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(54) **ARRANGEMENTS FOR CAPTURING AEROSOL DURING DENTAL PROCEDURES AND METHODS**

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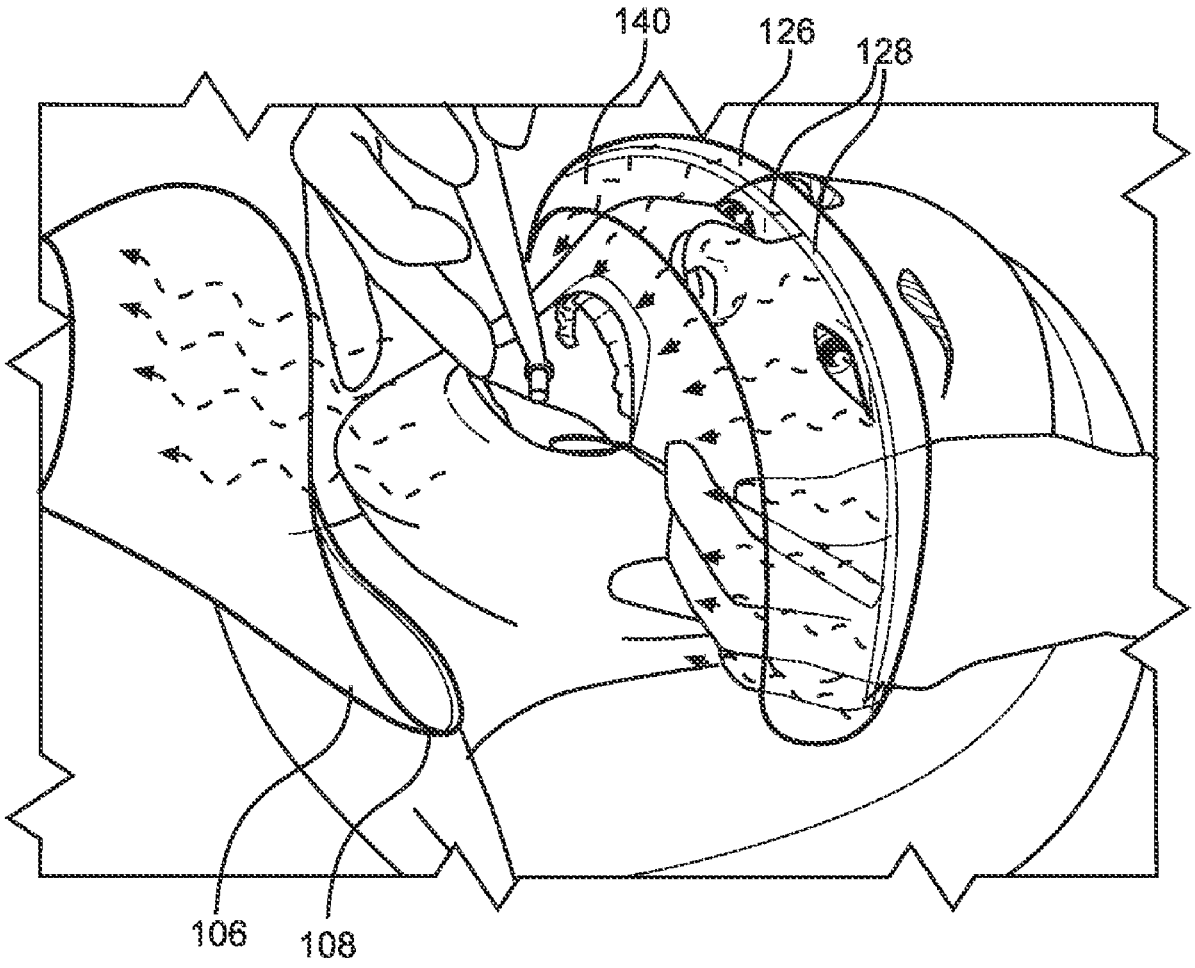
(52) **U.S. Cl.**

CPC ***A61C 17/08*** (2019.05); ***A61G 15/16*** (2013.01); ***A41D 13/1184*** (2013.01)

(57) **ABSTRACT**

Arrangements for capturing aerosol during dental procedures include an extraoral suction device and a blower arrangement to induce an airflow zone to push aerosol to the suction device. Blower arrangements can include plenums in the form of a tube, or a face mask, or attached to safety glasses. Extraoral suction devices can be wearable in the form of appliances to be fitted onto either the patient or the dental professional. Improved extraoral suction devices can include a screen secured to a nozzle of the device.



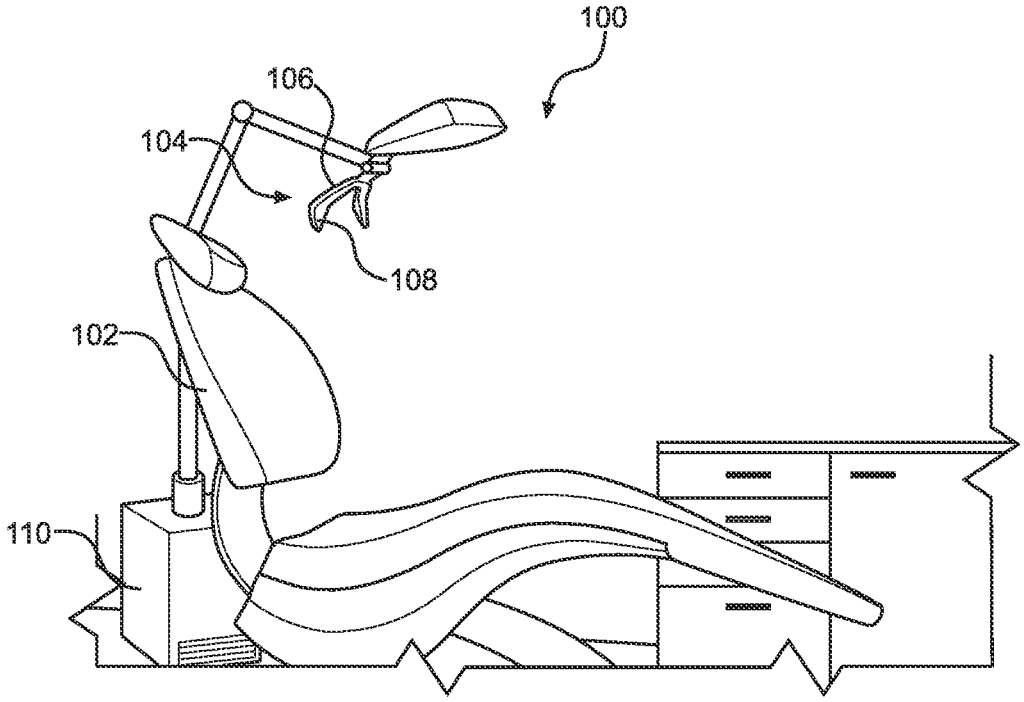


FIG. 1

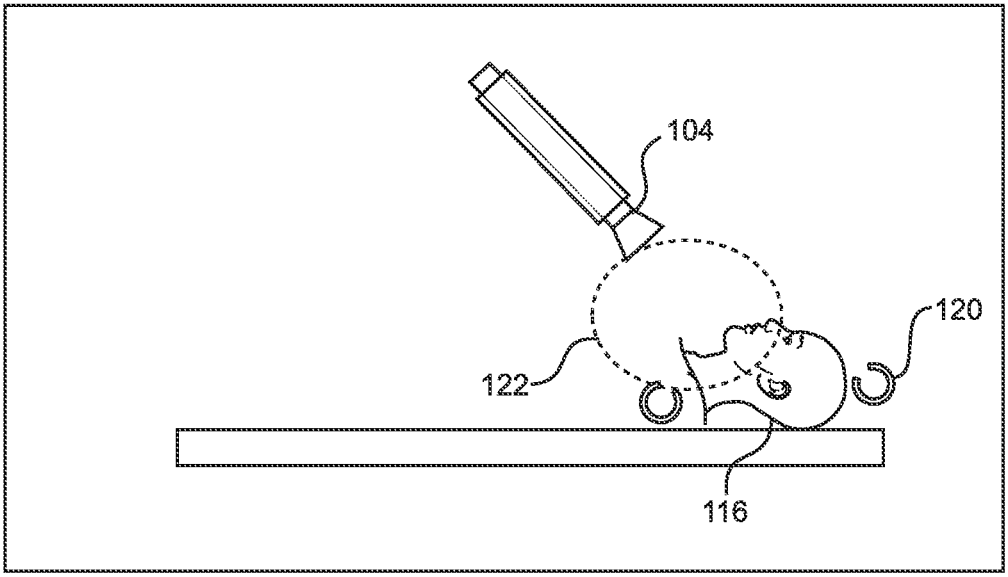


FIG. 2

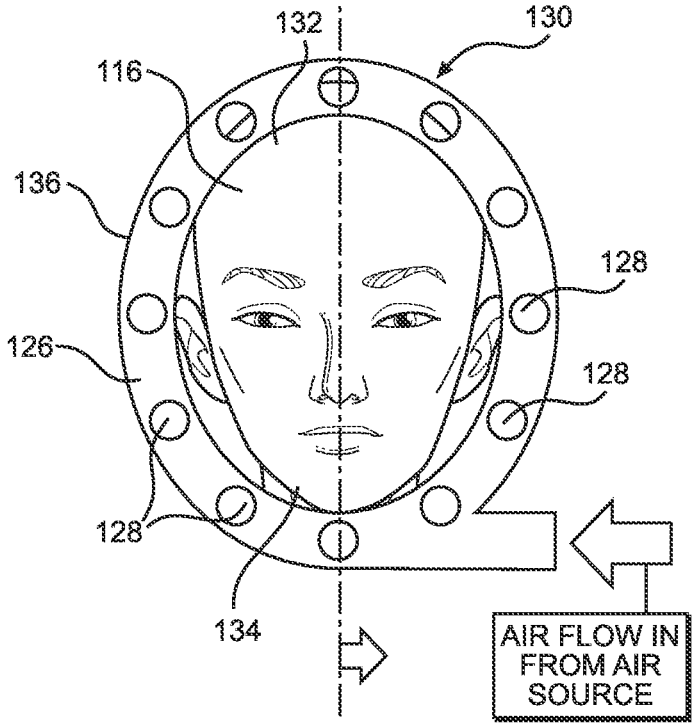

132
130
116
136
128
126
128
128
134
AIR FLOW IN FROM AIR SOURCE

FIG. 3

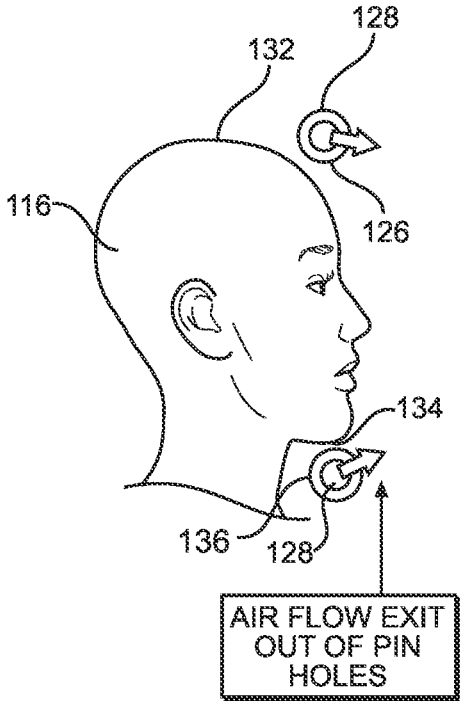

128
132
116
126
134
136
128
AIR FLOW EXIT OUT OF PIN HOLES

FIG. 4

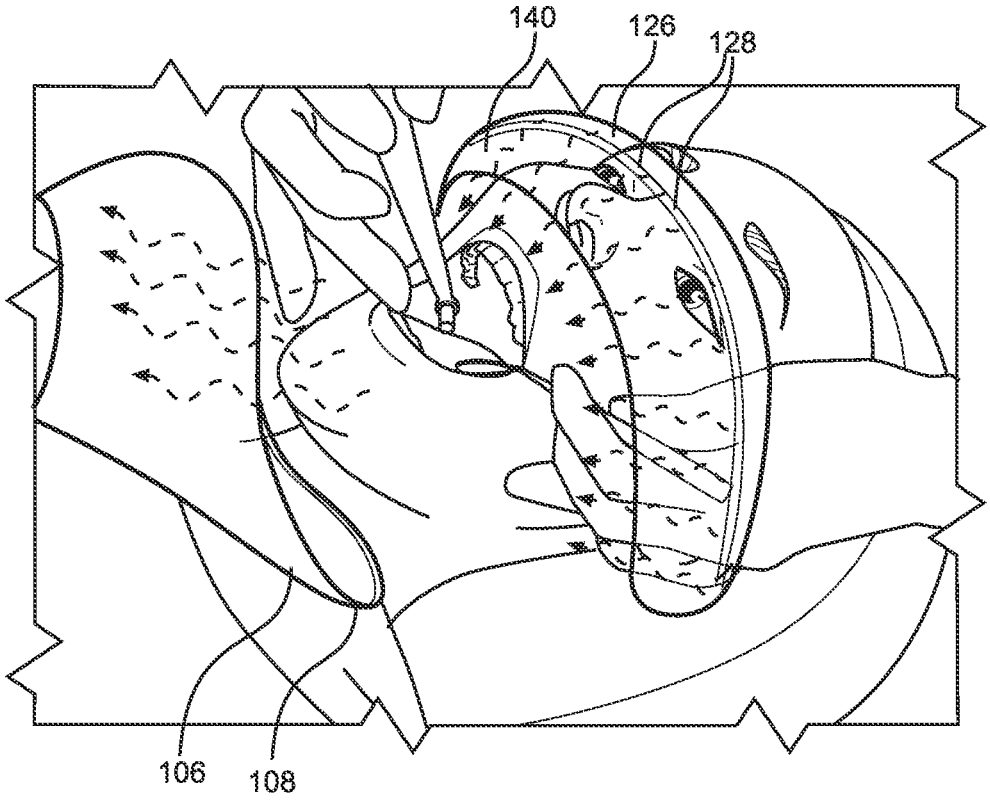


FIG. 5

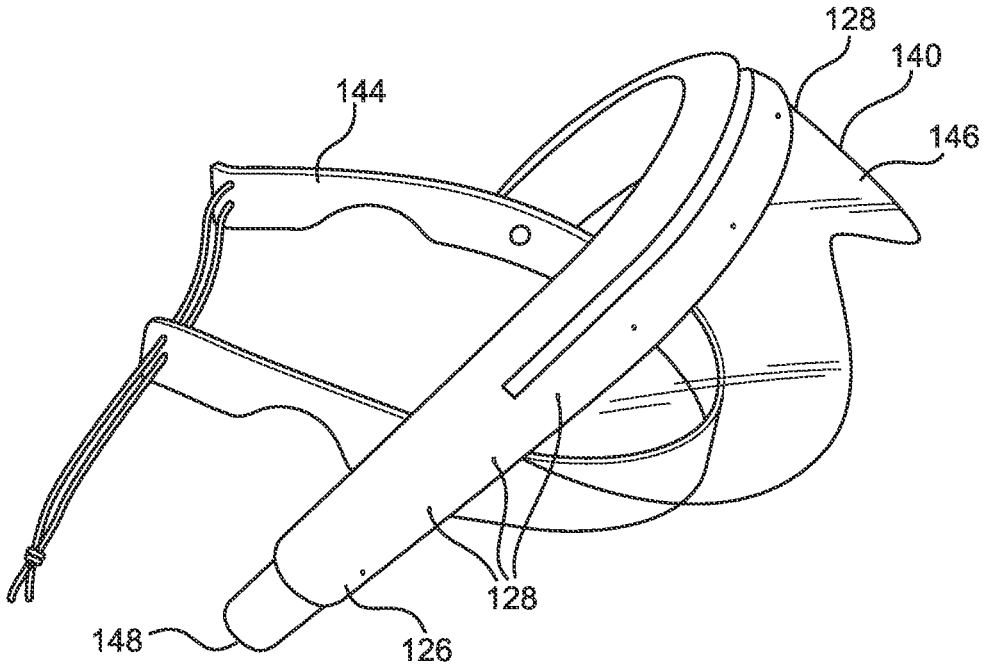


FIG. 6

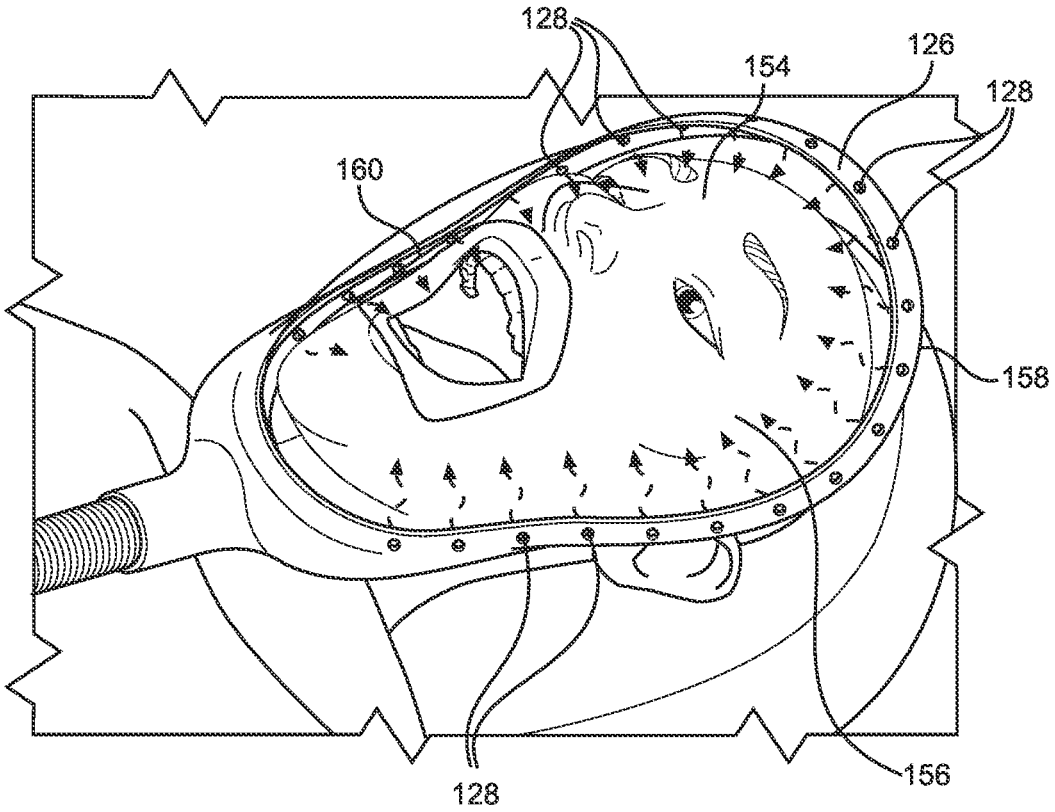


FIG. 7

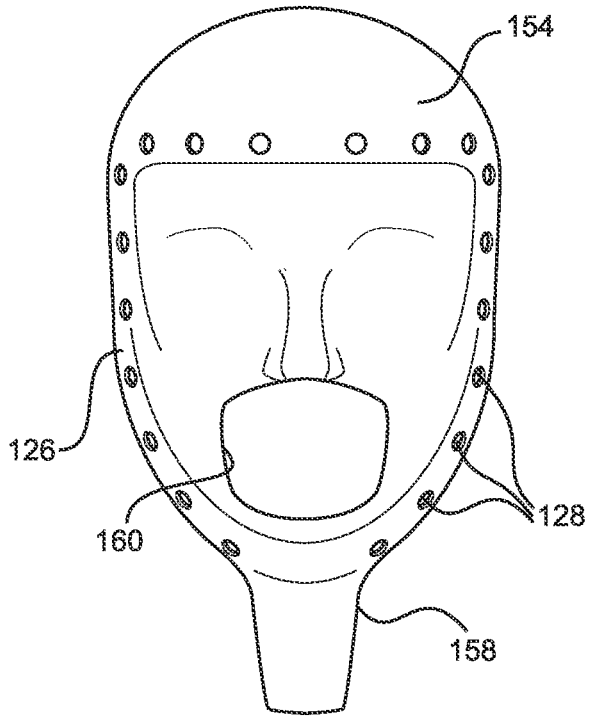


FIG. 8

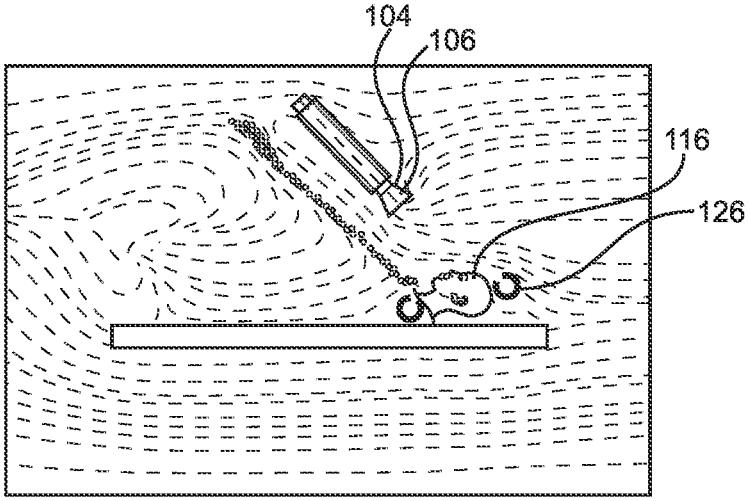


FIG. 9

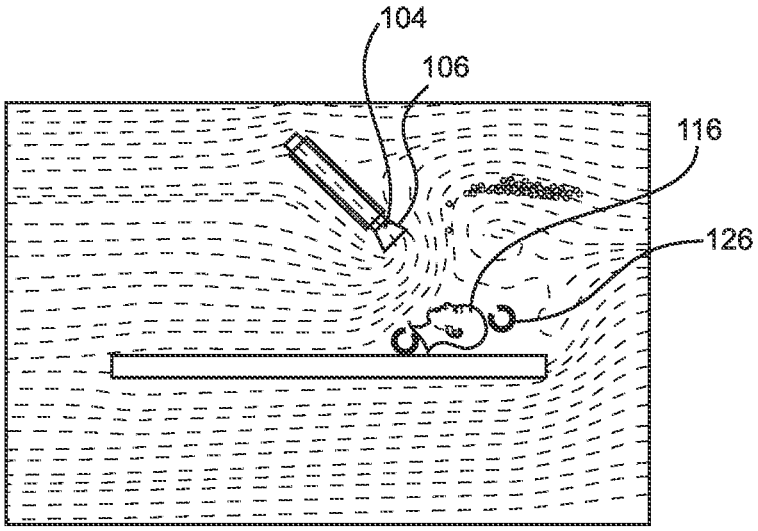


FIG. 10

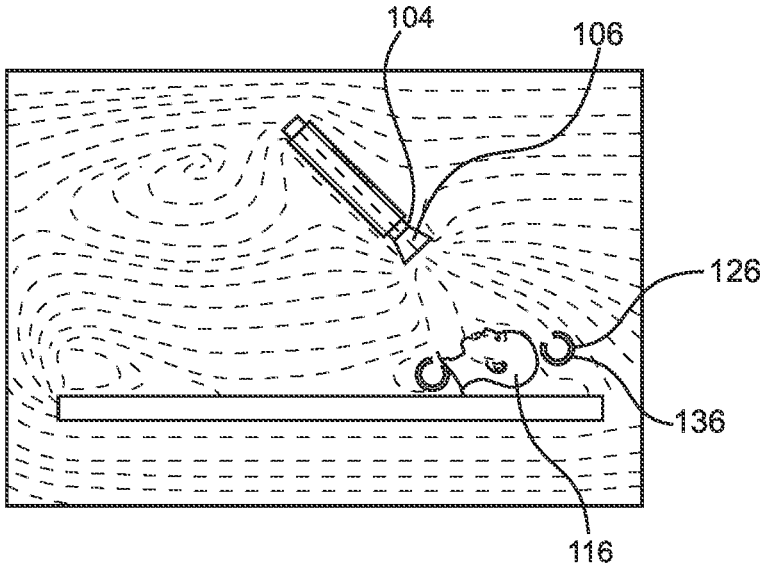


FIG. 11

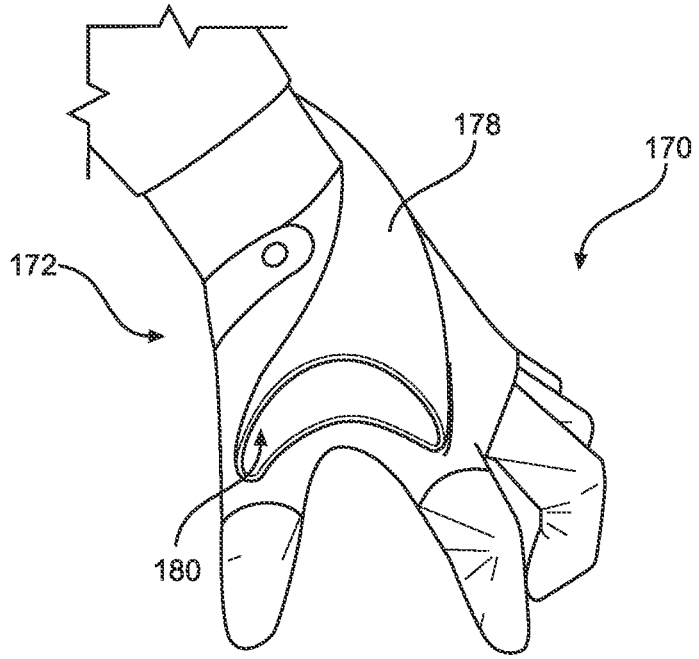


FIG. 12

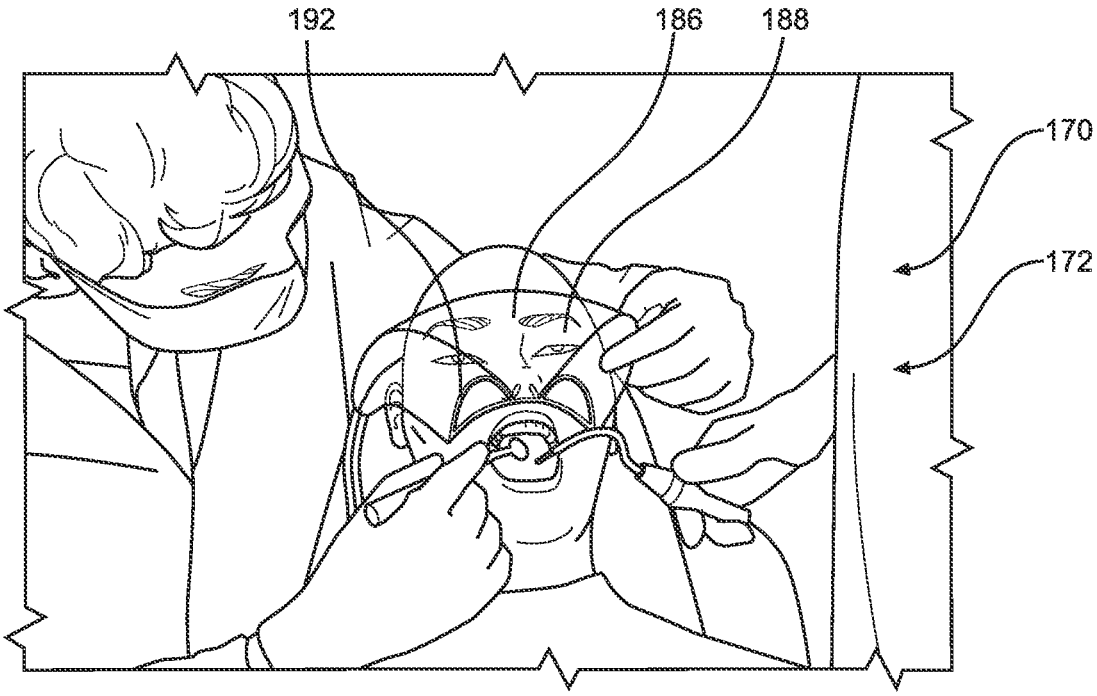


FIG. 13

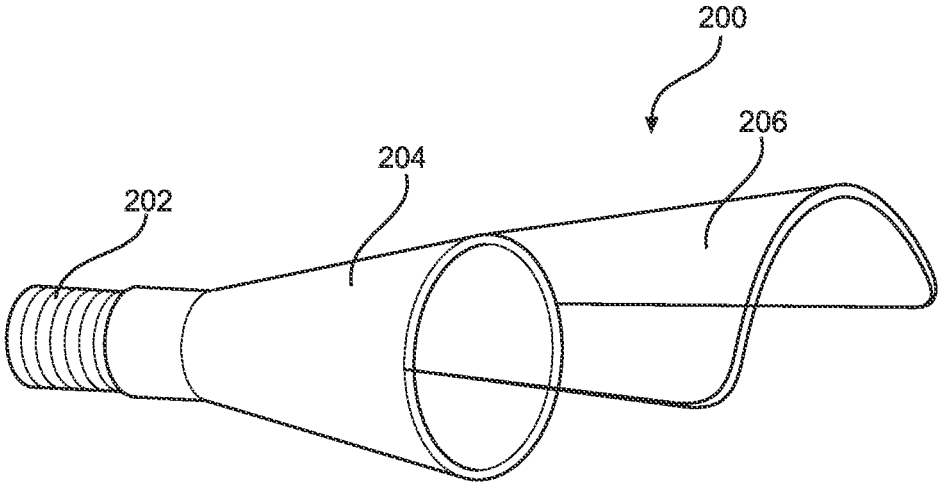


FIG. 14

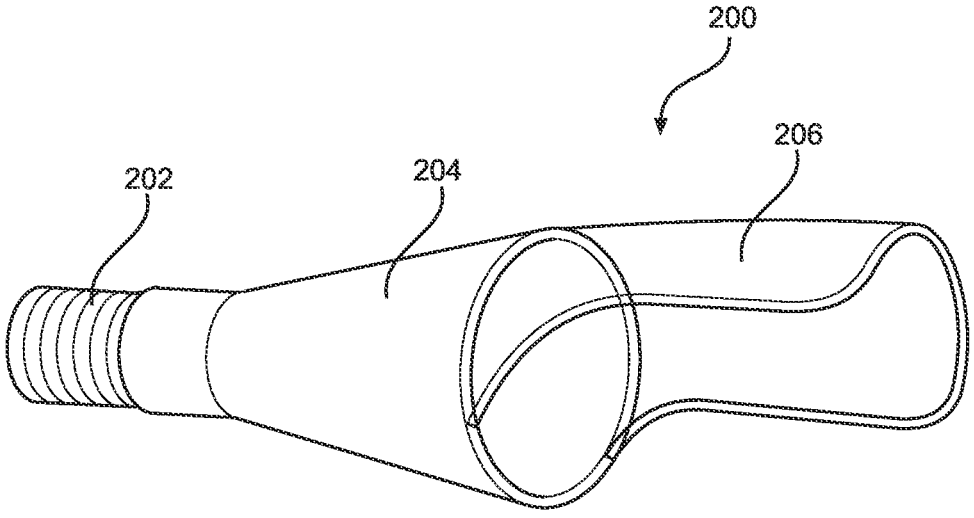


FIG. 15

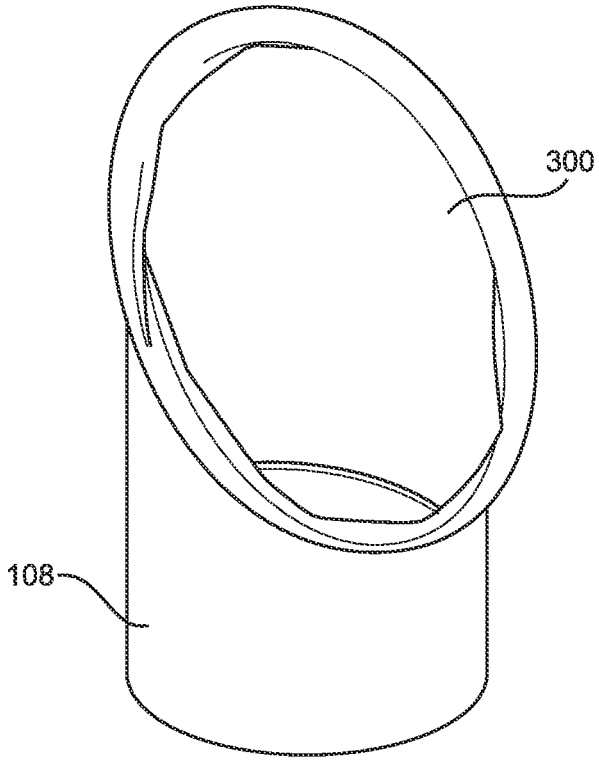


FIG. 16

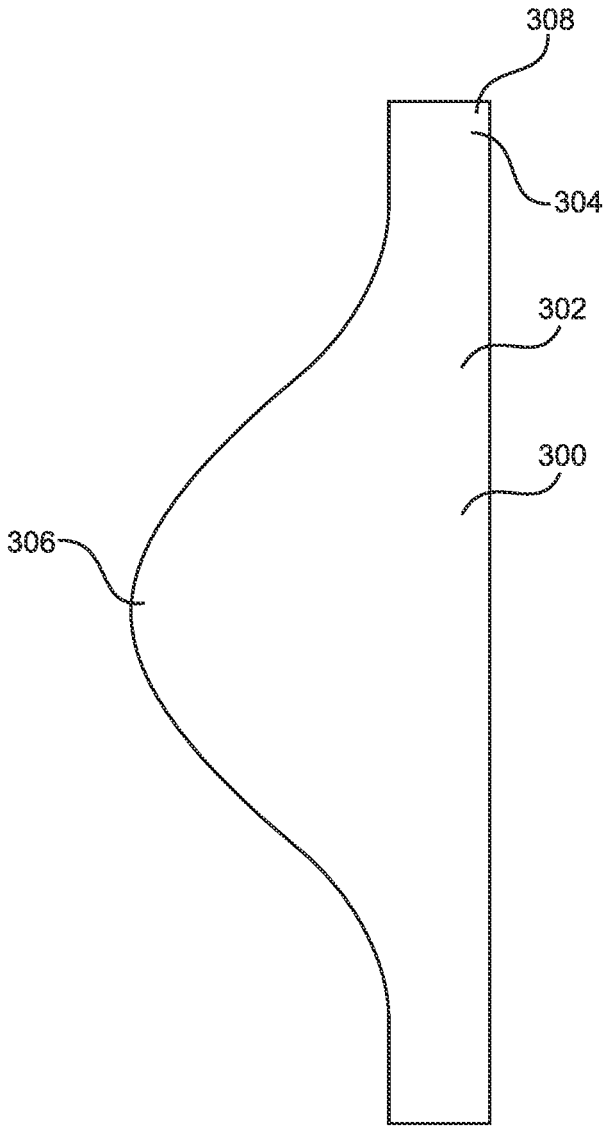


FIG. 17

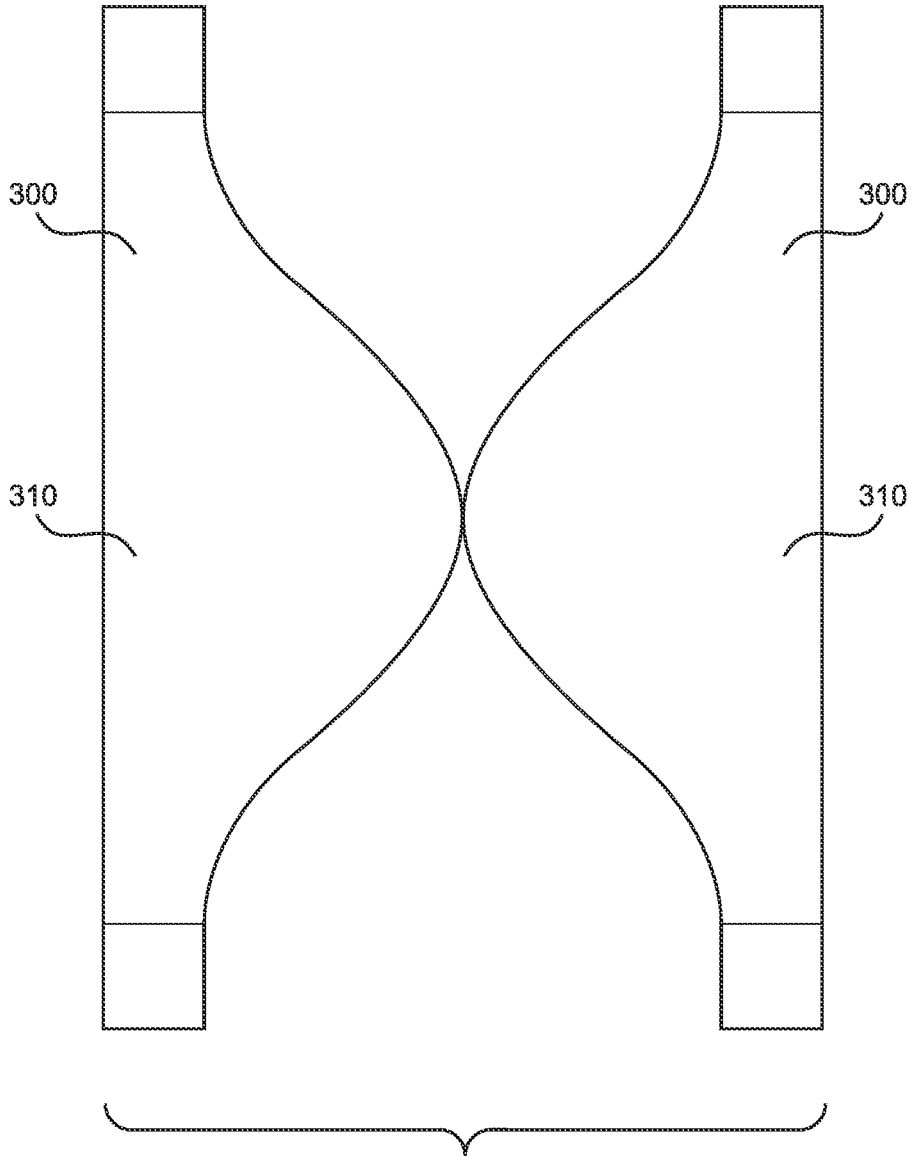


FIG. 18

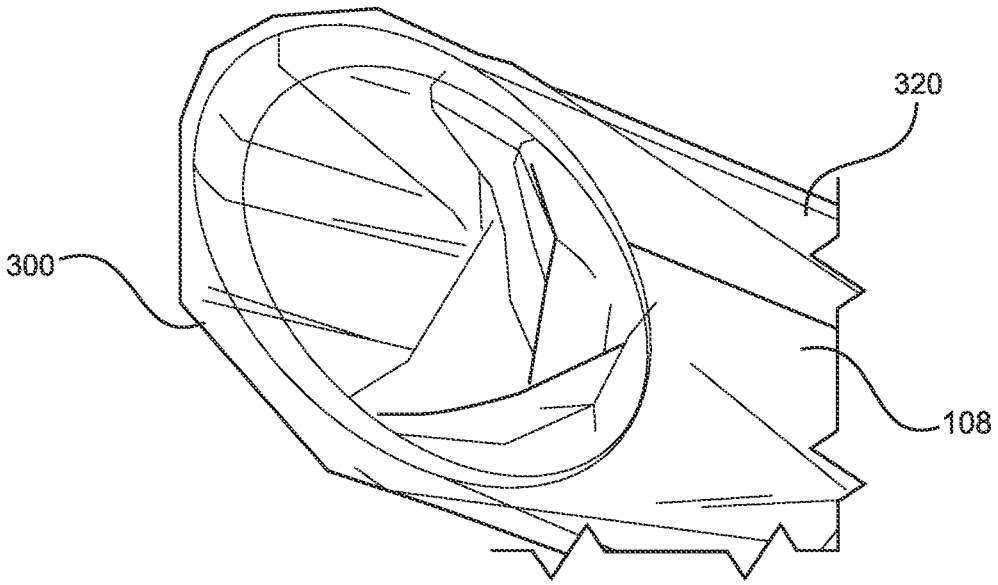


FIG. 19

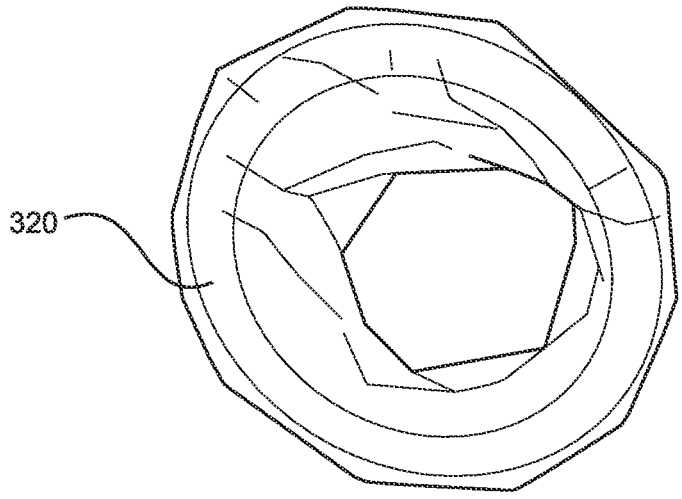


FIG. 20

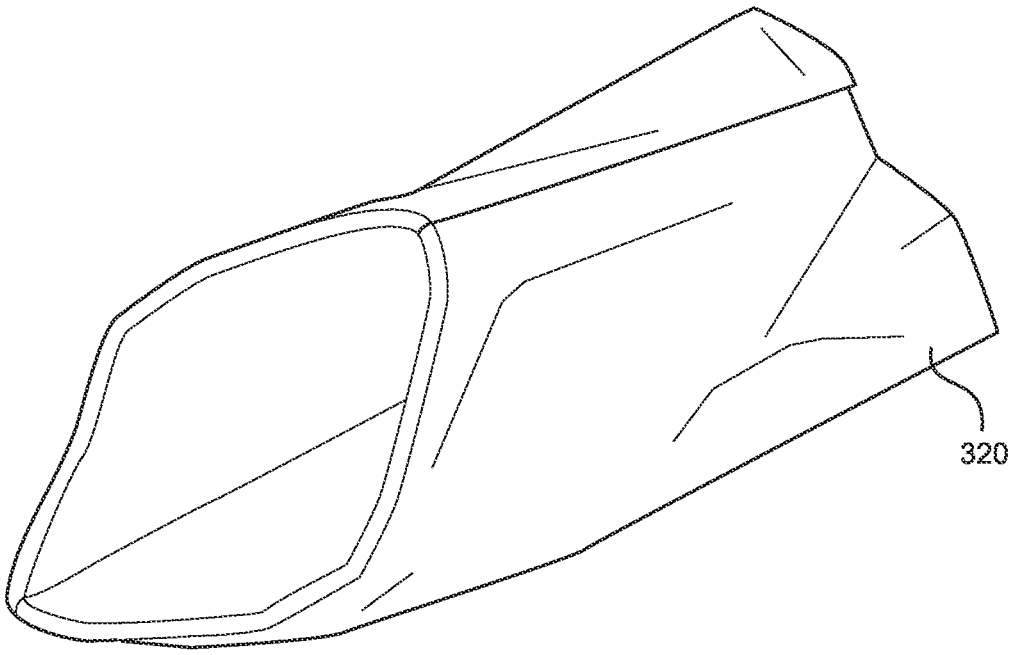


FIG. 21

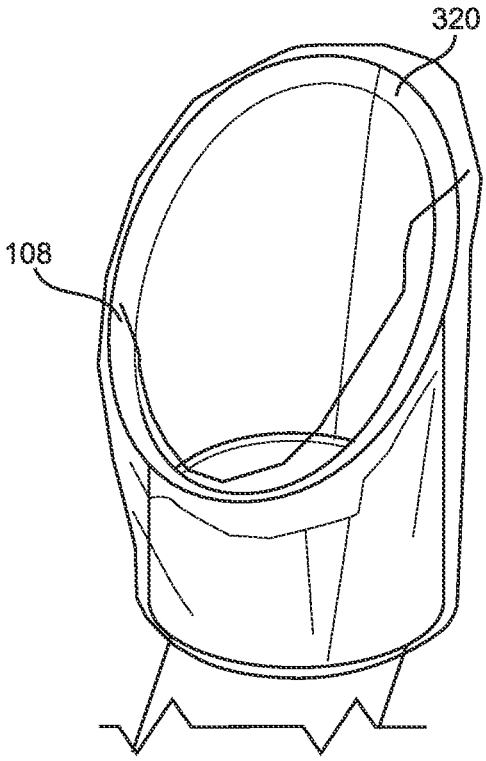


FIG. 22

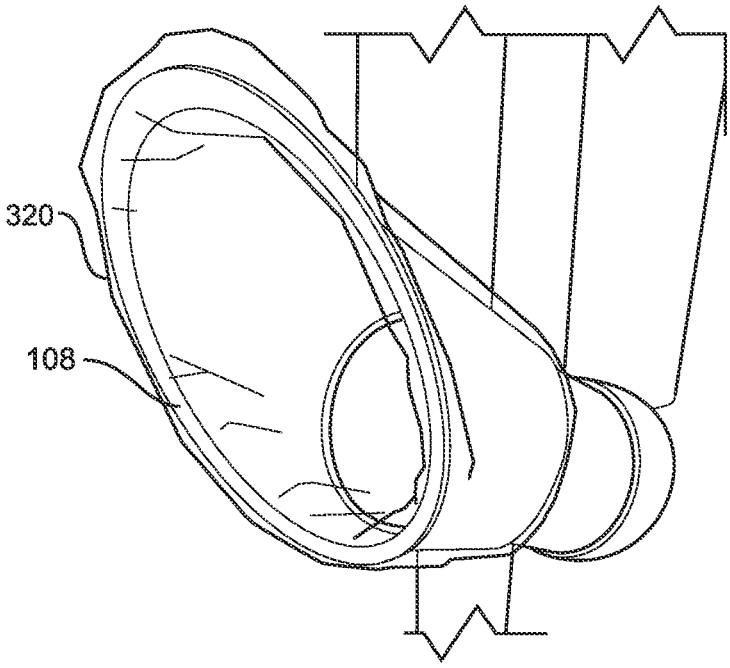


FIG. 23

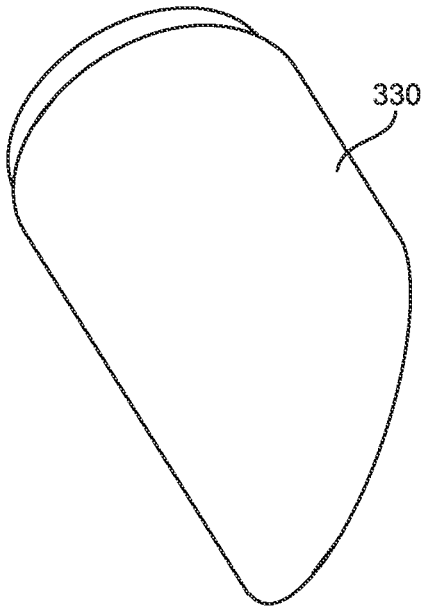


FIG. 24

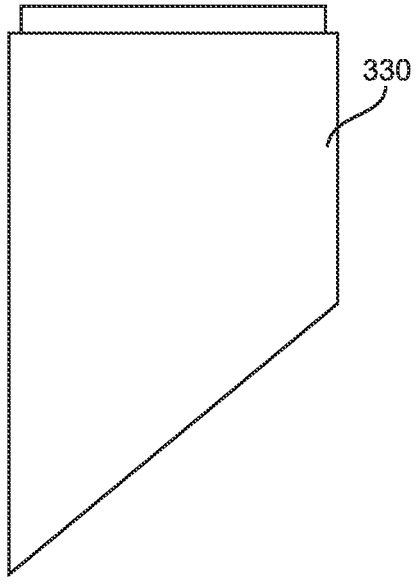


FIG. 25

ARRANGEMENTS FOR CAPTURING AEROSOL DURING DENTAL PROCEDURES AND METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 63/149,485 filed Feb. 15, 2021, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] This disclosure relates to arrangements and methods for improving recapture of aerosol during dental procedures. In particular, this disclosure relates to arrangements and methods of using one or more of extraoral suction devices; blower arrangements with extraoral suction devices; and/or wearable appliances.

BACKGROUND

[0003] Dental professionals and dental patients need protection for aerosol generation procedures during dental care. The need for this protection is heighted currently while viruses, such as Covid-19, are prevalent.

[0004] In the past, there have been used extraoral suction devices, sometimes called local extractors, which can suck aerosol into a filtration system, thus reducing the contaminants from the environment. One example of an extraoral suction device is described in U.S. Pat. No. 9,131,997, incorporated herein by reference.

[0005] In some extraoral suction devices, the suction is ineffective to deal with dynamic dental operation procedures and various room conditions. Because of this, the capture efficiency of the aerosol and any viruses within the aerosol is not guaranteed. With no guarantee of aerosol or virus captures efficiency, it is hard to justify an investment in this equipment.

[0006] What is needed is an improvement to the capture efficiency of aerosols and viruses, without creating additional discomfort to the patient. An arrangement that improves the robustness of capture efficiency under various conditions, as well as maintaining a comfort level for the patient, is desirable.

SUMMARY

[0007] In one aspect, an arrangement for capturing aerosol during a dental procedure on a human is provided. The arrangement includes an extraoral suction device; and a blower arrangement to induce an airflow zone to push aerosol to the suction device.

[0008] In some arrangements, the blower arrangement comprises an airflow plenum with a plurality of holes sized to permit a flow of air from the plenum and toward the suction device.

[0009] The plenum may comprise a ring sized to surround a human head from the crown of the head to under a chin and back to the crown.

[0010] In some examples, the plenum is a tube, and the holes are in a front of the tube facing away from the human head.

[0011] In one or more embodiments, the holes are circumferentially spaced along the tube. In some examples, they may be evenly circumferentially spaced, but many variations are possible.

[0012] In some example embodiments, the plenum comprises a face mask to cover a human face. The mask has an opening arrangement located to expose a mouth and nostrils, when the mask is over a human face. The holes are along an outer periphery of the mask and oriented to direct airflow from the holes toward the opening arrangement.

[0013] In one or more example embodiments, the plenum is attached to safety glasses worn over the eyes, and the holes are oriented to direct airflow away from the eyes and toward a mouth of the human.

[0014] The blower arrangement has a positive pressure side for inducing the air flow zone pushing aerosol to the suction device, and in some embodiments, the negative pressure side is used for inducing a vacuum pressure in the suction device.

[0015] In some preferred arrangements, the blower arrangement is configured to produce the air flow zone to flow from an upper position to a lower position.

[0016] One or more embodiments can further include an overhead light arrangement, in which the air flow zone flows from a duct attached to the overhead light arrangement.

[0017] In another aspect, an extraoral suction device is provided including a hose connected to a vacuum; a nozzle at the end of the hose; and a screen secured to the nozzle.

[0018] In some examples, the screen extends from an outer rim of the nozzle less than 270°.

[0019] In many examples, the screen is transparent.

[0020] In another aspect, a wearable extraoral suction device for capturing aerosol during a dental procedure is provided. The wearable extraoral suction device includes an appliance to be fitted onto a human; a hose connected to a vacuum secured to the appliance; and one or more ducts within the appliance and connected to the hose.

[0021] In some examples, the appliance is a flexible mitten sized to fit over a gloved hand of a user.

[0022] In some examples, the appliance is a visor worn by a patient.

[0023] In another aspect, an arrangement in a dental office for capturing aerosol during a dental procedure on a human is provided. The arrangement includes a dental chair; and an extraoral suction device in a vicinity of the dental chair to draw in aerosol from a patient in the dental chair.

[0024] The extraoral suction device can be arranged to draw in aerosol from an induced air flow zone.

[0025] In some cases, there further includes an overhead light arrangement, and wherein the air flow zone flows from a duct attached to the overhead light arrangement.

[0026] In some embodiments, there further includes a blower arrangement to induce the air flow zone.

[0027] The extraoral suction device can be attached to the dental chair.

[0028] The extraoral suction device can be part of a cabinet in the dental office; part of furniture in the dental office; and/or part of fixtures in the dental office.

[0029] The liner may comprise a filtration material, in some examples.

[0030] In some examples, the liner can have an antimicrobial treatment.

[0031] In one or more embodiments, the extraoral suction device is in accordance with various examples above.

[0032] A variety examples of desirable product features or methods are set forth in the description that follows, and in part, will be apparent from the description, or may be learned by various aspects of this disclosure. The aspects of

this disclosure may relate to individual features, as well as combinations of features. It is to be understood that both the foregoing detailed description are explanatory only and are not restrictive of the claimed inventions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] FIG. **1** is a perspective view of an example prior art extraoral extractor in a typical environment of use;

[0034] FIG. **2** is a schematic diagram of concepts usable consistent with principles of this disclosure;

[0035] FIG. **3** is a schematic diagram showing an example embodiment, constructed in accordance with principles of this disclosure;

[0036] FIG. **4** is another schematic diagram of the embodiment of FIG. **3**;

[0037] FIG. **5** is a schematic illustration of another embodiment, constructed in accordance with principles of this disclosure;

[0038] FIG. **6** is a perspective view of the embodiment of FIG. **5**;

[0039] FIG. **7** is a schematic diagram of another embodiment, constructed in accordance with principles of this disclosure;

[0040] FIG. **8** is a top plan view of the embodiment of FIG. **7**;

[0041] FIG. **9** is a schematic diagram showing a simulation, in which the embodiment of FIGS. **3-4** are not operating;

[0042] FIG. **10** is another schematic diagram showing a simulation, in which the embodiment of FIGS. **3-4** are not operating;

[0043] FIG. **11** is another schematic diagram showing a simulation, this time with the use of the embodiment of FIGS. **3-4** in operation;

[0044] FIG. **12** is a schematic, perspective view of another embodiment, constructed in accordance with principles of this disclosure;

[0045] FIG. **13** is a schematic, perspective view of another embodiment, constructed in accordance with principles of this disclosure;

[0046] FIG. **14** is a schematic, perspective view of another embodiment, constructed in accordance with principles of this disclosure; and

[0047] FIG. **15** is another embodiment, similar to that shown in FIG. **14**, constructed in accordance with principles of this disclosure;

[0048] FIG. **16** is a perspective view of a nozzle of an extra oral extractor having an insertable and disposable liner;

[0049] FIG. **17** is a top plan view of the liner used in the nozzle of FIG. **16**;

[0050] FIG. **18** is a top plan view of another embodiment of a liner, this embodiment being a double layer;

[0051] FIG. **19** is a perspective view of a nozzle of an extra oral extractor including a sock liner;

[0052] FIG. **20** is an end view of the embodiment of FIG. **19**;

[0053] FIG. **21** is a perspective view of a truncated, open ended sock liner for use with the nozzle of an extra oral extractor;

[0054] FIG. **22** is a perspective view of the truncated sock liner of FIG. **21** secured onto the extra oral extractor and secured with an elastic band;

[0055] FIG. **23** is another perspective view of the embodiment of FIG. **22**;

[0056] FIG. **24** is a top plan view of a fabric sock for use with an extra oral extractor having a double layer; and

[0057] FIG. **25** is another view of the fabric sock of FIG. **24**.

DETAILED DESCRIPTION

[0058] FIG. **1** illustrates a typical environment of use for principles of this disclosure. In FIG. **1** is a typical dental office **100** including a chair **102**, in which the patient is seated. An extraoral extractor **104** can be seen located in proximity to the head area of the chair **102**. The extraoral extractor **104** includes a suction device **106** having a nozzle **108**. The suction device **106** is connected to a vacuum inducing generator **110**. The vacuum inducing generator **110** produces a vacuum or suction, which is present at the nozzle **108**, which ideally will draw in aerosol generated during a dental procedure. The aerosol can include viruses, such as Covid-19.

[0059] The extraoral extractor **104** can be inefficient in its capture of aerosol due to various conditions in the dental office **100**, such as room size, ventilation, equipment operation, and human factors.

[0060] To improve capture efficiency, additional airflow is introduced beyond the suction port of the suction device **106**, to create an airflow zone to move all of the particles and generated aerosol into the extraoral extractor **104**.

[0061] In reference now to FIG. **2**, a schematic diagram illustrates one example concept of improvements to the prior art. In the diagram of FIG. **2**, the head of a patient can be seen at **116**. Extending over and spaced from the mouth of the patient **116** is extraoral suction device **106**. A blower arrangement **120** is shown schematically at the crown of the patients head **116** and under the chin of the patients head **116**. The blower arrangement **120** pushes out an airflow to induce an airflow zone shown in broken lines at **122**, which will push aerosol to the suction device **106**. The blower arrangement **120** surrounds the mouth and nose of the patient **116**, to push out air, creating the airflow zone **122**.

[0062] In FIGS. **3** and **4**, the blower arrangement **120** includes an airflow plenum **126** with a plurality of holes **128** sized to permit a flow of air from the plenum **126** and toward the suction device **106**. The holes **128** can be very small, such as pinholes. Many variations are possible, including varying the size of the holes **128**. One of the objections in some example embodiments aims for an even flow rate around the entire device, which can be achieved if the holes **128** are different sizes, with smaller holes **128** being near the point where the air is pumped in. As the holes **128** get farther away from the air source, they would be larger. In general, the size of the holes **128** will depend on the flow rated from the blower arrangement **120**. The blower flow rate can be decoupled from the suction flow rate, which means that the total flow rate out of all of the holes **128** can be different from the suction flow rate. Typically, it is desirable to have a smaller blower flow rate to have a quieter and more energy efficient system. In preferred systems, the flow rate of the blower arrangement **120** is determined independently, and the size(s) of the holes **128** are selected based on the flow rate of the blower arrangement **120**.

[0063] In the example shown in FIGS. **3** and **4**, the plenum **126** forms a ring **130** which is sized to surround the head **116** of the patient from the top or crown **132** of the head **116** down under the chin **134** and back the crown **132**. The plenum **126** can be in a form of a tube **136**, with the holes

128 in a front of the tube **136** facing away from the head **116**. In this arrangement, airflow through the holes **128** will flow in a direction away from the head **116** into the zone **126** and into the suction device **106**.

[0064] As can be seen in the example of FIG. **3**, the holes **128** can be made to be evenly circumferentially spaced along the tube **136**. In other embodiments, the holes **128** can be arranged in other patterns.

[0065] The holes **128** around the head **116** create the stable airflow that will naturally go to the suction device **106**. This will create a very stable flow zone **122** around the head **116** to carry contaminant to the nozzle **108**, even if there are disturbances in the airflow of the dental office. The airflow through the holes **128** can be independently controlled and can be smaller than the airflow of suction on the suction device **106**.

[0066] In the embodiment of FIGS. **3** and **4**, the tube **136** can be installed directly on the dental chair **102**, or it may be in a different form, such as a headset worn by the patient. The air source can be from the extraoral suction device **106**, or from a separate air pump, or from the dental chair **102**. The airflow rate can be adjustable. Many variations are possible.

[0067] The blower arrangement **120** induces the airflow zone on the positive pressure side to push aerosol to the suction device **106**. In some embodiments, the negative pressure side of the blower arrangement is used for inducing a vacuum pressure in the suction device **106**.

[0068] In some preferred arrangements, the blower arrangement **120** is configured to produce the air flow zone to flow from an upper position to a lower position, working with gravity to help move very large droplets to the suction device **106**. Very large droplets (i.e., splatter) can be more difficult to capture, due to their mass. But also due to their mass, these very large droplets do not linger in the air and pose as big of a risk to remaining airborne. Therefore this pushed air would work with gravity to move the very large droplets to the suction device **106**.

[0069] In FIG. **1**, the dental office **100** includes an overhead light arrangement **109**. In some embodiments, the air flow zone can be configured to flow from a duct attached to the overhead light arrangement **109**. Many alternatives are possible.

[0070] Another embodiment is illustrated in FIGS. **5** and **6**. In this embodiment, the plenum **126** is attached to safety glasses or goggles **140**. The safety glasses **140** are worn by the patient **116** to cover the eyes and protect the eyes from particulate and debris during a dental proceeding. In FIG. **5**, the nozzle **108** is placed close to the chin of the patient **116**, and the air holes **128** are oriented to direct airflow away from the eyes and toward a mouth and toward the nozzle **108**. An air slot can be designed using the Coanda effect to direct air toward the nozzle **108** and away from the dental professional.

[0071] In FIG. **6**, the safety glasses **140** are shown including an elastic headband **144**. The safety glasses **140** can include a hinged visor **146** having a hose connection **148**, to hook up to a hose with an air source. The visor **146** can be removable and replaceable.

[0072] FIGS. **7** and **8** show another embodiment in which the plenum **126** comprises a face mask **154**. The face mask **154** is sized to cover a human face **156**. The mask **154** has an outer periphery **158** which is generally along an outer boarder of the face **156**.

[0073] The mask **154** has an opening arrangement **160** located to expose the mouth and nostrils of the face **156**, when the mask is over the face **156**. In FIG. **8**, the opening arrangement **160** is shown as a single opening, but the opening arrangement **160** could be more than one opening, such as shown FIG. **7** where there is a separate opening for the mouth and a separate opening for the nostrils.

[0074] Holes **128** for the airflow are along the periphery **158** and are oriented to direct airflow from the holes **128** and toward the opening arrangement **160**. From there, it flows into the airflow zone **122** and into the suction device **106**.

[0075] The diagrams of FIGS. **9-11** show the effectiveness of the embodiments of FIGS. **2-8**. When there are airflow disturbances in the dental office, the suction zone created by an extraoral extractor **104** is distorted. In FIG. **9**, aerosol and droplets is simulated to eject out of a patients mouth, with an air disturbance to the left. In FIG. **9**, only the extraoral extractor **104**, is used, and while the plenum **126** is shown in the diagram, in this simulation, it is not operating. In this case, as can be seen in FIG. **9**, all of the aerosol flows to the side of the extraoral extractor **104**. The capture efficiency is 0%, meaning that the extraoral extractor **104** does not provide any value in capturing contaminants.

[0076] In the diagram of FIG. **10**, the conditions are the same as FIG. **9** (i.e., the embodiments of FIGS. **2-8** are not operating, and only the extraoral extractor **104** is being used), but the air disturbance is to the right, which causes all of the aerosol to go to the side of the extractor **104**. The capture efficiency is 0%, meaning the extraoral extractor **104** does not provide any value to capturing contaminants.

[0077] In FIG. **11**, the embodiments of FIGS. **3-4** are in operation creating the stable airflow zone **122**, in combination with the extraoral extractor **104**. The exact same conditions as shown in FIG. **10** are created, with an air disturbance to the right. In this case, a 93% capture efficiency is demonstrated with the significant improvement from the baseline of 0%. Only a very limited portion of large droplets is left on the lips of the patient.

[0078] Other advantages are realized, including being able to set the suction flow rate to be only 50% of the full flow rate in cases that do not use one of the embodiments of FIGS. **2-8**. This also lowers the noise level and lowers energy consumption. There are no obstacles for the dental procedure and no uncomfortable inserts into the mouth of the patient. The embodiments of FIGS. **2-8** maintain the performance, even for lower suction airflow, leading to a quiet procedure and lower energy consumption.

[0079] Additional embodiments are shown in FIGS. **12** and **13**. In the embodiment of FIGS. **12** and **13**, a wearable extraoral suction device **170** is provided. The wearable extraoral suction device **170** includes an appliance **172** to be fitted onto a human. The appliance **172** can be fitted onto either the patient or the dental professional working on the patient. In general, a hose will be provided, which is connected to a vacuum source, which is secured to the appliance **172**. There will be one or more ducts within the appliance **172** and connected to the hose.

[0080] In the example of FIG. **12**, the appliance **172** is a flexible mitten **178**. The mitten **178** is sized to fit over a gloved hand of a user, the user being the dental professional. The mitten **178** brings the extraction point as close to the source of the aerosol as possible. The mitten **178** can be made from a variety of materials, such as molded in silicone

or a similar material that is flexible and non-porous. Silicone is resistant to most chemicals and is easily cleaned.

[0081] The mitten **178** can be secured by a simple toggle and can be designed to be usable with either a right hand or a left hand.

[0082] The mitten **178** would be attachable to a flexible hose, and the hose will not deform under vacuum and should provide for ease of movement without adding excessive weight that may hinder the dental professional.

[0083] Within the mitten **178** are molded ducts **180**, which will take in the aerosol from the mouth of the patient.

[0084] In FIG. **13**, the appliance **172** is a visor **186** worn by the patient. The visor **186** includes a lightweight, transparent extraction funnel **188** having ducts **190** and is worn over the upper part of the face of the patient. The visor **186** can be molded so as to fit a wide variety of faces, with cheek and forehead pads for comfort. The extraction system can connect above the head of the patient at either side. The visor **186** can be incorporated into a design that would replace the usual safety glasses.

[0085] FIGS. **14** and **15** show another embodiment. In FIGS. **14** and **15** an extraoral suction device is illustrated at **200**. The extraoral suction device **200** includes a hose **202**, connected to a vacuum source. A nozzle **204** is at an end of the hose **202**. A screen **206** is secured to the nozzle **204**.

[0086] The screen **206** can extend from an outer rim of the nozzle **204** and be along the circumferential edge less than a full 360°, such as less than 270°. In some cases, the screen **206** is 180°, or less.

[0087] The screen **206** is preferably transparent, such that the dental professional can see through it. The screen **206** can be made from a variety of materials including, for example, acetate. The screen **206** will partially enclose the aerosol and limit the escape of droplets toward the dental professional.

[0088] FIG. **15** is a contoured version of the screen **206** which has better ergonomics.

[0089] In reference now to FIGS. **16-25**, it has been found that when dental hygienists use the extra oral extractor **104**, the nozzle **108** can be covered in water, saliva, and blood from various oral procedures, including ultrasonic scaling and laser root planing. Without the use of an extra oral extractor, these fluids would remain airborne or settle on the patient, hygienist, or other nearby surfaces. Because these fluids are settling on the nozzle **108**, rather than wiping them down, it is envisioned that a disposable liner fitting within the nozzle **108** would be helpful. FIGS. **16-25** show various embodiments of a disposable liner **300**.

[0090] The disposable liner **300** can be made of a paper or a fabric material formed to line an interior of the nozzle **108** of the extra oral suction device **104**. The paper can include anti-microbial coatings.

[0091] FIG. **16** shows nozzle **108** having a liner **300** lining the interior of the nozzle **108**.

[0092] In FIG. **17**, the liner **300** is shown as a paper liner made of a single layer **302**. The liner **300** is provided as a flat cutout having a band **304** and a hump **306** projecting from the band **304**. The band **304** can connect to itself after the liner **300** is formed into a cylinder shape. The band **304** can have a tab **308** that connects, either in the form of adhesive or by mechanical interlock. In this embodiment, the liner **300** is fitted within the interior of the nozzle **108**, and it can be free of physical connection with the nozzle **108**.

[0093] FIG. **18** shows a double layer paper liner **310**. The double layer liner **310** is similar to the single layer of FIG. **17**, except that it is two layers instead of one.

[0094] FIG. **19** illustrates a sock liner **320** made of a fabric material. The sock liner **320** is constructed and arranged to cover both the interior of the nozzle **108** and the exterior of the nozzle **108**. It is secured to the nozzle **108** with an elastic or rubber band around the nozzle **108**. FIG. **20** shows an end view of the nozzle **108** having the sock liner **320**. FIG. **21** shows a truncated sock liner **320** before securing it to the nozzle **108**.

[0095] FIGS. **22** and **23** show the truncated sock liner **320** of FIG. **21** secured to the nozzle **108** with an elastic band around the nozzle **108**.

[0096] FIGS. **24** and **25** show a fabric sock at **330**. The fabric sock **330** can be made of a material similar to face mask material. It can have a double layer to cover the nozzle **108** both along the interior and the exterior. The sock **330** can include fused or welded seems. It is shaped to fit the nozzle shape **108**.

[0097] The liner **320** can be made from a variety of materials, including a filtration material or media. It can also have an antimicrobial treatment.

[0098] The above represents example principles. Many embodiments can be made using these principles.

1. An arrangement for capturing aerosol during a dental procedure on a human; the arrangement comprising:

(a) an extraoral suction device; and

(b) a blower arrangement to induce an air flow zone to push aerosol to the suction device.

2. The arrangement of claim **1** wherein the blower arrangement comprises an airflow plenum with a plurality of holes sized to permit a flow of air from the plenum and toward the suction device.

3. The arrangement of claim **2** wherein the plenum comprises a ring sized to surround a human head from crown of the head, to under a chin, and back to the crown.

4. The arrangement of claim **3** wherein the plenum is a tube, and the holes are in a front of the tube facing away from the human head.

5. The arrangement of claim **4** wherein the holes are circumferentially spaced along the tube.

6. The arrangement of claim **2** wherein the plenum comprises a face mask sized to cover a human face; the mask having an opening arrangement located to expose a mouth and nostrils, when the mask is over a human face; the holes being along an outer periphery of the mask and oriented to direct airflow from the holes toward the opening arrangement.

7. The arrangement of claim **2** wherein the plenum is attached to safety glasses worn over eyes, and the holes are oriented to direct airflow away from the eyes and toward a mouth of the human.

8. The arrangement of claim **1** wherein the blower arrangement has a positive pressure side for inducing the air flow zone pushing aerosol to the suction device, and a negative pressure side for inducing a vacuum pressure in the suction device.

9. The arrangement of claim **1** wherein the blower arrangement is configured to produce the air flow zone to flow from an upper position to a lower position.

10. The arrangement of claim **1** further including an overhead light arrangement, and wherein the air flow zone flows from a duct attached to the overhead light arrangement.

11. An extraoral suction device comprising:

(a) a hose connected to a vacuum;

(b) a nozzle at an end of the hose; and

(c) a screen secured to the nozzle.

12. The extraoral suction device of claim **11** wherein the screen extends from an outer rim of the nozzle less than 270 degrees.

13. The extraoral suction device of claim **11** wherein the screen is transparent.

14. The extraoral suction device of claim **11** further including a disposable liner positioned in the nozzle.

15. A wearable extraoral suction device for capturing aerosol during a dental procedure comprising:

(a) an appliance to be fitted onto a human;

(b) a hose connected to a vacuum secured to the appliance; and

(c) one or more ducts within the appliance and connected to the hose.

16. The wearable extraoral suction device of claim **15** wherein the appliance is a flexible mitten sized to fit over a gloved hand of a user.

17. The wearable extraoral suction device of claim **15** wherein the appliance is a visor worn by a patient.

18. An arrangement in a dental office for capturing aerosol during a dental procedure on a human; the arrangement comprising:

a dental chair; and

an extraoral suction device in a vicinity of the dental chair to draw in aerosol from a patient in the dental chair.

19. The arrangement of claim **18** wherein the extraoral suction device is arranged to draw in aerosol from an induced air flow zone.

20. The arrangement of claim **19** further including an overhead light arrangement, and wherein the air flow zone flows from a duct attached to the overhead light arrangement.

21. The arrangement of claim **20** further including a blower arrangement to induce the air flow zone.

22. The arrangement of claim **18** wherein the extraoral suction device is attached to at least one of: the dental chair; part of a cabinet in the dental office; part of furniture in the dental office; or part of fixtures in the dental office.

23.-**33**. (canceled)

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