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(54) **COOLING FAN**

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Related U.S. Application Data

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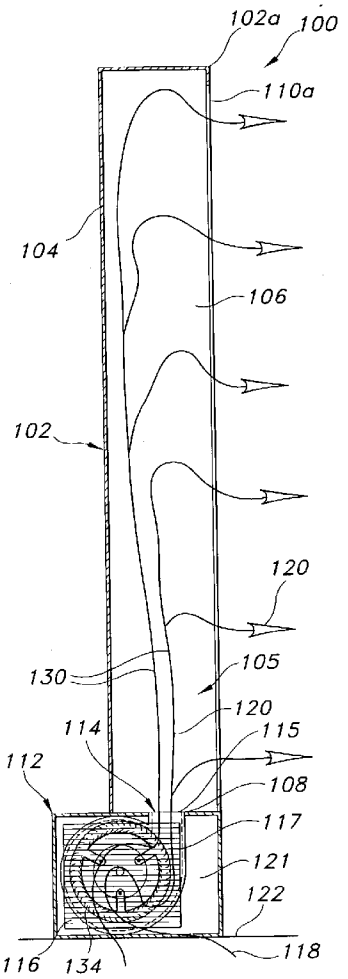
Publication Classification

(51) **Int. Cl.**[7] **F01D 25/26**

(52) **U.S. Cl.** **415/213.1**

(57) **ABSTRACT**

A fan for providing comfort to a user. The fan comprises a housing and an air generator. The housing has at least one wall portion, an elongate interior portion bounded by the at least one wall portion, at least one inlet opening formed at a lower portion of the at least one wall portion, and at least one outlet opening formed in the at least one wall portion. The air generator has at least one exhaust port in fluid communication with the at least one inlet opening of the housing. The air generator also has at least one intake port receiving a supply of air and generating exhaust air through the exhaust port. The exhaust air enters the housing through the at least one inlet opening and exits the housing through the at least one outlet opening.



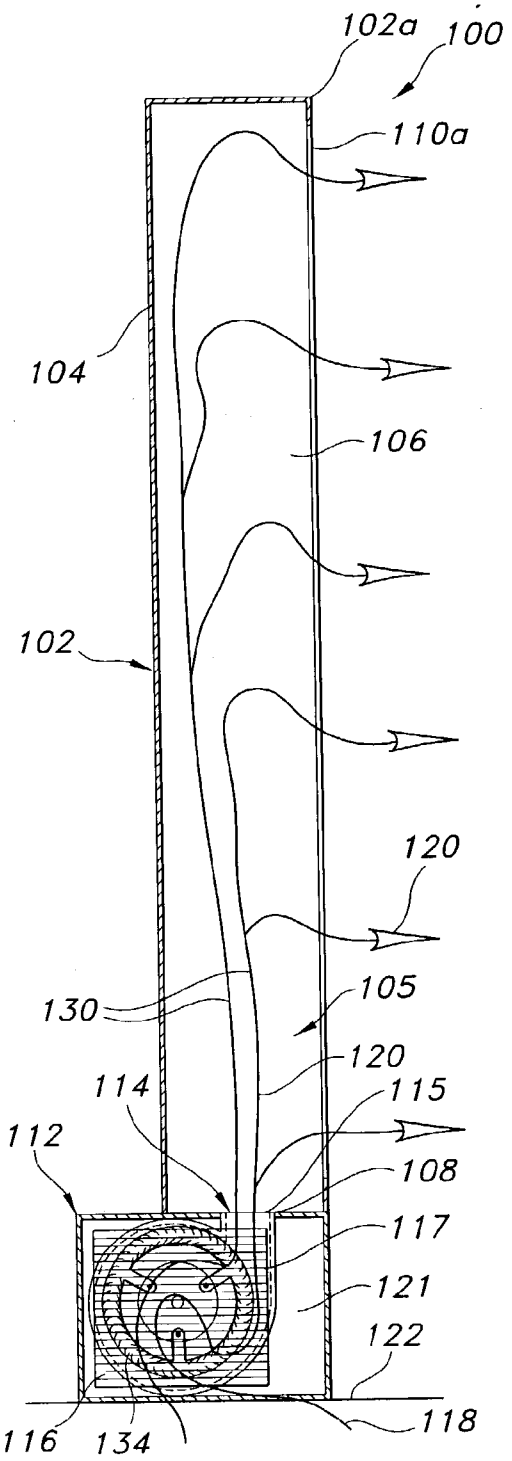

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FIG. 1A

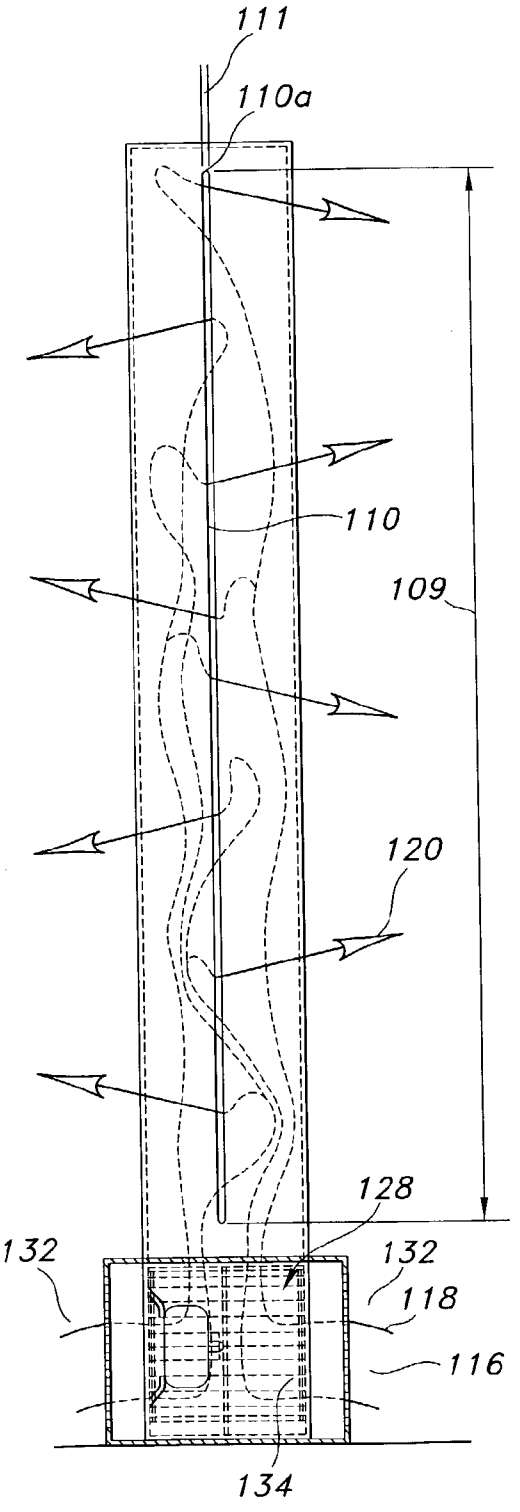
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FIG. 1B

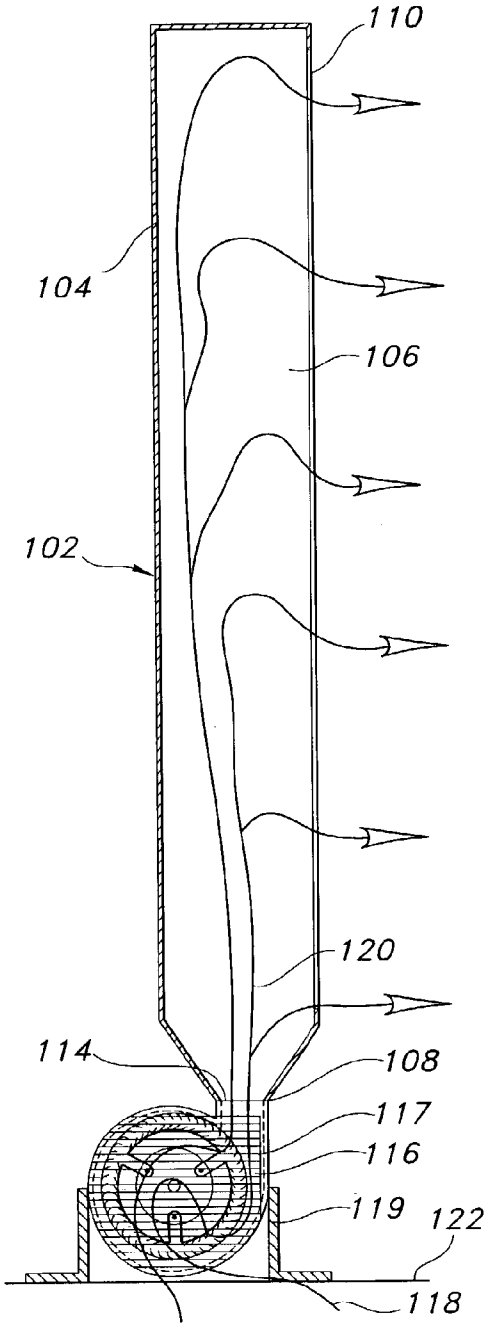

FIG. 1C

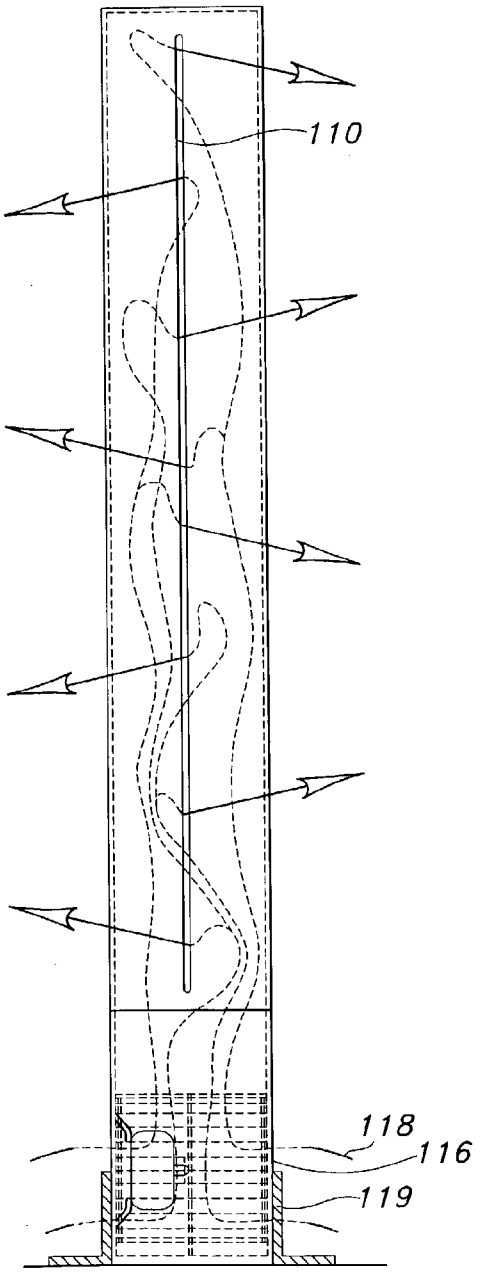

FIG. 1D

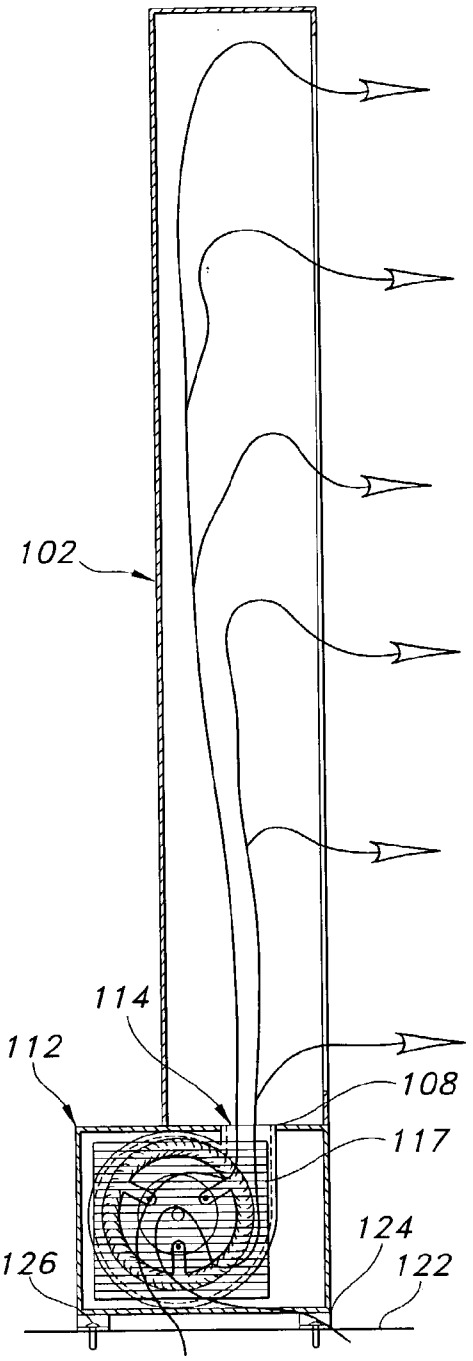

FIG. 1E

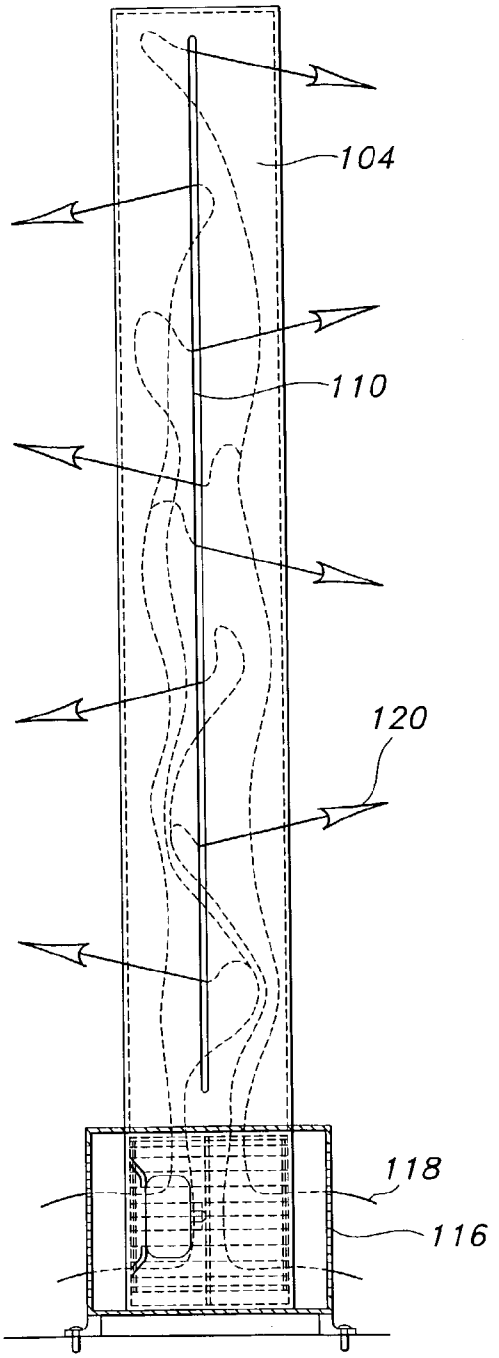

FIG. 1F

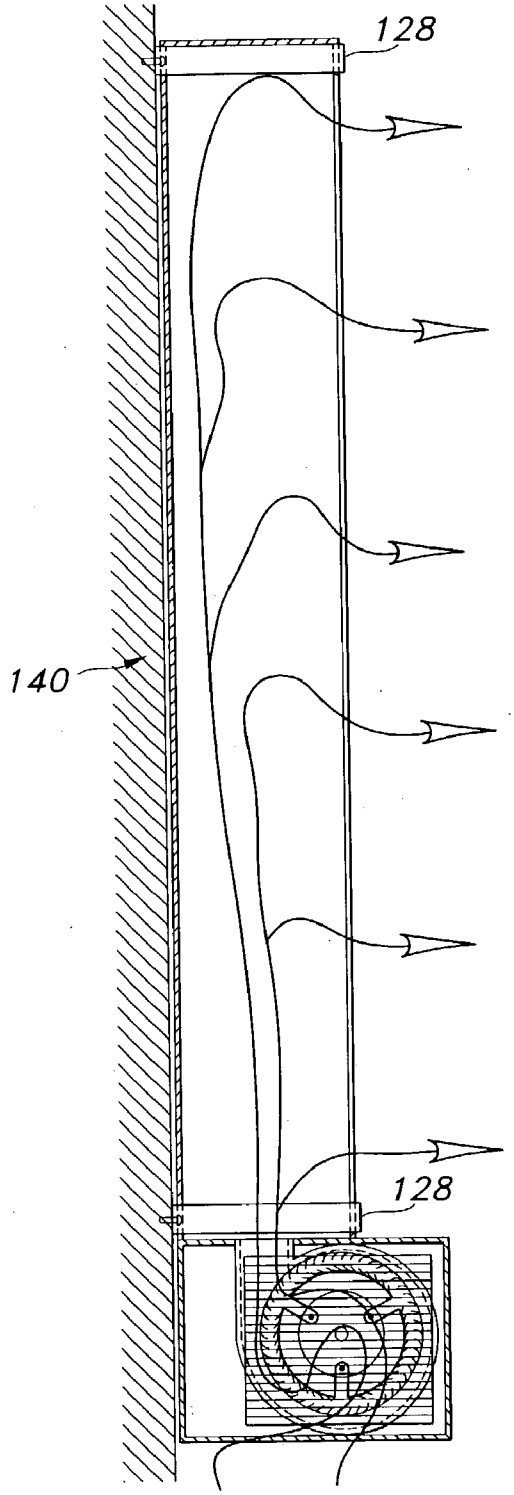

FIG. 1G

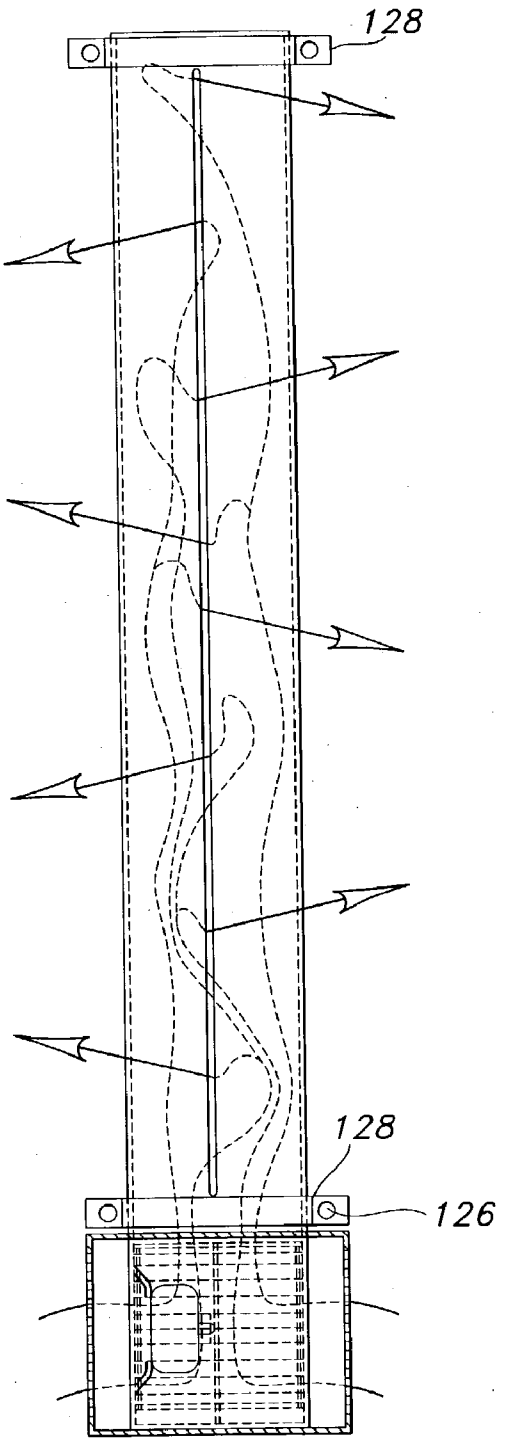

FIG. 1H

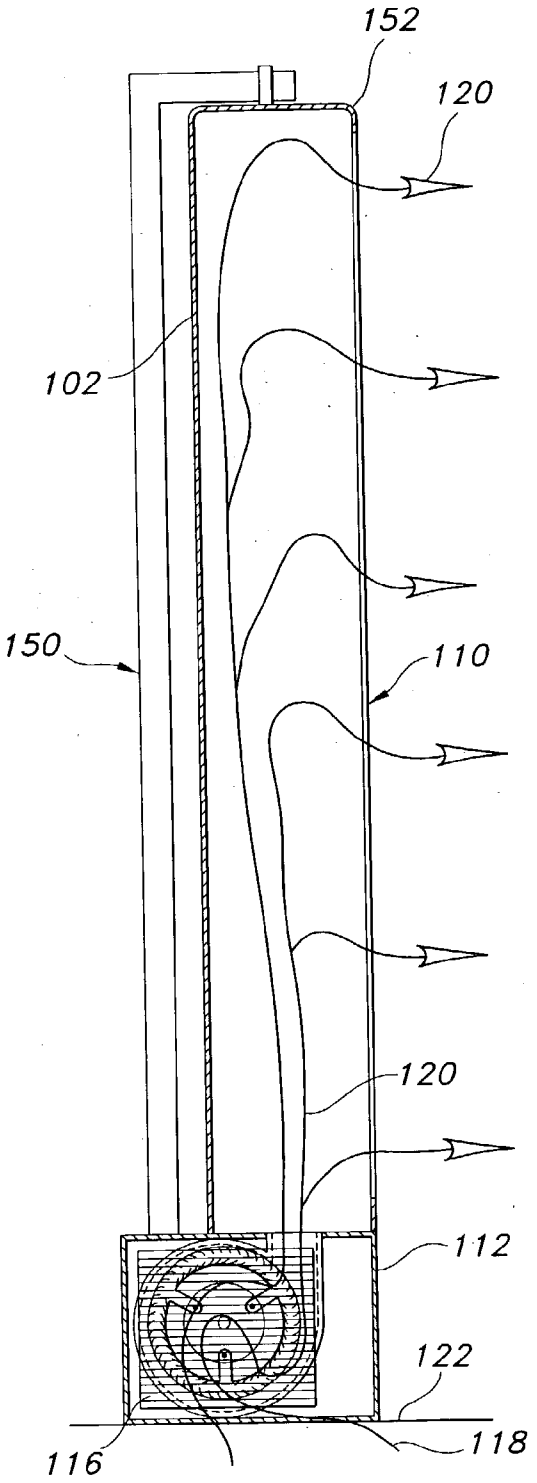

FIG. 1I

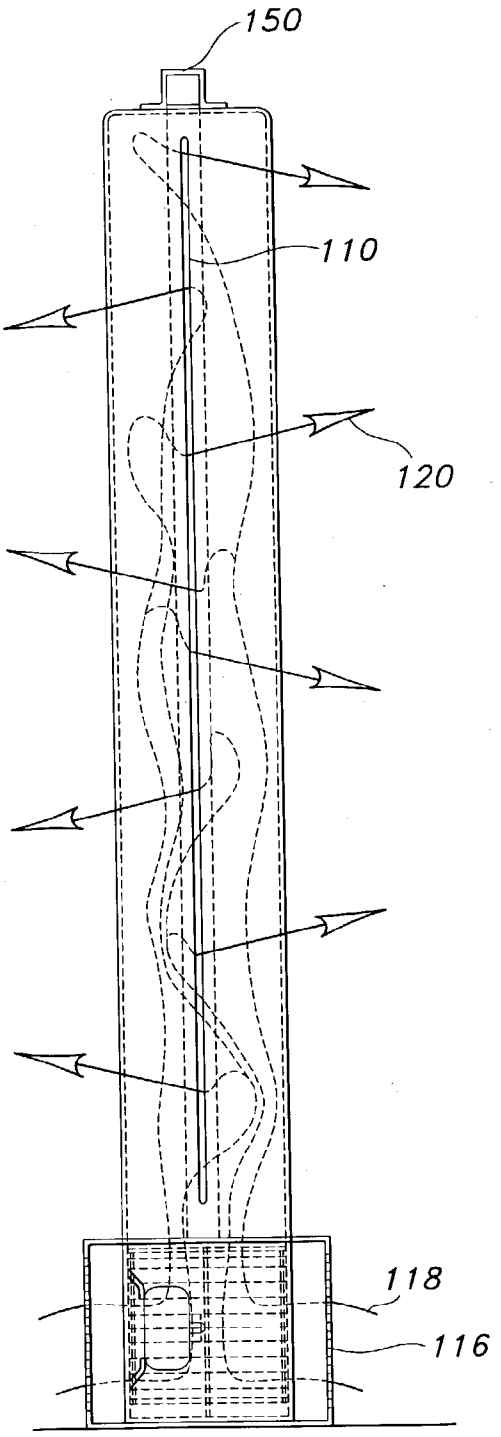

FIG. 1J

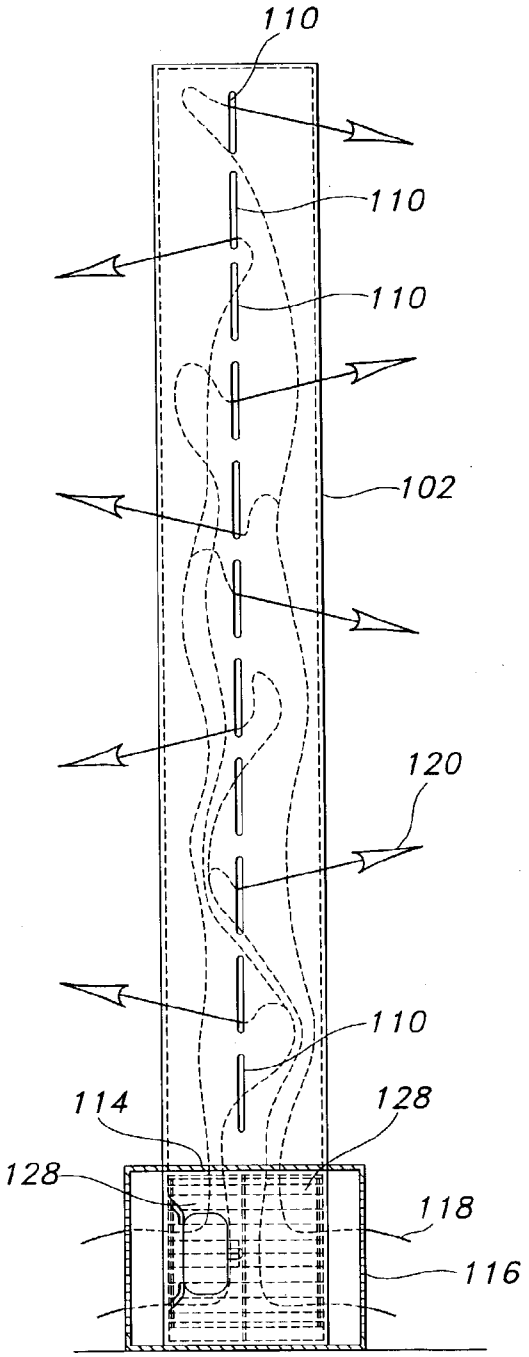
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FIG. 2A

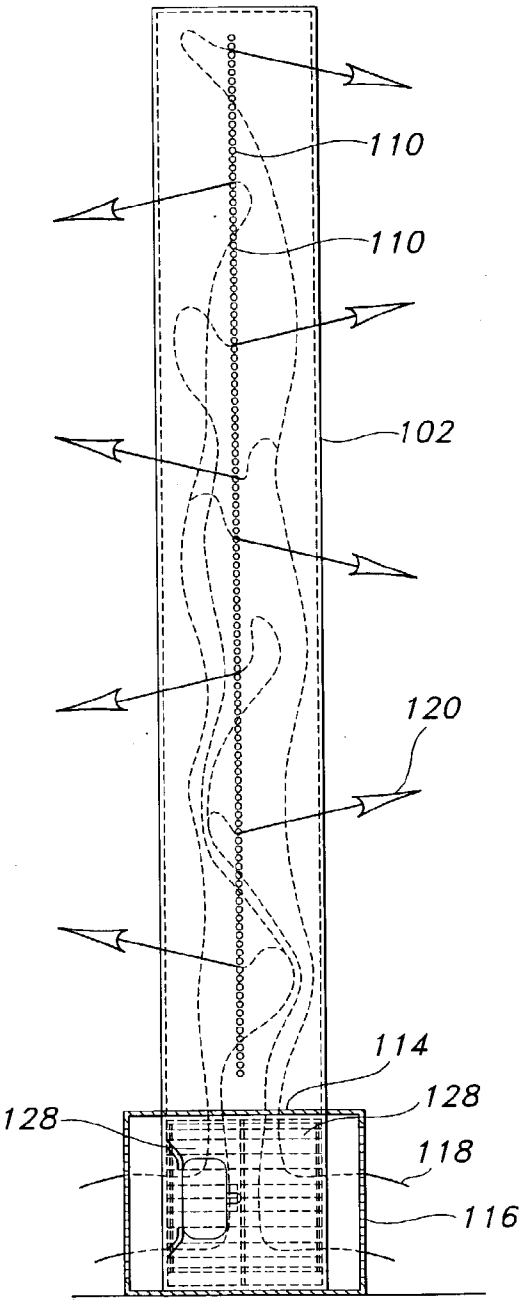
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FIG. 2B

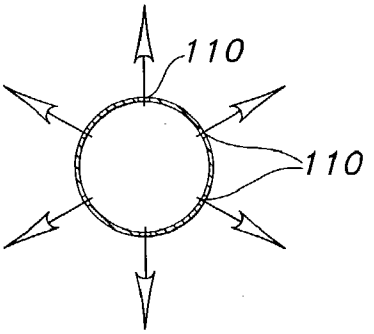


FIG. 3B

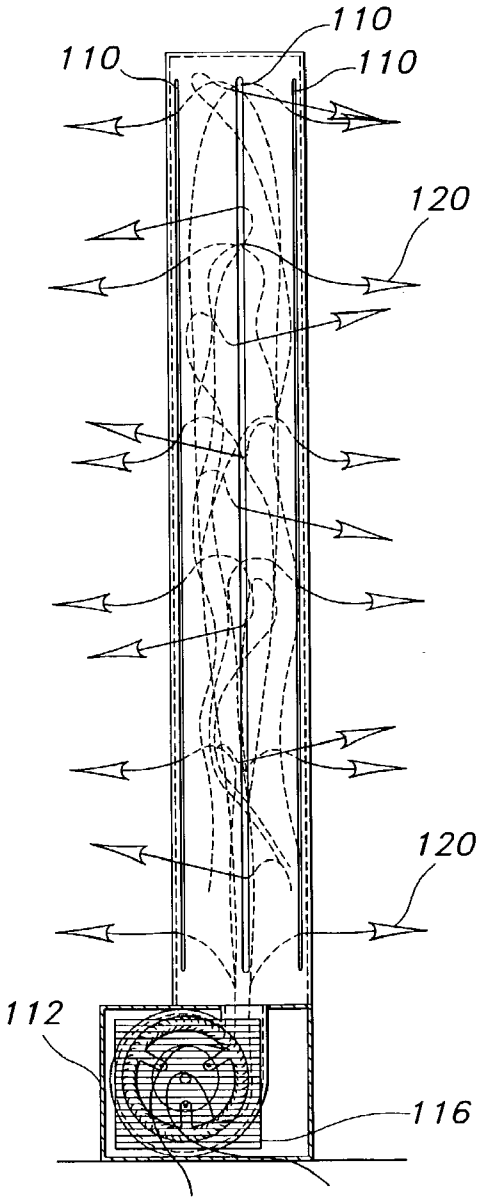


FIG. 3A

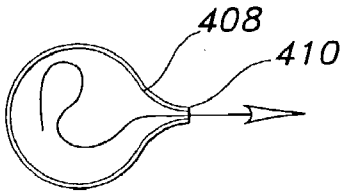


FIG. 4C

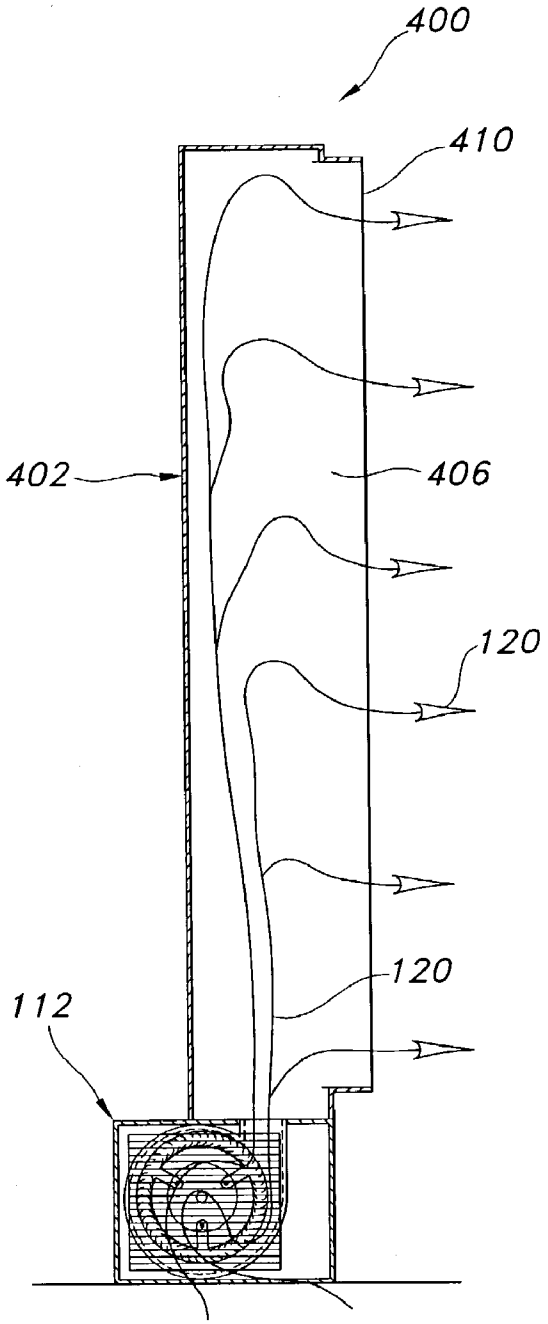


FIG. 4A

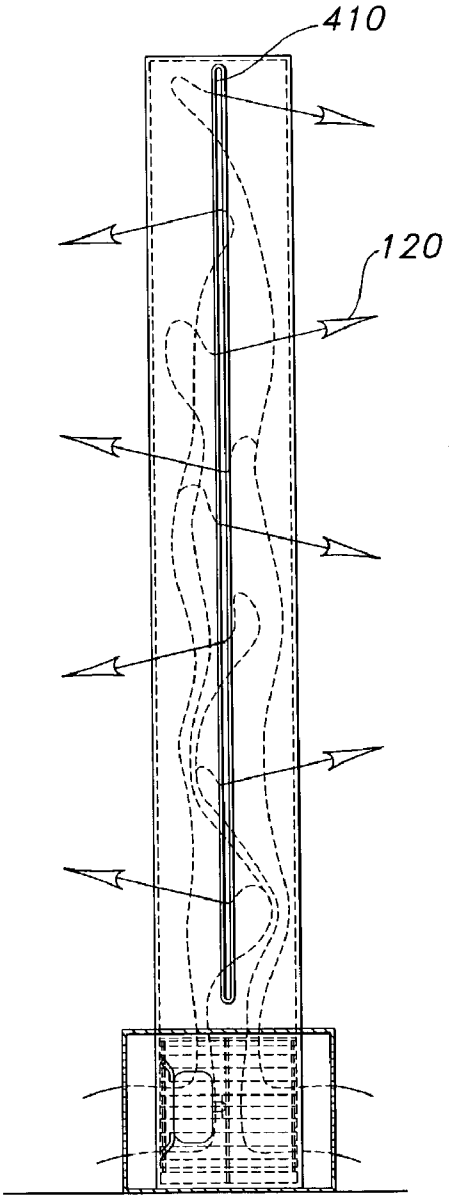


FIG. 4B

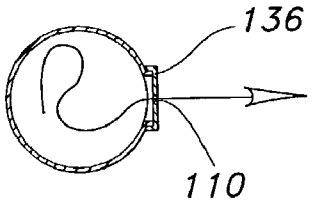


FIG. 5C

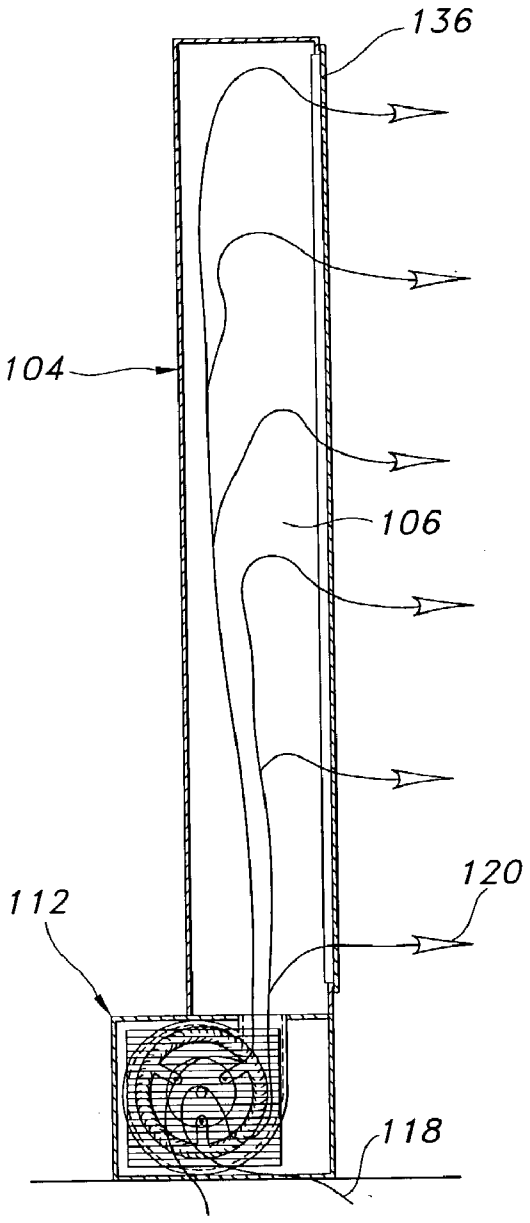
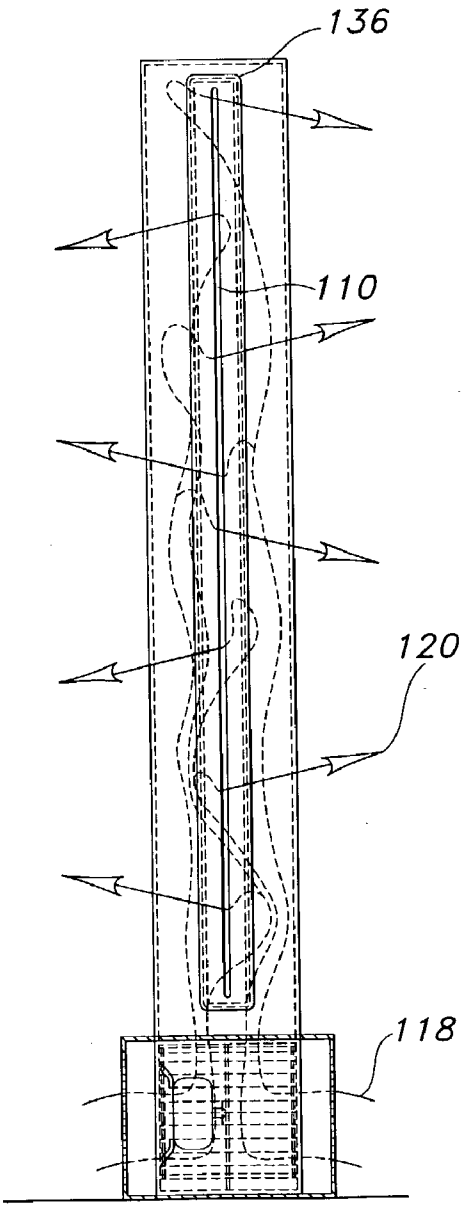


FIG. 5A



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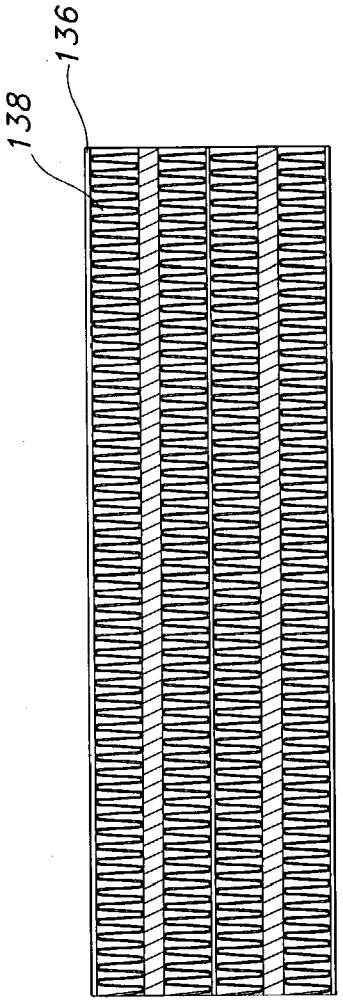
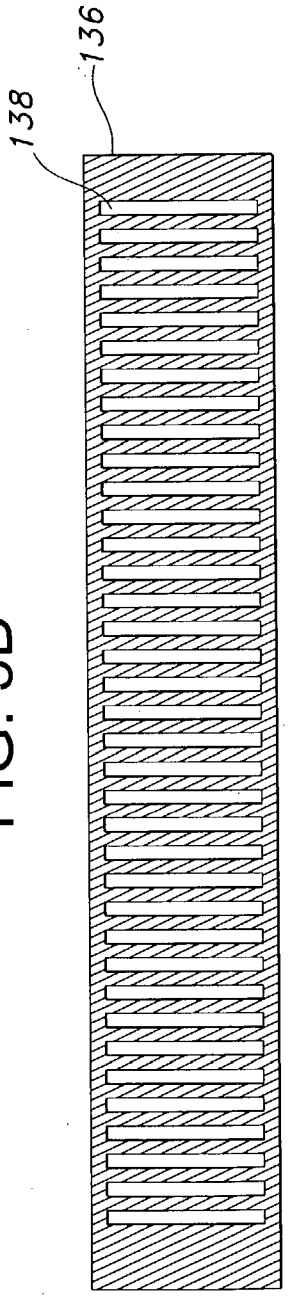


FIG. 5D



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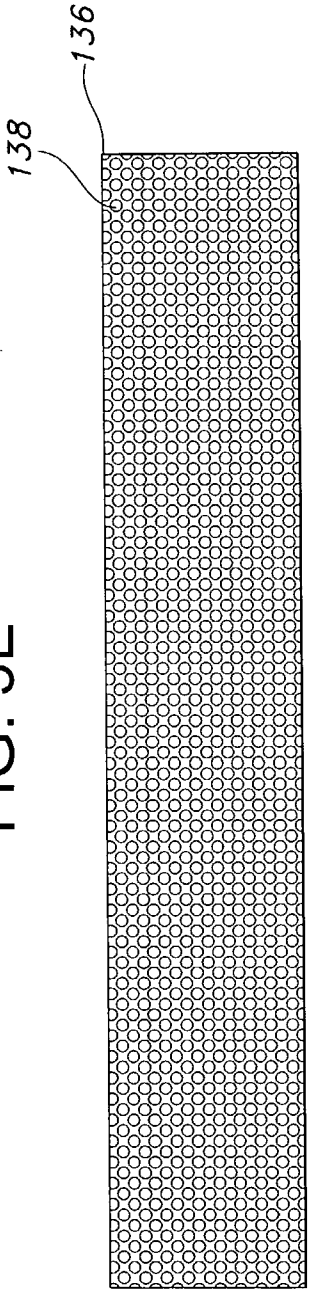

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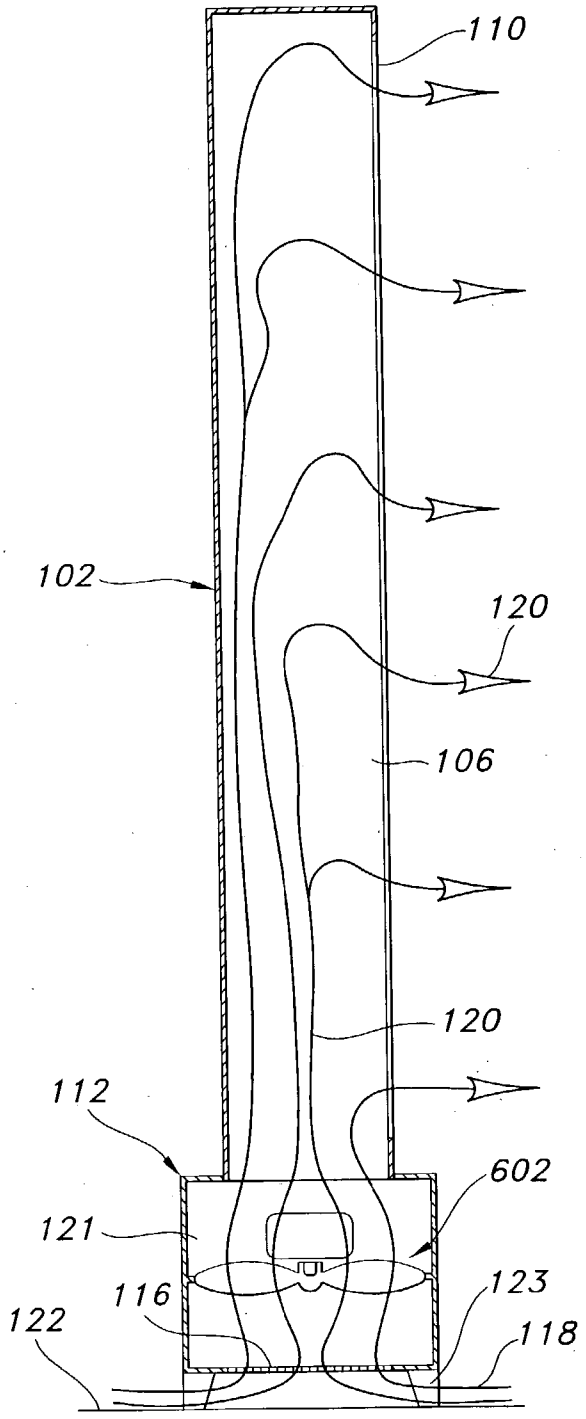


FIG. 6A

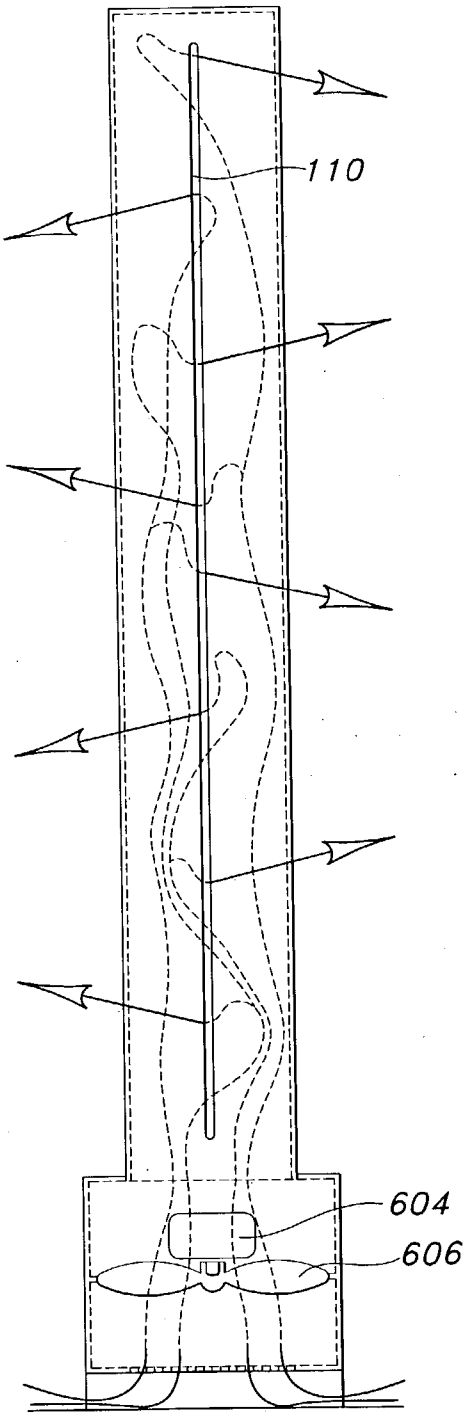


FIG. 6B

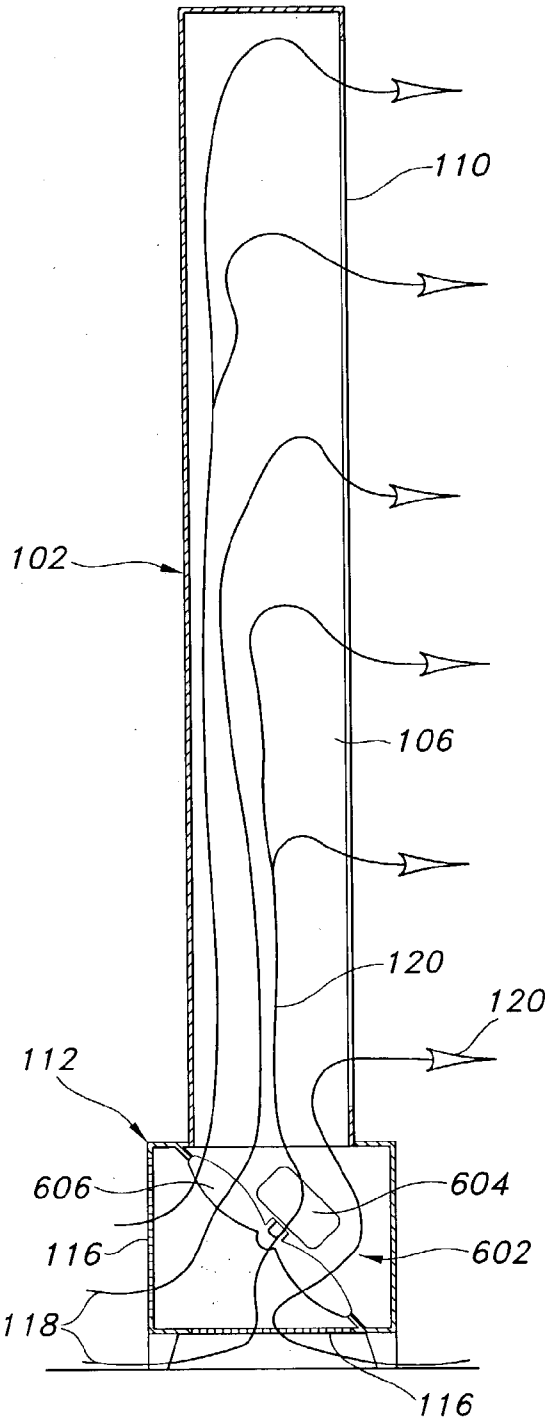
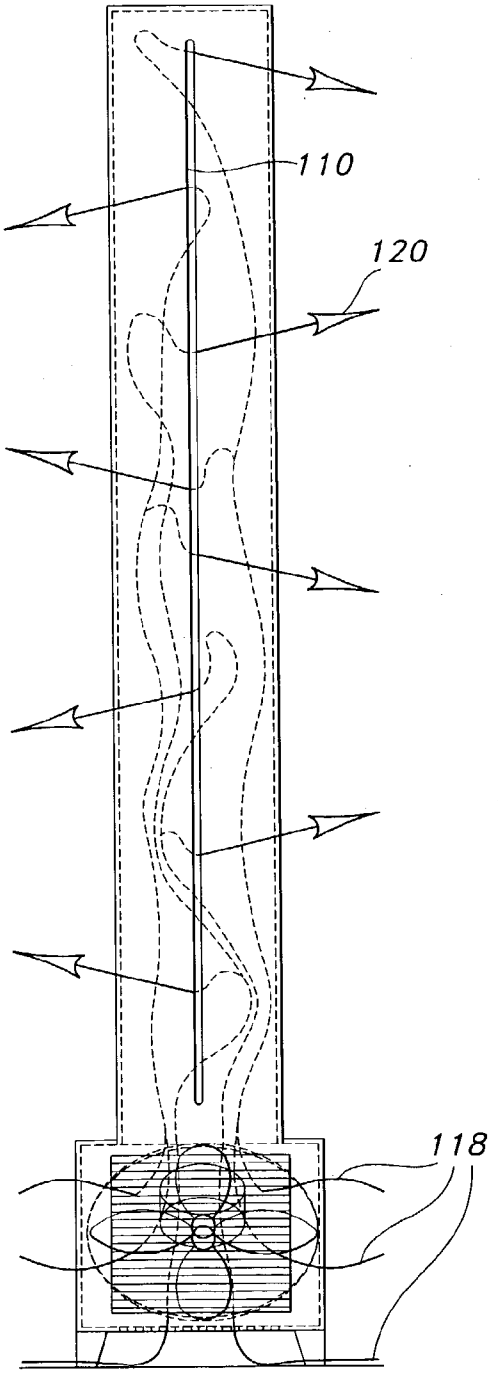


FIG. 6C



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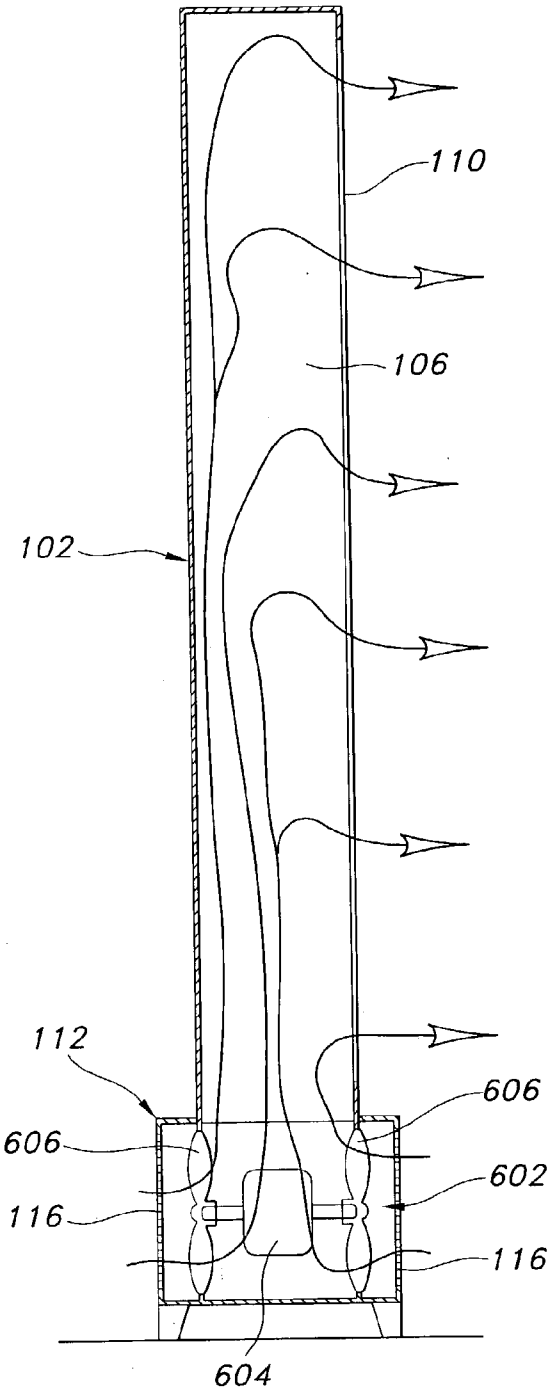


FIG. 6E

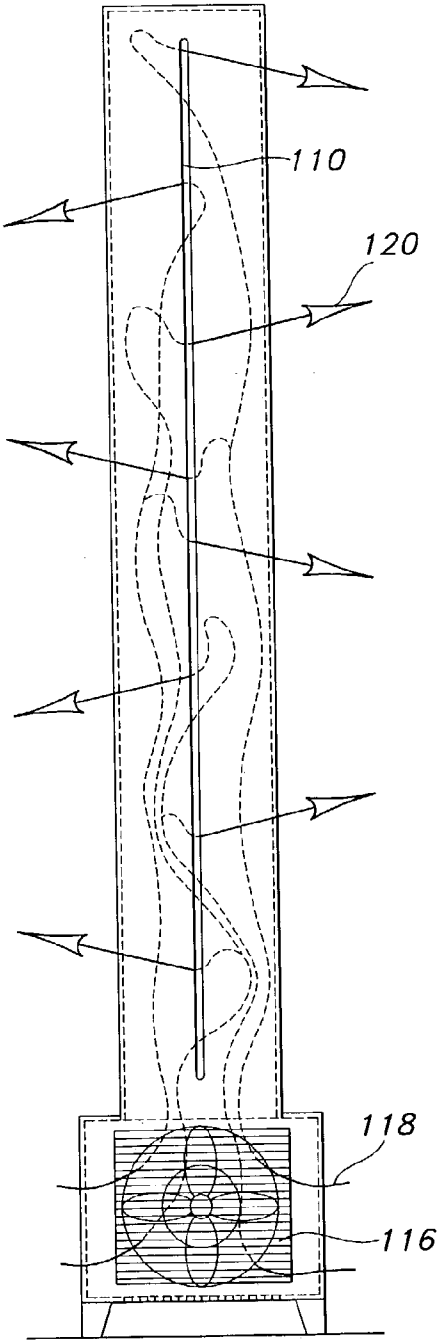


FIG. 6F

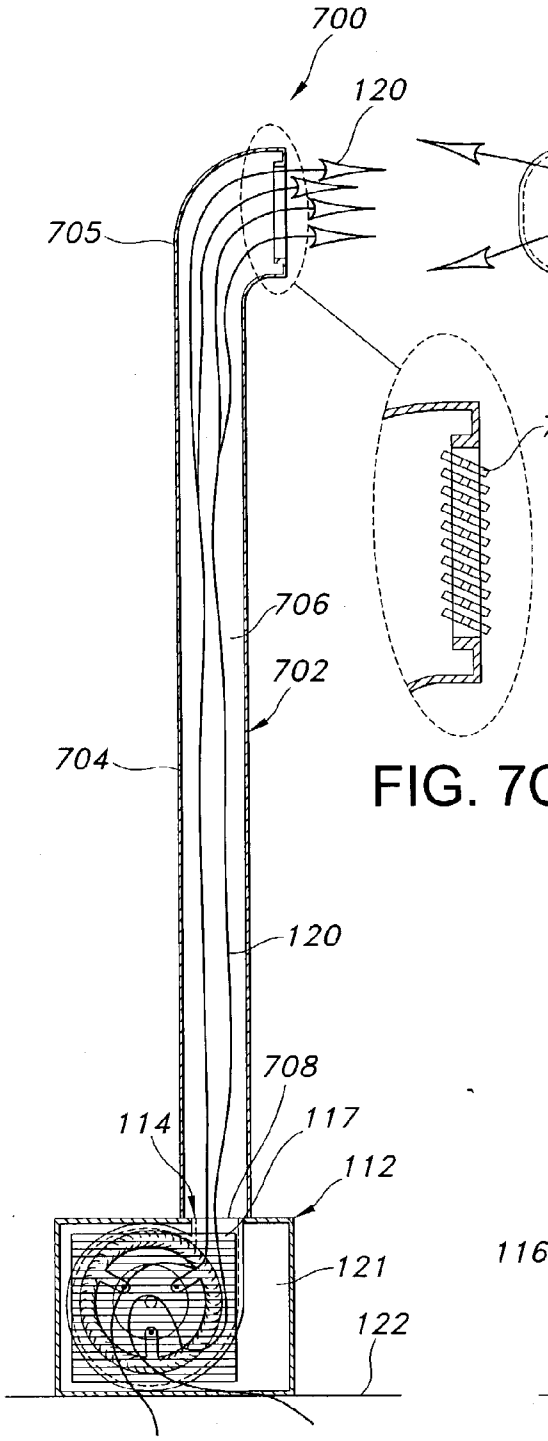


FIG. 7A

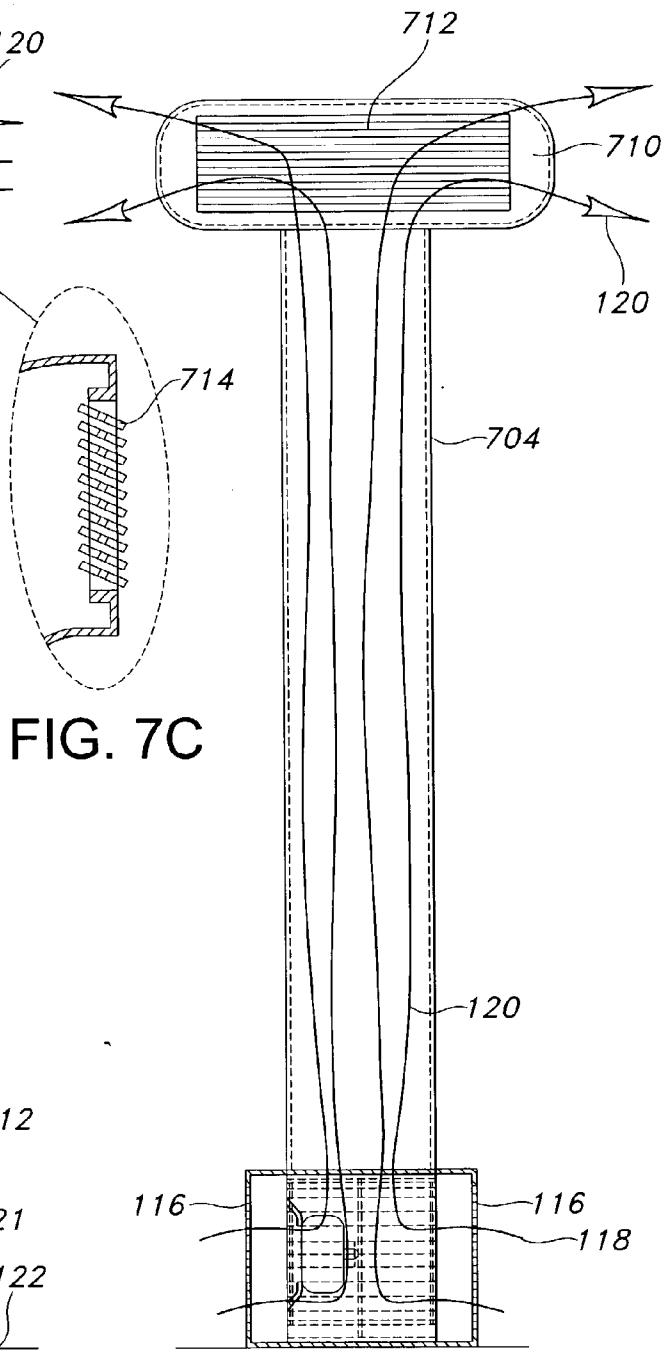


FIG. 7B

FIG. 7C

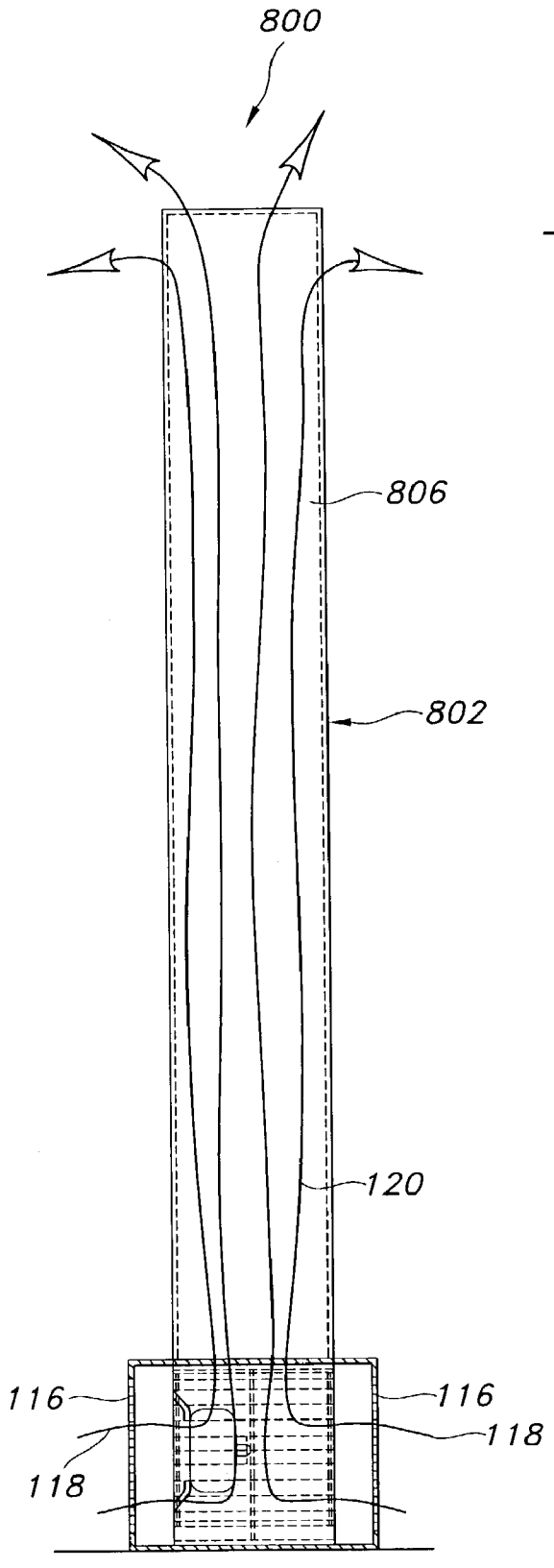


FIG. 8A

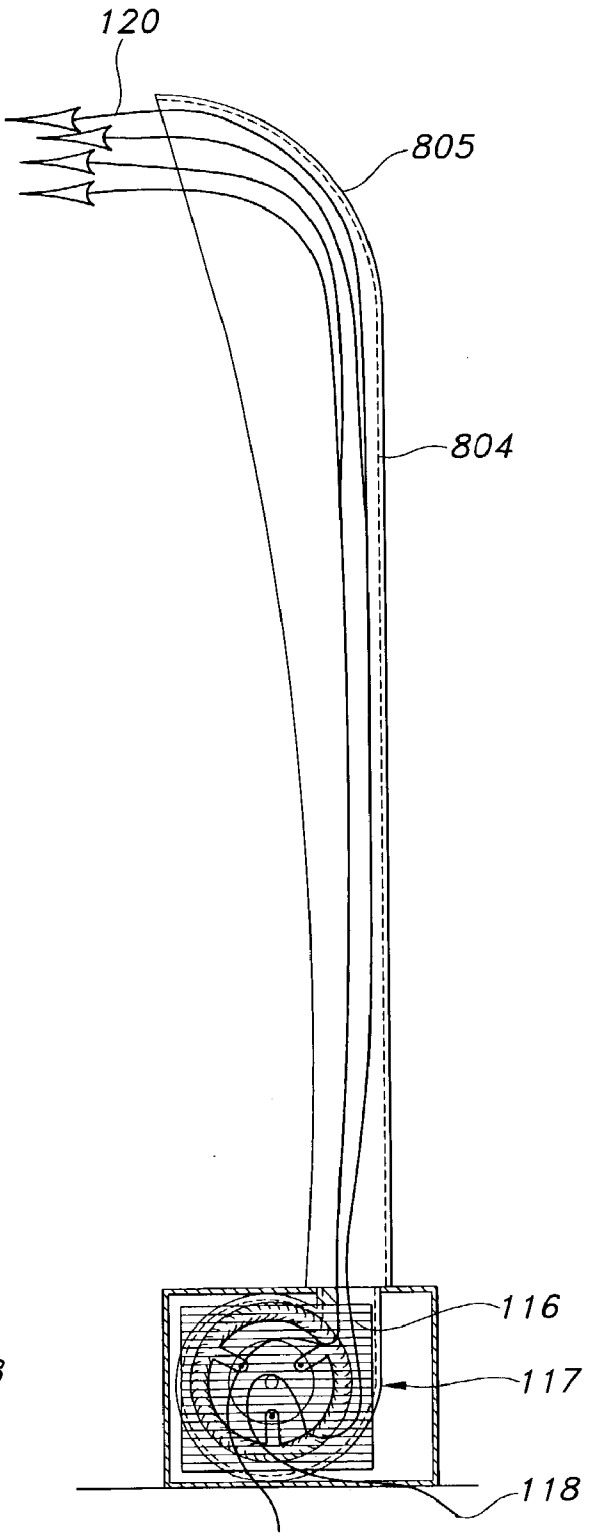


FIG. 8B

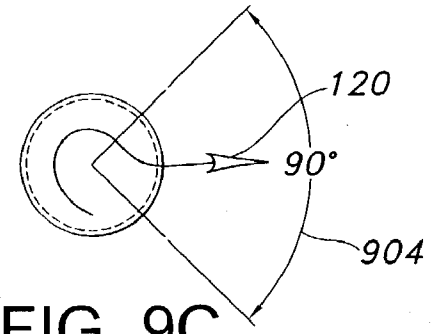


FIG. 9C

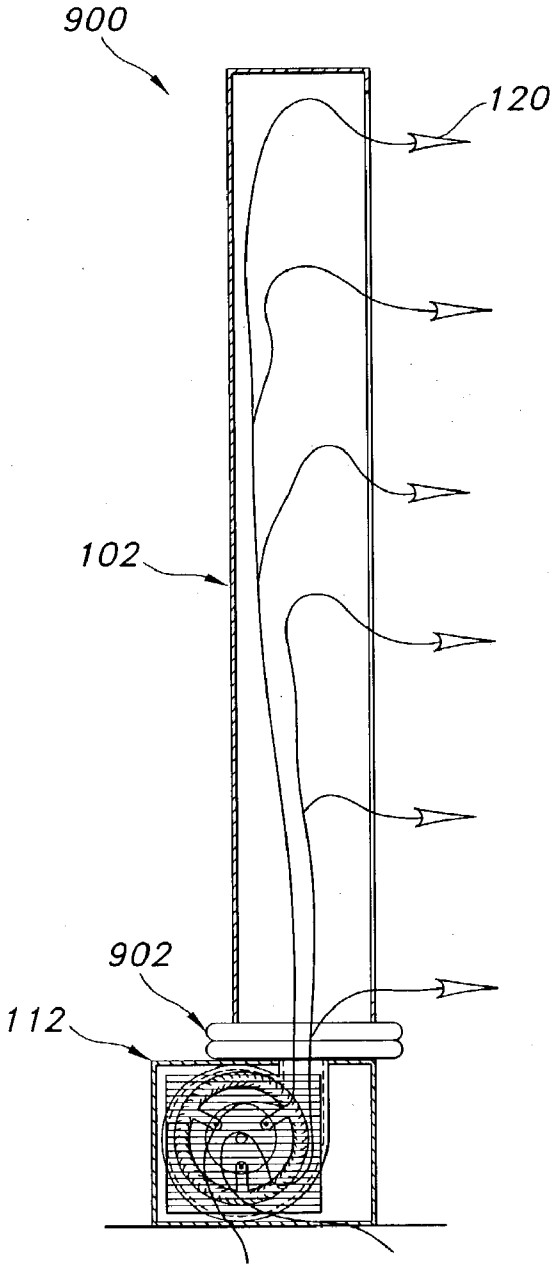


FIG. 9A

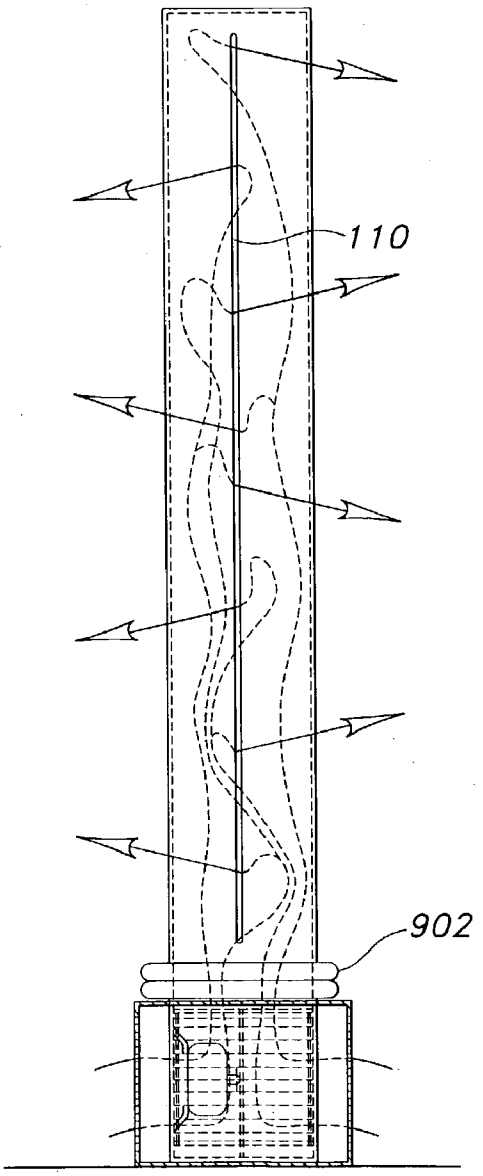
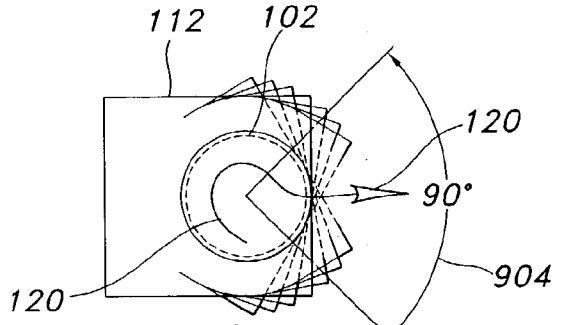


FIG. 9B



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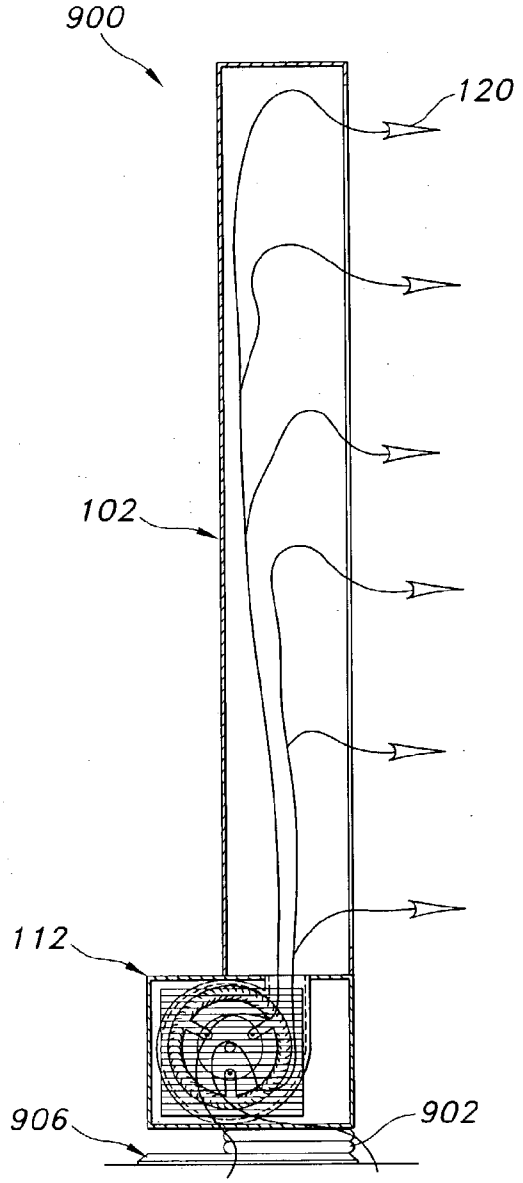
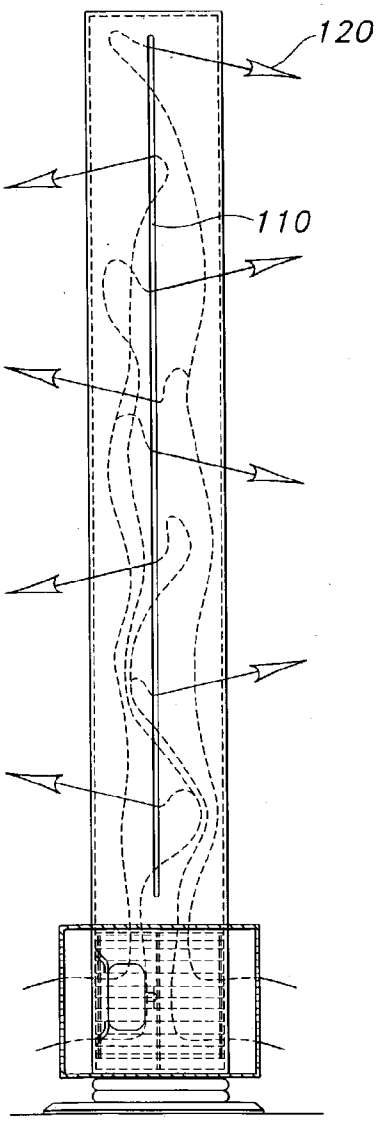


FIG. 9D



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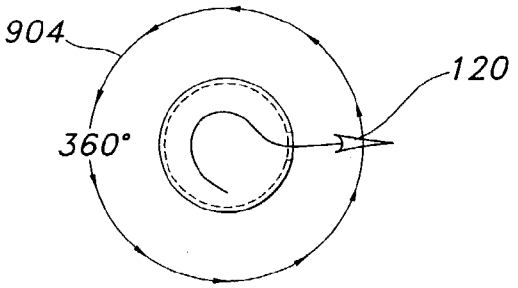


FIG. 9I

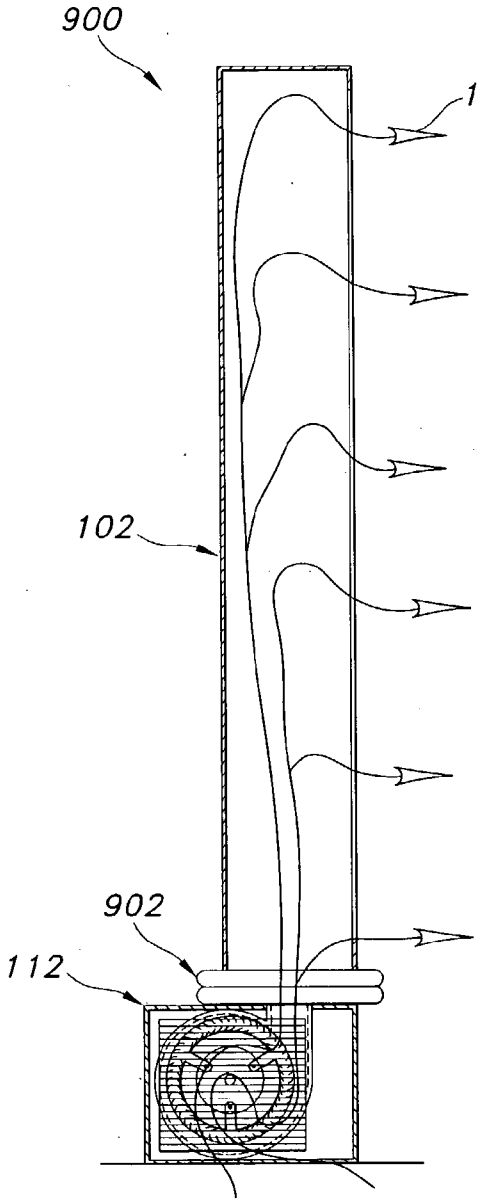


FIG. 9G

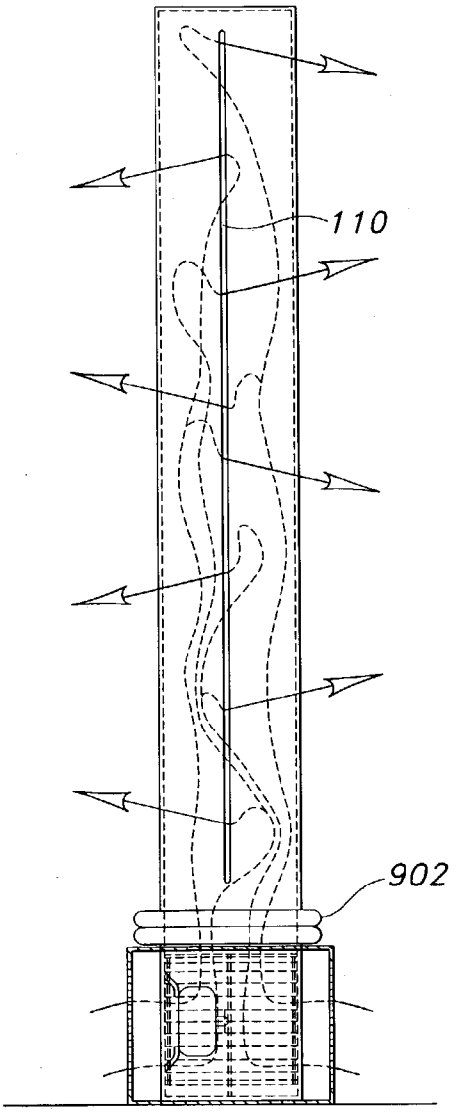


FIG. 9H

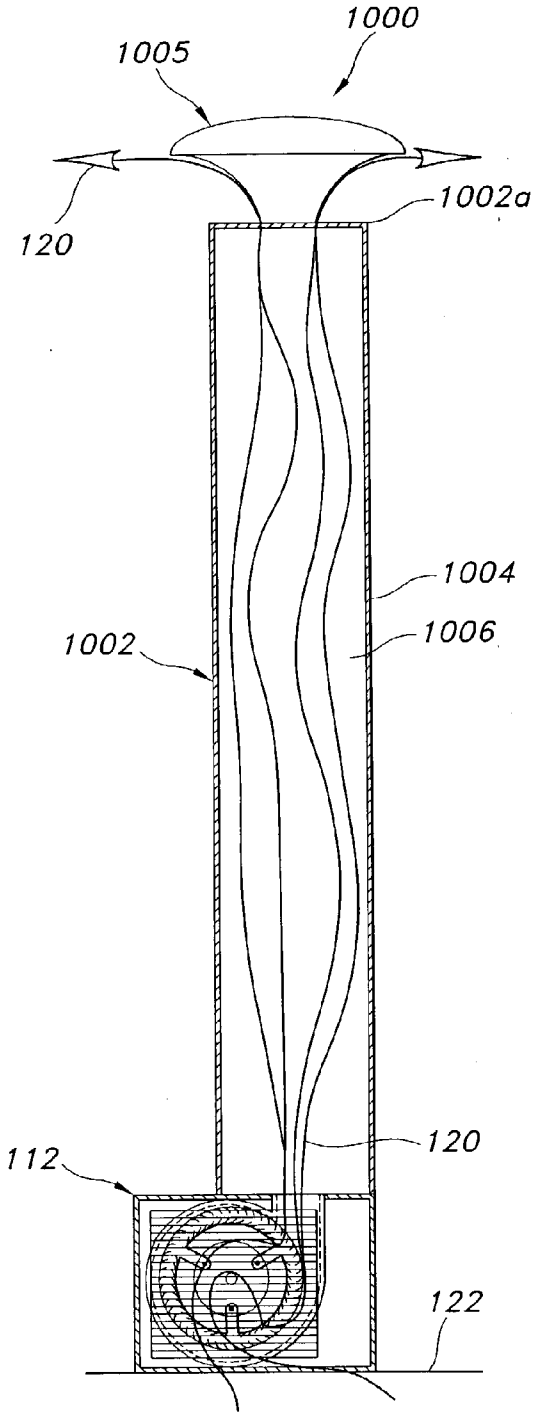


FIG. 10A

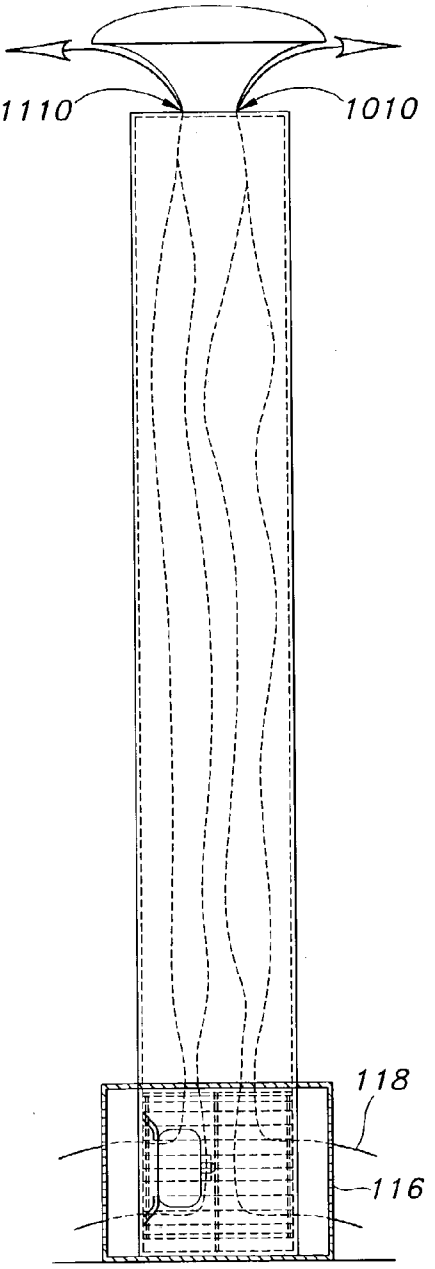
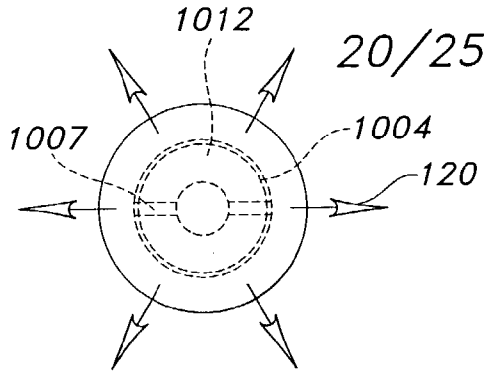


FIG. 10B



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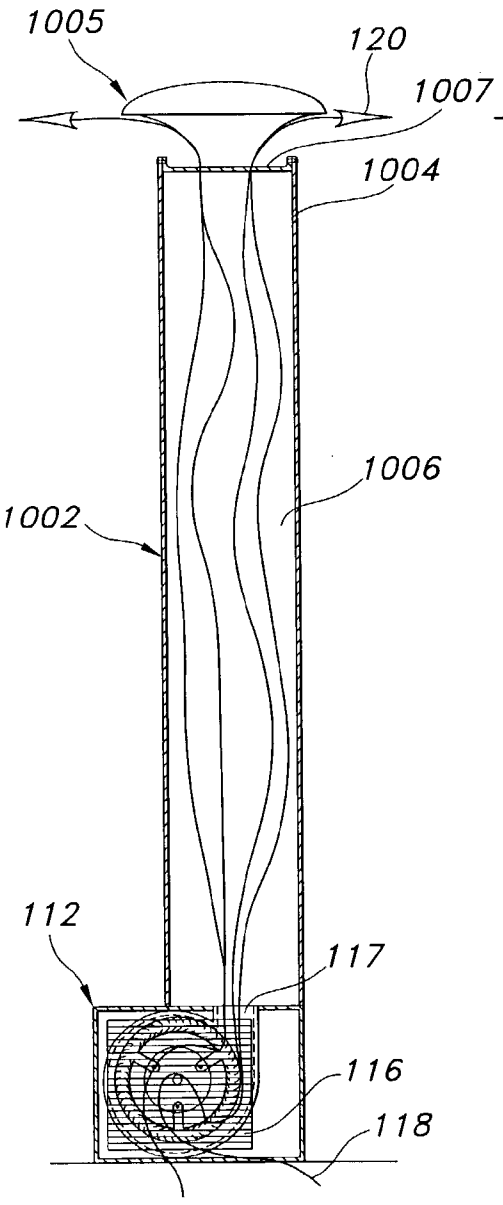


FIG. 10C

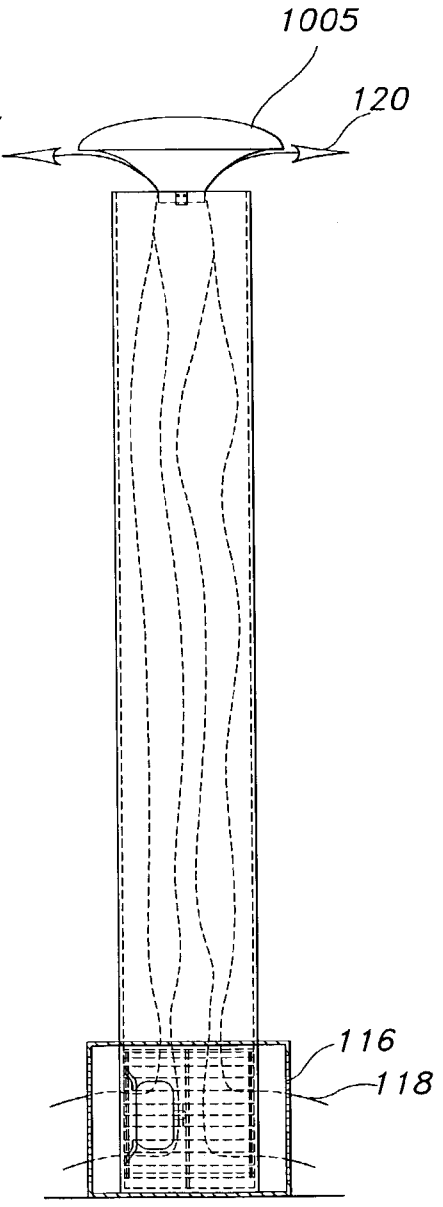


FIG. 10D

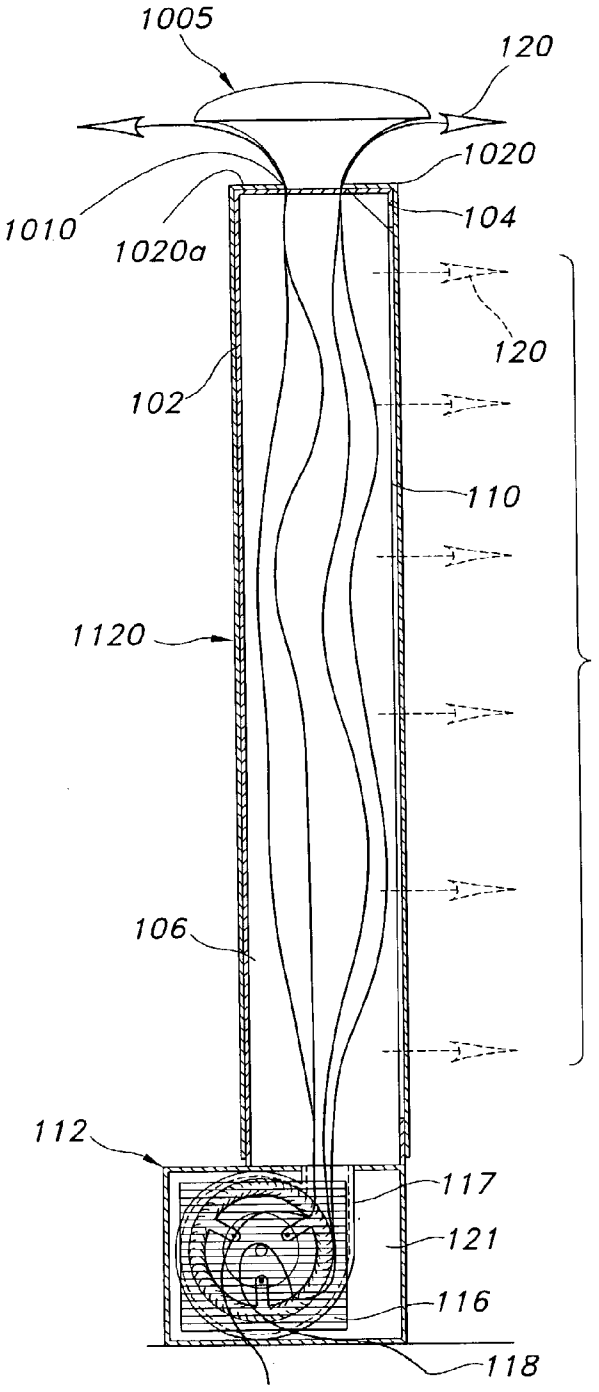


FIG. 10F

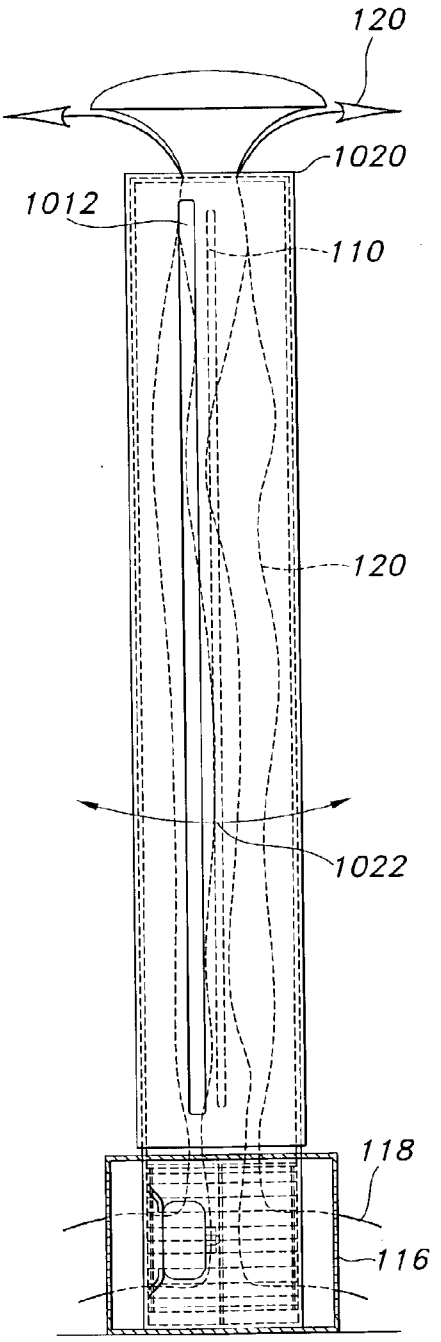


FIG. 10G

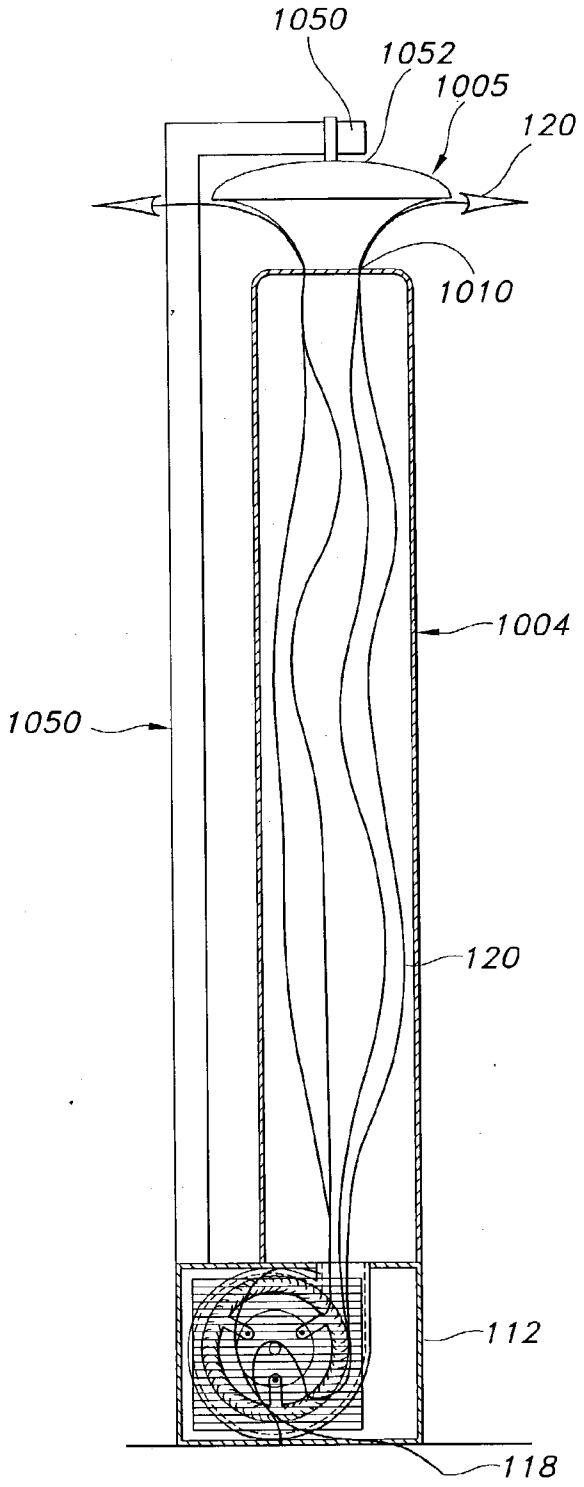


FIG. 10H

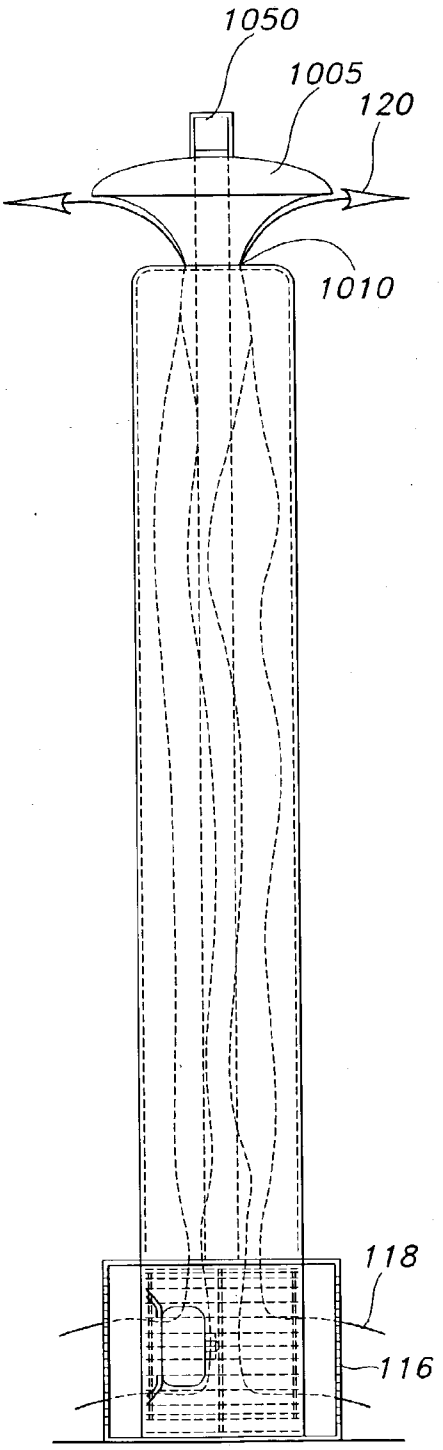


FIG. 10I

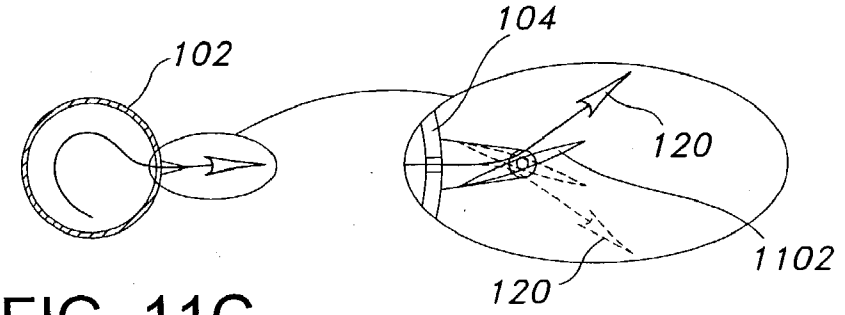


FIG. 11C

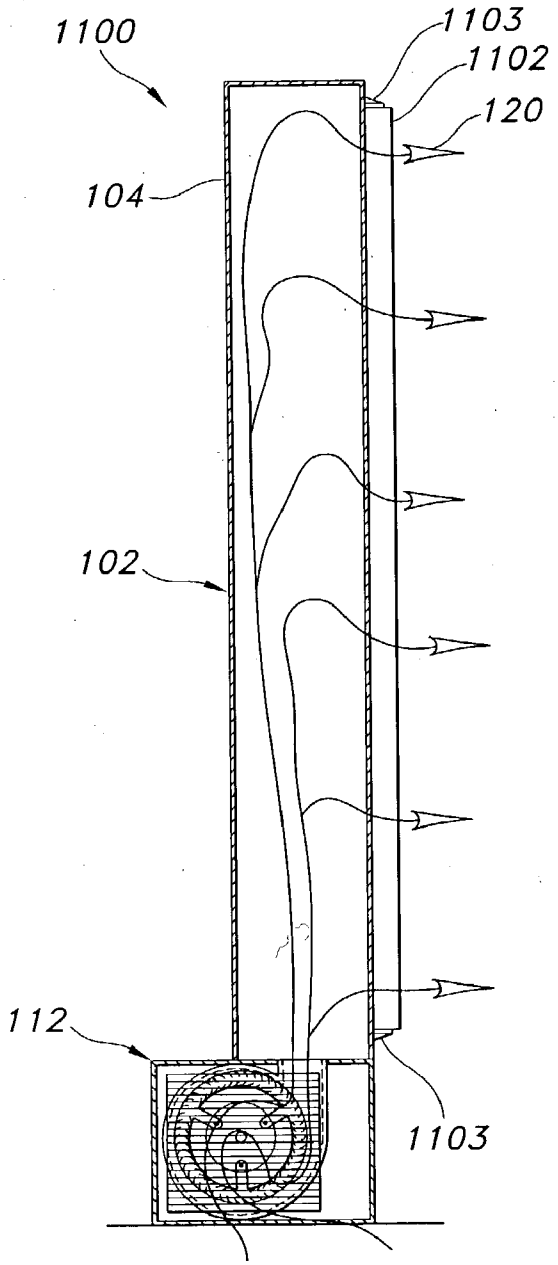
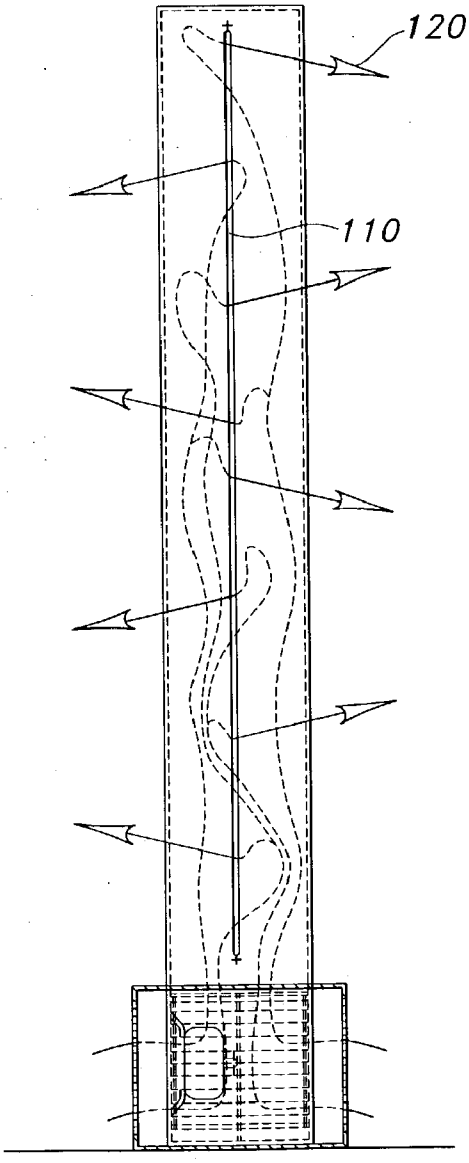


FIG. 11A



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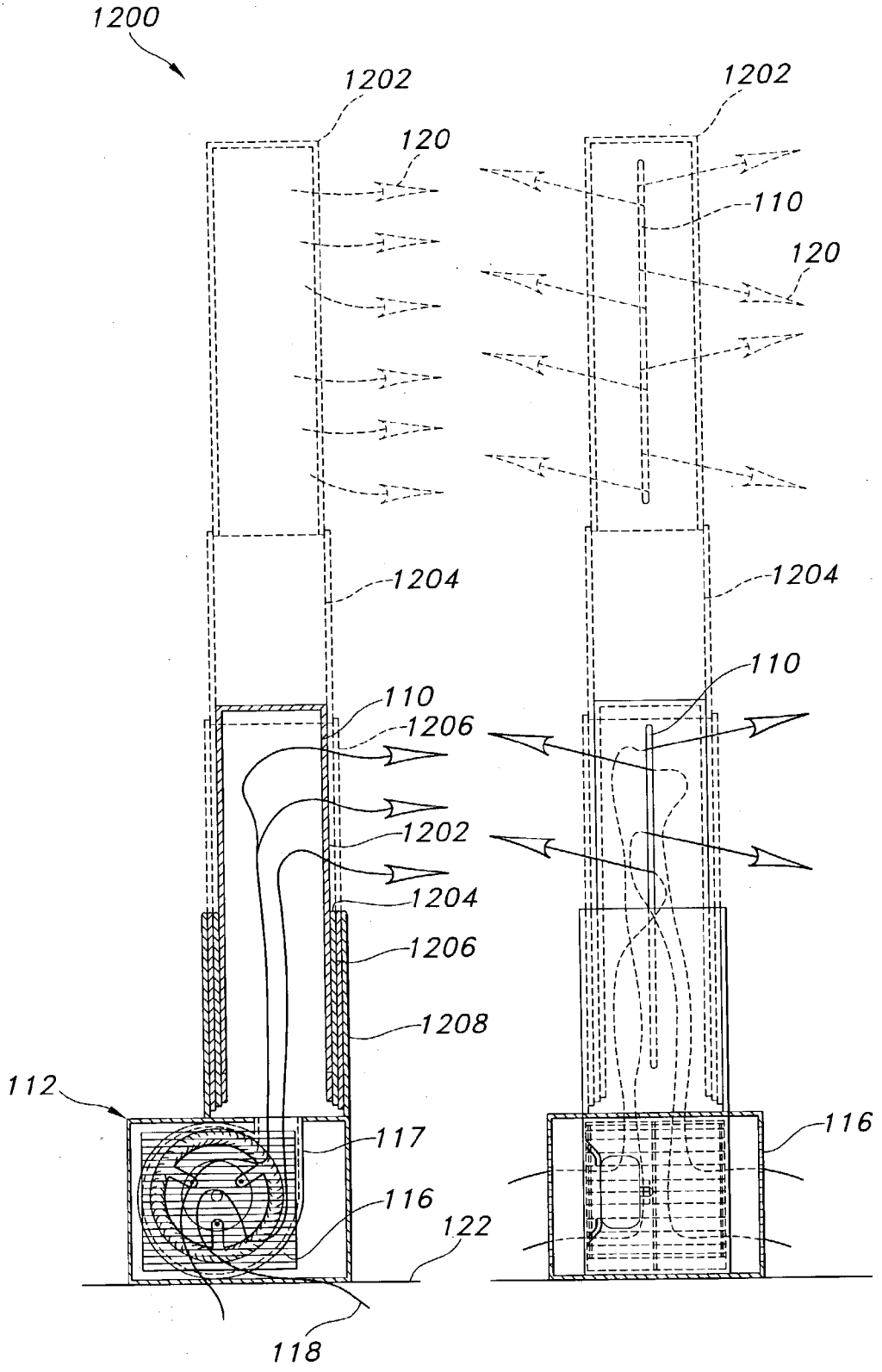

FIG. 12A FIG. 12B

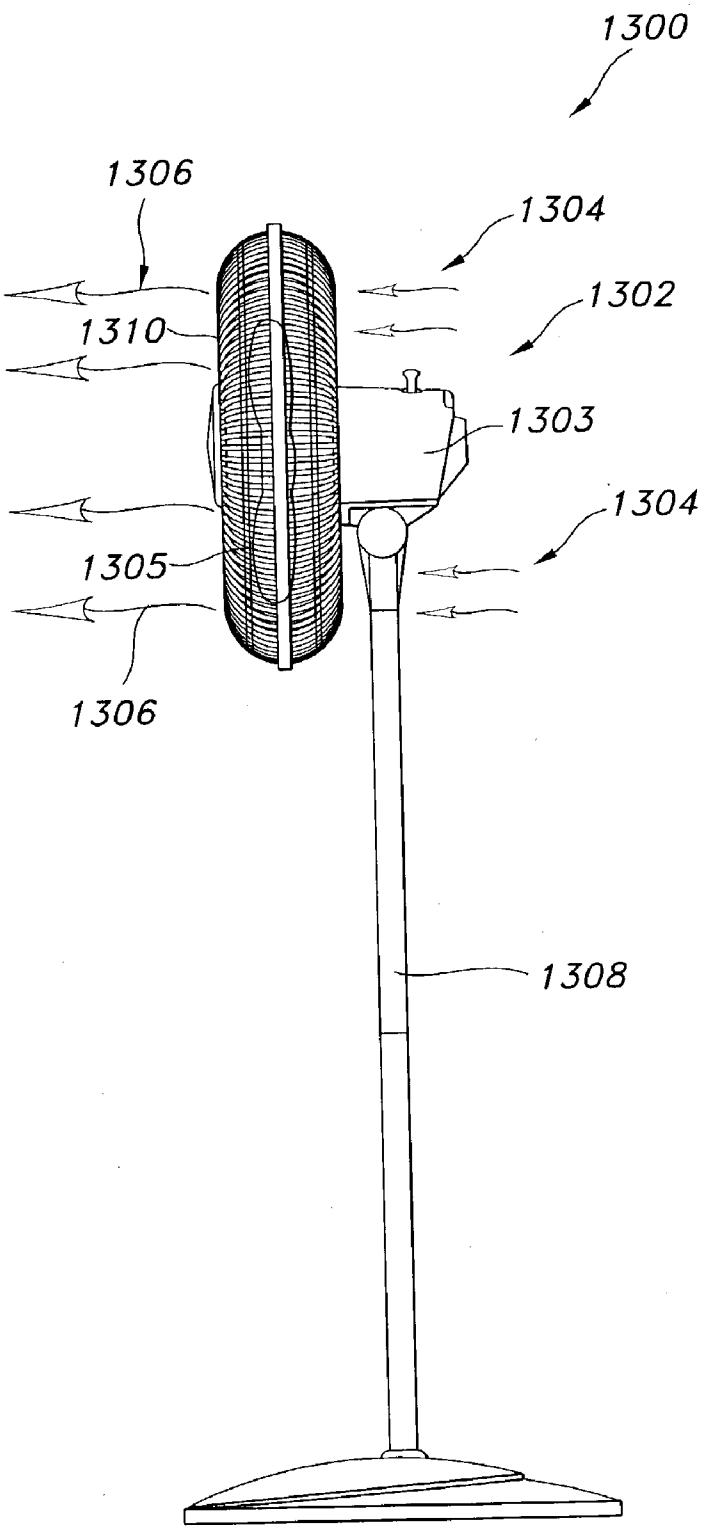

FIG. 13
(PRIOR ART)

COOLING FAN

[0001] This application is a Continuation-in-Part of application Ser. No. 10/322,169, filed Dec. 18, 2002.

FIELD OF THE INVENTION

[0002] This invention relates to fans. More specifically, the present invention relates to an elongate fan in which pressurized exhaust air passes through an outlet of the fan.

BACKGROUND OF THE INVENTION

[0003] Conventional fans for consumer use are well-known and are comprised of a motor and fan blade assembly within a grill structure. An example of such a conventional fan is shown in **FIG. 13**. Many of these fans may be wall mounted or placed on the table to elevate the fan blade assembly from the floor and thus provide the air path at a higher point. As shown in **FIG. 13**, in fan **1300** air created by axial fan assembly **1302** (comprising fan head **1303**, fan blade **1305**, front grill **1310** and rear grill **1312**) from intake air **1304** results in exhaust air **1306**. Axial fan assembly **1302** is set above the floor by pedestal **1308**.

[0004] Other types of fans provide airflow above floor level, typical of such fans is a ceiling fan (not shown). These conventional fans provide a cylindrical air flow into a living space.

[0005] These fans are deficient, however, because they are unable to provide a column of air into a living space. Further, these fans require grill structures (such as **1310**, **1312**), or must be mounted well above the floor, i.e. on a ceiling, in order to protect the user from contacting rotating fan blade **1305**.

[0006] There is a need for a fan in which the blade is concealed and not in line with the user.

[0007] There is also a need for a fan that provides increased comfort levels, and provides exhaust air having a more uniform velocity across the outlet from which the air emanates.

[0008] In addition, there is a need for a fan construction having a blower assembly with unitary construction which is easily mounted in the fan unit and less expensive to manufacture.

SUMMARY OF THE INVENTION

[0009] In view of the shortcomings of the prior art, the present invention is a apparatus and method for providing air circulation, specifically a fan. The fan comprises a housing and an air generator. The housing comprises at least one wall portion, an elongate interior portion bounded by the at least one wall portion, at least one inlet opening formed at a lower portion of the at least one wall portion, and at least one outlet opening formed in the at least one wall portion. The air generator comprises at least one exhaust port in fluid communication with the at least one inlet opening of the housing, and at least one intake port receiving a supply of air and generating exhaust air through the exhaust port. In this construction the exhaust air enters the housing through the at least one inlet opening and exits the housing through the at least one outlet opening.

[0010] According to another aspect of the invention, the at least one outlet opening is formed in a longitudinal direction of the housing.

[0011] According to a further aspect of the invention, the at least one outlet opening is formed at an upper portion of the housing.

[0012] According to still another aspect of the invention, the fan further comprises a deflector positioned adjacent an upper portion of the housing, such that the deflector redirects at least a portion of the exhaust air along a path substantially orthogonal to a longitudinal axis of the housing.

[0013] According to yet a further aspect of the present invention, the at least one outlet opening is a plurality of outlet openings parallel to one another.

[0014] According to yet another aspect of the present invention, the at least one outlet opening is a plurality of outlet openings adjacent one another and spaced apart from one another by a portion of the at least one wall portion.

[0015] According to still another aspect of the present invention, the fan is portable.

[0016] According to a further aspect of the present invention, an effective length of the at least one outlet opening is based on a diameter of a fan blade of the air generator.

[0017] According to yet a further aspect of the present invention, an effective length of the at least one outlet opening is greater that a length of a fan blade assembly of the air generator.

[0018] According to yet another aspect of the present invention, the supply air has a negative static pressure and the exhaust air has a positive static pressure.

[0019] According to still another aspect of the invention, an upper portion of the at least one outlet opening is spaced apart from the air generator by a predetermined distance at least as great as a diameter of a fan blade of the air generator.

[0020] According to yet another aspect of the invention, the fan further comprises means for at least one of i) positioning the fan at one of a plurality of rotational positions, ii) oscillating the fan between a first position and a second position, and iii) rotating the fan about a longitudinal axis.

[0021] According to yet a further aspect of the invention, the at least one wall portion is at least of one of rigid and self-supporting.

[0022] According to-still a further aspect of the invention, at least a portion of the at least one outlet opening is substantially orthogonal to a longitudinal axis of the housing.

[0023] According to yet another aspect of the invention, the air generator is a blower assembly.

[0024] According to still a further aspect of the invention, the air generator comprises an axial fan.

[0025] According to still another aspect of the invention, the fan further comprises redirecting means for redirecting the exhaust air flowing from the outlet opening.

[0026] According to a further aspect of the invention, the housing is substantially linear.

[0027] According to still another aspect of the invention, the fan further comprises a grill coupled to an upper portion of the housing.

[0028] According to yet a further aspect of the invention, the housing is formed from a plurality of sections, an inside portion of a first one of the plurality of sections coupled to an outside portion of a second one of the plurality of sections, such that the second section slideably engages the first section.

[0029] According to another aspect of the invention, further comprising directing means for directing the exhaust air between a first one of the at least one outlet openings and a further outlet opening.

[0030] According to still a further aspect of the invention, the at least one outlet opening is a restricting means for restricting the exhaust air exiting the housing and distributing the exhaust air along a length of the restricting means such that the exiting air has a substantially even velocity along at least a portion of a length of the at least one outlet opening.

[0031] According to another aspect of the invention, a flow through area of the restricting means between 5% and 250% of an outlet area of the air generator.

[0032] According to a still another aspect of the invention, the elongate interior portion forms a plenum within the housing for at least one of storing and distributing the exhaust air.

[0033] According to yet another aspect of the invention, the exhaust air exiting from the at least one outlet opening travels along a flow path substantially orthogonal to at least a portion of the exhaust air from the air generator.

[0034] According to a further aspect of the invention, the fan comprises a housing defining a first interior space; an air generator positioned within the housing and defining the second interior space and in fluid communication with the first interior space, the air generator having at least one intake port receiving intake air and generating exhaust air; and at least one air restrictor positioned one of within or adjacent the first interior space to distribute the exhaust air over at least a portion of a length of the air restrictor; wherein the exhaust air flows through the at least one air restrictor.

[0035] According to still a further aspect of the invention, the air restrictor has an elongate aspect ratio.

[0036] According to yet a further aspect of the invention, the at least one air restrictor has a total length of at least 6 inches.

[0037] According to another aspect of the invention, the exhaust air flows through the air restrictor at a substantially uniform velocity along at least a portion of a length of the air restrictor.

[0038] According to still another aspect of the invention, the velocity of the exiting air is greater than 375 fpm at 1 foot from the air restrictor.

[0039] According to yet another aspect of the invention, the air restrictor converts the static pressure associated with the exhaust air into an air velocity which is in turn imparted into the exhaust air flowing from the fan outlet.

[0040] The method comprises the steps of providing a housing having at least a first interior space; receiving intake air; generating exhaust air into the first interior space based on the intake air; pressurizing the exhaust air in the first interior space; and expelling the pressurized exhaust air from the first interior space.

[0041] These and other aspects of the invention are set forth below with reference to the drawings and the description of exemplary embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042] The invention is best understood from the following detailed description when read in connection with the accompanying drawing. It is emphasized that, according to common practice, the various features of the drawing are not to scale. On the contrary, the dimensions of the various features are arbitrarily expanded or reduced for clarity. Included in the drawing are the following Figures:

[0043] FIGS. **1A-1J** are various cross sectional views of a first exemplary embodiment of the present invention;

[0044] **FIGS. 2A and 2B** are views of a variation of the exemplary embodiment of FIGS. **1A-1J**;

[0045] FIGS. **3A-3B** are views of a further variation of the exemplary embodiment of FIGS. **1A-1J**;

[0046] FIGS. **4A-4C** are various views of a second exemplary embodiment of the present invention;

[0047] FIGS. **5A-5C** are various views of a third exemplary embodiment of the present invention;

[0048] FIGS. **5D-5F** are illustrations of exemplary restricting means according to the present invention;

[0049] FIGS. **6A-6F** are various views of an alternative to the first exemplary embodiment of the present invention;

[0050] FIGS. **7A-7C** are various views of a fourth exemplary embodiment of the present invention;

[0051] FIGS. **8A-8B** are various views of a fifth exemplary embodiment of the present invention;

[0052] FIGS. **9A-9I** are various views of a sixth exemplary embodiment of the present invention;

[0053] FIGS. **10A-10I** are various views of a seventh exemplary embodiment of the present invention;

[0054] FIGS. **11A-11C** are various views of an eighth exemplary embodiment of the present invention;

[0055] FIGS. **12A-12B** are various views of a ninth exemplary embodiment of the present invention; and

[0056] **FIG. 13** is a side view of a convention fan.

DETAILED DESCRIPTION

[0057] The entire disclosure of U.S. patent application Ser. No. 10/322,169, filed Dec. 18, 2002 is expressly incorporated by reference herein.

[0058] A first exemplary embodiment of the present invention is shown in FIGS. **1A-1B**. As shown in FIGS. **1A-1B**, fan **100** has a generally elongate configuration and includes housing **102**, having at least one wall **104** defining an elongate interior space **106**. The configuration of the walls

may be such that the housing has a substantially round cross section, for example. The invention is not so limited, however, in that the wall **104** may be more than one wall coupled to one another and/or having any of a variety of geometric cross sections, such as a square, a rectangle, or other forms. In one exemplary embodiment, wall **104** may be formed from any material that is rigid or self-supporting, such as a polymer for example. In another exemplary embodiment, wall **104** may be formed from a material which requires an external support structure, such as support **150** coupled to upper portion **152** of housing **102**, as shown in FIG. **FIGS. 1I and 1J**, to maintain an elongate configuration.

[**0059**] Air generator **112** is positioned adjacent housing **102**. In one exemplary embodiment, air generator **112** may be a part of housing **102**. In another exemplary embodiment, air generator **112** is separate from housing **102** and is coupled thereto by conventional means. Air generator **112** has at least one inlet port **116** for receiving a supply of air **118** and at least one exhaust port **114** for providing exhaust air **120**. Exhaust air **120** flows along path **130** that is substantially perpendicular to path along which supply air **118** flows. In addition, while exhaust air **120** has a positive static pressure imparted therein by air generator **112** in combination with interior space **106**, supply air **118** has a negative static pressure. Exhaust port **114** has a predetermined width and a predetermined length defining an outlet area **115**.

[**0060**] Inlet port **116** may be a grill having at least one slot or a plurality of holes or other type of orifice, for example. Air generator **112** may be comprised of a blower assembly **117**, as shown in **FIG. 1**A, or may be an axial fan assembly **602**, such as shown in FIGS. **6A-6**F (discussed in detail below).

[**0061**] Air generator **112** also includes fan blade **128** having a predetermined length and a predetermined diameter (in the case of a blower) or having a predetermined width (in the case of an axial fan). In one exemplary embodiment, air generator **112** is a non-transverse blower.

[**0062**] Along a lower portion of wall **104** is at least one inlet opening **108** in fluid communication with exhaust port **114** of air generator **112**. Along another surface of wall **104** is an outlet **110** having length **109** and width **111**. In one exemplary embodiment outlet **110** has an upper portion **110***a* located toward the upper end **102***a* of housing **102**, where upper portion **110***a* is spaced apart from air generator **112** by a predetermined distance based on the diameter of fan blade **128**. The length of outlet **110** is at least as great as the diameter or length of fan blade **128**. The elongate configuration of fan **100** allows for outlet **110** to have a significant length **109** to width **111** ratio (aspect ratio).

[**0063**] In one exemplary embodiment, length **109** is at least six (6) inches. Although a single outlet **110** is shown in **FIG. 1**, the invention is not so limited. It is also contemplated that outlet **110** may also be two or more outlets arranged in any desired configuration, such as end-to-end as shown in **FIGS. 2A and 2B** and/or side-by-side as shown in **FIGS. 3A and 3B**, for example. In addition, and as shown in **FIG. 2**B, outlet opening **110** may be a series of generally circular shaped outlets arranged along wall **104**, as desired.

[**0064**] Fan **100** may be moved-from place to place, as desired. It is also contemplated that fan **100** may be mounted to any convenient surface, such as a table top, floor, or wall for example. Referring now to FIGS. **1E-1H** such mounting options are shown. In FIGS. **1E-1F**, for example, fan **100** is shown mounted to surface **122** using mounting foot **124** and attaching means **126**. Attaching means **126** may be of any type well known in the art, such as a screw, rivet, adhesives, etc. As shown in FIGS. **1G-1H**, fan **100** is attached to a substantially vertical surface, such as wall **140**, with bracket **128**.

[**0065**] Further, although the exemplary embodiment of FIGS. **1A-1H** illustrates a vertically configured apparatus, the invention is not so limited. It is also contemplated that fan **100** may be configured in a horizontal configuration if desired.

[**0066**] Referring again to **FIG. 1**A, blower assembly **117** is shown enclosed within second interior space **121** of air generator **112**. The invention is not so limited, however, as it is contemplated that blower assembly **117** may be configured such that it is able to support housing **102** and be coupled to the bottom thereof. FIGS. **1C-1D** illustrate such an embodiment. As shown in **FIG. 1**C, exhaust port **114** of blower assembly **117** is coupled to inlet **108** of housing **102**. To facilitate stability of fan **100**, stabilizers **119** may be coupled to, or made integral with, blower assembly **117**.

[**0067**] As shown in **FIG. 1**A, air generator **112** is adjacent first interior space **106**. In this embodiment, the positioning of outlet **110** and air generator **112** with respect to interior space **106** creates a plenum **105** between air generator **112** and outlet **110**. As a result, air generator **112** receives supply air **118** entering housing **102** along first flow path **132**, which enters interior **115** of fan blade **122** and generates exhaust air **120** along second flow path **130** into plenum **105** which, in turn, stores and distributes exhaust air **120**. As shown, second flow path **130** is substantially orthogonal to first flow path **132**. Further, and as also shown in **FIG. 1A** for example, exhaust air **120** exiting from outlet **110** flows along a path substantially orthogonal to the longitudinal direction of housing **102**.

[**0068**] Referring again to FIGS. **1A-1J**, in one exemplary embodiment air generator **112** may have at least one fan blade **128**, and preferably two or more blades, each having a plurality of blade elements **134** which face in a rotational direction of air generator **112**.

[**0069**] Exhaust air **120** charges plenum **105** with a static pressure which then flows through outlet **110** at a substantially constant velocity. In one exemplary embodiment of the present invention, the air velocity is in excess of 375 feet per minute (FPM) as measured at one (1) foot from outlet **110**. An additional benefit of the exemplary embodiment, is that exhaust air **120** flows through substantially all of outlet **110**, thus providing more even air circulation in the space in which fan **100** is placed, thereby increasing the comfort level of the user.

[**0070**] According to one exemplary embodiment of the present invention, and as shown in FIGS. **5A-5**C, outlet **110** has a restrictor **136** positioned adjacent outlet **110** which acts to further restrict the flow of exhaust air **120** through outlet **110**. The use of restrictor **136** converts the static pressure formed within plenum **105** into an air velocity. Restrictor **136** may be formed on one or both of the interior or exterior of housing **102**, and may be either a part of or separate from

outlet **110**. Exemplary restrictors **136** are shown in FIGS. **5**D-**5**F. As shown, restrictor **136** has a flow through (unobstructed) area **138** of between 60% and 140%, and preferably between about 5% and 250% of outlet area **115** of air generator **112**.

[**0071**] According to one exemplary embodiment, the static pressure developed within first interior space **106** is greater than 0.05 inch water column.

[**0072**] Referring now to FIGS. **4**A-**4**C, a second exemplary embodiment of the present invention is shown. As shown in **FIG. 4**A-**4**C, fan **400** has a generally elongate configuration and includes housing **402** defining a first interior space **406**. Housing **402** is formed to direct exhaust air **120** from air generator **112** through outlet **410**. As shown, housing **402** has a generally circular cross section with portion **408** extending substantially orthogonal to its longitudinal axis to form outlet **410**. In all other respects, this exemplary embodiment is similar to and may comprise the various different configurations of the first exemplary embodiment discussed above.

[**0073**] Referring now to FIGS. **6**A-**6**F a fourth exemplary embodiment of the present invention is illustrated. As shown in FIGS. **6**A-**6**F, air generator **112** comprises axial fan assembly **602** positioned within second interior space **121**. Axial fan assembly includes fan blade **606** coupled to motor **604**, such as those well known to those skilled in the art.

[**0074**] In FIGS. **6**A-**6**B, axial fan assembly **602** is positioned such that the rotational axis of axial fan assembly **602** is substantially parallel to the longitudinal axis of housing **102**. Air generator **112** draws supply air **118** through inlet port **116** and generates exhaust air **120** into first interior space **106**. Exhaust air **120** exits first interior space **106** through outlet **110**. To facilitate the unobstructed flow of supply air, air generator **112** may be set above surface **122** with stand **123**, such as mounting feet of well-known type. In all other respects, this exemplary embodiment is similar to and may comprise the various different configurations of the exemplary embodiments discussed above.

[**0075**] In FIGS. **6**C-**6**D, axial fan assembly **602** is positioned such that the rotational axis of axial fan assembly **602** is offset from the longitudinal axis of housing **102** by a predetermined angle. Air generator **112** draws supply air **118** through inlet ports **116** and generates exhaust air **120** into first interior space **106**. Exhaust air **120** flows along a path that is substantially perpendicular to the path along which at least a portion of supply air **118** flows. In all other respects, this exemplary embodiment is similar to the exemplary embodiment discussed immediately above and may comprise the various different configurations of these embodiments.

[**0076**] In FIGS. **6**E-**6**F, axial fan assembly **602** is positioned such that the rotational axis of axial fan assembly **602** is substantially orthogonal to the longitudinal axis of housing **102**. Air generator **112** draws supply air **118** through inlet ports **116** and generates exhaust air **120** into first interior space **106**. Exhaust air **120** flows along a path that is substantially perpendicular to path along which a substantial portion of supply air **118** flows. In all other respects, this exemplary embodiment is similar to the exemplary embodiments discussed immediately above and may comprise the various different configurations of these embodiments.

[**0077**] Referring now to FIGS. **7**A-**7**C a fifth exemplary embodiment of the present invention is illustrated. As shown in FIGS. **7**A-**7**B, fan **700** has a generally elongate configuration and includes housing **702**, having at least one wall **704** defining an elongate interior space **706**. Deflector **705** is coupled to the upper portion of housing **702**. Deflector **702** redirects exhaust air **120** from a direction substantially parallel to the longitudinal axis of housing **702** to a direction substantially perpendicular to the longitudinal direction of housing **702**.

[**0078**] Similar to the first exemplary embodiment, air generator **112** is positioned adjacent housing **702**. Along a lower portion of wall **704** is at least one inlet opening **708** in fluid communication with exhaust port **114** of air generator **112**.

[**0079**] Coupled to the end of deflector **705** is grill assembly **710** comprising outlets **712** formed from a plurality of louvers **714**. In one exemplary embodiment, louvers **714** may be manually repositioned as desired. In another exemplary embodiment, louvers **714** may be automatically repositioned using a motor of well-known type (not shown) coupled to louvers **714**. Although louvers **714** are shown in a generally horizontal orientation, the invention is not so limited. It is contemplated that louvers **714** may be oriented in a vertical direction as well as being repositioned as desired either manually or under control of a motor, for example. In all other respects, this exemplary embodiment is similar to the exemplary embodiments discussed immediately above and may comprise the various different configurations of these embodiments.

[**0080**] Referring now to FIGS. **8**A-**8**B a sixth exemplary embodiment of the present invention is illustrated. As shown in FIGS. **8**A-**8**B, fan **800** has a generally elongate configuration and includes housing **802**, having at least one wall **804** defining an open elongate space **806**. Deflector **805** is coupled to, or formed from, the upper portion of housing **802**. Deflector **802** redirects exhaust air **120** from a direction substantially parallel to the longitudinal axis of housing **802** to a direction substantially perpendicular to the longitudinal axis of housing **802**. In all other respects this exemplary embodiment is similar to the exemplary embodiments above, but does not include a grill assembly or louvers.

[**0081**] Referring now to FIGS. **9**A-**9**I a seventh exemplary embodiment of the present invention is illustrated. This exemplary embodiment is similar to the previous exemplary embodiments, but also comprises rotator/oscillator **902** for either rotating or oscillating fan **900** about its longitudinal axis. In one exemplary embodiment shown in FIGS. **9**A-**9**C, fan **900** has rotator/oscillator **902** positioned between housing **102** and air generator **112**. Rotator/oscillator **902** may be manually adjustable or driven by other means, such as a motor, for example. Operation of rotator/oscillator **902** provides for the redirection of outlet air **120** over a predetermined angle **904**, such as 90 degrees. The invention is not so limited, however, in that angle **904** may be set as desired by the user to any of a number of angles using conventional means, such as repositionable stops (not shown), for example.

[**0082**] In another exemplary embodiment, shown in FIGS. **9**D-**9**F, rotator/oscillator **902** is positioned between air generator **112** and mounting base **906**. In yet another exemplary embodiment, shown in FIGS. **9**G-**9**I, rotator/oscillator **902** is

positioned between housing **102** and air generator **112**, and provides either rotation or oscillation over a 360 degree arc. In all other respects, these exemplary embodiments are similar to the exemplary embodiments discussed immediately above and may comprise the various different configurations of these embodiments.

[**0083**] Referring now to FIGS. **10A-10I** an eighth exemplary embodiment of the present invention is illustrated. In one exemplary embodiment, and as shown in FIGS. **10A-10B**, fan **1000** has a generally elongate configuration and includes housing **1002**, having at least one wall **1004** defining an elongate interior space **1006**. Deflector **1005** is coupled to upper portion **1002***a* of housing **1002**. Deflector **1002** redirects exhaust air **120** exiting from outlet **1010** at the top of housing **1002** from a direction substantially parallel to the longitudinal axis of housing **1002** to a direction substantially perpendicular to the longitudinal direction of housing **1002**.

[**0084**] In a further exemplary embodiment, shown in FIGS. **10C-10E**, deflector **1005** is coupled to wall **1004** at an upper portion of housing **1002** with coupler **1007**. Exhaust air **120** exits interior portion **1006** of housing **1002** through outlet **1012**. Similar to the embodiment of FIGS. **10A-10B**, deflector **1002** redirects exhaust air **120** exiting from outlet **1012** at the top of housing **1002** from a direction substantially parallel to the longitudinal axis of housing **1002** to a direction substantially perpendicular to the longitudinal direction of housing **1002**.

[**0085**] In yet a further exemplary embodiment, shown in FIGS. **10F-10G**, a second housing **1020** having outlet **1012** along a face thereof is concentrically coupled to housing **102**. Outlet **1012** of second housing **1020** is substantially parallel with outlet **110** of housing **102** and, as second housing **1020** is rotated with respect to housing **102** (as indicated by direction arrow **1022**), outlet **1012** becomes aligned with outlet **110**. As a result of this alignment, exhaust air **120** is directed between outlet **1010** at the top of housing **102** and outlet **110** along the face of housing **102**.

[**0086**] In a first instance, when outlet **1012** is position away from outlet **110**, exhaust air **120** is directed mostly toward outlet **1010** and ultimately deflected into the surrounding living space by deflector **1005**. It is possible that due to manufacturing tolerances between the inner wall of second housing **1020** and the outer portion of wall **104**, that a small portion of exhaust air **120** may find its way through outlet **110** even when outlet **1012** is position away from outlet **110**.

[**0087**] In a second instance, when outlet **1012** is fully aligned with outlet **110**, exhaust air **120** is directed mostly through outlet **110**. In one embodiment, a portion of exhaust air **120** may also exit through outlet **1010**. In an alternative embodiment, however, outlet as outlet **1012** becomes aligned with outlet **110** outlet **1010** may become restricted by a portion **1020***a* of housing **1020**.

[**0088**] Thus, by adjusting the position of outlet **1012** relative to outlet **110** exhaust air may be mixed between outlet **110** and outlet **1010**.

[**0089**] In one exemplary embodiment, wall **1004** may be formed from any material that is rigid or self-supporting, such as a polymer for example. In another exemplary embodiment, wall **1004** may be formed from a material which requires an external support structure, such as support **1050** coupled to upper portion **1052** of deflector **1005**, as shown in FIG. **FIGS. 10H and 10I**, to maintain an elongate configuration. In all other respects, these exemplary embodiments are similar to the exemplary embodiments discussed above and may comprise the various different configurations of these embodiments.

[**0090**] Referring now to FIGS. **11A-11C** a ninth exemplary embodiment of the present invention is illustrated. As shown in FIGS. **11A-11C**, fan **1100** is similar to fan **100** but includes exhaust air director **1102** coupled to housing **102** at pivot points **1103**. Air director **1102** may be positioned between a variety of positions either manually or electrically, using a motor (not shown), for example. In another exemplary embodiment, air director **1102** may oscillate between positions to direct exhaust air **120** over a wider area. In all other respects, this exemplary embodiment is similar to the exemplary embodiments discussed above and may comprise various different configurations of these embodiments.

[**0091**] Referring now to FIGS. **12A-12B** a tenth exemplary embodiment of the present invention is illustrated. As shown in FIGS. **12A-12B**, fan **1200** is comprised of multiple sections **1202**, **1204**, **1206**, **1208** that are slidably coupled to one another in a telescoping arrangement. In one exemplary embodiment, upper section **1202** includes outlet **110**. In other exemplary embodiment outlet **110** may be included in other sections as well if desired. Although four sections are illustrated, the invention is not so limited in that any number of telescoping sections may be used as desired.

[**0092**] As shown in FIGS. **12A-12B**, the position of outlet **110** relative to surface **122** may be adjusted as desired to provide exhaust air **120** at a desired height. Although not shown in this figure, the position of the various housing sections relative to one another may be maintained using various well known means, such as ball and detent, resilient ribs, etc. In all other respects, this exemplary embodiment is similar to the exemplary embodiments discussed above and may comprise various different configurations of these embodiments.

[**0093**] Although the invention has been described with reference to exemplary embodiments, it is not limited thereto. Rather, the appended claims should be construed to include other variants and embodiments of the invention, which may be made by those skilled in the art without departing from the true spirit and scope of the present invention.

What is claimed:

1. A fan comprising:

a housing comprising:

at least one wall portion,

an elongate interior portion bounded by the at least one wall portion,

at least one inlet opening formed at a lower portion of the at least one wall portion, and

at least one outlet opening formed in the at least one wall portion; and

an air generator having at least one exhaust port in fluid communication with the at least one inlet opening of

the housing, the air generator having at least one intake port receiving a supply of air and generating exhaust air through the exhaust port,

wherein the exhaust air enters the housing through the at least one inlet opening and exits the housing through the at least one outlet opening.

2. The fan according to claim 1, wherein the at least one outlet opening is formed in a longitudinal direction of the housing.

3. The fan according to claim 1, wherein the at least one outlet opening is formed at an upper portion of the housing.

4. The fan according to claim 3, further comprising a deflector positioned adjacent an upper portion of the housing, wherein the deflector redirects at least a portion of the exhaust air along a path substantially orthogonal to a longitudinal axis of the housing.

5. The fan according to claim 1, wherein the at least one outlet opening is a plurality of outlet openings parallel to one another.

6. The fan according to claim 1, wherein the at least one outlet opening is a plurality of outlet openings adjacent one another and spaced apart from one another by a portion of the at least one wall portion.

7. The fan according to claim 1, wherein the fan is portable.

8. The fan according to claim 1, further comprising means for coupling the fan to at least one of a floor and a wall.

9. The fan according to claim 1, wherein an effective length of the at least one outlet opening is based on a diameter of a fan blade of the air generator.

10. The fan according to claim 9, wherein the effective length of the at least one outlet opening is greater that the diameter of the fan blade.

11. The fan according to claim 1, wherein an effective length of the at least one outlet opening is greater that a length of a fan blade assembly of the air generator.

12. The fan according to claim 1, wherein at least a portion of the supply of air flows along a first path and at least a portion of the exhaust air flows along a second path, the second path substantially orthogonal to the first path.

13. The fan according to claim 1, wherein the supply air has a negative static pressure and the exhaust air has a positive static pressure.

14. The fan according to claim 1, wherein an upper portion of the at least one outlet opening is spaced apart from the air generator by a predetermined distance.

15. The fan according to claim 14, wherein the predetermined distance is at least as great as a diameter of a fan blade of the air generator.

16. The fan according to claim 1, wherein the air generator is below the elongate interior portion.

17. The fan according to claim 1, further comprising means for at least one of i) positioning the fan at one of a plurality of rotational positions, ii) oscillating the fan between a first position and a second position, and iii) rotating the fan about a longitudinal axis.

18. The fan according to claim 1, wherein the housing further comprises a second interior portion for enclosing the air generator.

19. The fan according to claim 1, wherein the at least one wall portion is at least of one of rigid and self-supporting.

20. The fan according to claim 1, further comprising supporting means for supporting the at least one wall portion so as to maintain an elongate aspect of the at least one wall portion.

21. The fan according to claim 1, wherein at least a portion of the at least one outlet opening is substantially orthogonal to a longitudinal axis of the housing.

22. The fan according to claim 1, wherein the air generator is a blower assembly.

23. The fan according to claim 1, wherein the air generator comprises an axial fan.

24. The fan according to claim 1, further comprising redirecting means for redirecting the exhaust air flowing from the outlet opening.

25. The fan according to claim 1, further comprising at least one louver adjacent the at least one outlet opening for redirecting the exhaust air flowing from the outlet opening.

26. The fan according to claim 1, wherein the housing is substantially linear.

27. The fan according to claim 1, further comprising a grill coupled to an upper portion of the housing.

28. The fan according to claim 1, wherein the housing is formed from a plurality of sections, an inside portion of a first one of the plurality of sections coupled to an outside portion of a second one of the plurality of sections, such that the second section slideably engages the first section.

29. The fan according to claim 28, wherein at least one of the plurality of sections includes the outlet opening.

30. The fan according to claim 28, wherein a length of the housing is adjustable to one of a plurality of lengths.

31. The fan according to claim 1, further comprising directing means for directing the exhaust air between a first one of the at least one outlet openings and a further outlet opening.

32. The fan according to claim 1, wherein the at least one outlet opening is a restricting means for restricting the exhaust air exiting the housing and distributing the exhaust air along a length of the restricting means such that the exiting air has a substantially even velocity along at least a portion of a length of the at least one outlet opening.

33. The fan according to claim 32, wherein a flow through area of the restricting means is less than an outlet area of the air generator.

34. The fan according to claim 32, wherein a flow through area of the restricting means between 60% and 140% of an outlet area of the air generator.

35. The fan according to claim 32, wherein a flow through area of the restricting means between 5% and 250% of an outlet area of the air generator.

36. The fan according to claim 1, wherein the elongate interior portion forms a plenum within the housing for at least one of storing and distributing the exhaust air.

37. The fan according to claim 1, wherein at least a portion of the exhaust air exiting from the at least one outlet opening travels along a flow path substantially orthogonal to at least a portion of the exhaust air from the air generator.

38. The fan according to claim 1, wherein the at least one wall portion is a plurality of wall portions coupled to one another.

39. The fan according to claim 1, wherein the at least one wall portion has a substantially circular cross section.

40. A fan comprising:

a housing comprising:

at least one wall portion,

an elongate portion bounded by the at least one wall portion,

an upper portion having at least a partially arcuate portion, and

at least one inlet opening formed at a lower portion of the at least one wall portion; and

an air generator having at least one exhaust port coupled to the at least one inlet opening of the housing, the air generator having at least one intake port receiving a supply of air and generating exhaust air through the exhaust port,

wherein the exhaust air enters the housing through the at least one inlet opening and exits the housing adjacent the arcuate portion of the housing.

41. A fan comprising:

a housing defining a first interior space;

an air generator positioned within the housing and defining the second interior space and in fluid communication with the first interior space, the air generator having at least one intake port receiving intake air and generating exhaust air; and

at least one air restrictor positioned one of within or adjacent the first interior space to distribute the exhaust air over at least a portion of a length of the air restrictor;

wherein the exhaust air flows through the at least one air restrictor.

42. The fan according to claim 41, wherein at least a portion of the supply of air flows along a first path and at least a portion of the exhaust air flows along a second path, the second path substantially orthogonal to the first path.

43. The fan according to claim 41, wherein exhaust air exiting from the at least one restrictor travels along a flow path substantially orthogonal to at least a portion of the exhaust air from the air generator.

44. The fan according to claim 41, wherein an upper portion of the at least one restrictor is spaced apart from the air generator by a predetermined distance.

45. The fan according to claim 41, wherein the air generator has at least one fan blade having a plurality of blade elements facing in a rotational direction of the air generator.

46. The fan according to claim 41, wherein a static pressure within the first interior space is at least 0.05 inch water column.

47. The fan according to claim 41, wherein the air restrictor has an elongate aspect ratio.

48. The fan according to claim 41, wherein the fan is at least one of i) mountable to at least one of a floor and a wall or ii) portable.

49. The fan according to claim 41, wherein the at least one air restrictor has a total length of at least 6 inches.

50. The fan according to claim 41, wherein air generator is adjacent the first interior space.

51. The fan according to claim 41, wherein the air generator is directly coupled to the first interior space.

52. The fan according to claim 41, wherein air generator is a unitary blower assembly.

53. The fan according to claim 41, wherein air generator is an assembly comprising at least one axial fan.

54. The fan according to claim 41, wherein the first interior space forms a plenum area between the air restrictor and the air generator.

55. The fan according to claim 41, wherein the housing further defines a second interior space below and in fluid communication with the first interior space, the air generator located within the second interior space.

56. The fan according to claim 41, wherein the exhaust air flows through the air restrictor at a substantially uniform velocity along at least a portion of a length of the air restrictor.

57. The fan according to claim 56, wherein the velocity is greater than 375 fpm at 1 foot from the air restrictor.

58. The fan according to claim 41, wherein the air restrictor converts the static pressure associated with the exhaust air into an air velocity which is in turn imparted into the exhaust air and flows out of the fan.

59. The fan according to claim 41, wherein the housing has a substantially vertical configuration or a substantially horizontal configuration.

60. The fan according to claim 41, wherein the air generator is a non-transverse blower.

61. The fan according to claim 41, further comprising means for at least one of i) positioning the fan at one of a plurality of rotational positions, ii) oscillating the fan between a first position and a second position, and iii) rotating the fan about a longitudinal axis.

62. A fan comprising:

housing means for defining a first interior space;

air generation means for defining a second interior space and generating an exhaust airflow within the first interior space; and

restricting means for restricting the exhaust airflow generated by the air generation means and distributing the exhaust air along a length of the restricting means, the restricting means in fluid communication with the first interior space.

63. The fan according to claim 62, wherein the air generation means receives intake air from a first path and generates the exhaust air along a second path, the second path substantially orthogonal to the first path, the exhaust air flowing through the restricting means.

64. The fan according to claim 62, wherein the exhaust air exiting from the restricting means travels along a flow path substantially orthogonal to at least a portion of the exhaust air from the air generator.

65. A method for providing air circulation comprising the steps of:

providing a housing having at least a first interior space;

receiving intake air;

generating exhaust air into the first interior space based on the intake air;

pressurizing the exhaust air in the first interior space; and

expelling the pressurized exhaust air from the first interior space.

66. The method according to claim 65, wherein at least a portion of the intake air flows along a first path and at least a portion of the exhaust air flows along a second path, the second path is substantially orthogonal to the first path.

67. The method according to claim 66, wherein at least a portion of the expelled air flows is directed substantially orthogonal to the exhaust air from the air generator.

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