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(54) Centrifugal exhaust fan for bathrooms

(57) The present invention relates to a centrifugal exhaust fan for bathrooms, comprising an outer casing (1) and an inner casing (2), between which there is defined an air passage from an intake (5) of the front part to a rotating drum (3) which is transversely arranged inside the inner casing (2), which is housed partially inside a tubular air exhaust nozzle (6) in the rear part such that the rotating drum (3) is set back at least partially with respect to the seating plane (10) of the exhaust fan in the application installation.

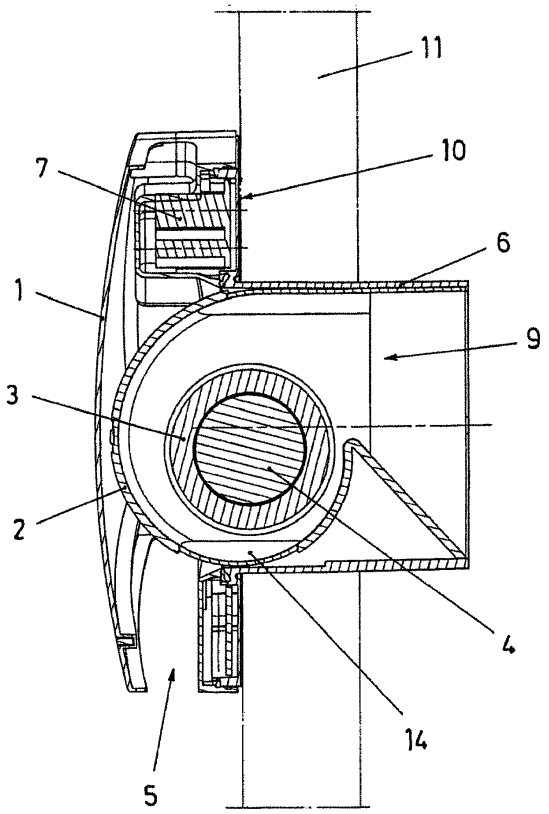

Fig.2

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Description

Field of the Art

[0001] The present invention relates to interior air renewal apparatuses for enclosures, for example to eliminate odors in bathrooms, proposing a centrifugal exhaust fan with implementation features making it advantageous for said function.

State of the Art

[0002] For renewing stuffy or polluted air in enclosures, exhaust apparatuses are used which sucks in the air from inside the application enclosure and expel it out through an outlet duct.

[0003] Axial exhaust fan apparatuses having a motor-powered propeller for sucking in the air to be removed, and centrifugal exhaust fan apparatuses having a motor-driven cylindrical drum with longitudinal flanges for sucking in the air to be removed are known for that function.

[0004] Centrifugal exhaust fans are more effective because they develop a stronger air movement force, but they have the drawback that the cylindrical drum with which they move the air is located transversely in front of the air ejection outlet, conditioning the exhaust apparatus to have a considerable dimension between the rear part and the front part, such that in places where it is applied, as in bathrooms, where the gaps of the enclosure are usually very limited, such exhaust fans are rather impractical because they take up too much space.

Object of the Invention

[0005] The invention proposes a centrifugal exhaust fan with features that allow it to be installed such that it projects very little with respect to an application surface where it is mounted.

[0006] This exhaust fan object of the invention comprises an outer casing which determines in the front part an intake for the passage of air towards the inside, there being inside said outer casing an inner casing housing a rotating drum with longitudinal blades associated to a drive motor, said drum being arranged such that opposite its ends are side openings of the inner casing and being arranged transversely with respect to a rear port defined by said inner casing, whereas the outer casing defines in the rear portion a tubular nozzle in which the inner casing containing the rotating drum is housed, said tubular nozzle being defined from a seating plane of the exhaust fan on the installation surface, the rotating drum being at least partially set back towards the rear part with respect to such seating plane.

[0007] A centrifugal exhaust fan is thus constructed which, in the application installation, has its air induction mechanism housed at least partially inside the air outlet conduit to which the rear tubular nozzle of the exhaust fan is coupled, such that the body of the exhaust fan projects very little from the installation surface, taking up little room in the application enclosure.

[0008] The inner casing of the exhaust fan is arranged inside the outer casing with a clearance between both on the sides so that the air entering through the front part of the outer casing can pass to the side openings of the inner casing which are opposite the ends of the rotating air induction drum; the inner casing further being provided with bevels on the edges of the sides for allowing the passage of the air towards the mentioned openings opposite the ends of the rotating drum.

[0009] Concerning the side openings of the inner casing there are provided flanges protruding from said inner casing outwardly, such that in the structural assembly of the exhaust fan said flanges form a closure between the inner casing and the outer casing at the rear part of the side openings of the inner casing, thus preventing the passage of air between the negative pressure area in which the air intakes towards the rotating drum are located and the pressure area of the exhaust fan located behind the rotating drum, at the same time facilitating the air intake through the side openings towards the rotating drum, whereby improving the performance of the exhaust fan.

[0010] As a result, said exhaust fan object of the invention has very advantageous features for the function for which it is intended, having a preferred character and its own identity with respect to conventional exhaust fans of the same application.

Description of the I3rawings

[0011]

Figure 1 shows an exploded perspective view of an embodiment of the centrifugal exhaust fan object of the invention.

Figure 2 is a side section view of the centrifugal exhaust fan of the preceding figure, herein mounted.

Figure 3 is a perspective view of the exhaust fan without the front part of the outer casing.

Figure 4 is a cross-section view of the exhaust fan showing the arrangement of the inner casing and the rotating drum with respect to the rear tubular nozzle for coupling to the air outlet conduit.

Figure 5 is a side section view of the arrangement of a conventional centrifugal exhaust fan with respect to an installation wall, showing how the entire body said conventional exhaust fan is outside the installation face.

Figures 6A, 6B and 6C show diagrams of the arrangement in which the rotating drum of the centrifugal exhaust fan object of the invention is in three different positions with respect to an installation wall of the exhaust fan.

Detailed Description of the Invention

[0012] The object of the invention relates to a centrifugal exhaust fan, with a particular application for bathrooms, but which can generally be applied in any type of enclosure where interior air is to be renewed.

[0013] The proposed centrifugal exhaust fan consists of an outer casing (1), inside which there is housed an inner casing (2), in which there is in turn housed a rotating drum (3) formed by a cylinder with longitudinal blades that is arranged coupled to a drive motor (4).

[0014] The outer casing (1) determines in the front part an intake (5) for the air passage towards the inside, whereas in the rear part it defines a tubular air exhaust nozzle (6).

[0015] The inner casing (2) is made up of two complementary parts between which a housing is determined in which the functional assembly formed by the rotating drum (3) with the motor (4) and an electronic circuit board (7) is included, said inner casing (2) determining openings (8) in the sides with respect to which the ends of the rotating drum (3) are opposite, which drum is located transversely in front of a port (9) defining the inner casing (2) itself in the rear part.

[0016] The outer casing (1) determines in the rear part a seating plane (10) of the exhaust fan in the installation assembly, for example on the face (11) of a wall or ceiling, in correspondence with an air outlet tube (12) arranged through the face (11); from which support plane (10) the tubular nozzle (6) extends towards the rear part, the inner casing (2) being partially included in said tubular nozzle (6) of the rear part in the structural assembly of the exhaust fan, as observed in Figure 2, such that the rotating drum (3) is set back at least partially with respect to the mentioned support plane (10) of the exhaust fan, towards the rear part.

[0017] With this structural arrangement, the exhaust fan can be placed in the application installation on a face (11) with the tubular nozzle (6) of the rear part coupled with respect to the corresponding air outlet tube (12), supporting the seating plane (10) against the outer surface of the face (11), such that only a slightly projecting part of the exhaust fan protrudes outside the face (11), overcoming the drawback of conventional centrifugal exhaust fans, in which, as depicted in Figure 5, the entire body (13) of said conventional exhaust fans protrudes outside the installation face (11), taking up a lot of space in the application enclosure.

[0018] With the proposed exhaust fan, only part of the body of the exhaust fan projects from the installation face (11), that projecting part depending on the position of the rotating drum (3) with respect to the seating plane (10) in the structural assembly of the exhaust fan, such that depending on that position of the structural assembly in the application installation of the exhaust fan, the rotating drum (3) can range from being partially set back with respect to the installation face (11) to being completely set back with respect to said face (11), as observed in Figures 6A, 6B and 6C.

[0019] In that arrangement, the less set back the rotating drum (3) is with respect to the installation face (11), the greater the air aspiration achieved by the exhaust fan, but the projecting part of the body of the exhaust fan with respect to the face (11) is greater; and as the set-back position of the rotating drum (3) increases with respect to the installation face (11), the part of the body of the exhaust fan projecting from the face (11) decreases, but the air aspiration of the exhaust fan is also reduced.

[0020] According to a study performed for that purpose, it has been found that the position from which a suitable ratio of the air aspiration of the exhaust fan and the part projecting from the body of the exhaust fan is when the rotating drum (3) is set back by a proportion of the order of 80% of its radius with respect to the seating plane (10) of the exhaust fan in the installation assembly, without this position being limiting.

[0021] Between the inner casing (2) and the outer casing (1) there has to be a clearance (h) in the sides as observed in Figure 3 in order for the air entering through the intake (5) to reach the openings (8) of the sides of the inner casing (2) and through them the rotating drum (3), such that depending on the diameter (D) of the tubular air exhaust nozzle (6) in which the inner casing (2) containing the rotating drum (3) is housed, said clearance (h) must be such that $0.16 < h/D < 0.30$.

[0022] Furthermore, in order for the air entering through the intake (5) to pass to the areas of the mentioned clearance (h) between the inner casing (2) and the outer casing (1), the inner casing (2) has bevels (14) on the side edges which allow the air to pass.

[0023] On the other hand, in relation to the side openings (8) of the inner casing (2) it is envisaged that said inner casing (2) has flanges (15) outwardly exiting in the rear part of the mentioned openings (8), such that said flanges (15) close the gap between the two casings (1 and 2) behind the openings (8), preventing the passage of the air between the negative pressure area in which said openings (8) are located and the pressure area located behind the rotating drum (3) once the intake of the arriving air is facilitated towards the rotating drum (3) through those openings (8), whereby improving the performance of the exhaust fan.

Claims

1. A centrifugal exhaust fan for bathrooms, comprising an outer casing (1) and an inner casing (2), between which there is defined an air passage between an intake (5) of the front part to openings (8) of the sides of the inner casing (2) whereby the openings are opposite the ends of a rotating drum (3) which is located transversely in front of a rear air outlet port (9), the outer casing (1) determining a seating plane (10) in the rear part for the exhaust fan in the application installation, from which plane (10) a tubular

nozzle (6) exits towards the back for coupling to an air outlet tube (12), **characterized in that** the inner casing (2) is housed partially inside the tubular nozzle (6), the rotating drum (3) being set back at least partially with respect to the seating plane (10) of the exhaust fan, towards the rear part.

2. The centrifugal exhaust fan for bathrooms according to claim 1, **characterized in that** the rotating drum (3) is located in a position in which it is set back at a proportion of the order of 80% of its radius with respect to the seating plane (10) of the exhaust fan in the installation assembly.

3. The centrifugal exhaust fan for bathrooms according to claim 1, **characterized in that** the inner casing (2) is provided with a clearance (h) with respect to the outer casing (1) in side areas with a proportion of said clearance (h) with respect to the diameter (D) of the tubular air exhaust nozzle (6), such that $0.16 < h/D < 0.30$.

4. The centrifugal exhaust fan for bathrooms according to claim 1, **characterized in that** the inner casing (2) determines flanges (15) outwardly in the rear part of the side openings (8), said flanges (15) closing the gap between said inner casing (2) and the outer casing (1), preventing the passage of air between the negative pressure area and the pressure area in the exhaust fan.

5. The centrifugal exhaust fan for bathrooms according to claim 1, **characterized in that** the inner casing (2) has bevels (14) on the side edges for allowing the air to pass from the intake (5) towards the openings (8) of the sides of said inner casing (2).

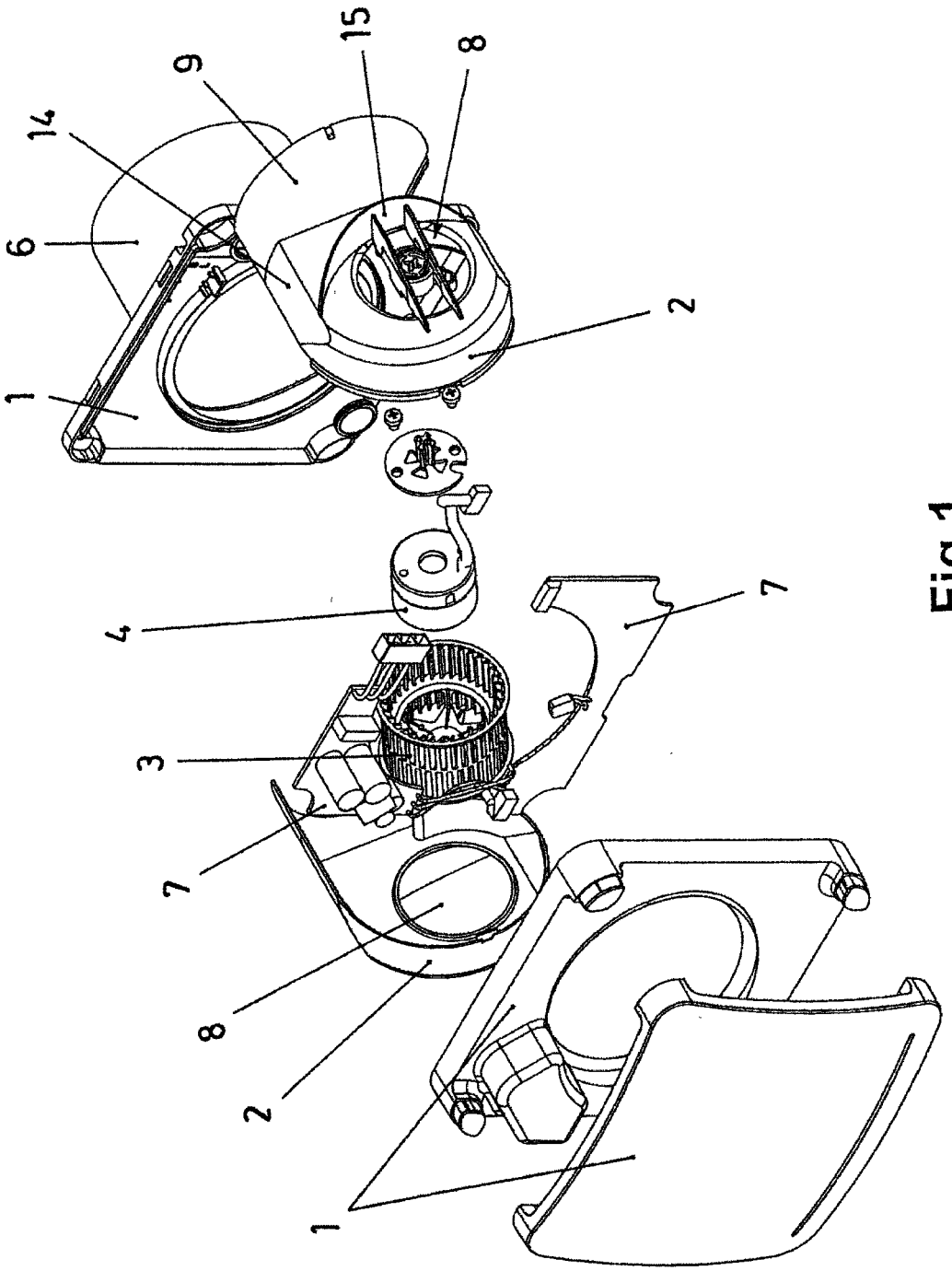

Fig.1

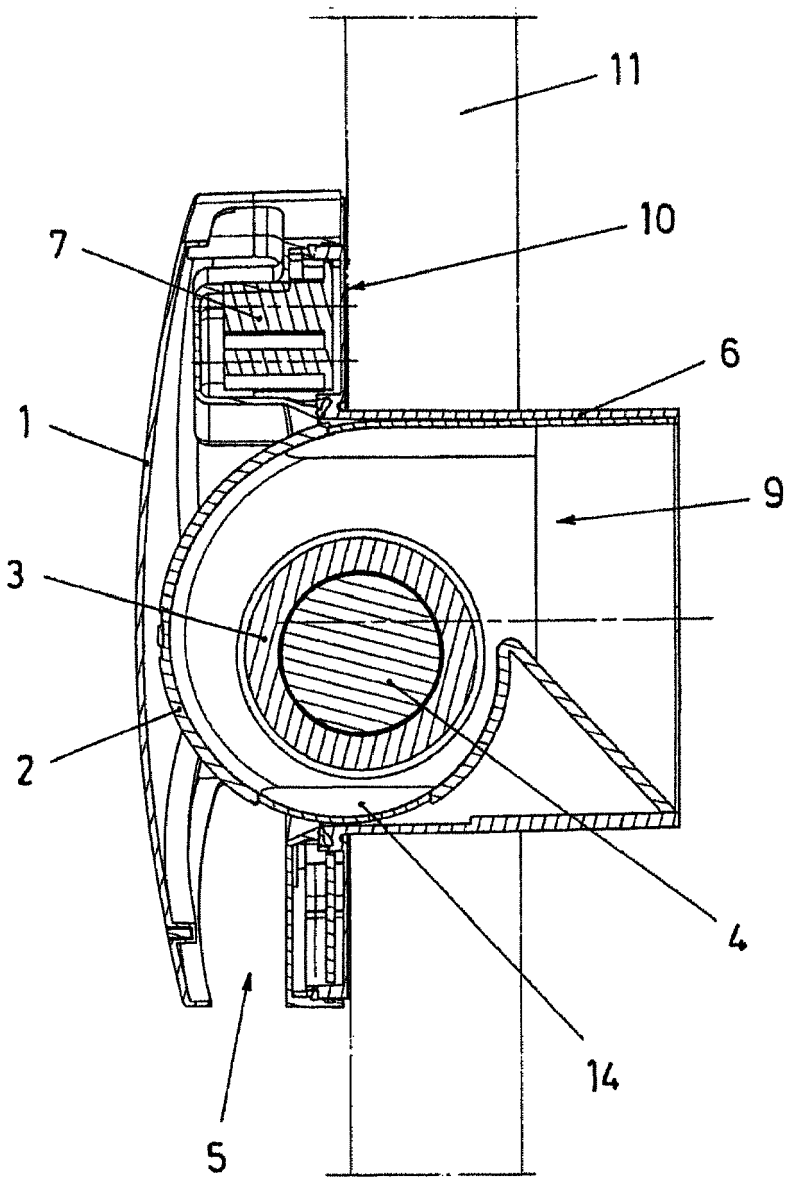

Fig.2

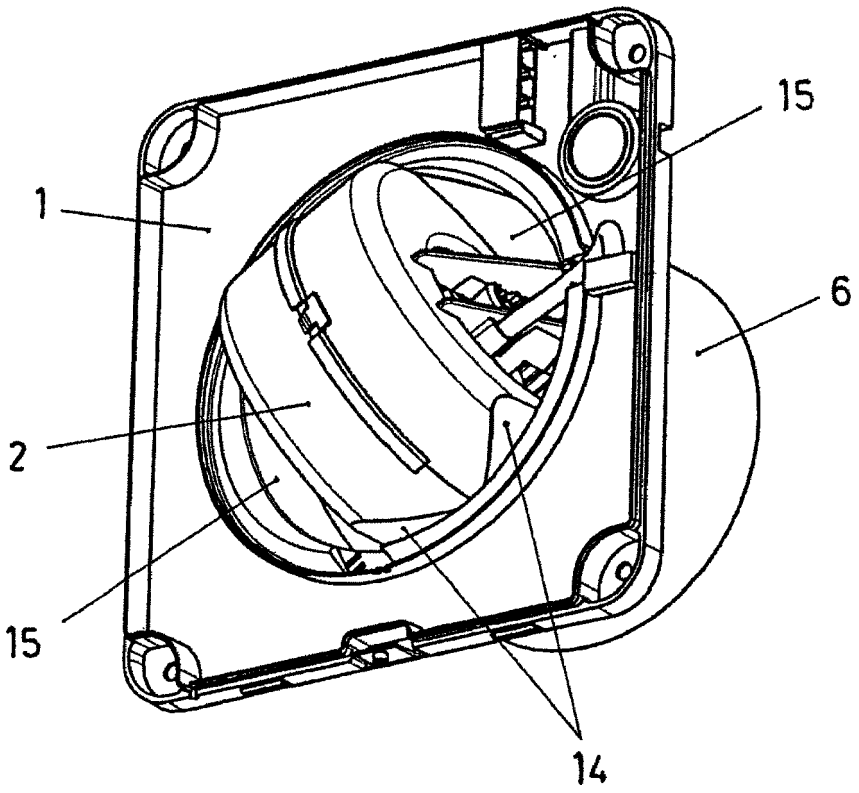

Fig.3

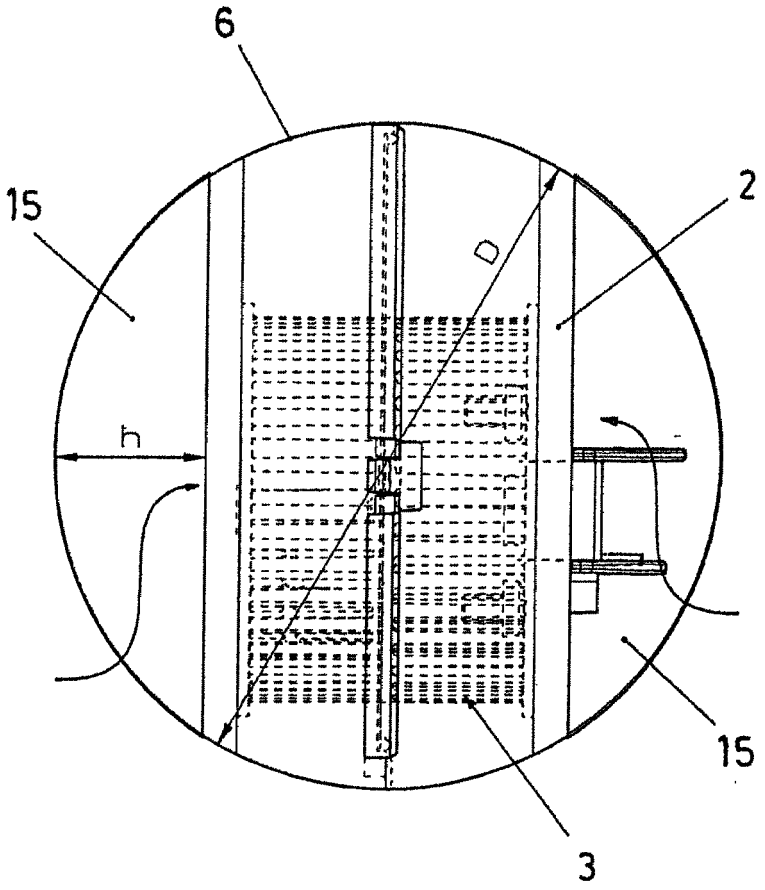

Fig.4

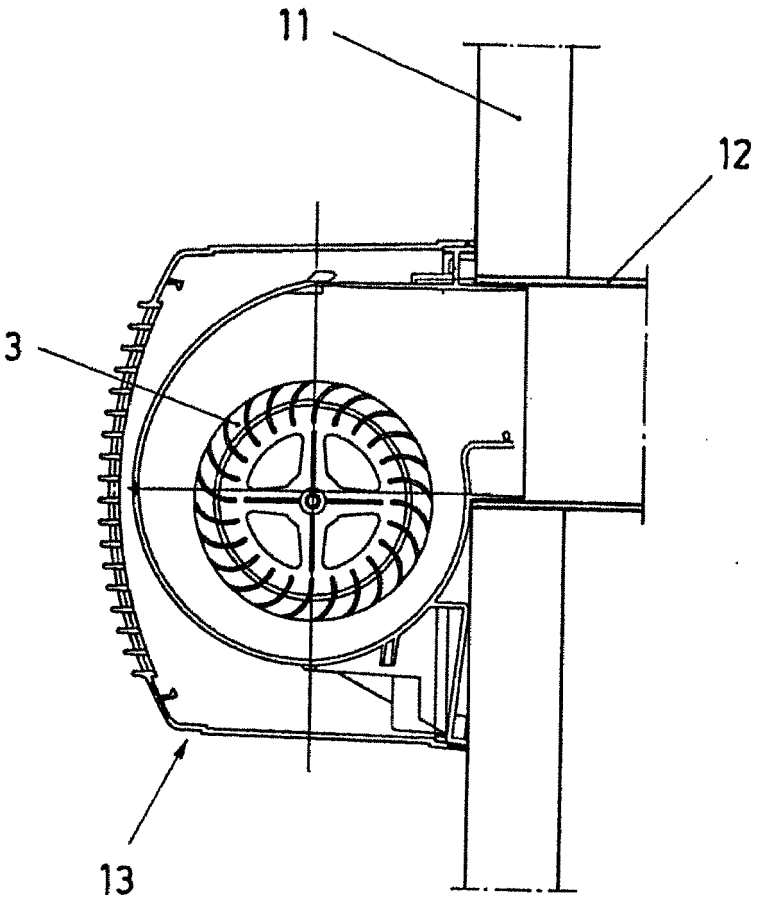

Fig.5

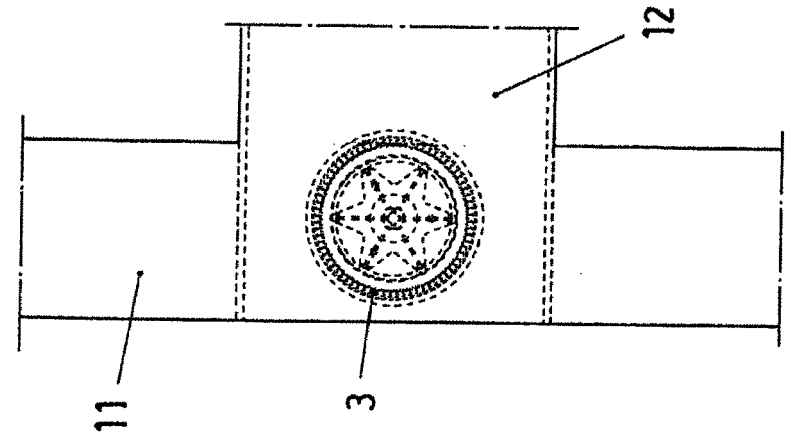

Fig.6C

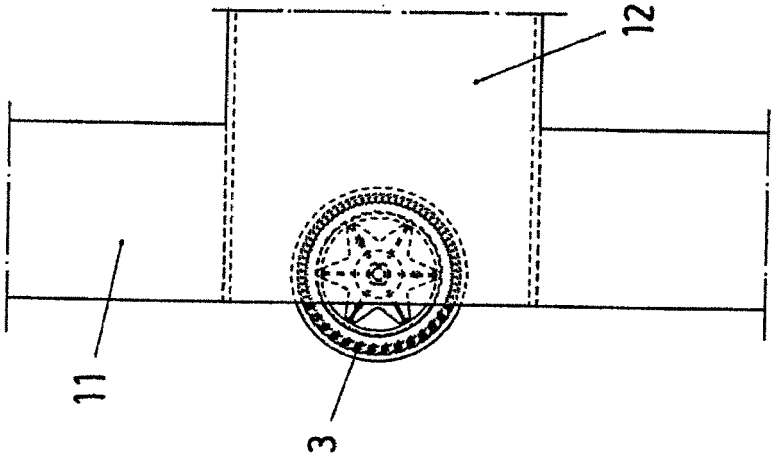

Fig.6B

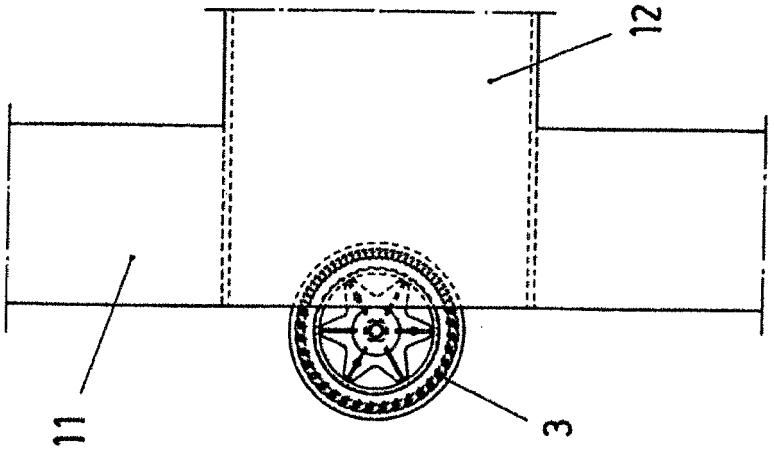

Fig.6A