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(54) CENTRIFUGAL EXHAUST FAN FOR BATHROOMS

ZENTRIFUGAL-ABLUFTVENTILATOR FÜR BADEZIMMER

VENTILATEUR D'ÉCHAPPEMENT CENTRIFUGE POUR SALLES DE BAIN

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(56) References cited:
DE-U1- 8 914 525
GB-A- 1 339 690
JP-A- 2002 310 093

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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, such as that disclosed in GB 1 339 690, 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 according to claim 1 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] A centrifugal exhaust fan is thus constructed which, in the application installation, has its air induction mechanism housed 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.

[0007] 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 Drawings

[0008]

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

[0009] 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.

[0010] 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).

[0011] 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).

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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.

[0016] 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.

[0017] 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.

[0018] 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 $0.16 < h/D < 0.30$.

[0019] 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.

[0020] 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) with a front part, a rear part determining a seating plane (10) for the exhaust fan and a tubular nozzle (6) extending rearwards from said seating plane (10) for coupling to an air outlet tube (12);
   an inner casing (2);
   a drive motor (4); and
   a rotating drum (3) located transversely in front of a rear air outlet port (9) of the inner casing (9) and coupled to the drive motor (4); and
   wherein the inner casing (2) is housed partially inside the tubular nozzle (6), the rotating drum (3) being set back partially rearwards with respect to the seating plane (10) of the exhaust fan; and
   whereby:

   - the drive motor (4) is arranged within the rotating drum (3) ;
   - a clearance (h), greater than 0.16 times but smaller than 0.30 times a diameter (D) of the tubular nozzle (6), is provided between the inner casing (1) and the outer casing (2), so that an air passage is defined from an intake (5) of the front part of the outer casing (1) to side openings (8) of the inner casing (2), located opposite the ends of the rotating drum (3); and
   - the inner casing (2) comprises outwardly extending flanges (15) behind the side openings (8), closing the gap between the inner and outer casings (2,3) to prevent air flow, within the exhaust fan, between a negative pressure area where the side openings (8) are located and a pressure area located behind the rotating drum (3).

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) has side edges with bevels (14) for allowing the air to pass from the intake (5) towards the side openings (8) of said inner casing (2).

Patentansprüche

1. Zentrifugal-Abluftventilator für Badezimmer, umfassend:

   ein Außengehäuse (1) mit einem vorderen Teil, einem hinteren Teil, der eine Sitzebene (10) für den Abluftventilator bestimmt, und einer Rohrdüse (6), die sich von der Sitzebene (10) nach hinten erstreckt, um an ein Luftaustrittsrohr (12) zu koppeln,
   ein Innengehäuse (2),
   einen Antriebsmotor (4) und
   eine rotierende Trommel (3), die sich quer vor einer hinteren Luftaustrittsöffnung (9) des Innengehäuses (9) befindet und mit dem Antriebsmotor (4) gekoppelt ist, und
   wobei das Innengehäuse (2) teilweise im Inneren der Rohrdüse (6) untergebracht ist und die rotierende Trommel (3) in Bezug auf die Sitzebene (10) des Abluftventilators teilweise nach hinten zurückgesetzt ist und
   wobei:

      der Antriebsmotor (4) innerhalb der rotierenden Trommel (3) angeordnet ist,
      zwischen dem Innengehäuse (1) und dem Außengehäuse (2) ein Spiel (h) vorgesehen ist, das größer als das 0,16-Fache, jedoch kleiner als das 0,30-Fache eines Durchmessers (D) der Rohrdüse (6) ist, so dass ein Luftdurchgang von einem Einlass (5) von dem vorderen Teil des Außengehäuses (1) zu Seitenöffnungen (8) des Innengehäuses (2) definiert ist, der sich gegenüber den Enden der rotierenden Trommel (3) befindet, und
      das Innengehäuse (2) nach außen verlaufende Flansche (15) hinter den Seitenöffnungen (8) umfasst, die den Spalt zwischen dem Innen- und dem Außengehäuse (2, 3) schließen, um einen Luftstrom innerhalb des Abluftventilators zwischen einem Unterdruckbereich, wo sich die Seitenöffnungen (8) befinden, und einem Druckbereich, der sich hinter der rotierenden Trommel (3) befindet, zu verhindern.

2. Zentrifugal-Abluftventilator für Badezimmer nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die rotierende Trommel (3) in einer Position befindet, in der sie mit einem Anteil in der Größenordnung von 80 % ihres Radius in Bezug auf die Sitzebene (10) des Abluftventilators in der Installationsanordnung zurückgesetzt ist.

3. Zentrifugal-Abluftventilator für Badezimmer nach Anspruch 1, **dadurch gekennzeichnet, dass** das Innengehäuse (2) Seitenkanten mit Abschrägungen (14) aufweist, um zu ermöglichen, dass die Luft von dem Einlass (5) in Richtung der Seitenöffnungen (8) des Innengehäuses (2) strömt.

Revendications

1. Ventilateur d'échappement centrifuge pour salles de bain comprenant :

   un carter externe (1) avec une partie avant, une partie arrière déterminant un plan d'installation (10) pour le ventilateur d'échappement et une buse tubulaire (6) s'étendant vers l'arrière à partir dudit plan d'installation (10) pour se coupler à un tube de sortie d'air (12) ;
   un carter interne (2) ;
   un moteur d'entraînement (4) ; et
   un tambour rotatif (3) positionné transversalement en face d'un orifice de sortie d'air arrière (9) du carter interne (9) et couplé au moteur d'entraînement (4) ; et
   dans lequel le carter interne (2) est logé partiellement à l'intérieur de la buse tubulaire (6), le tambour rotatif (3) étant replacé partiellement vers l'arrière par rapport au plan d'installation (10) du ventilateur d'échappement ; et
   dans lequel :

      le moteur d'entraînement (4) est agencé dans le tambour rotatif (3) ;
      un jeu (h) supérieur à 0,16 fois mais inférieur à 0,30 fois un diamètre (D) de la buse tubulaire (6), est prévu entre le carter interne (1) et le carter externe (2), de sorte qu'un passage d'air est défini à partir d'une admission (5) de la partie avant du carter externe (1) jusqu'aux ouvertures latérales (8) du carter interne (2), positionnées à l'opposé des extrémités du tambour rotatif (3) ; et
      le carter interne (2) comprend des brides s'étendant vers l'extérieur (15) derrière les ouvertures latérales (8), fermant l'espace entre les carters interne et externe (2, 3) pour empêcher l'écoulement d'air, à l'intérieur du ventilateur d'échappement, entre une zone de pression négative où les ouvertures latérales (8) sont positionnées et une zone de pression positionnée derrière le tambour rotatif (3).

2. Ventilateur d'échappement centrifuge pour salles de

bain selon la revendication 1, **caractérisé en ce que** le tambour rotatif (3) est positionné dans une position dans laquelle il est replacé selon une proportion de l'ordre de 80% de son rayon par rapport au plan d'installation (10) du ventilateur d'échappement dans l'ensemble d'installation.

3. Ventilateur d'échappement centrifuge pour salles de bain selon la revendication 1, **caractérisé en ce que** le carter interne (2) a des bords latéraux avec des biseaux (14) pour permettre à l'air de passer par l'admission (5) vers les ouvertures latérales (8) dudit carter interne (2).

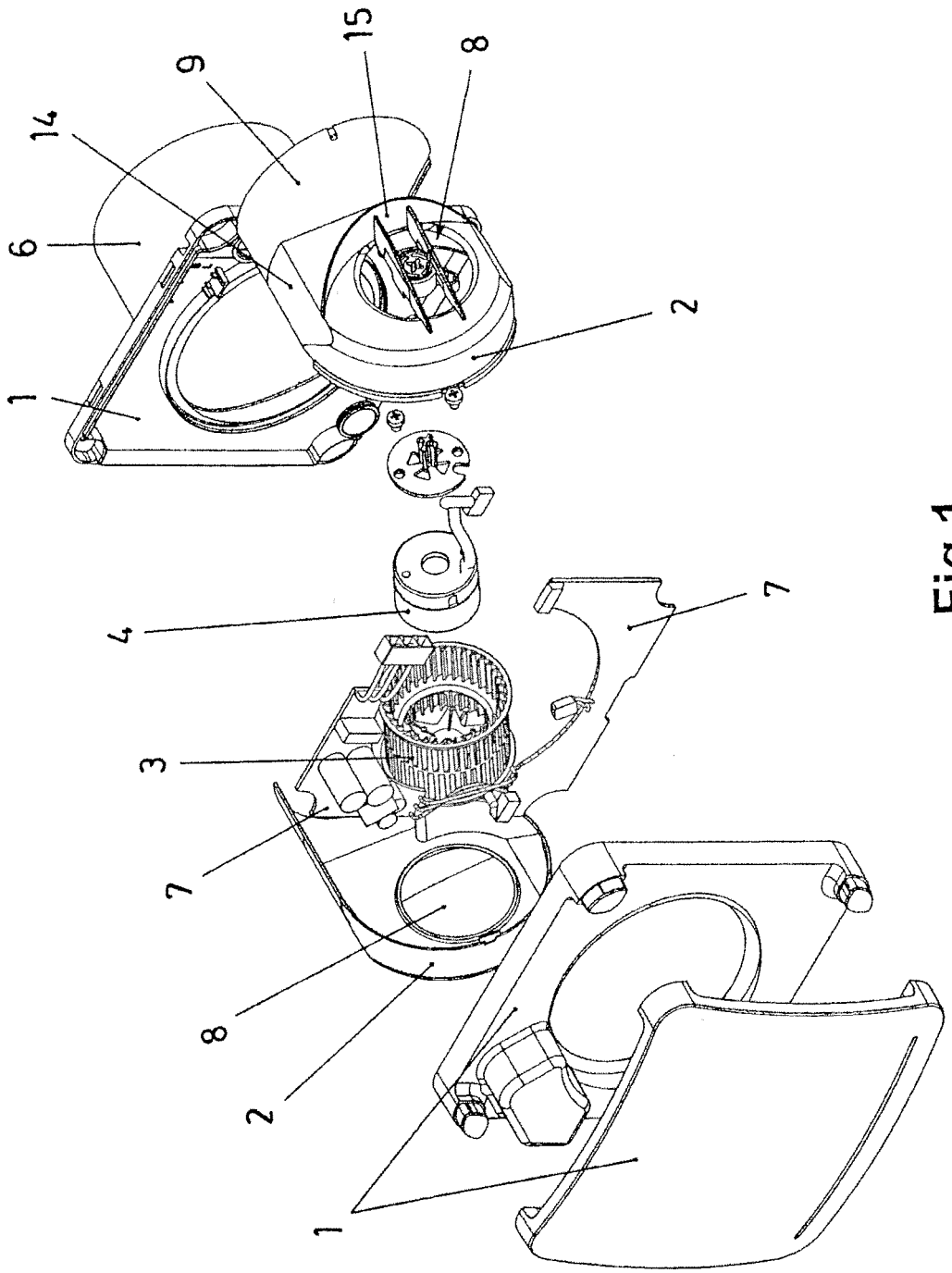


Fig.1

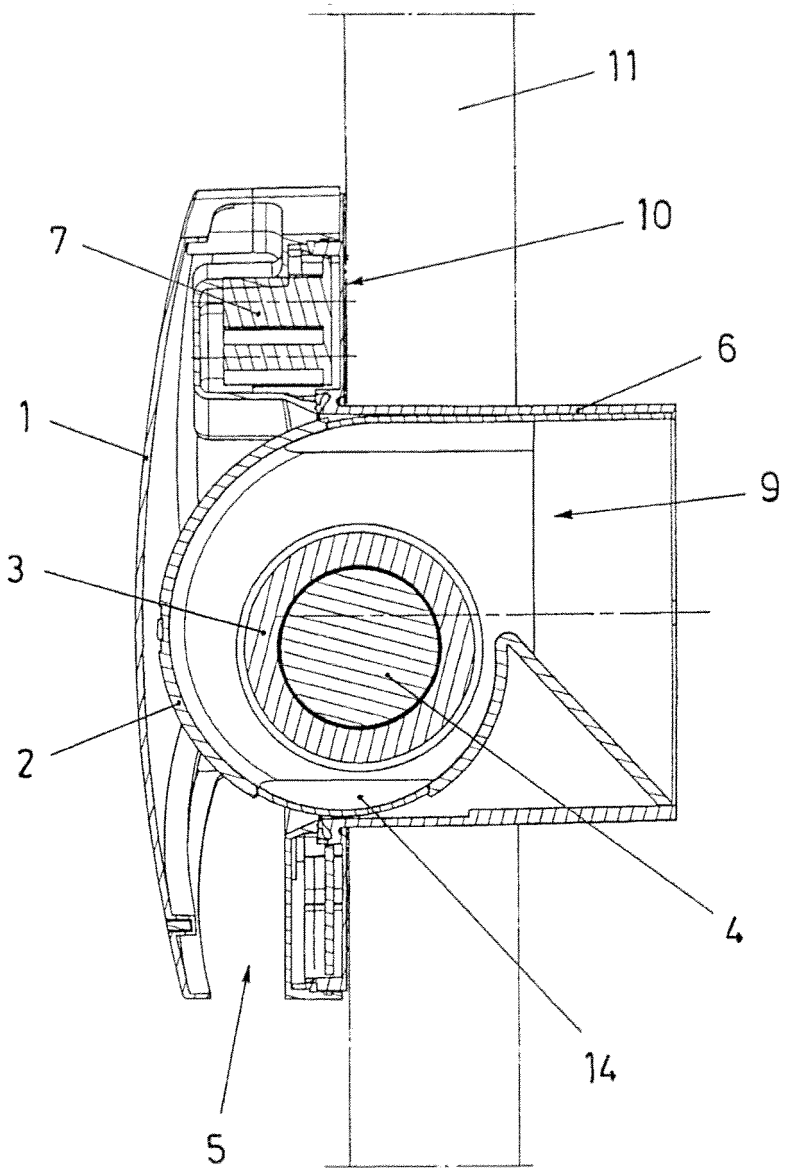


Fig.2

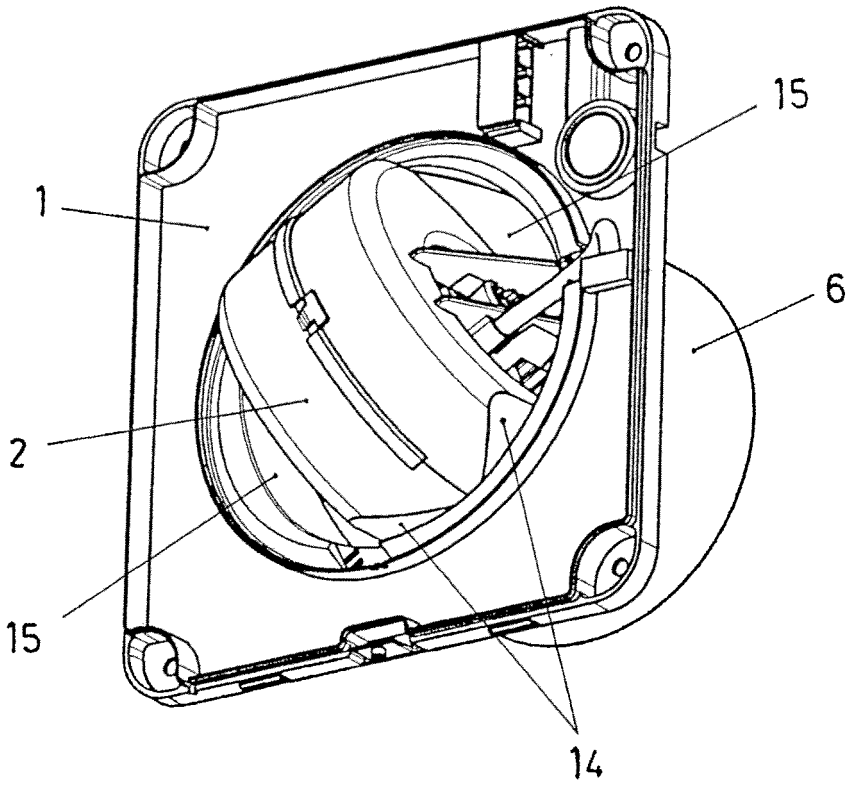


Fig.3

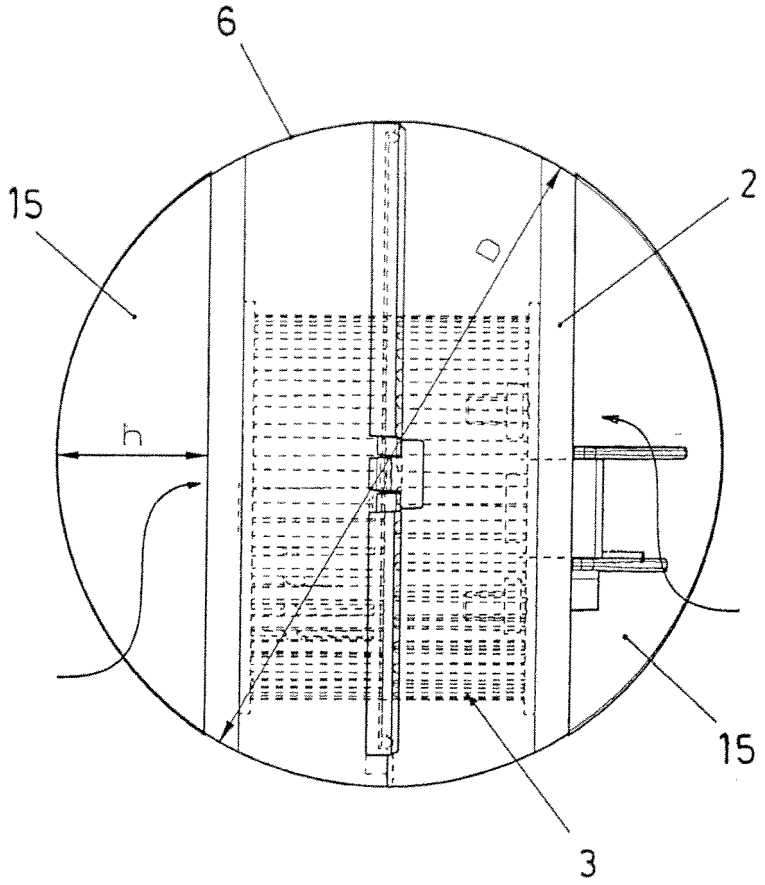


Fig.4

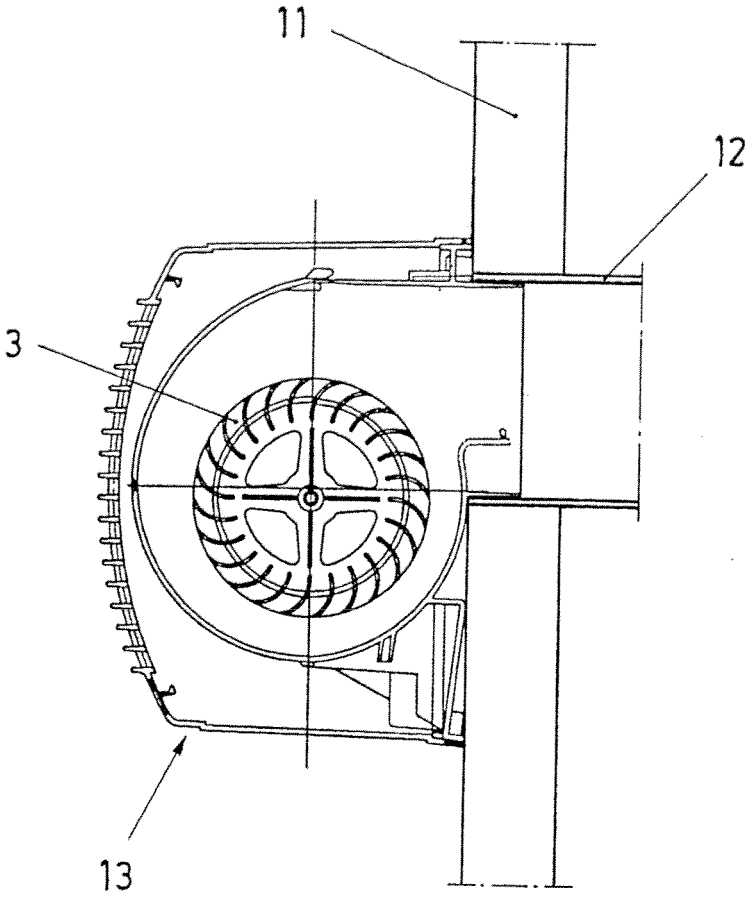


Fig.5

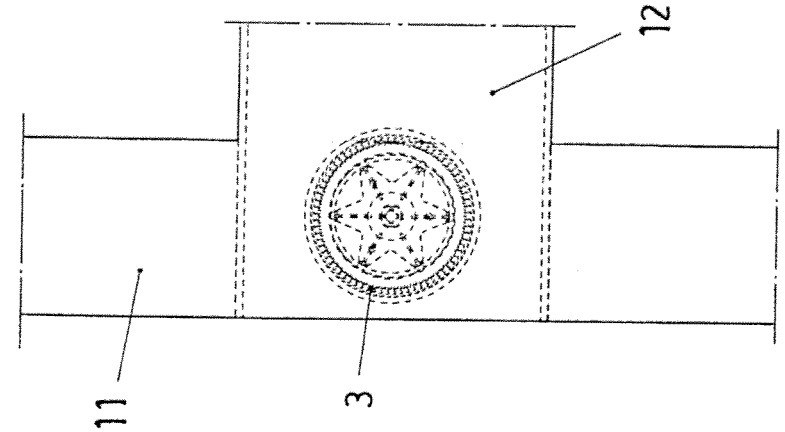


Fig.6C

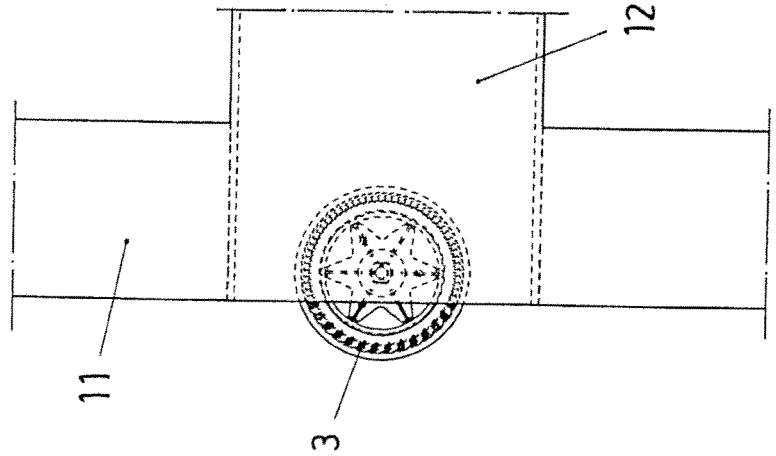


Fig.6B

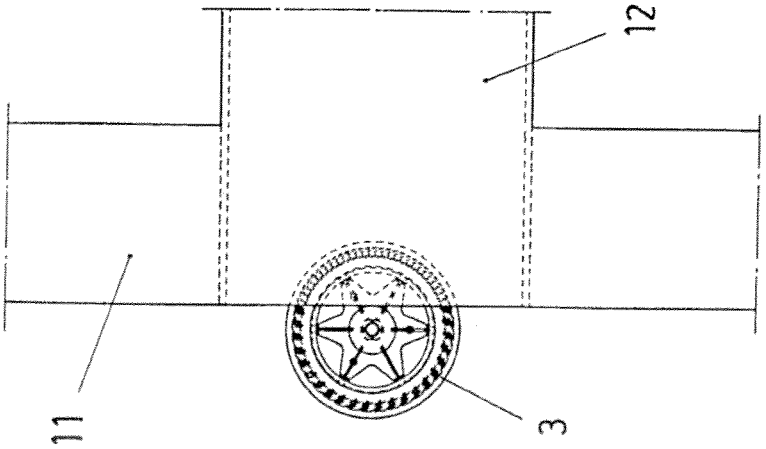


Fig.6A

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 1339690 A **[0004]**