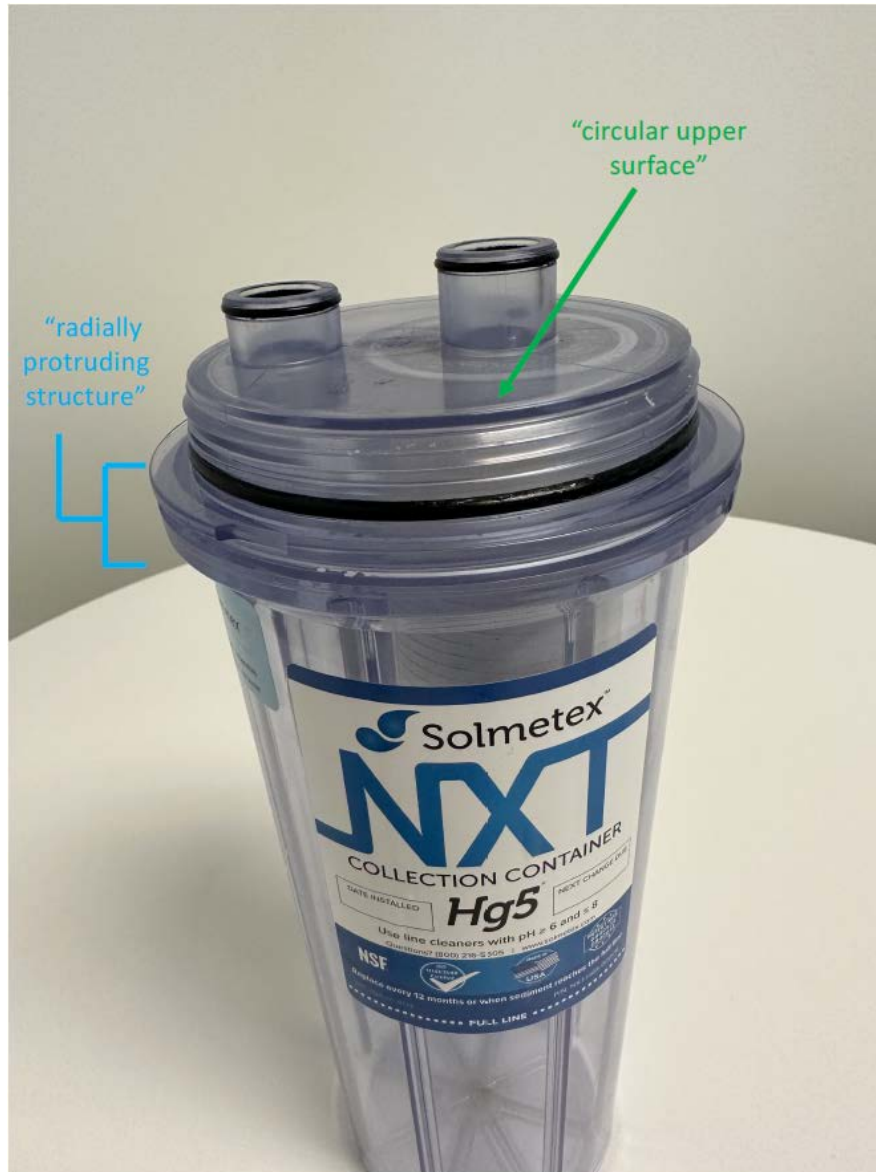


4. **18[b2]: “the container top portion further including at least one radially protruding structure located below the upper generally cylindrical region, the at least one radially protruding structure having a lower surface under which the at least one retaining pin of the dental amalgam separation system is received to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward relative to the periphery of the circular upper surface; and”**

The “**container top portion**” includes a “**radially protruding structure**” that is located below the “**generally cylindrical upper region.**” As in 1[b], POSA would have understood or found obvious that the “**radially protruding structure**” is used for engaging a retaining pin of the dental amalgam separation system so the container does not detach from the system. EX1003, ¶201.

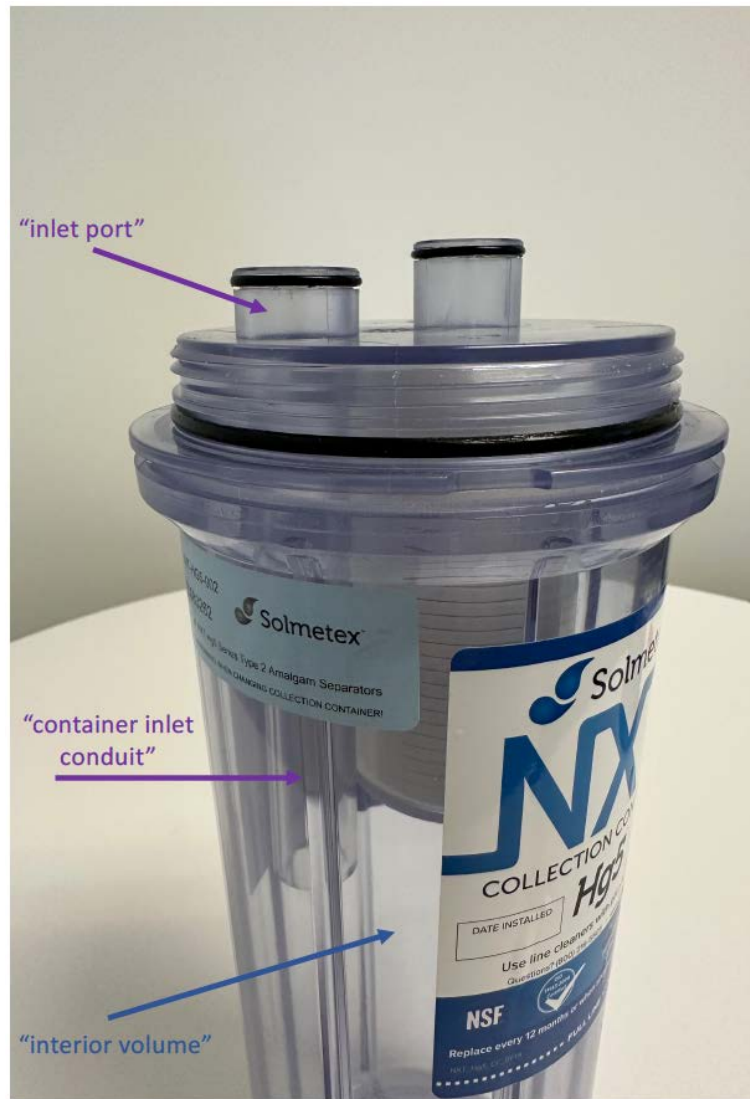


Furthermore, the “radially protruding structure” extends radially outward relative to the periphery of the “circular upper surface,” as shown below. EX1003, ¶202.



5. 18[c]: “wherein the container inlet port is configured to transfer the dental amalgam effluent that is received by the system inlet into the interior volume of the main body; and”

NXT Container discloses this limitation. A POSA would have understood or it would have been obvious that, as the word “inlet” implies, the container inlet port” is for transferring dental amalgam effluent from the NXT system *into* the interior volume of NXT Container. EX1003, ¶¶203-204.



6. **18[d]: “wherein the container outlet port is configured to be coupled to the system outlet port such that fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting on the dental amalgam separation system.”**

NXT Container discloses this limitation. The “**container outlet port**” is coupled to an outlet port on NXT System, which has a vacuum source, that

suctions effluent from the main body of the container and out the outlet port.

EX1003, ¶205.



O. Claims 13, 15-16, 19-22:

These claims are invalid for the reasons already set forth above according to the following mapping:

Claim	Corresponding analysis
13	See claim 5. EX1003, ¶188.
15	See claim 8. EX1003, ¶190.
16	See claim 9. EX1003, ¶191.
19	See claim 10. EX1003, ¶206.
20	See claims 15 and 17. EX1003, ¶207.
21	See claim 9. EX1003, ¶208.
22	See claim 13. EX1003, ¶209.

VIII. GROUND 5 – CLAIMS 1-3, 6-8, 10, 12, 15, 17-20 ARE ANTICIPATED BY LIU, OR, IN THE ALTERNATIVE, RENDERED OBVIOUS BY LIU ALONE

Liu discloses a strikingly similar dental-amalgam separation system to the '175 patent. EX1003, ¶¶210.

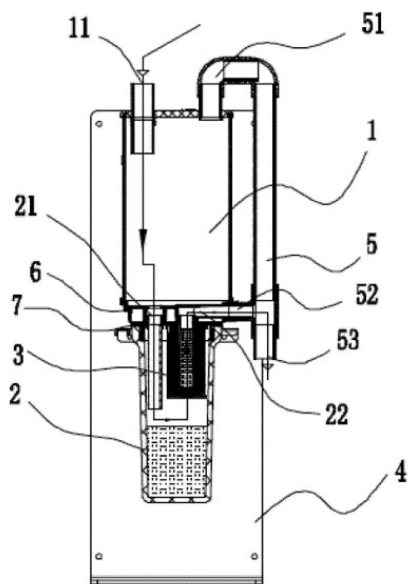


Figure 2 of Liu

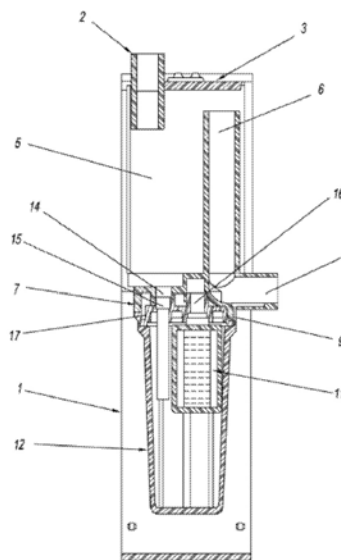


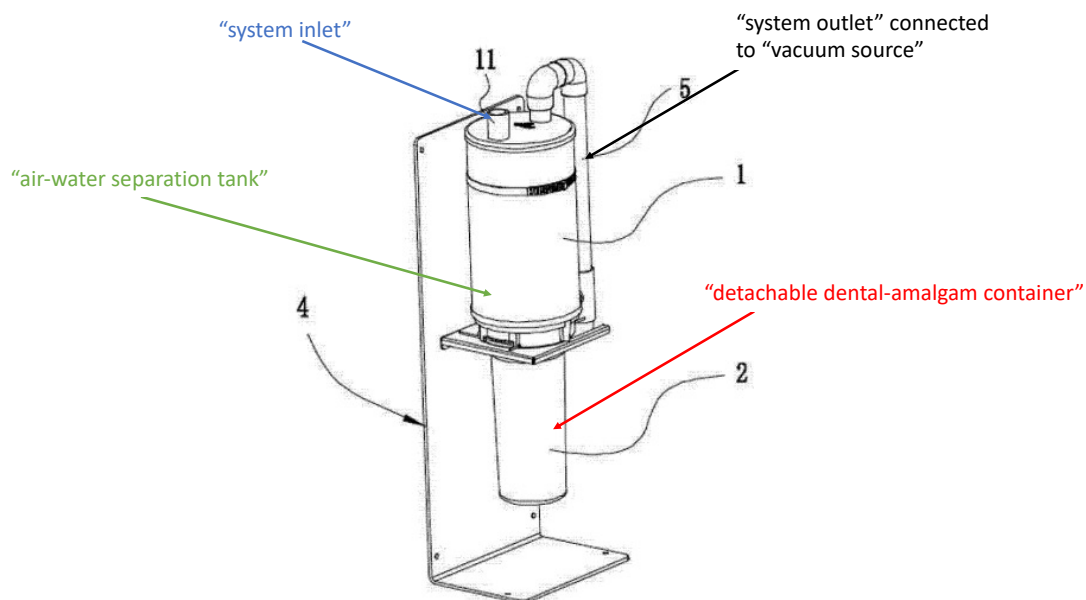
Figure 1 of '175 patent

A. Claim 1

1. 1[pre]: “A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”

Liu renders this limitation obvious. Liu discloses an entire “heavy metal separation device” (dental-amalgam separation system), including a detachable container. EX1010, Abstract. As detailed in Figure 1 below, that system includes a detachable “heavy metal receiving bottle 2” (detachable dental-amalgam container) that may be removed and replaced. *Id.*, ¶22. That detachable container

is part of a “heavy metal separation device” (dental amalgam separation system) that has a “sewage water inlet 11” (system inlet); “collection tank 1,” (air-water separation tank for holding dental amalgam effluent received from the system inlet); “suction pipe 5” (system outlet); and “negative pressure suction machine” (vacuum source acting on the system outlet for moving fluid from the dental amalgam effluent toward the system outlet). *Id.*, ¶¶17-21; EX1003, ¶211.



To hold the detachable receiving bottle to the rest of the device, Liu discloses a “second sealed connector 7 in the form of an interface” on the detachable bottle that are “fastened by a buckle.” *Id.*, ¶18. A POSA would have understood that the buckle disclosed in Liu is a type of “retaining pin 13” as depicted in the ’175 patent in Figure 2. EX1003, ¶¶212.

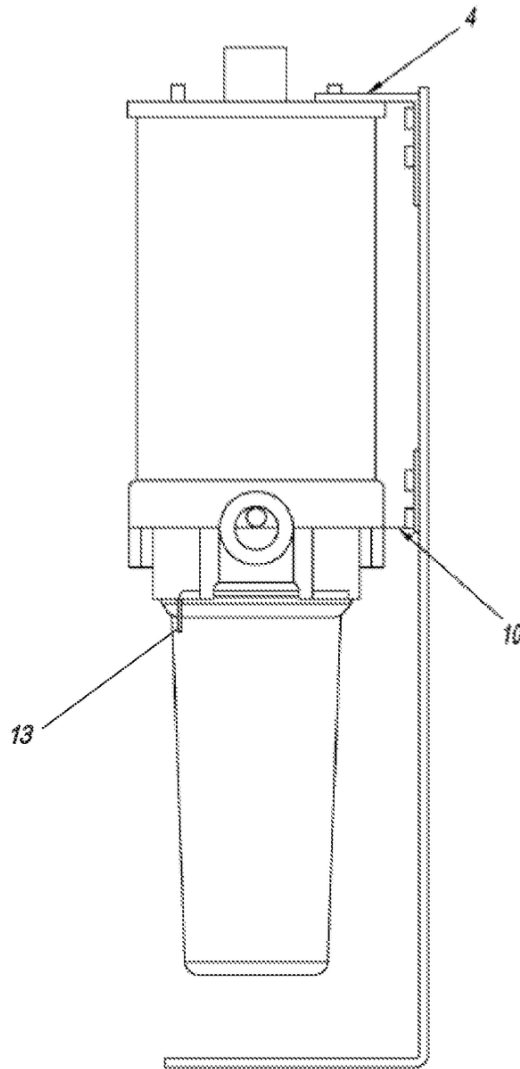


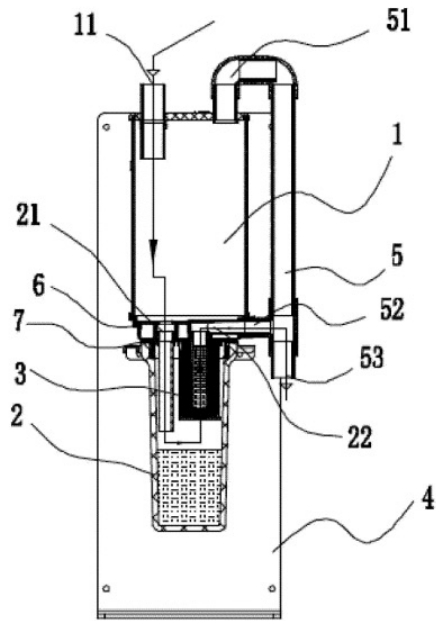
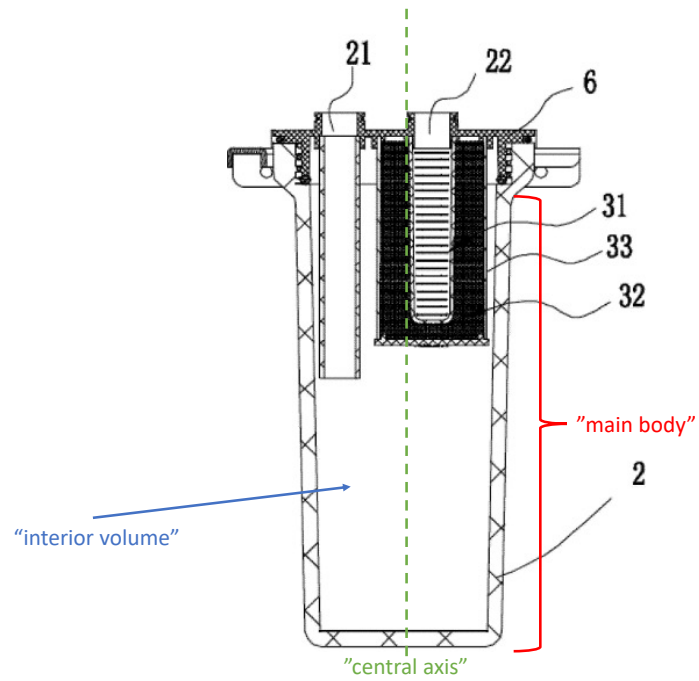
FIG. 2

In the alternative, it would have been obvious to a POSA that the “buckle” disclosed in Liu could have been replaced by retaining pin that is engaged under the “second sealed connector 7.” EX1003, ¶213. There are only a finite number of fastening structures that can be used to connect a disposable container to the rest of the system and a POSA would have recognized that, in addition to the buckle disclosed in Liu, a retaining pin could have also been used. Retaining pins were

well-known in the field. *E.g.*, EX1011, 10. Furthermore, a POSA would have been motivated to try using a retaining pin because they could be produced more cheaply than a buckle and could be easily replaced if the pin rusts (due to exposure to moisture from the tank) or otherwise get damaged. EX1003, ¶213. It would have been obvious to a POSA that replacement of rusty or damaged pins would be important in a system like this that involves liquid and frequent changes. *See id.*

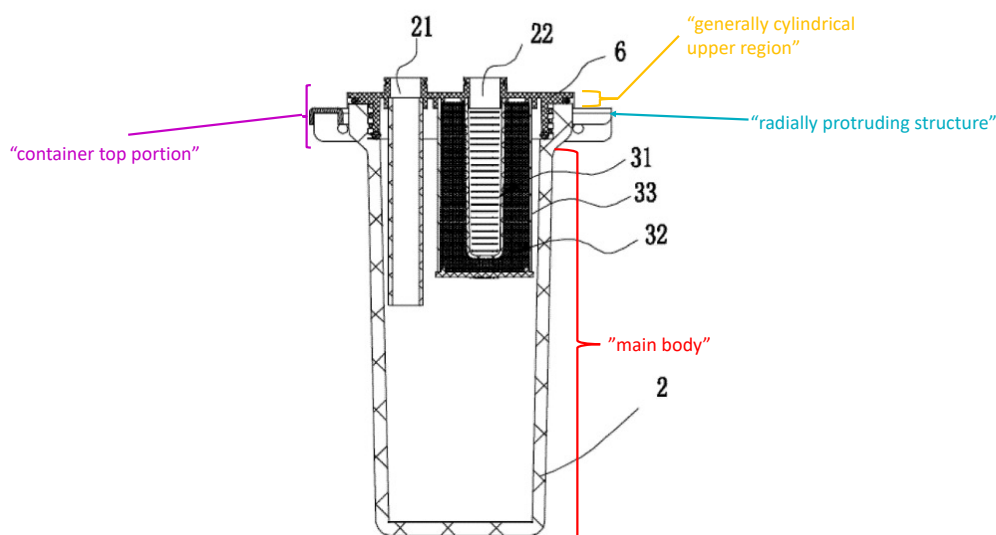
2. 1[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”

The bottle in Liu has a “**main body**” with a “**central axis**” as depicted in the annotated picture below, which is a cross section of the bottle. The main body includes an “**interior volume**” for receiving dental amalgam effluent from the air-water separation tank also disclosed in Liu. EX1003, ¶214.



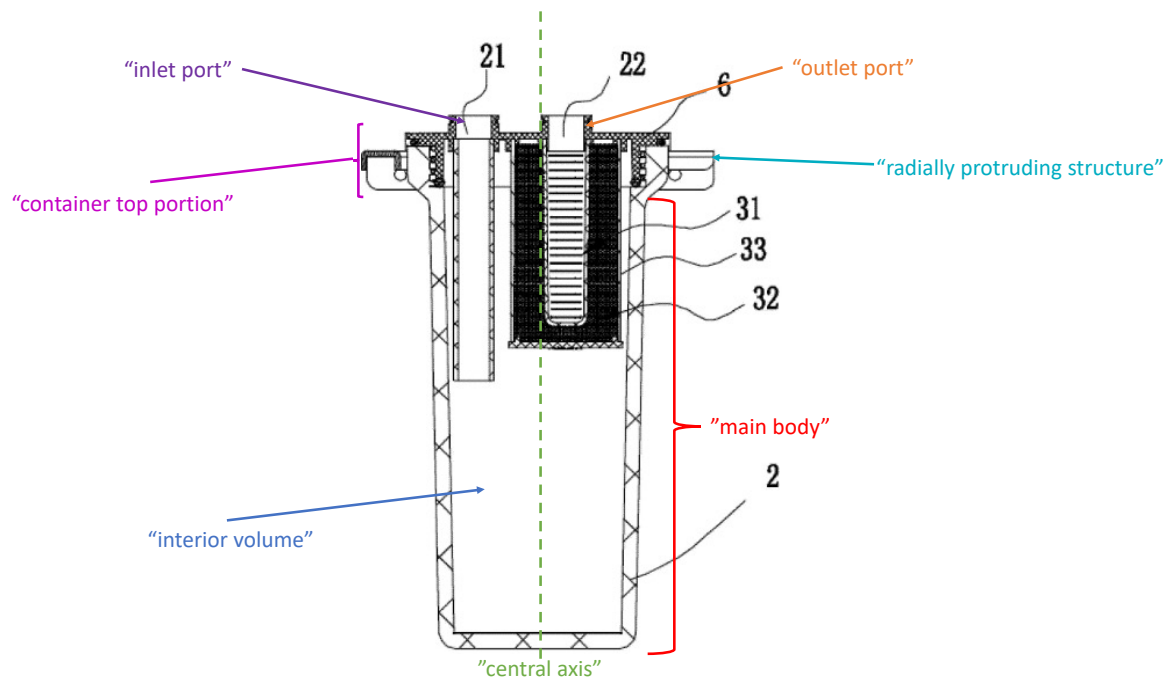
3. 1[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”

Liu discloses this limitation. As depicted below, the collection bottle has a “container top portion” located at the top of the “main body.” The “container top portion” has a “generally cylindrical upper region” with a “circular upper surface.” EX1003, ¶215. A POSA would have understood that there is a “circular upper surface” at the top of the bottle to hold in the effluent and prevent spillage when the bottle is removed. EX1003, ¶215.



From the “circular upper surface,” there is a “container inlet port” and

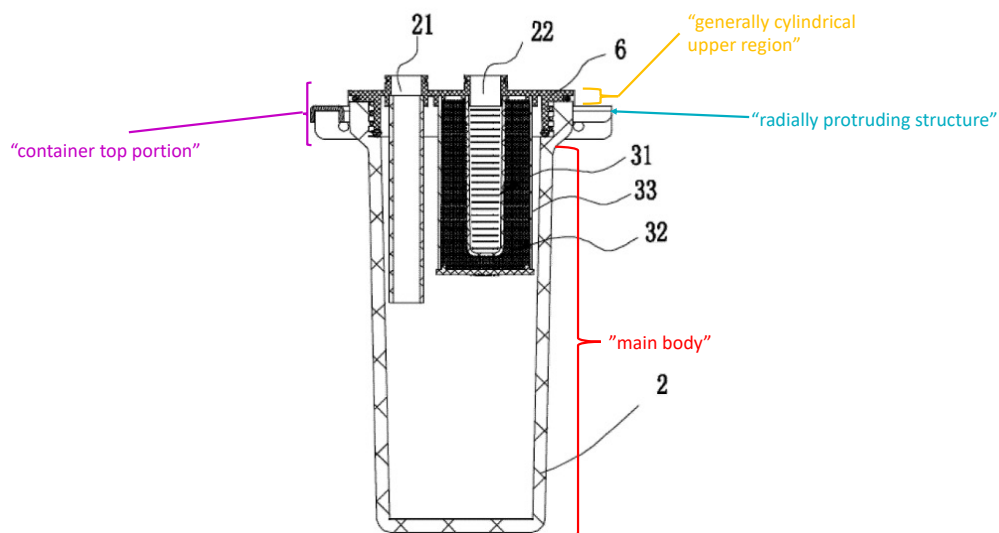
“container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface. EX1003, ¶216.



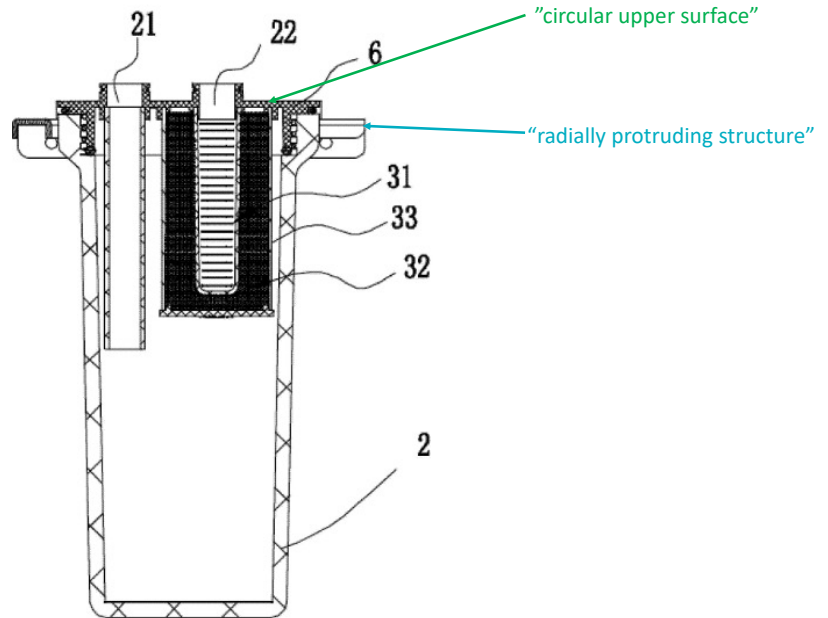
1. 1[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure for engaging the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system when there is no pressure being applied from the vacuum source, the at least one radially protruding structure being located radially outward relative to the periphery of the circular upper surface;”

The “container top portion” includes a “radially protruding structure” that is located below the “generally cylindrical upper region.” A POSA would have

understood that the “radially protruding structure” is used for engaging a buckle disclosed by Liu. EX1003, ¶217. Alternatively, it would have been obvious that the “radially protruding structure” is used for engaging the buckle because there are no other structures to which the buckle could engage. EX1003, ¶217. As discussed for 1[pre], a POSA would have understood or it would have been obvious to a POSA that the buckle is a retaining pin or could be replaced with a retaining pin. EX1003, ¶217.

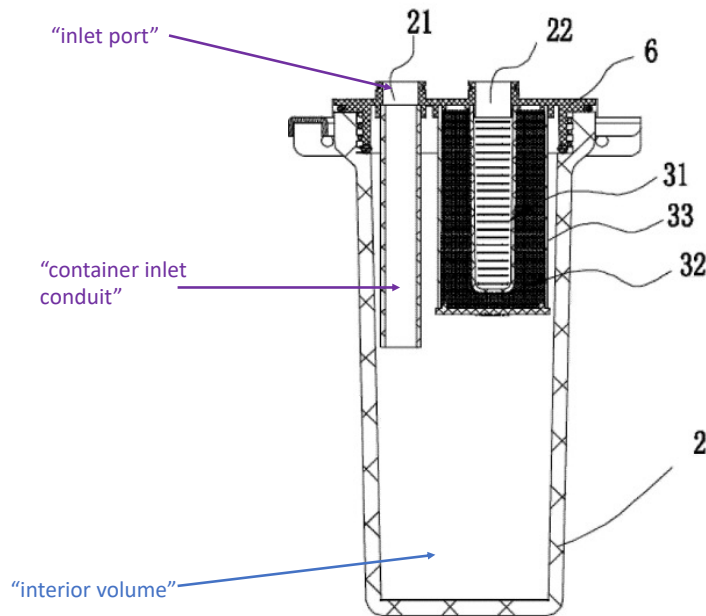


Furthermore, the “radially protruding structure” extends radially outward relative to the periphery of the “circular upper surface,” as shown below. EX1003, ¶218.



2. 1[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and”

Liu discloses this limitation. Liu has a “sewage inlet 21” that includes a “container inlet port” at the top that is “connected to the bottom of the waste collection tank 1.” EX1010, ¶18. The “sewage inlet 21” extends into the “interior volume” from the “container top portion,” which comprises the “container inlet conduit.” EX1003, ¶219.

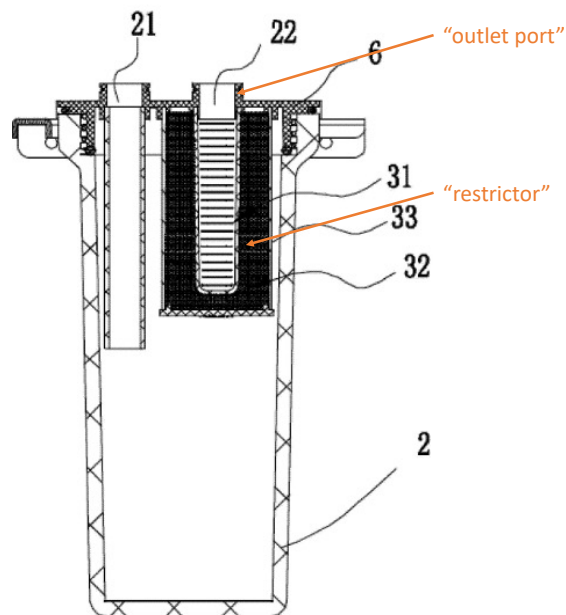


A POSA would have understood or it would have been obvious that, as the word “inlet” implies, the inlet port and conduit are for transferring dental amalgam effluent from the collection tank of *into* the interior volume of the collection bottle in Liu. EX1003, ¶220.

3. 1[d]: “a restrictor located within the interior volume of the main body and fluidically coupled to the container outlet port, the restrictor configured to remove fine particles from the dental amalgam effluent as fluid from the dental amalgam effluent is moved toward the container outlet port due to the vacuum source.”

Liu discloses this limitation. Liu has a solid filter (that “includes two filter layers 31, 33 and a sand layer 32 located between the two filter layers 31 and 33”) or “restrictor” located inside the main body of the collection bottle that restricts amalgam from flowing out of Liu. EX1010, ¶19, Fig. 3. In other words, the

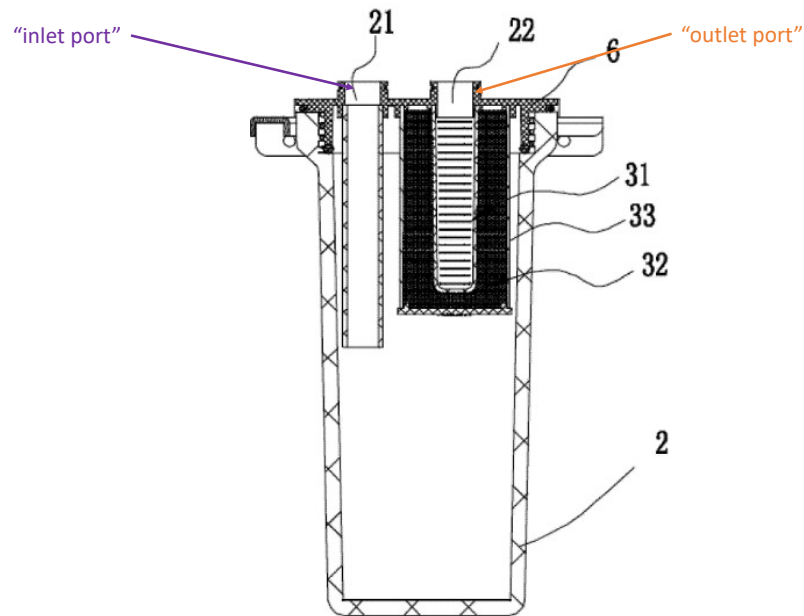
“**restrictor**” prevents fine particles of amalgam from flowing out the outlet port as fluid is sucked out by the vacuum source. The “**restrictor**” is fluidically coupled to the “**container outlet port**” because fluid must flow through the restrictor to reach the port. EX1003, ¶¶221-222.



- B. 2: “The detachable dental-amalgam container of claim 1, wherein the container inlet port and the container outlet port extend above the circular upper surface by the same height.”**

As shown below, the “**container inlet port**” and “**container outlet port**” extend the same height above the upper surface of the collection bottle in Liu.

EX1003, ¶223.

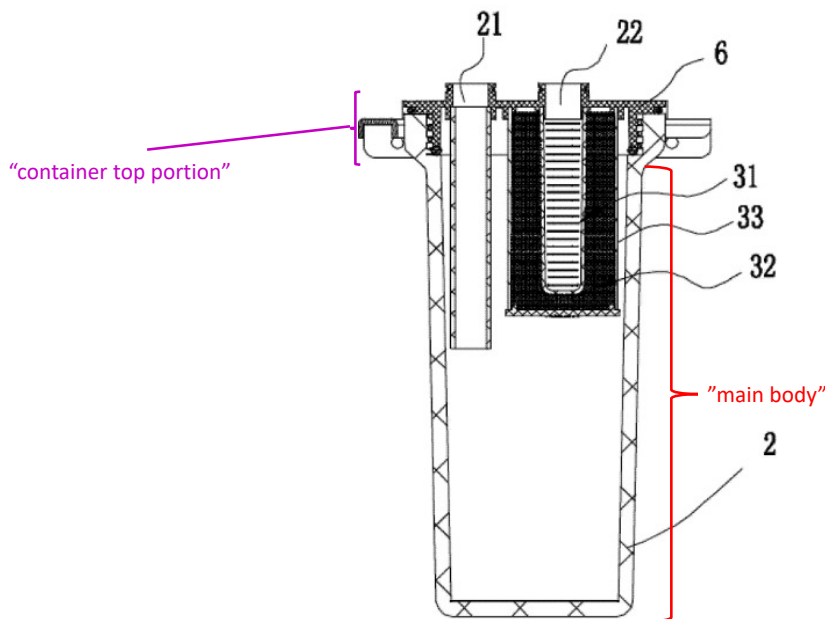


- C. 3: “The detachable dental-amalgam container of claim 1, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container.”

Liu renders this limitation obvious. Liu discloses that, when a receiving bottle fills up, it “is removed from the lower end of the waste collecting tank and a new heavy metal receiving bottle ... is replaced before continued use.” EX1010, ¶22. It would have been obvious to a POSA that the waste in the filled bottle could spill out of the inlet and outlet ports and a POSA would have known that some sort of plug would be needed to prevent spills. A POSA therefore would have been motivated to provide plugs to put in the inlet and outlet ports to seal the filled container. EX1003, ¶224.

- D. 6: “The detachable dental-amalgam container of claim 1, wherein the container top portion has a maximum outer dimension that is greater than a maximum outer diameter of the main body.”**

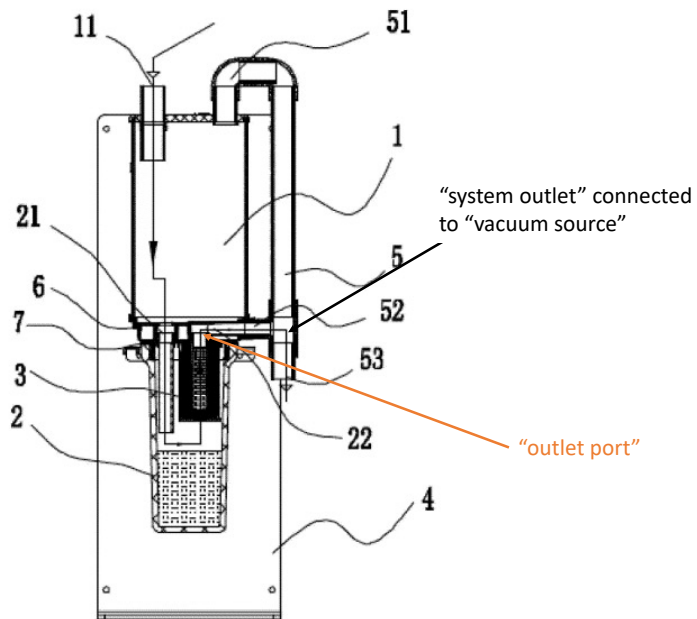
As shown below, the “container top portion” has a larger outer dimension (i.e., circumference) than the outer dimension of the “main body” because the “container top portion” extends outside the diameter of the “main body.” EX1003, ¶225.



- E. 7: “The detachable dental-amalgam container of claim 1, wherein the container outlet port is configured for fluidic coupling to the system outlet of the dental amalgam separation system that transfers fluid from the dental amalgam effluent to a municipal water disposal system.”**

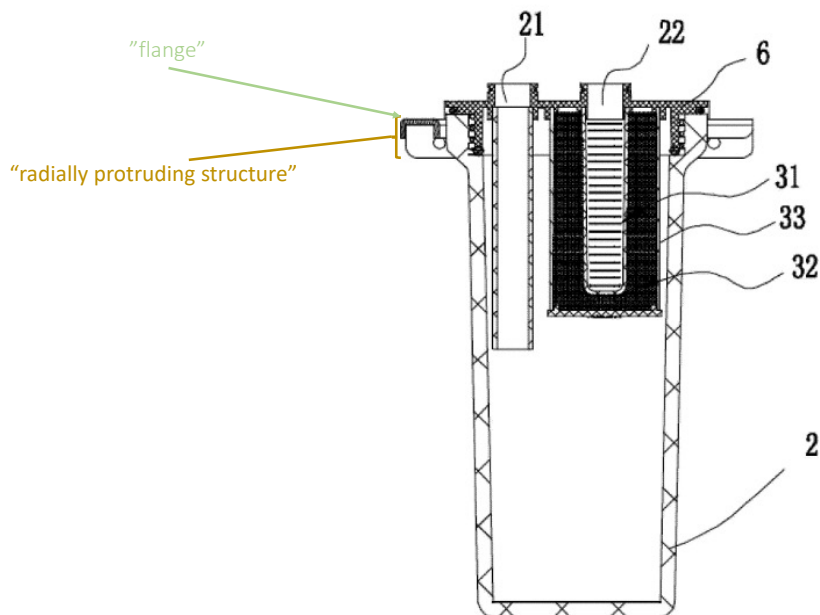
Liu discloses this limitation. Liu discloses a “suction pipeline 5” that “is connected to the negative pressure suction machine.” EX1010, ¶21. According to

Liu, the suction machine will suck the sewage generated during treatment of the patient into the waste collecting tank, through the inlet port 21 into the collection bottle 2, and then out through the filter and discharge port 22 and “into the national sewage channel.” *Id.*; EX1003, ¶226.



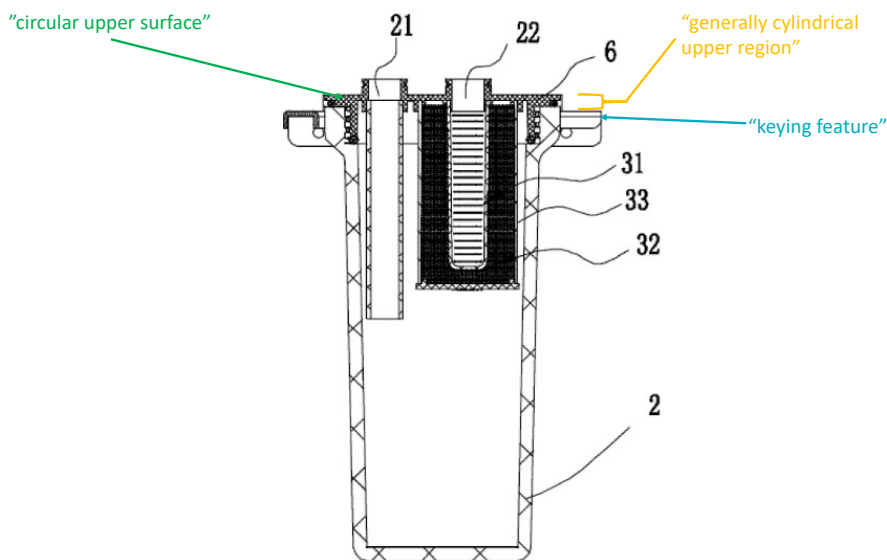
- F. 8: “The detachable dental-amalgam container of claim 1, wherein the at least one radially protruding structure includes a flange extending in a direction away from the generally cylindrical upper region.”**

The “**radially protruding structure**” includes a “**flange**,” or flat rim, that extends outward from the upper region of the container, as shown below. EX1003, ¶227.



- G. 10: “The detachable dental-amalgam container of claim 1, wherein the container top portion further comprises a keying feature for mating with a corresponding keying feature on the dental amalgam separation system, the keying feature being located below the generally cylindrical upper region and being outside the periphery of the circular upper surface, the detachable dental-amalgam container is capable of mating securely with the dental amalgam separation system when the keying feature and the corresponding keying feature on the dental amalgam separation system are mated.”**

Liu discloses this limitation. Liu discloses a “second sealed connector 7 in the form of an interface” on the detachable bottle (“keying feature”) that is “fastened by a buckle” (“corresponding keying feature”). EX1010, ¶18. As shown below, the “second sealed connector 7” is located below the generally cylindrical upper region and outside the periphery of the circular upper surface. EX1003, ¶¶228-29.



A POSA would have understood that the disclosed buckle, which is a retaining pin or could be replaced by a retaining pin, and the interface of the second sealed connector 7 are capable of mating securely when the buckle is attached to the sealed connector. EX1003, ¶¶230.

H. Claim 12

1. 12[pre]: “A detachable dental-amalgam container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, an air-water separation tank for holding the dental amalgam effluent received from the system inlet, a system outlet, a vacuum source for moving fluid from the dental amalgam effluent through the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”

Liu renders this limitation obvious. Liu discloses an entire “heavy metal separation device” (dental-amalgam separation system), including a detachable

container, with the components detailed in 1[pre]. EX1010, Abstract; EX1003, ¶¶231-32.

To hold the detachable receiving bottle to the rest of the device, Liu discloses a “second sealed connector 7 in the form of an interface” on the detachable bottle that are “fastened by a buckle.” *Id.*, ¶18. As in 1[pre], POSA would have understood that the buckle is a type of “retaining pin 13” or it would have been obvious to use a pin instead. EX1003, ¶232.

2. **12[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the air-water separation tank;”**

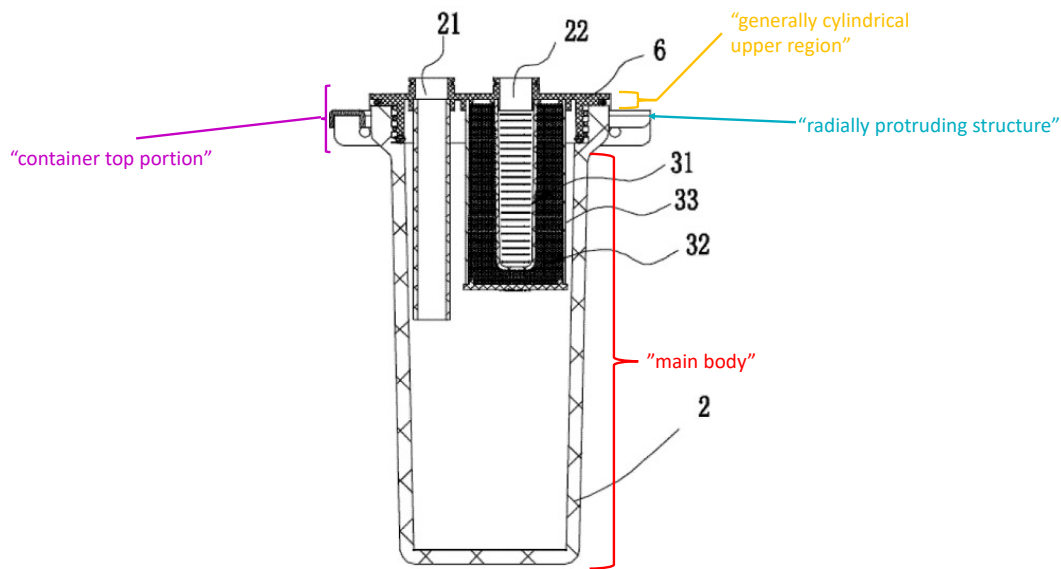
See 1[a]. EX1003, ¶233.

3. **12[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having an upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the upper surface than the container outlet port, the container inlet port and the container outlet port both including an external O-ring at upper portions thereof that are configured to help provide a seal between the detachable dental-amalgam container and the dental amalgam separation system while the vacuum source acts upon the dental amalgam separation system to move fluid from the dental amalgam effluent toward the system outlet,”**

Liu discloses this limitation. As depicted below, the collection bottle has a “container top portion” located at the top of the “main body.” The “container top

portion” has a “generally cylindrical upper region” with a “circular upper surface.”

EX1003, ¶234. A POSA would have understood that there is a “circular upper surface” at the top of the bottle to hold in the effluent and prevent spillage when the bottle is removed. *Id.*

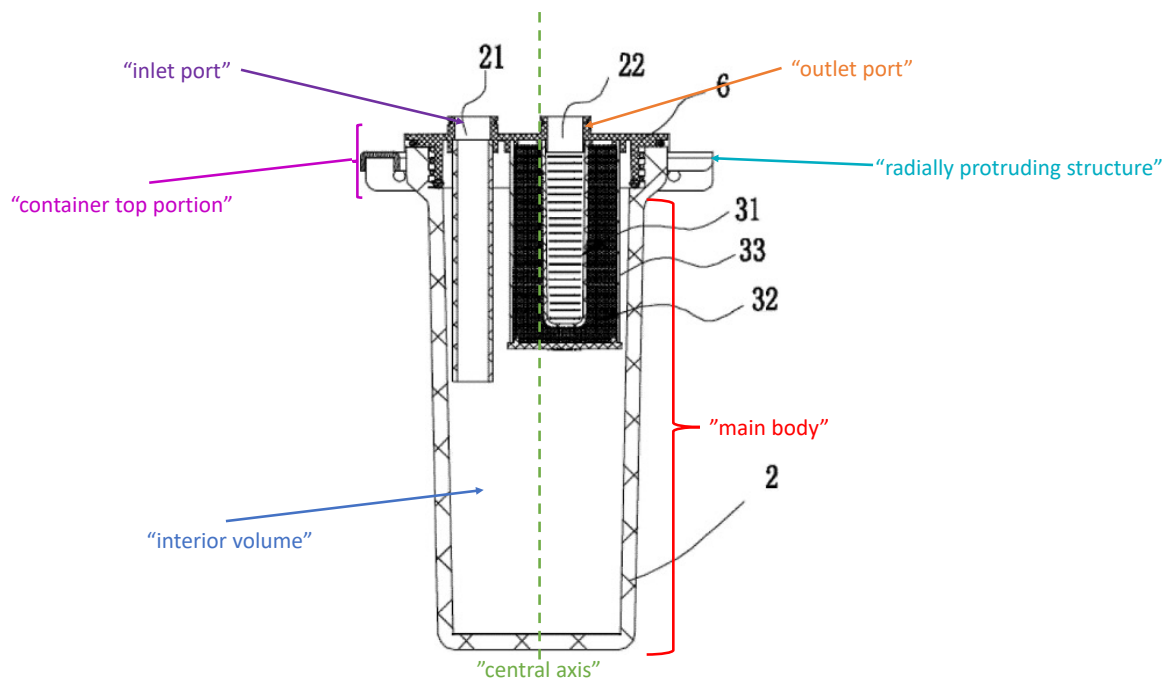


From the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface. EX1003, ¶235. Although not explicitly disclosed by Liu, it would have been obvious to a POSA to include an external rubber “O-ring” on the inlet and outlet ports to help create a seal between the collection bottle and the rest of the system. A POSA would have understood that, because effluent and waste is moved in and out of these ports, it was

important for a tight seal to be formed with the collection bottle to prevent leakage.

It therefore would have been obvious to a POSA to use known methods to create a tighter seal, including by using rubber O-rings on each of the ports because rubber rings were well known ways to create a tighter seal on liquid-tight devices.

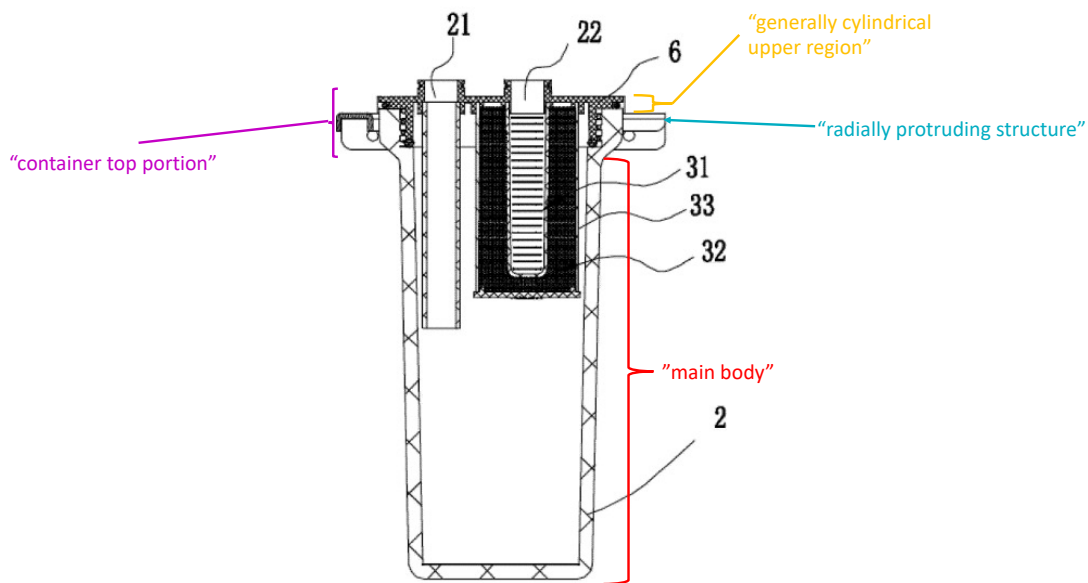
EX1003, ¶236.



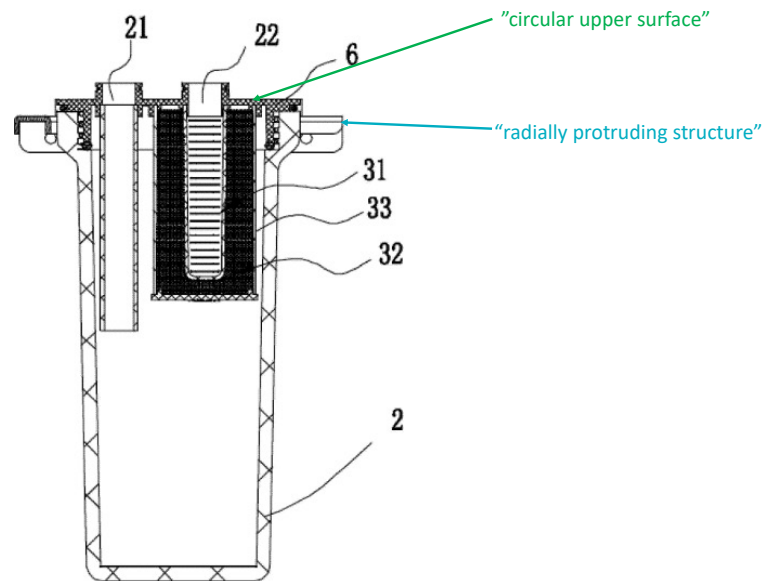
4. 12[b2]: “the container top portion further including at least one radially protruding structure located below the generally cylindrical upper region, the at least one radially protruding structure defining a pin-receiving region therebelow for receiving the at least one retaining pin of the dental amalgam separation system to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward from the periphery of the upper surface;”

The “container top portion” includes a “radially protruding structure” that is

located below the “generally cylindrical upper region.” A POSA would have understood that the “radially protruding structure” with a pin-receiving region on the bottom that is used for engaging a buckle disclosed by Liu. EX1003, ¶237. As discussed for 1[pre], it would have been obvious to a POSA that the buckle is a retaining pin or could be replaced with a retaining pin. *Id.*

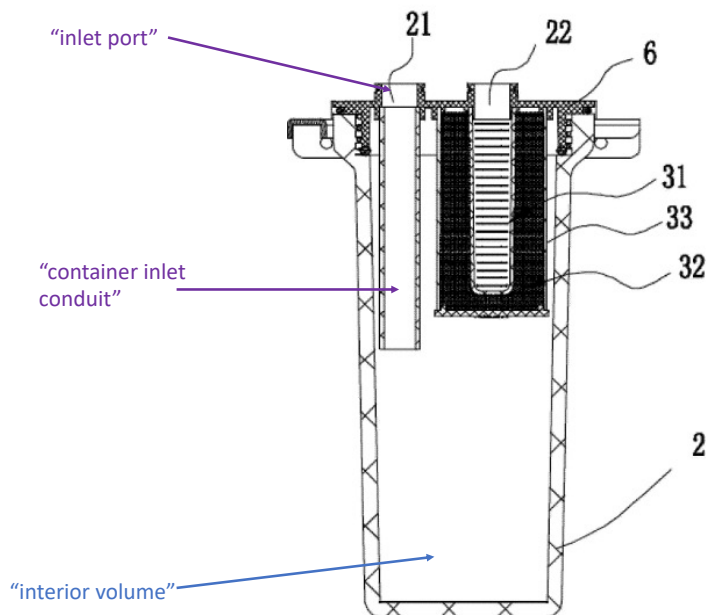


Furthermore, the “radially protruding structure” extends radially outward relative to the periphery of the “circular upper surface,” as shown below. *Id.*, ¶238.



5. **12[c]: “a container inlet conduit extending downwardly from the container top portion and into the interior volume, the container inlet conduit being coupled to the container inlet port, the container inlet conduit and the container inlet port for transferring the dental amalgam effluent from the air-water separation tank to the interior volume of the main body; and”**

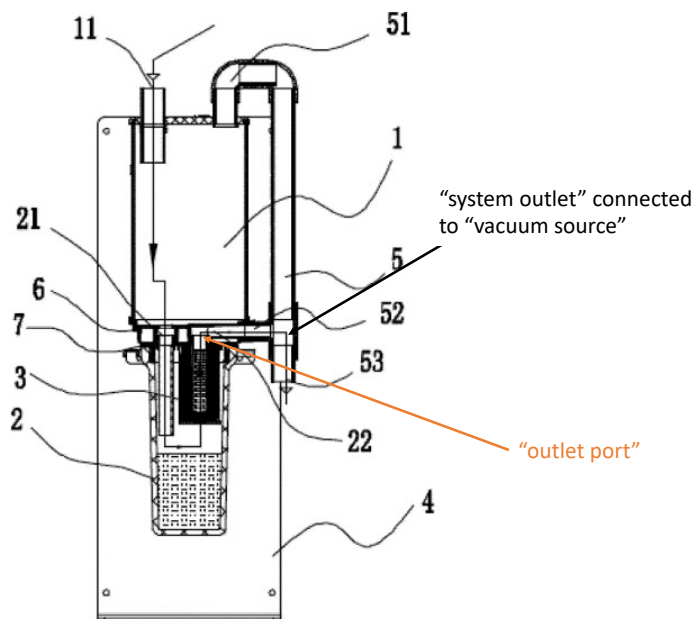
Liu discloses this limitation. Liu has a “sewage inlet 21” that includes a “**container inlet port**” at the top that is “connected to the bottom of the waste collection tank 1.” EX1010, ¶18. The “sewage inlet 21” extends into the “**interior volume**” from the “**container top portion**,” which comprises the “**container inlet conduit**.” EX1003, ¶239.



A POSA would have understood or it would have been obvious that, as the word “inlet” implies, the inlet port and conduit are for transferring dental amalgam effluent from the collection tank of *into* the interior volume of the collection bottle in Liu. EX1003, ¶240.

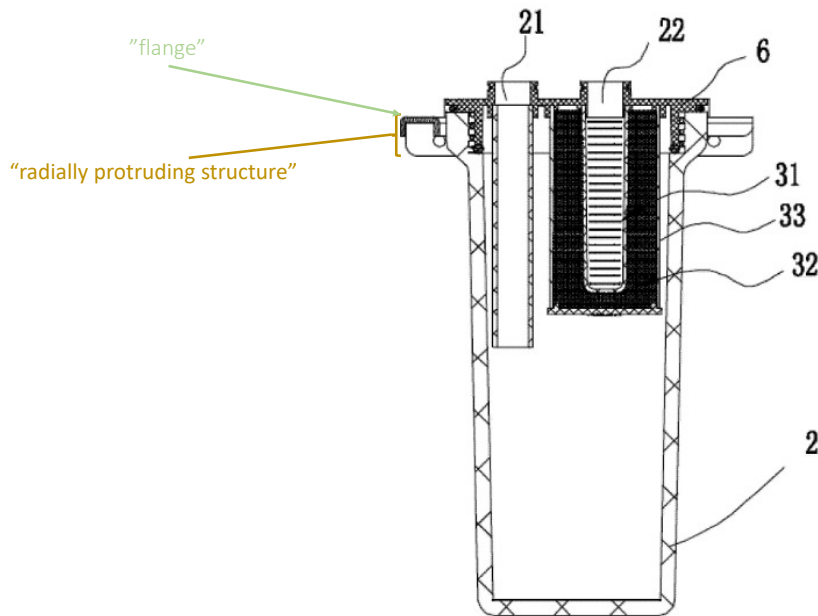
6. 12[d]: “wherein the container outlet port is for being coupled to the system outlet port such that the fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting upon the dental amalgam separation system.”

Liu discloses this limitation. Liu discloses a “sewage discharge port 22” (“**container outlet port**”) for the collection bottle through which fluid is sucked out of the collection bottle by the vacuum source. EX1010, ¶¶20-21; EX1003, ¶241.



I. 17: “The detachable dental-amalgam container of claim 15, wherein the flange includes a curved outer surface.”

Liu discloses that the “second sealed connector 7” (“flange”) forms an interface to be fastened to a buckle. It would have been obvious to a POSA that the outer surface of the flange would be curved to match the curved outer surface of the collection bottle. A POSA would have understood that a curved outer flange would be the easiest and cheapest to create on the outside of a curved surface and therefore would be likely to design the flange to be curved. EX1003, ¶243.



J. Claim 18

1. 18[pre]: “A detachable container for use with a dental amalgam separation system, the dental amalgam separation system having a system inlet for receiving dental amalgam effluent, a system outlet, a vacuum source for moving-fluid from the dental amalgam effluent toward the system outlet, and at least one retaining pin for use with the detachable dental-amalgam container, the detachable dental-amalgam container comprising:”

Regardless of whether the preamble is limiting, Liu renders this limitation obvious. Liu discloses an entire “heavy metal separation device” (dental-amalgam separation system), including a detachable container, with the components detailed in 1[pre]. EX1010, Abstract.

To hold the detachable receiving bottle to the rest of the device, Liu discloses a “second sealed connector 7 in the form of an interface” on the

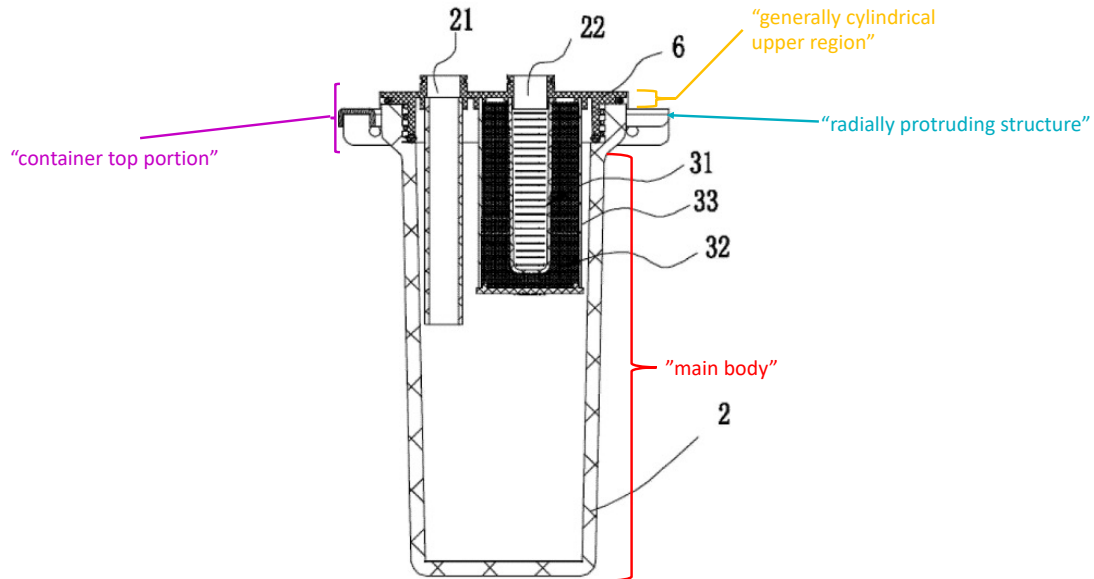
detachable bottle that are “fastened by a buckle.” *Id.*, ¶18. As in 1[pre], POSA would have understood that the buckle is a type of “retaining pin 13” or it would have been obvious to use a pin instead. EX1003, ¶¶244-245.

2. **18[a]: “a main body having a central axis and an interior volume for receiving the dental amalgam effluent from the dental amalgam separation system;”**

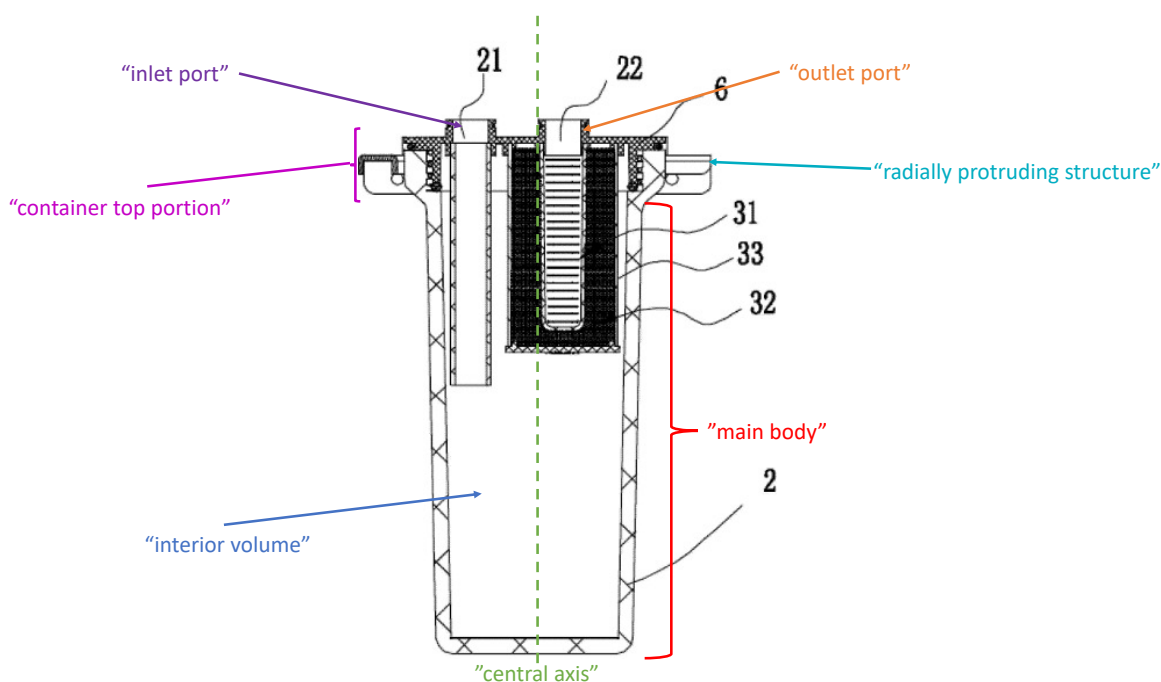
See 1[a]. EX1003, ¶246.

3. **18[b1]: “a container top portion located at a top of the main body, the container top portion including a generally cylindrical upper region having a circular upper surface from which a container inlet port and a container outlet port extend away from the main body, the container outlet port being positioned nearer to the central axis of the main body than the container inlet port, the container inlet port being positioned nearer to a periphery of the circular upper surface than the container outlet port,”**

Liu discloses this limitation. As depicted below, the collection bottle has a “container top portion” located at the top of the “main body.” The “container top portion” has a “generally cylindrical upper region” with a “circular upper surface.” EX1003, ¶247. A POSA would have understood that there is a “circular upper surface” at the top of the bottle to hold in the effluent and prevent spillage when the bottle is removed. *Id.*

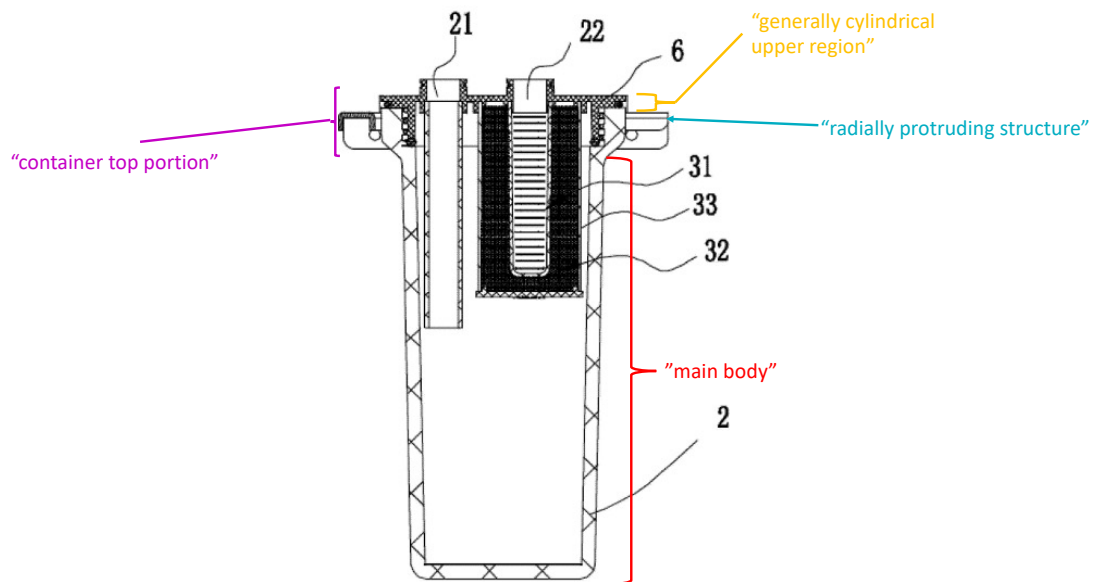


From the “circular upper surface,” there is a “container inlet port” and “container outlet port” that extend away from the “main body.” The “container outlet port” is closer to the “central axis” whereas the “container inlet port” is located closer to the periphery of the upper surface. EX1003, ¶248.

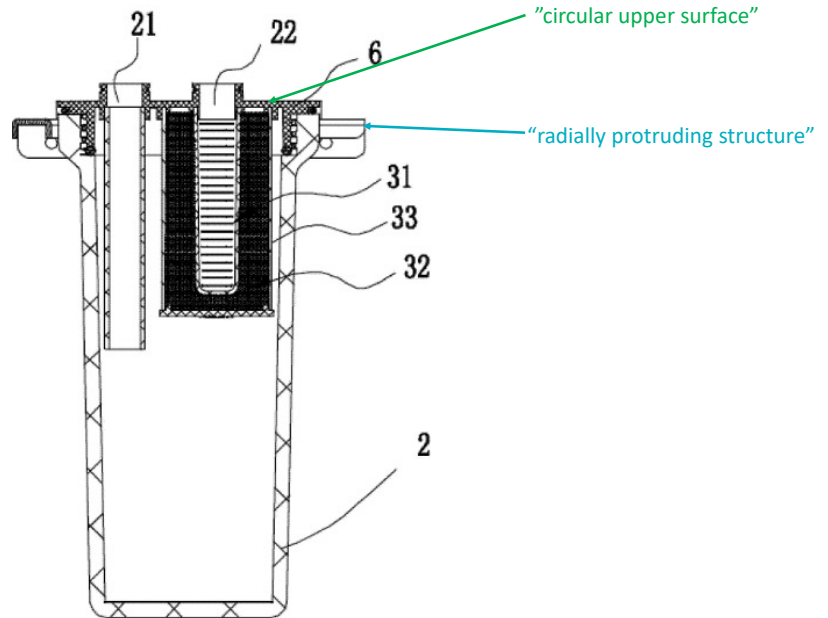


4. 18[b2]: “the container top portion further including at least one radially protruding structure located below the upper generally cylindrical region, the at least one radially protruding structure having a lower surface under which the at least one retaining pin of the dental amalgam separation system is received to ensure the detachable dental-amalgam container does not become detached from the dental amalgam separation system, the at least one radially protruding structure is located radially outward relative to the periphery of the circular upper surface; and”

The “container top portion” includes a “radially protruding structure” that is located below the “generally cylindrical upper region.” A POSA would have understood that the “radially protruding structure” is used for engaging a buckle disclosed by Liu. EX1003, ¶249. As discussed for 1[pre], it would have been obvious to a POSA that the buckle is a retaining pin or could be replaced with a retaining pin. EX1003, ¶¶249.

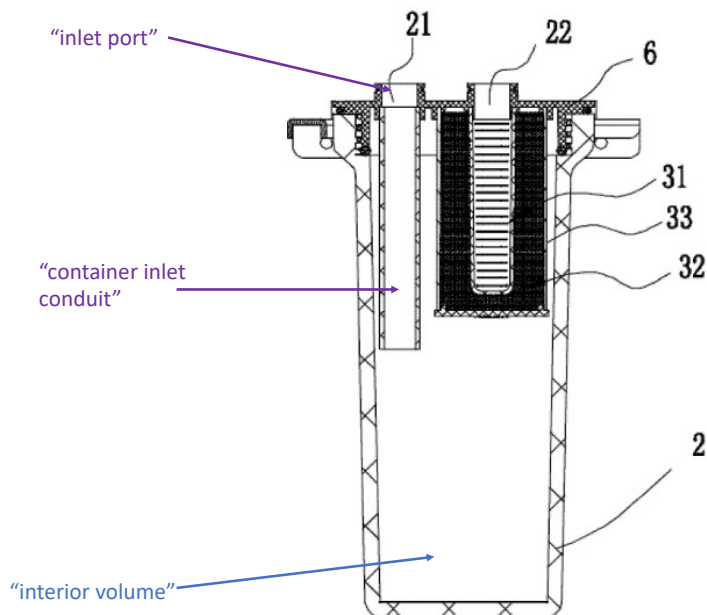


Furthermore, the “**radially protruding structure**” extends radially outward relative to the periphery of the “**circular upper surface**,” as shown below. EX1003, ¶250.



- 5. 18[c]: “wherein the container inlet port is configured to transfer the dental amalgam effluent that is received by the system inlet into the interior volume of the main body; and”**

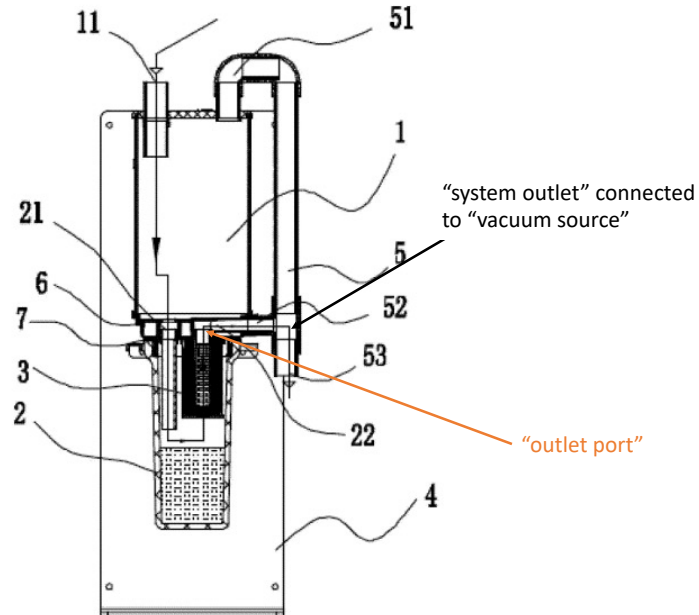
Liu discloses this limitation. Liu has a “sewage inlet 21” that includes a “**container inlet port**” at the top that is “connected to the bottom of the waste collection tank 1.” EX1010, ¶18; EX1003, ¶251.



A POSA would have understood or it would have been obvious that, as the word “inlet” implies, the inlet port and conduit are for transferring dental amalgam effluent from the collection tank of *into* the interior volume of the collection bottle in Liu. EX1003, ¶252.

6. **18[d]: “wherein the container outlet port is configured to be coupled to the system outlet port such that fluid from the dental amalgam effluent is moved from the interior volume of main body, through the container outlet port, and into the system outlet due to the vacuum source acting on the dental amalgam separation system.”**

Liu discloses this limitation. Liu discloses a “sewage discharge port 22” (“**container outlet port**”) for the collection bottle through which fluid is sucked out of the collection bottle by the vacuum source. EX1010, ¶¶20-21; EX1003, ¶253.



K. Claims 15, 19-20:

These claims are invalid for the reasons already set forth above according to the following mapping:

Claim	Corresponding analysis
15	See claim 8. EX1003, ¶242.
19	See claim 10. EX1003, ¶254.
20	See claims 15 and 17. EX1003, ¶255.

IX. GROUND 6 – CLAIMS 1-8, 10, 12-15, 17-20, 22 ARE RENDERED

OBVIOUS BY LIU OVER BOYD

To the extent Liu alone does not render obvious claims 1-3, 6-8, 10, 12, 15, 17-20, Liu over Boyd render those claims obvious. Furthermore, Liu over Boyd render obvious claims 4-5, 13-14, and 22, which include the “cap” limitations.

A. Liu Over Boyd Render Obvious Claims 1-3, 6-8, 10, 12, 15, and 17-20

To the extent Liu alone does not render obvious the limitations requiring that the “radially protruding structure” is “for engaging the at least one retaining pin,” it would have been obvious to a POSA to combine the container structure from Liu, including the “radially protruding structure,” with the retaining pin disclosed in Boyd. EX1003, ¶¶257-259. Liu and Boyd both disclose dental-amalgam separation systems with the same basic components, including an air/liquid separation chamber and detachable collection container that gets attached to the chamber. *Id.* A POSA would have been motivated to look for the most efficient ways to affix the collection bottle in Liu to the separation chamber because forming a secure seal between those components is critical to prevent leaks or other issues with the collection, particularly because the vacuum system is only powered on some of the time, making the pressure on the seal inconsistent. *Id.*

Although Liu discloses using a “buckle” to connect the chamber and the bottle, a POSA would have realized that there are other possible structures of forming that connection and would have been motivated to try other structures.

Id.; EX1010, ¶18. Boyd provides other examples of structures to connect, including, “for example, by threads, pins and a gasket system.” EX1011, 10. A POSA would have been motivated to try using threads and/or retaining pins in the amalgam separation system in Liu instead of a buckle to see what worked better and what was more efficient and durable and less expensive. EX1003, ¶¶259-260. And, a POSA would have understood that a retaining pins disclosed in Boyd would have been a good option because they were inexpensive and durable and could be easily replaced if there was damage or rust.

Furthermore, a POSA would have had a reasonable expectation of success because retaining pins, like those disclosed in Boyd, were a well-known structure used for affixing filters to the main device. EX1003, ¶¶259-260; EX1029, Fig. 6A; EX1030, Fig. 5; EX1031, Fig. 4; EX1032, Fig. 1; EX1033, Fig. 2.

B. Liu Over Boyd Render Obvious Claims 4-5, 13-14, and 22

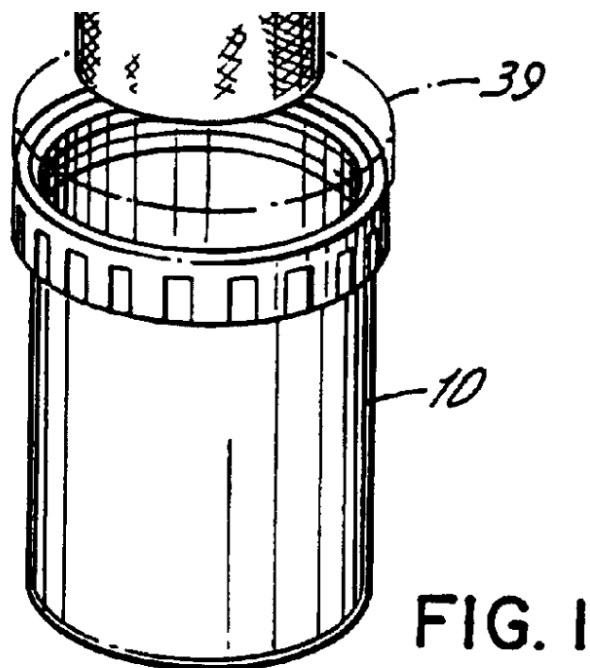
It would have been obvious to use the “threaded cap 39” disclosed in Boyd with the collection bottle disclosed in Liu. Liu discloses that the bottle is to be detached and then disposed after it fills up. EX1010, ¶22-24. It would have been obvious that the collection bottle should be sealed after use to prevent leakage, such as by using plugs over the inlet and outlet ports on the top. EX1003, ¶261-263. A POSA would have been motivated to look for means to secure the plugs and make sure they do not come loose after disposal. *Id.* Boyd discloses one such

method for trapping the contaminants in the container using a threaded cap 39 that is screwed onto the container. *Id.*

A POSA would have been motivated to try and would have had a reasonable expectation of success in trying the cap 39 on the collection bottle disclosed in Liu because a threaded cap is a known structure for preventing leakage from a container and bottles with thread caps to form a liquid tight seal were commonly used. *Id.*

- 1. 4: “The detachable dental-amalgam container of claim 3, further including a cap configured to retain at least one of the plugs on the filled detachable dental-amalgam container.”**

Liu over Boyd render obvious this claim. It would have been obvious to use plugs to fill ports in the collection bottle disclosed in Liu as discussed for claim 3. Boyd further discloses a “threaded cap 39” that is screwed onto the collection bottle after it is full to prevent leakage. EX1003, ¶264.



It would have been obvious to combine Liu with Boyd and a POSA would have had a reasonable expectation of success for the reasons discussed above. EX1003, ¶265. It further would have been obvious to a POSA that the cap could be used in connection with the plugs such the threaded cap holds the plugs in place. *Id.* A POSA would have been motivated to do so because a cap that holds a plug in place would decrease the chance of spillage of the contaminant. A POSA would have understood that decreasing the chance of spillage was important because the container likely contains mercury and other toxic materials. *Id.*; EX1011, 5.

2. **5: “The detachable dental-amalgam container of claim 4, wherein the cap has an inside surface with a first circular wall and a second circular wall, the first circular wall placed so as to engage a first one of the pair of plugs on the container inlet port and the second circular wall placed so as to engage a second one of the pair of plugs on the container outlet port.”**

Liu over Boyd render obvious this claim. It would have been obvious to use plugs to fill ports in the collection bottle and the “threaded cap 39” from Boyd to hold those plugs in place as discussed for claim 4. A POSA would have understood that there may need to be two different walls inside the cap so as to securely hold the plugs in place given that one of the plugs is closer to the central axis and the other plug is closer to the periphery. EX1003, ¶¶266-267. A POSA would have understood that circular walls within the cap are the easiest to manufacture when the cap itself is circular. *Id.*

3. **13: “The detachable dental-amalgam container of claim 12, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container, and a cap that retains at least one of the plugs on the filled detachable dental-amalgam container.”**

See claim 5. EX1003, ¶268.

4. **14: “The detachable dental-amalgam container of claim 13, wherein the cap has internal threads that threadably mate with corresponding threads on the generally cylindrical upper region of the container top portion to retain the pair of plugs on the detachable dental-amalgam container.”**

Liu over Boyd render obvious this claim. It would have been obvious to use plugs to fill ports in the collection bottle and the “threaded cap 39” from Boyd to hold those plugs in place as discussed for claim 4. Boyd further discloses that the cap is “threaded” and a POSA would have known that, for the threaded cap to mate with the collection bottle, the collection bottle must have corresponding threads on the top so that the thread cap may be screwed on. EX1003, ¶269.

5. **22: “The detachable dental-amalgam container of claim 20, further including a pair of plugs configured to seal a container inlet port and a container outlet port of a filled detachable dental-amalgam container, and a cap configured to retain at least one of the plugs on the filled detachable dental-amalgam container.”**

See claim 13. EX1003, ¶270.

X. THIS PETITION SHOULD NOT BE REJECTED ON DISCRETIONARY GROUNDS

A. §325(d)

Petitioner submits that this petition should not be denied pursuant to §325(d). None of the references were before the examiner during prosecution and the examiner did not consider the priority date of the patent after Patent Owner added new matter to the specification. *See* M.P.E.P. § 201.08 (“The Office *does*

not need to make a determination as to whether the requirement of 35 U.S.C. 120 that the earlier nonprovisional application discloses the invention of the second application in the manner provided by 35 U.S.C. 112(a) is met *unless the filing date of the earlier nonprovisional application is relied upon* in a proceeding before the Office.”).

B. *Fintiv* factors

Petitioner respectfully submits that, consistent with the Board's precedential decision in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (P.T.A.B. Mar. 20, 2020), and the Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022) (“Interim *Fintiv* Procedure”), this Petition should not be denied pursuant to the Board's discretionary authority. While there is a parallel district court action involving the challenged claims, discretionary denial would not be appropriate at least because of (i) the compelling evidence of unpatentability, which is separately and independently dispositive on the question of discretionary denial and (ii) the lack of a trial date and relatively nascent stage in the parallel district court proceedings.

C. Whether the Court Granted a Stay or Evidence Exists That One May be Granted If a Proceeding Is Instituted

The '175 patent is asserted in a parallel district court proceeding: *Solmetex, LLC v. Dental Recycling North America, Inc.*, No. 1:23-cv-602 (D. Del.) (“the

Parallel Proceeding”). If this proceeding is instituted, a stay is likely to be granted.

The court recently granted contested motions to stay. (EX1034; EX1035;

EX1036.) This factor weighs against discretionary denial.

D. Proximity of the Court’s Trial Date to the Board’s Projected Statutory Deadline for a Final Written Decision

If instituted, the Statutory Deadline for a Final Written Decision relating to this Petition is likely to be roughly 18 months from the date that it was filed—i.e.,

roughly March 2025. By contrast, no trial date has been set in the Parallel

Proceeding, and the most recently available statistics from June 2023 indicate that the average time-to-trial for civil cases in the District of Delaware is 36 months.

(EX1037.) That means that a trial would likely be held around June 2026—over a year after the statutory deadline that would apply to these proceedings. This factor therefore weighs strongly against discretionary denial.

E. Investment in the Parallel Proceeding by the Court and the Parties

As of the date of filing, Petitioner’s motion to dismiss is still pending. The parties have not engaged in any discovery and no schedule has been entered.

(EX1020.) This factor thus weighs strongly against discretionary denial.

F. Overlap between Issues Raised in the Petition and in the Parallel Proceeding and Whether the Petitioner and the Defendant in the Parallel Proceeding are the Same Party

The challenged claims and the prior art cited in this Petition overlap with those in the Parallel Proceeding and Petitioner is the Defendant in the Parallel Proceeding. Although these factors weigh slightly in favor of denial, it is overcome by the other factors. *See, e.g.*, Interim *Fintiv* Procedure at 4 (“[C]ompelling, meritorious challenges will be allowed to proceed at the PTAB even where district court litigation is proceeding in parallel.”).

G. Other Circumstances That Impact the Board's Exercise of Discretion, Including the Merits

This is a critical *Fintiv* factor, because “where the PTAB determines that the information presented at the institution stage presents a compelling unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*.” (Interim *Fintiv* Procedure.) This Petition presents a compelling unpatentability challenge.

XI. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(a)(1)

A. 37 C.F.R. § 42.8(b)(1): Real Parties-In-Interest

Petitioner is the real party-in-interest.

B. 37 C.F.R. § 42.8(b)(2): Related Matters

The '175 patent is asserted against Petitioner in *Solmetex, LLC v. Dental Recycling North America, Inc.*, No. 1:23-cv-602 (D. Del.).

C. 37 C.F.R. § 42.8(b)(3)-(4): Lead And Back-Up Counsel And Service Information

Designated Counsel for Petitioner and service information is below:

Lead Counsel	Back-Up Counsel
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Petitioner consents to service by email at the addresses above.

XII. FEES UNDER 37 C.F.R. § 42.103

Petition and Post-Institution fees totaling \$50,550 have been paid by electronic funds transfer.

XIII. CONCLUSION

For the foregoing reasons, Petitioner requests that the Board institute IPR of the challenged claims, and cancel them.

Respectfully Submitted,

Dated: September 29, 2023

/s/Andrew D. Gish

Andrew D. Gish (Reg. #67,562)

ATTORNEY FOR PETITIONER

CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. § 42.24(a)

I, the undersigned, do hereby certify that the attached petition contains 18,275 words, as measured by the Word Count function of Microsoft Word. This is less than the limit of 18,700 words as specified by 37 C.F.R. § 42.24(a)(i).

Dated: September 29, 2023

/s/ Ryan Iwahashi

Ryan Iwahashi (Reg. # 63,378)

ATTORNEY FOR PETITIONER

CERTIFICATION OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. §§ 42.6(e) and 42.105 on the Patent Owner of a copy of this Petition for *Inter Partes* Review and supporting materials at the following correspondence address of record:

Steven R. Lazar
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234 Broadway
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Dated: September 29, 2023

/s/ Ryan Iwahashi

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