



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.09.2008 Bulletin 2008/37

(51) Int Cl.:
F04D 29/40 (2006.01)

(21) Application number: **08151374.9**

(22) Date of filing: **13.02.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicant: **LN 2 S.R.L. a socio unico**
62010 Montecassiano (MC) (IT)

(72) Inventor: **Ranalli, Antonio**
66020 Scerni (CH) (IT)

(74) Representative: **Fabris, Stefano et al**
Cantaluppi & Partners S.r.l.
Via Matteotti 26
35137 Padova (IT)

(30) Priority: **06.03.2007 IT PD20070076**

(54) **A manifold, in particular a scroll type manifold for fans for use in extractor hoods**

(57) A manifold (2), in particular a scroll type manifold, which is intended to constitute a housing for a radial impeller (3) of a fan (1), comprises a first and a second manifold half-shell (8, 9) which can be connected to each other at a connection profile (P), one of the half-shells including a nozzle (10) which defines the delivery cross-section (5) of the manifold, and removable connection means being provided between the half-shells (8, 9). The

connection means comprise first form-fit connection means (15) between the respective half-shells (8, 9) which are provided at the nozzle (10), second form-fit connection means (20) between the respective half-shells (8, 9) which are provided at least at a portion of the connection profile (P) and removable snap-fit connection means (25) and counter-means between the half-shells (8, 9) which are provided at the opposite side with respect to the nozzle (10).

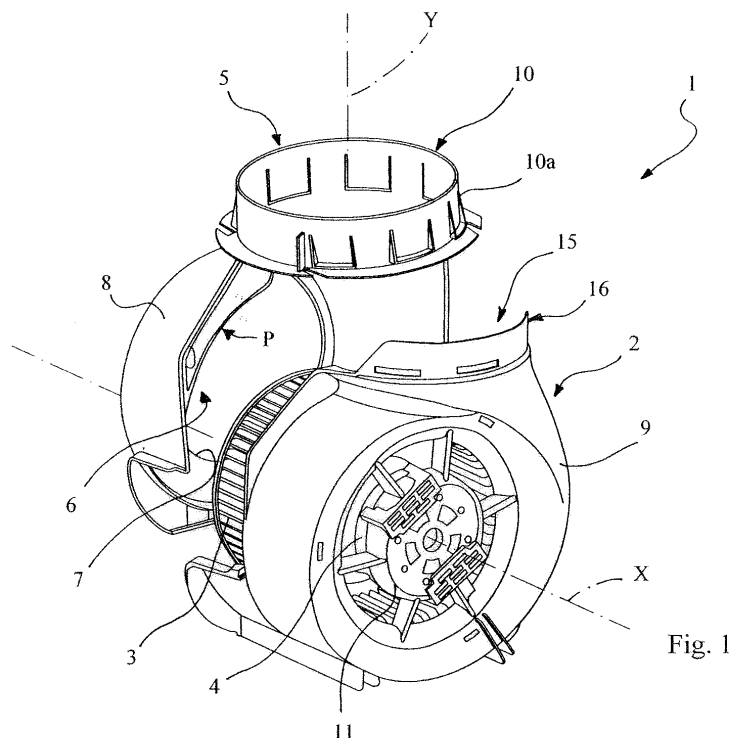


Fig. 1

Description

[0001] The present invention relates to a scroll type manifold, particularly for fans for use in extractor hoods, having the features set out in the preamble of main claim 1.

[0002] The invention is used particularly, though not exclusively, in the construction of ventilation units for hoods for extracting air-like gases.

[0003] In that context, the manifold which defines the volute of the fan is typically constructed in two separate portions, otherwise referred to using the term "half-shells" or "semi-cochlea" in the relevant sector. The half-shells are provided so as to be connected to each other with removable connection means, typically constructed as screw type fixing means, once the impeller and optionally the control motor thereof has/have been accommodated inside the manifold.

[0004] There are further defined, in the manifold, jointly by the half-shells being joined together, a delivery cross-section which is directed tangentially relative to the volute and one or more open intake cross-sections in the manifold coaxially relative to the axis of rotation of the impeller.

[0005] One of the problems encountered in those applications involves the limited accessibility to the spaces provided inside the extractor hoods, owing to the reduced spaces provided in the assembly region of the ventilation unit, which circumstance makes the operations for assembling/disassembling the manifold with respect to the extractor hood complex and quite difficult both during the installation phase and in the subsequent maintenance phase.

[0006] In this respect, the provision of connection means, for example, of the screw type or the like, in order to join the half-shells to each other is not found to be particularly convenient and rapid for the fitter.

[0007] A main object of the invention is to overcome those limitations by means of a manifold which is structurally and functionally configured in order to make it quicker and easier to connect the manifold half-shells and which is at the same time capable of ensuring reliable and correct connection thereof.

[0008] This object and other objects which will be appreciated more clearly below are achieved by a manifold, in particular a scroll type manifold, which is constructed in accordance with the appended claims.

[0009] Further features and advantages of the invention will be appreciated more clearly from the following detailed description of one preferred embodiment thereof which is illustrated, purely by way of non-limiting example, with reference to the appended drawings, in which:

- Figure 1 is an exploded perspective view of a fan having a manifold constructed in accordance with the present invention,
- Figures 2 and 3 are exploded perspective views of the manifold of Figure 1,

- Figures 4 and 5 are side elevation views of the respective half-shells of the manifold of the preceding Figures,
- Figures 6 and 7 are perspective views of the components of Figures 4 and 5, respectively,
- Figure 8 is a perspective view of the manifold of the preceding Figures with the half-shells connected together,
- Figures 9 and 10 are partial perspective views, drawn to an enlarged scale, of a component of the manifold of the preceding Figures,
- Figures 11 and 12 are partial perspective views, drawn to an enlarged scale, of another component of the manifold of the preceding Figures,
- Figure 13 is a partially sectioned view, drawn to an enlarged scale, of a component of the manifold of the preceding Figures,
- Figures 14 and 15 are perspective views of construction variants of components of the manifold according to the invention.

[0010] With reference to the Figures mentioned, a fan is generally designated 1 and comprises a scroll type manifold 2 which is provided so as to constitute a housing of a radial impeller 3 of the fan, which is operated by a motor 4 about an axis of rotation designated X.

[0011] There are defined, in the manifold, a delivery cross-section 5, in which the delivery flow direction which is indicated by the axis Y in the Figures is perpendicular to the axis of rotation X and a main intake cross-section 6 which includes a lateral opening 7 which is formed in the manifold, the opening 7 being coaxial with the axis X of the impeller. Preferably, the delivery cross-section 5 and intake cross-section 6 are of circular shape as illustrated in the Figures.

[0012] The manifold 2 further comprises a first half-shell and a second half-shell which are designated 8 and 9, respectively, and which can be connected to each other at a connection profile P by removable connection means which are described in detail below. The half-shells 8, 9 together define the volute of the fan in which the impeller is caused to rotate.

[0013] In greater detail, there is formed in the first half-shell 8 of the manifold the main intake opening 7, in a coaxial position relative to the axis X of the impeller. In that first half-shell, there is further integrally formed a cylindrical nozzle 10, which has a cross-section having a closed circular contour and which defines the cross-section 5 for the discharge of the delivery flow generated by the fan.

[0014] The nozzle 10 comprises a cylindrical collar 10a which is developed, over at least a portion, in the axial direction Y of the delivery flow and which is provided so as to be connected to a corresponding cross-section (not illustrated) for conveying and discharging the flow drawn in, for example, defined in an extractor hood structure. Advantageously, the nozzle 10 is provided with means for removable connection to a portion of the stationary

structure of the hood.

[0015] The second half-shell 9 is provided in order to rotatably support thereon both the impeller 3 and the motor unit 4 for operating it. As illustrated in Figure 1, a preferred configuration provides for the motor 4 to be supported in a projecting manner on the half-shell 9, inside the manifold, by means of a support flange 11 which is provided laterally in the half-shell 9, at the side axially opposite the intake opening 7 of the other half-shell 8. The impeller 3 is mounted coaxially with respect to the motor 4 and is also supported in a projecting manner on the manifold half-shell 9.

[0016] There is provision, in the mutual connection of the half-shells 8, 9, for the connection profile P, starting from the nozzle 10, to have a sequence of portions, which are consecutive relative to each other and which belong to a broken line with rectilinear and curvilinear portions, as will appear clearly from the appended Figures. In the present context, therefore, the term "profile" is intended to refer to that portion of the above-mentioned line on which the half-shells are caused to meet each other with mutual connection.

[0017] The removable connection means of the half-shells 8, 9 comprise first connection means of the form-fit type between the half-shells, which are generally designated 15 and which are provided at the nozzle 10, in the delivery cross-section 5 of the fan. In greater detail, the means 15 comprise an extension piece 16 which extends from the second half-shell 9 near the delivery cross-section of the manifold, which is formed as part of an axial portion 16a having a cylindrical wall. The surface profile of that wall is selected so as to have such dimensions as to engage, with the outer wall surface thereof, with at least part of the internal surface of the cylindrical nozzle 10, with a substantial form-fit connection between the surfaces in mutual contact, as clearly illustrated in Figure 8.

[0018] Preferably, the extension piece 16 is constructed so as to be integral with the half-shell 9 and has such a profile and dimensions as to constitute a guide means for the nozzle 10 in the delivery direction (axis Y) during the mutual connection of the manifold half-shells, so that the form-fit connection between the extension piece 16 and the nozzle 10 allows mutual retention of the half-shells, at least in the transverse direction relative to the axis Y in the region of the nozzle 10.

[0019] The first connection means 15 are configured so as to cooperate with other second removable form-fit connection means which are generally designated 20 and which are provided between the half-shells 8, 9.

[0020] Those second connection means 20 comprise, along portions of the connection profile P, a plurality of reliefs which are all designated 21 and which are provided on the first half-shell 8, and a corresponding plurality of grooves which are all designated 22 and which are formed on the second half-shell 9, each relief being able to engage with a respective groove, which is formed in a corresponding position facing the said relief, in order

to bring about a substantial form-fit connection between reliefs and grooves in mutual engagement, in a connection direction which is directed parallel with the axis X (therefore, transversely relative to the delivery flow direction).

[0021] In greater detail, the reliefs 21 project from the half-shell 9 in the same direction along at least a portion of the connection profile P. There is advantageously provided a first pair of reliefs, designated 21' and 21" for convenience in Figure 7, which extend from the delivery cross-section 5, respectively, at diametrically opposed sides of the nozzle 10 along the profile P. Other reliefs 21, spaced apart from each other, are provided along the remaining portion of the connection profile P, as illustrated in Figure 7.

[0022] Similarly, the grooves 22 are developed on the other half-shell 8 in the same direction, in a position which correspondingly faces the respective reliefs 21, when the half-shells are coaxially arranged relative to the axis X, and have such a longitudinal dimension as to receive, with form-fit connection, the corresponding reliefs 21. Preferably, the reliefs 21 are engaged with slight pressure in the respective grooves for mutual connection, so as to bring about a retention action between the half-shells not only in a direction transverse to the axis X but also in the same axial direction X for relative connection.

[0023] It will be appreciated that the reliefs 21 and the grooves 22, although being able to be provided in different numbers and forms from those described, are developed longitudinally in accordance with main current directions along part of the respective connection lines which define the connection profile P of the half-shells.

[0024] The removable connection means between the half-shells further comprise snap-fit connection means which are generally designated 25 and which are intended to cooperate with the form-fit connection means 15 and 20 so as to ensure adequate mutual securing between the half-shells 8, 9.

[0025] The connection means 25 comprise a pair of seats 26 on the first half-shell 8, each one being able to be engaged in a snap-fit manner with a respective tooth 27 of a pair of teeth which are formed on the half-shell 9 in a corresponding position. Preferably, the seats 26 are provided at the connection profile P, at the axially opposite side (in the direction Y) with respect to the nozzle 6. Preferably, each seat 26 comprises a through-hole 26a which is intended to be engaged with the corresponding tooth 27 in a hook-like manner, before resilient deformation of the tooth (in the engagement phase of the seat) and the subsequent resilient return thereof into the non-deformed position, with a surface 27a of the tooth in abutment against the seat 26 so as to ensure the relative retention of the tooth in the seat, at least in the opposite direction to that for mutual insertion (directed parallel with the axial direction X).

[0026] It will be appreciated that the cooperation of the snap-fit connection means 25 with the form-fit connection means 15 and 20 ensures suitable mutual connection

between the half-shells 8 and 9 at each zone of the connection profile, from the nozzle to the opposite axially rear portion as well as along the connection sides of the half-shells between the above-mentioned zones.

[0027] The removable connection means between the half-shells 8, 9 further comprise other form-fit connection means which are generally designated 30 and which include a pair of protrusions 31 which are provided on the second half-shell 9 and a respective pair of openings 32 which are formed in the first half-shell 8 in a position which correspondingly faces the protrusions (with the half-shells arranged coaxially relative to the axis X). Each protrusion 31 is intended to engage, substantially with a form-fit connection, with the corresponding opening 32, the respective formations of the protrusion and the opening being selected in such a manner that an embedded type connection is brought about between the mutually engaged portions, as described in detail below.

[0028] In particular, there are provided a pair of protrusions 31 which extend in the same direction from the half-shell 9, each located along the profile P, behind a corresponding and separate relief 21 (the reliefs provided behind the nozzle 10), with such an arrangement that the protrusions are arranged at opposite sides with respect to a theoretical median plane which extends through the axis X and which is parallel with the delivery direction Y. In a corresponding position, the pair of openings 32 is formed in the half-shell 8, those openings preferably being formed so as to be through-holes and being able to be engaged with the corresponding reliefs 21 in a relative engagement direction which is directed parallel with the axis X.

[0029] In greater detail, each protrusion 31 has a body 31a of tapered shape with a pair of opposite sides 31b, 31c which project from the half-shell 9 and which converge in the direction of an end 31d of the body 31a, that formation being clearly illustrated in Figure 7. Similarly, the through-holes 32 are formed as slots having elongate form, whose opposite sides 32a, 32b converge towards an end 32c of the slot, the tapered portions of the protrusion and the slot being selected in order to construct a substantial form-fit connection of the protrusion in the slot, in particular along the corresponding sides.

[0030] The tapered ends 31d of the protrusions are further formed so as to be turned towards the region of the nozzle 10. In that manner, during the mutual engagement of the protrusions in the respective slots, each protrusion is capable of a sort of wedging action in the slot, in the direction of the tapered end, so as to bring about mutual retention with substantial relative embedding between the connected portions.

[0031] With reference to Figures 14 and 15, in relation to a construction variant of the invention, there are optionally provided further means and counter-means for mutually retaining the half-shells 8, 9, including a pair of seats 35 which extend through the collar 10a of the nozzle 6 and a respective pair of retention teeth 36 which project in the same direction from the extension piece 16, each

tooth 36 being able to be received and retained in the respective corresponding seat 35 in order to ensure the relative retention between the half-shells 8, 9 at least in the delivery direction of the nozzle. Advantageously, the seats 35 are formed as through-holes through the cylindrical collar of the delivery nozzle.

[0032] The mutual cooperation of the connection means 15, 20, 25, 30, and optionally 35, 36, in practice allows a stable connection to be produced between the half-shells 8, 9, the connection being particularly rapid and reliable in comparison with the securing means of conventional type. In particular, the connection system described does not require either any additional fixing means separate from the half-shells, such as those which provide for screw type connections, or any equipment for carrying out the connection.

[0033] It will be understood that, in order to disconnect the half-shells, for example, for maintenance operations or to replace parts of the fan, it is necessary to use suitable tools, in particular for disengaging the connection means 25.

[0034] The invention thereby achieves the objects set out and provides the advantages set out above over known solutions.

Claims

1. A manifold (2), in particular a scroll type manifold, which is intended to constitute a housing for a radial impeller (3) of a fan (1), comprising a first and a second manifold half-shell (8, 9) which can be connected to each other at a connection profile (P), one of the half-shells including a nozzle (10) which defines the delivery cross-section (5) of the manifold, removable connection means being provided between the half-shells (8, 9),
characterized in that the connection means comprise:
 - first form-fit connection means (15) between the respective half-shells (8, 9), which are provided at the nozzle (10),
 - second form-fit connection means (20) between the respective half-shells (8, 9), which are provided at least at a portion of the connection profile (P),
 - removable snap-fit connection means (25) and counter-means between the half-shells (8, 9), which are provided at the opposite side with respect to the nozzle (10).
2. A manifold according to claim 1, wherein the delivery nozzle (10) is provided on the first half-shell (8) and comprises a cylindrical collar (10a) which extends over an axial portion in the delivery flow direction and the first form-fit connection means (15) comprise at least one extension piece (16) which extends from

the second half-shell (9) with such a surface profile as to engage with at least a portion of the cylindrical internal surface of the nozzle (10), with a substantial form-fit connection between the surfaces in mutual contact.

3. A manifold according to claim 2, wherein the at least one extension piece (16) is formed as part of a cylindrical portion and has such dimensions as to constitute a guide means for the nozzle (10) in the delivery direction during the mutual connection of the manifold half-shells (8, 9), and in such a manner that the form-fit connection between the extension piece (16) and the nozzle (10) allows mutual retention of the half-shells (8, 9) transversely relative to the delivery flow direction at least at the nozzle (10).
4. A manifold according to any one of the preceding claims, wherein the second form-fit connection means (20) comprise at least one relief (21) on one (9) of the half-shells and at least one groove (22) in the other (8) of the half-shells, the at least one groove (22) being able to be engaged with the at least one relief (21) with substantial form-fit connection, in a connection direction which is directed substantially transversely relative to the delivery flow direction at the delivery cross-section.
5. A manifold according to claim 4, wherein the at least one relief (21) projects from the corresponding half-shell (9) along at least a portion of the connection profile (P) between the half-shells.
6. A manifold according to claim 4 or 5, wherein the at least one relief (21) is engaged with pressure in the respective groove (22) for mutual connection.
7. A manifold according to claim 6, wherein the at least one relief (21) is provided on the second half-shell (9) and the at least one groove (22) is formed in the first half-shell (8).
8. A manifold according to claim 7, wherein there is provided a first pair of reliefs (21', 21'') which extend from the delivery cross-section (5), at diametrically opposed sides of the nozzle (10), along the connection profile (P) of the half-shells, respectively.
9. A manifold according to any one of claims 4 to 8, wherein the at least one relief (21) and the at least one groove (22) are developed in accordance with respective main current directions along at least part of the corresponding connection profiles (P) of the half-shells.
10. A manifold according to any one of the preceding claims, wherein the snap-fit connection means (25) comprise at least one seat (26) on one (8) of the half-

shells and at least one tooth (27) on the other (9) of the half-shells which are capable of resilient deformation in order to engage the seat (26) with a disengageable snap-fit connection so that, in the engagement position, the half-shells (8, 9) are mutually retained along the connection profile (P), at least at the snap-fit connection means.

11. A manifold according to claim 10, wherein there are provided a pair of seats (26) for engaging a respective pair of teeth (27), the seats (26) being provided on the first half-shell (8), at the opposite side with respect to the nozzle (10) relative to a central median plane of the manifold which contains the axis of rotation of the impeller and which is perpendicular to the delivery flow direction, the pair of corresponding teeth (27) being formed in a corresponding position on the other half-shell (9).
12. A manifold according to claim 10 or 11, wherein the at least one seat (26) comprises a through-hole (26a) in the corresponding half-shell which is capable of being engaged in a hook-like manner with the corresponding tooth (27) for mutual connection.
13. A manifold according to one or more of the preceding claims, comprising third form-fit connection means (30) between the half-shells (8, 9) which are arranged in a position located near the connection profile (P) of the half-shells.
14. A manifold according to claim 13, wherein the third connection means (30) comprise at least one protrusion (31) on one (9) of the half-shells and at least one opening (32) on the other (8) half-shell, which are capable of mutual engagement with form-fit connection in an embedded manner, so as to bring about the mutual retention of the half-shells (8, 9) when joined along the connection profile (P).
15. A manifold according to claim 14, wherein the at least one protrusion (31) has, in cross-section, a tapered formation so as to engage with the corresponding opening (32) with a wedging action therein in order to bring about the mutual retention with resultant relative embedding of the connected portions.
16. A manifold according to claim 15, wherein the protrusion (31) and the corresponding opening (32) have a tapered formation in the direction of the delivery cross-section.
17. A manifold according to claim 16, wherein there are provided a pair of protrusions (31) which are formed, at the connection profile (P) of the half-shells, at opposite sides with respect to a plane which is parallel with the delivery flow direction and which extends through the axis of rotation of the impeller.

18. A manifold according to claim 2 or 3, wherein there are provided auxiliary means and counter-means for mutually retaining the half-shells, including at least one seat (35) which extends through the nozzle (10) and at least one retention tooth (36) which projects from the extension piece (16), the at least one tooth (36) being capable of being received and retained in the at least one seat (35), in order to ensure the relative retention between the half-shells (8, 9) at least in the delivery direction of the nozzle (10).
19. A manifold according to claim 18, wherein there are provided a pair of seats (35) on the collar (10a) of the delivery nozzle (10) and a respective pair of retention teeth (36) which project in a corresponding position from the extension piece (16) and which are capable of engaging with the seats for mutually retaining the half-shells (8,9).

5

10

15

20

25

30

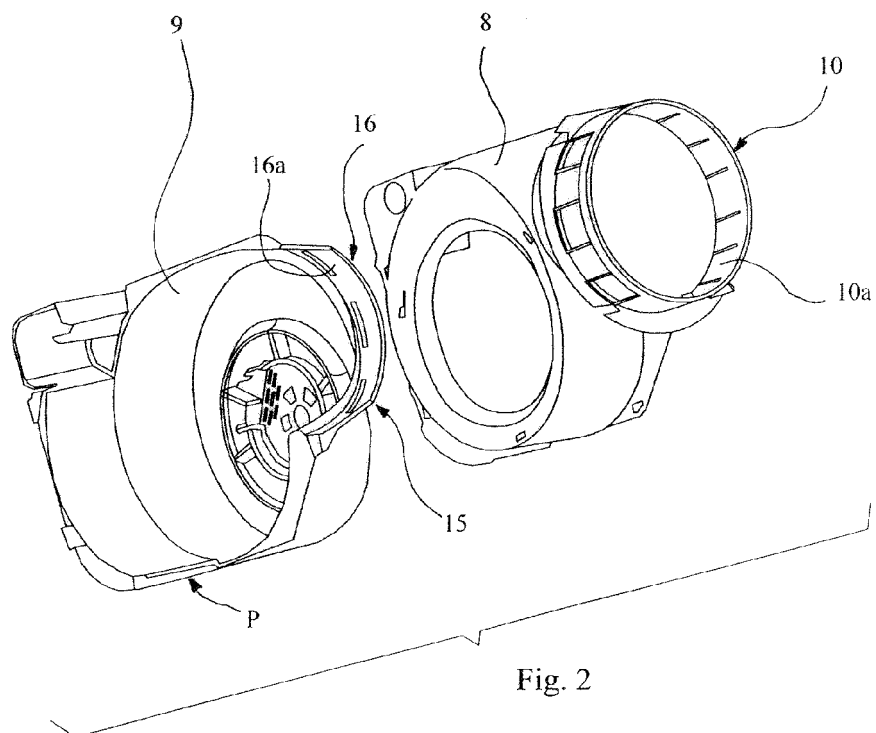
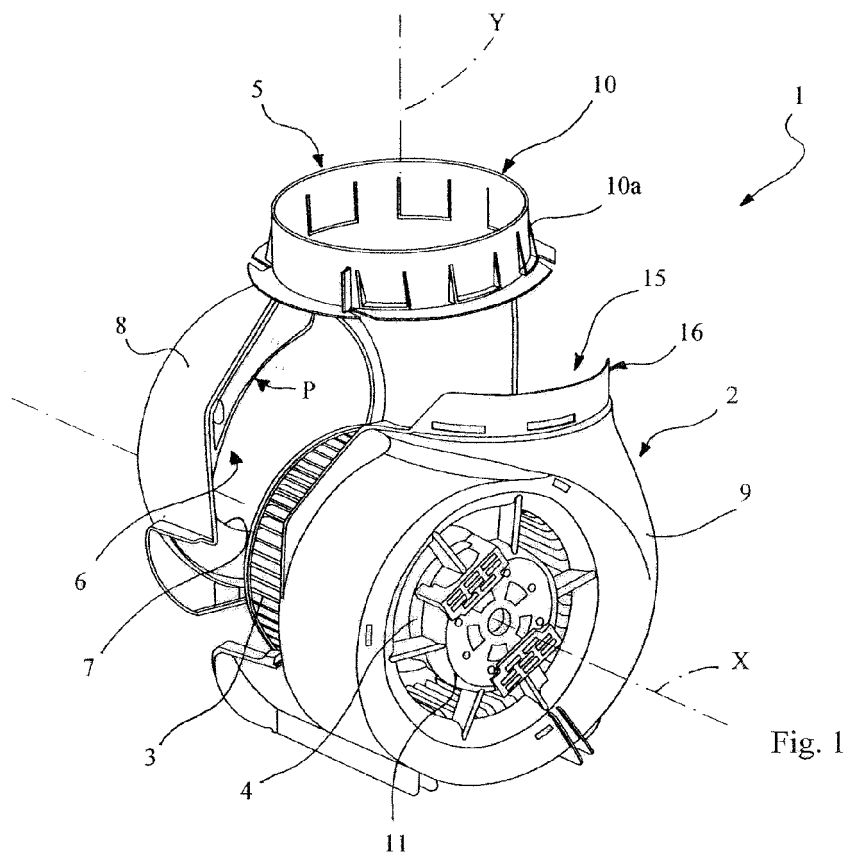
35

40

45

50

55



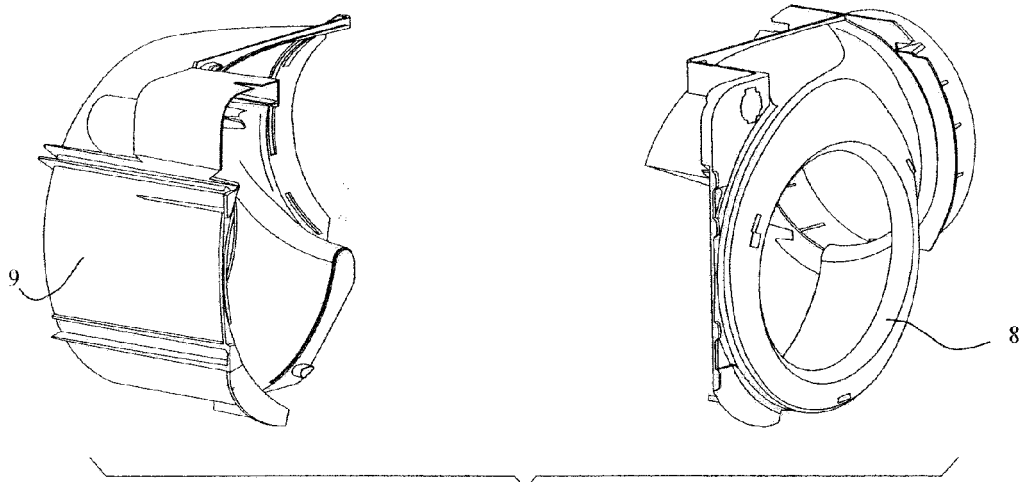


Fig. 3

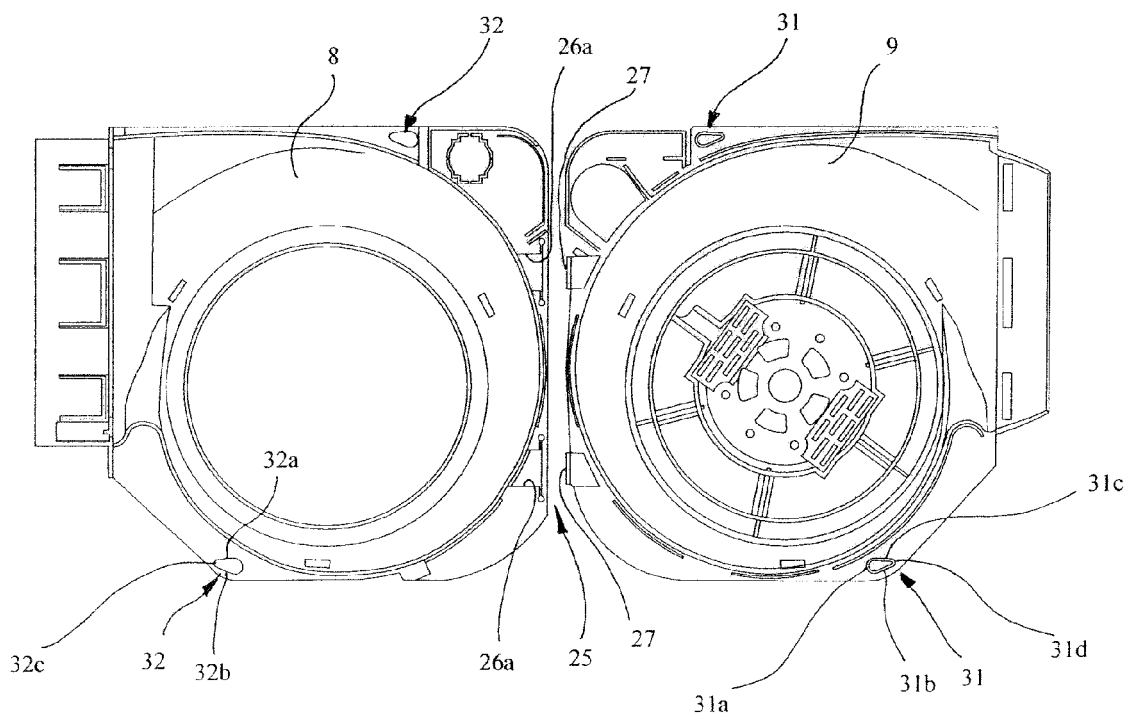


Fig. 4

Fig. 5

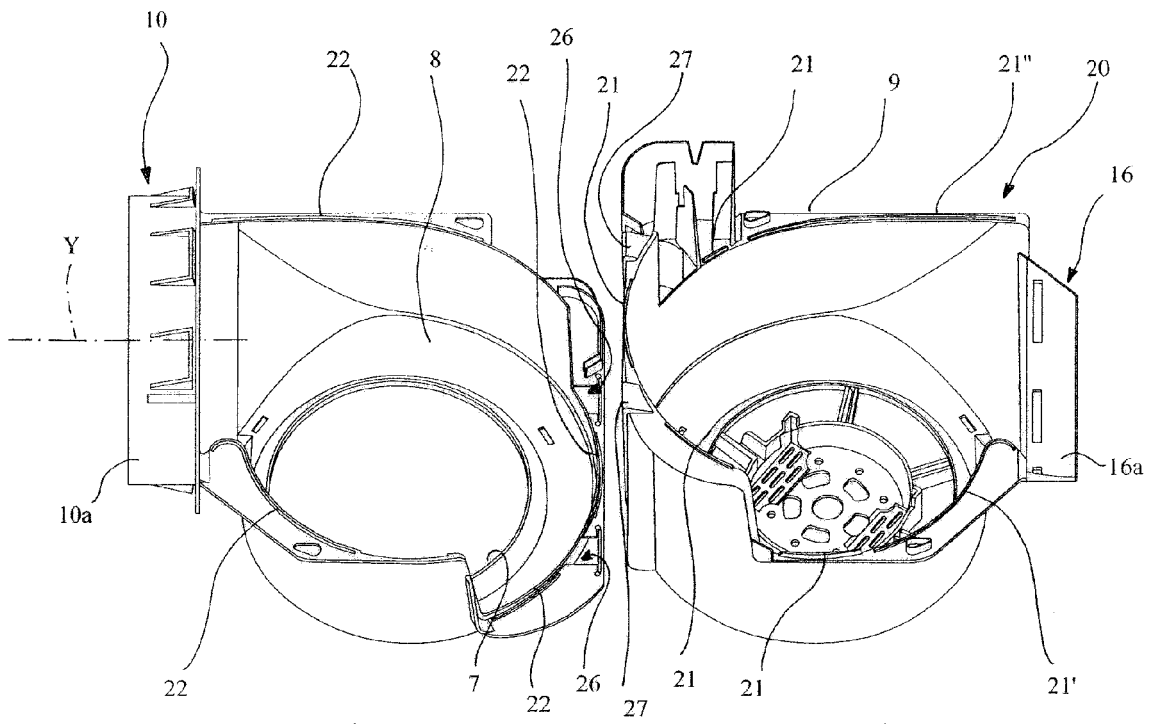


Fig. 6

Fig. 7

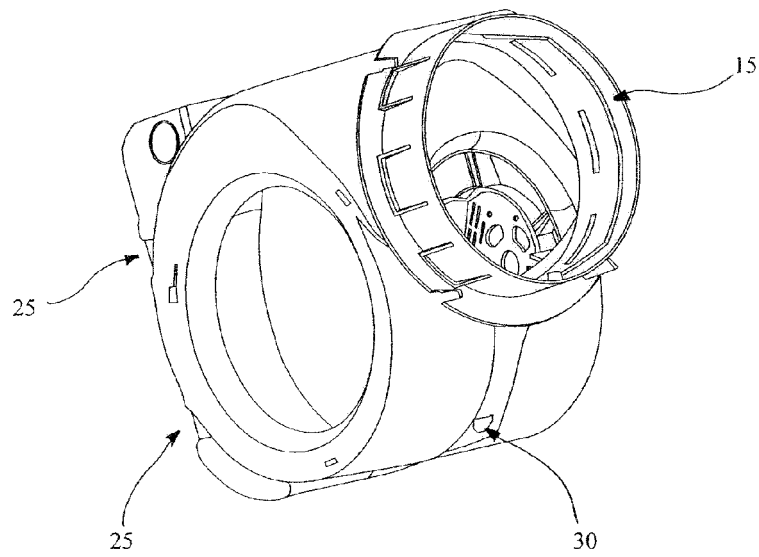


Fig. 8

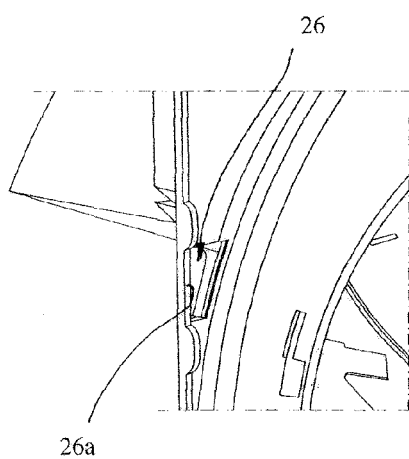


Fig. 9

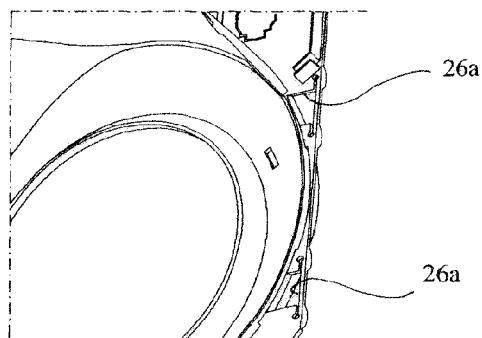


Fig. 10

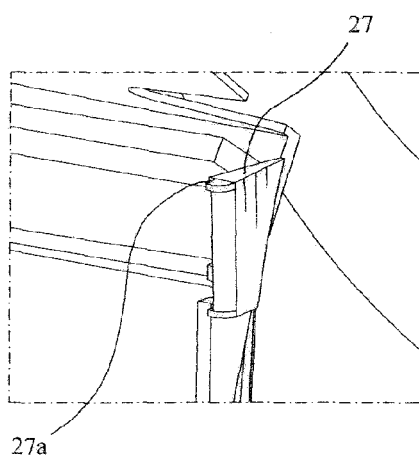


Fig. 11

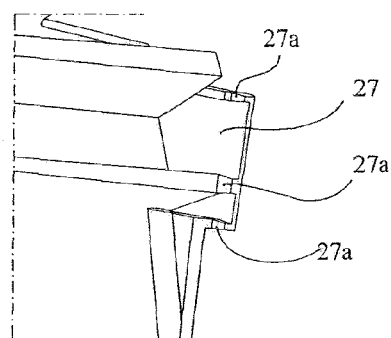
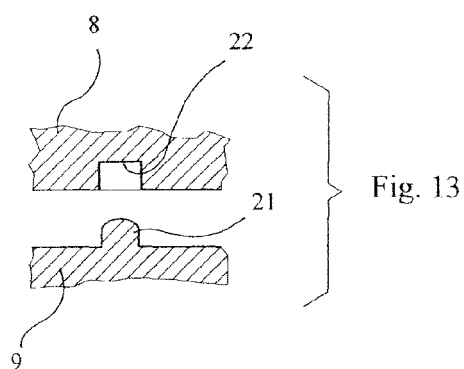


Fig. 12



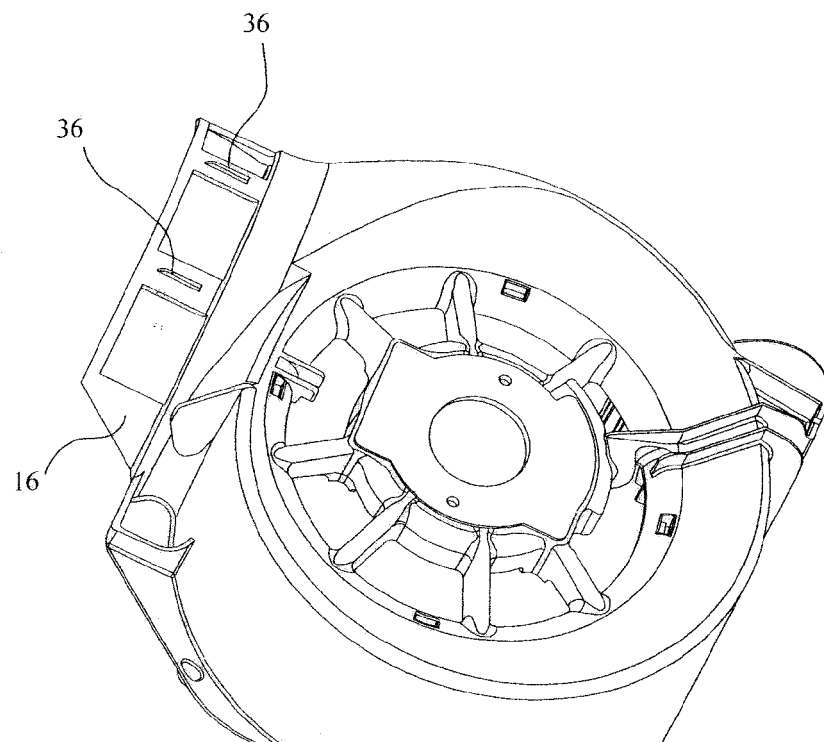


Fig. 14

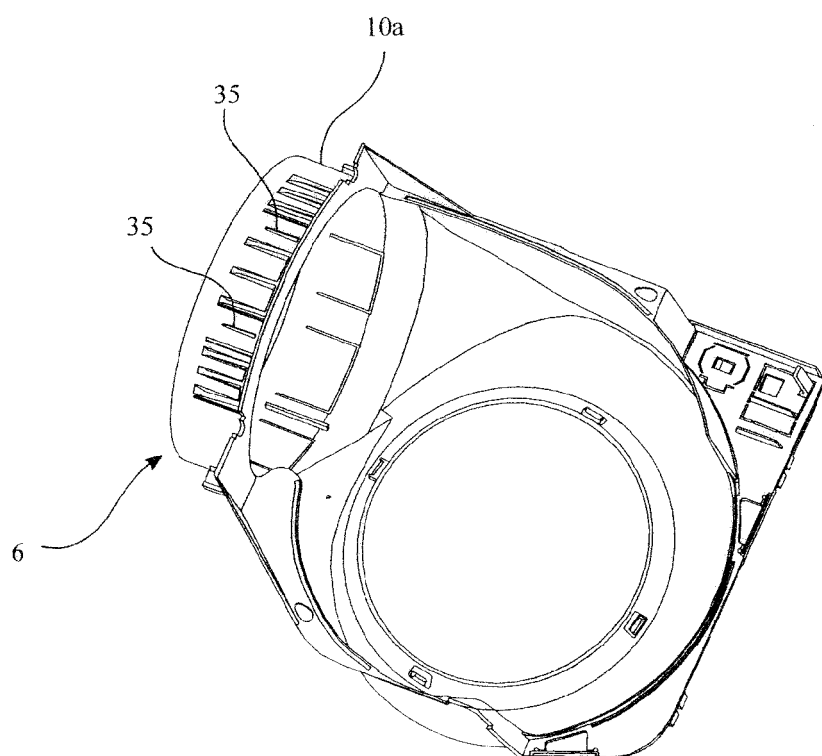


Fig. 15