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(72) Inventor: **Giacalone, Ignazio**
60044 Fabriano (AN) (IT)

(74) Representative: **Gentili, Enrico**
MAR.BRE Consulting S.r.l.,
Viale Aristide Merloni 1
60044 Fabriano (Ancona) (IT)

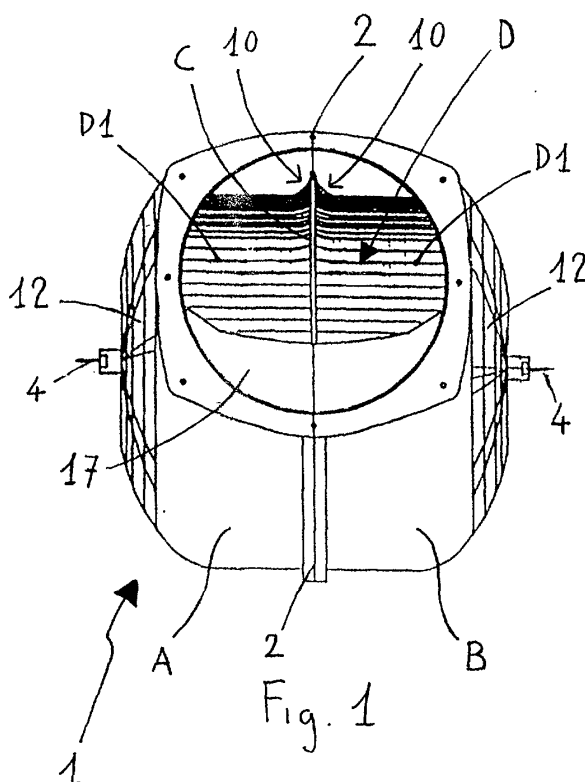
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(71) Applicant: **ELIN S.r.l.**
60040 Serra San Quirico (AN) (IT)

(54) Motorised fan for suction hoods

(57) An air conveyor (1) for suction hoods consists of a pair of half-augers (A,B) which are in juxtaposition; a fan (D) with a transverse plate (C) and a double set of vanes (D1) which are each fixed to the plate (C) with their own attachment point (3) and placed in such a way as to define circular rings that project from the plate (C) bilaterally and coaxially with the rotational axis (4) of the

fan (D); and a spring return motor (H), supported by one (A) of the half-augers (A,B), that sustain the fan's (D) plate (C) inside the conveyor (1). The plate (C) has a greater radius (5) than the radius (6) of the circular rings formed by the vanes (D1), in order to ensure that the air flows that are moving separately through the conveyor (1) do not come into contact with each other.



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Description

[0001] This invention refers to the construction of kitchen suction hoods and specifically to a particularly silent and efficient motorised air conveyor unit.

[0002] When constructing suction hoods for domestic kitchens, an objective of general interest is the constant search for an even more effective reduction of the noise levels generated by the operation of the motorised conveyor. It is well known that the motor ensures the continuation of the active flow of air between the suction hood and the exhaust chimney.

[0003] Achieving such a result, however, is hindered on one hand by the need for adequate suction power for the satisfactory operation of the hoods; and on the other, by the need to consider the design or constructional constraints of finding the space to install the conveyor unit inside the hoods. For example, these restrictions necessitate the division of the total exhaust air flow into two parallel flows, the management of which can mean that the efficiency of the entire flow dynamics of the conveyor - due also to the diversity of the total routes and to the diversity of the relevant rates of flow - is compromised.

[0004] With regard to the general problems set out above, the aim of this invention is therefore to improve the performance of existing double-flow type conveyors, similar to that described in claim 1. This can be done by using certain technical devices aimed at achieving better flow dynamics, which will minimise the turbulence responsible for the noise and inefficient use of the conveyors.

[0005] With the invention described in this document, the above goal can be reached by using a suction hood air conveyor unit which consists of: a pair of half-augers, in juxtaposition at a joint connection surface; a fan equipped with a transverse plate and a double set of vanes. The vanes are solidly fixed to the plate with their own attachment ends and are positioned in such a way as to define, between them, circular rings which project bilaterally from the plate and coaxially with the rotation axis of the fan; and a spring return motor, mounted on one of the half-augers, which sustains the fan at the plate, inside the conveyor. The above-mentioned conveyor is distinguished by the fact that the radius of the plate is greater than the radius of the circular rings formed by the vanes, therefore ensuring that the two flows travelling through the conveyor do not come into contact with each other.

[0006] Therefore, a conveyor made in this way ensures the physical separation of the flows coming concurrently into the fan at the same time and prevents them from interfering with and/or mixing with each other.

[0007] Furthermore, if the vanes have the plate attachment ends shaped with an appropriate edge outline that is capable of progressively deflecting the flows from the air intake, axial to the fan, towards the exit, radial to the fan, it ensures that even the possibility of triggering off turbulence due to the abrupt change in direction, is

avoided.

[0008] The air intake sections of the half-augers that make up the carcass of the conveyor should preferably be provided with grilles, formed so that their component sections are essentially identical from one area of the grille to another, over the entire air entry section.

[0009] This helps to prevent the air stream, which is sucked in, finding preferential entry conditions in one part or another of the whole suction section, thereby making sure that no turbulence can occur even before the air starts moving through the conveyor.

[0010] Moreover, the dynamic capacity devices placed between the half-augers and the fan, actuated in particular by the cusp edges protruding from the half-augers, and interacting with the rings connecting the free extremities of the vanes, also prevent the recirculation of air between the turn in the conveyor and the half-auger air intake sections.

[0011] The technical characteristics of the invention, according to the abovementioned goals, can be clearly understood from the content of the claims listed below, and the advantages therein will be made even clearer in the detailed description that follows. This description refers to the enclosed diagrams, which are only illustrative and are therefore not restrictive, in which:

- figure 1 is a view from above of a conveyor which exemplifies the invention;
- figures 2 and 3 respectively, are a back view and an front view of the conveyor, shown in elevation;
- figures 4 and 5 are views of the two half-augers, which are components of the conveyor;
- figure 6 is a meridian, axial section of figure 1;
- figure 7 is a detailed view, enlarged to scale, of a detail from figure 6.

[0012] With reference to the figures in the enclosed designs, figure 1 shows a motorised air conveyor, to be used preferably for kitchen suction hoods; the whole is marked with the number 1 and comprises two half-augers marked A and B, and a fan D with vanes, operated by a motor H (visible in figure 6).

[0013] The two half-augers A and B, which are, respectively, a half-auger engine mounting A and a half-auger filter mounting B which are in juxtaposition at the joint connection surface 2 in order to form the whole conveyor carcass 1. This can be seen in figure 1, as well as in figures 2 and 3.

[0014] The half-auger motor mounting A is shown in detail in figure 4. This motor mounting is provided with suitable attachment points 21 on a flange 22 and is centered on an axis 4 which coincides with the rotational axis of the motor H; figure 5, on the other hand, shows the half-auger filter mounting B.

[0015] Both the half-augers, A and B, are provided with air intake sections 12, made of two circular holes with grilles 13 formed by concentric rings 14 - or more precisely cylindrical blades - which are coaxial with the

axis 4 of the motor H and connected by transverse arms 15.

[0016] The rings 14 have different distances between them and in particular, the distance between the rings 14, set two by two adjacent to each other, becomes greater as, little by little, their distance from the rotational axis 4 of the motor H decreases.

[0017] These rings 14, together with the arms 15, form the elementary sections 16, which are components of the whole air intake section 12: this means that they all have the same section used for the passage of air. This allows the half-augers A and B to present the air entering the conveyor 1 with a uniform resistance at any point of the surface area of their intake section 12 that the air goes through.

[0018] The fan D - seen more clearly in figure 6 - comprises a transverse plate C and a double row of vanes D1 which are firmly fixed to the plate C, each via an attachment end 3. The vanes are distributed in such a way as to define, in combination between themselves, circular rings which have a smaller radius than the radius of the plate itself. These circular rings project out sharply from the plate C and at both sides of it.

[0019] The vanes D1 should preferably be of the "action" type, although this does not mean that the fan D cannot have vanes D1 of the "reaction" type.

[0020] The fan D and the circular rings, formed by the blades D1 are co-axial to the rotational axis 4 of the motor H.

[0021] The fan D is sustained by the spring return motor H inside the conveyor 1, and is supported by the motor H by way of the connection of the plate C to the relevant shaft 23.

[0022] As the detail of figure 7 shows more clearly, the radius 5 of the plate C, as already mentioned, is larger than the radius 6 of the circular rings formed by the vanes D1.

[0023] Moreover, near the attachment zone on plate C, these rings widen to the point that they themselves assume a greater circumference than their own circumference in the points that are furthest from plate C.

[0024] Indeed, according to a meridian section plan of fan D, both figure 6 and figure 7 show that the attachment ends 3 of the vanes D1 to the plate C have edge profiles 9 defined by points 11 that are a distance 7 from the rotation axis 4 of the fan D which is variable and increases continuously with the reduction in the distance 8 from the plate C.

[0025] In the end, this edge profile 9 is variable, with a continuous progression between a minimum, the minimum radius 6 of the fan D, and a maximum, the radius 5 of the plate C.

[0026] With regard to the shape of edge profile 9, numerous alternative options are possible, since, according to the case, it is possible to adopt the following edge profiles 9: circle arc and parabolic arc; hyperbolic arc or even polycentric curve arc.

[0027] Dynamic capacity devices have been placed

between the fan D and the half-augers, A and B. These devices are there to stop the formation of turbulence due to the recirculation of air in areas of the conveyor 1 that are subject to different pressures.

[0028] The devices, seen clearly in figure 6, comprise cusp edges 18 projecting from the half-augers, A and B, towards the inside of the conveyor 1 which are facing, and in strict proximity with, the rings 19 that connect the free ends 20 of the vanes D1.

[0029] These edges 18 and the rings 19 prevent the reflux of air between the turn, or exit section 17 of the conveyor 1 and the entry sections 12 of the half-augers A and B.

[0030] This eliminates the possibility of any turbulence occurring, as well as a loss of pumping efficiency.

[0031] From the same figure 6, it can be seen that the above-mentioned capacity devices are also present between the border 25 of the plate C and the facing internal ring wall 24 of the half-augers A and B. This contributes even further to ensuring that the two air flows, which enter the conveyor 1 by way of the two entry sections 12 of the half-augers A and B, are rotated first of all inside the conveyor and then sent on to the exit section, or turn, 17, remaining separated from each other at all times.

Claims

1. Air conveyor for suction hoods, comprising: a pair of half-augers (A,B), which are in juxtaposition; a fan (D) with a transverse plate (C) and a double row of vanes (D1), which are each firmly fixed to the plate (C) by way of attachment ends (3) and are arranged in such a way as to define, in combination between themselves, circular rings which project from the plate (C), both bilaterally and co-axially with the rotation axis (4) of the fan (D); and a spring return motor (H), supported by one (A) of the half-augers (A,B), which sustains the fan (D) at the plate (C) inside the conveyor (1); said conveyor (1) being **characterised by the fact** that the plate (C) has a greater radius (5) than the radius (6) of the circular rings formed by the vanes (D1) in order to prevent the flows that stream separately through the conveyor (1), from coming into contact with each other.
2. Conveyor, in accordance with claim 1, **characterised by the fact** that, according to a meridian section plan of the fan (D), the attachment ends (3) of the vanes (D1) to the plate (C), have an edge profile (9) which is defined by points (11) that are a distance (7) from the rotation axis (4) of the fan (D) which varies in accordance with the variation in its distance (8) from the plate (C).
3. Conveyor, according to claim 2, **characterised by the fact** that the distance from the rotational axis (4) of the points (11) of the aforementioned edge profile

(9), increases with the reduction in the corresponding distance (8) from the plate (C), said attachment ends (3) of the vanes (D1) defining the corresponding borders (10) of the aforementioned circular rings, which are wider near the plate (C).

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4. Conveyor, according to claim 2 or 3, **characterised by** the fact that the distance (7) from the rotation axis (4) of the points (11) of the aforementioned edge profile (9) varies, with continuous progression, with the variation in the distance (8) from the plate (C).

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5. Conveyor, according to claim 4, **characterised by** the fact that the distance (7) from the rotational axis (4) of the points (11) of the aforementioned edge profile (9) varies, with continuous progression, with the variation in the distance (8) from the plate (C), said distance (7) from the rotational axis varies between a minimum, which is the minimum radius (6) of the fan (D), and a maximum, which is the radius (5) of the aforementioned plate (C).

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6. Conveyor, according to one of the claims from 2 to 5, **characterised by** the fact that the aforementioned edge profile (9) includes a circle arc.

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7. Conveyor, according to one of the claims from 2 to 5, **characterised by** the fact that the aforementioned edge profile (9) includes a parabolic arc.

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8. Conveyor, according to one of the claims from 2 to 5, **characterised by** the fact that the aforementioned edge profile (9) includes a hyperbolic arc.

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9. Conveyor, according to one of the claims from 2 to 5, **characterised by** the fact that the aforementioned edge profile (9) includes a polycentric curve arc.

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10. Conveyor, according to one of the claims from 1 to 9, **characterised by the fact** that the aforementioned vanes (D1) are of the action type.

11. Conveyor, according to one of the claims from 1 to 9, **characterised by the fact** that the aforementioned vanes (D1) are of the reaction type.

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12. Conveyor, according to one of the previous claims, **characterised by the fact** that the aforementioned half-augers (A,B) have air intake sections covered by grilles (13), formed by concentric rings (14), that are coaxial to the rotational axis (4) of the motor (H), and connected by transverse arms (15). The distance between these rings (14), two by two adjacent to each other, increases with the reduction in the distance from the rotational axis (4) of the motor (H). This allows the aforementioned rings (14), together

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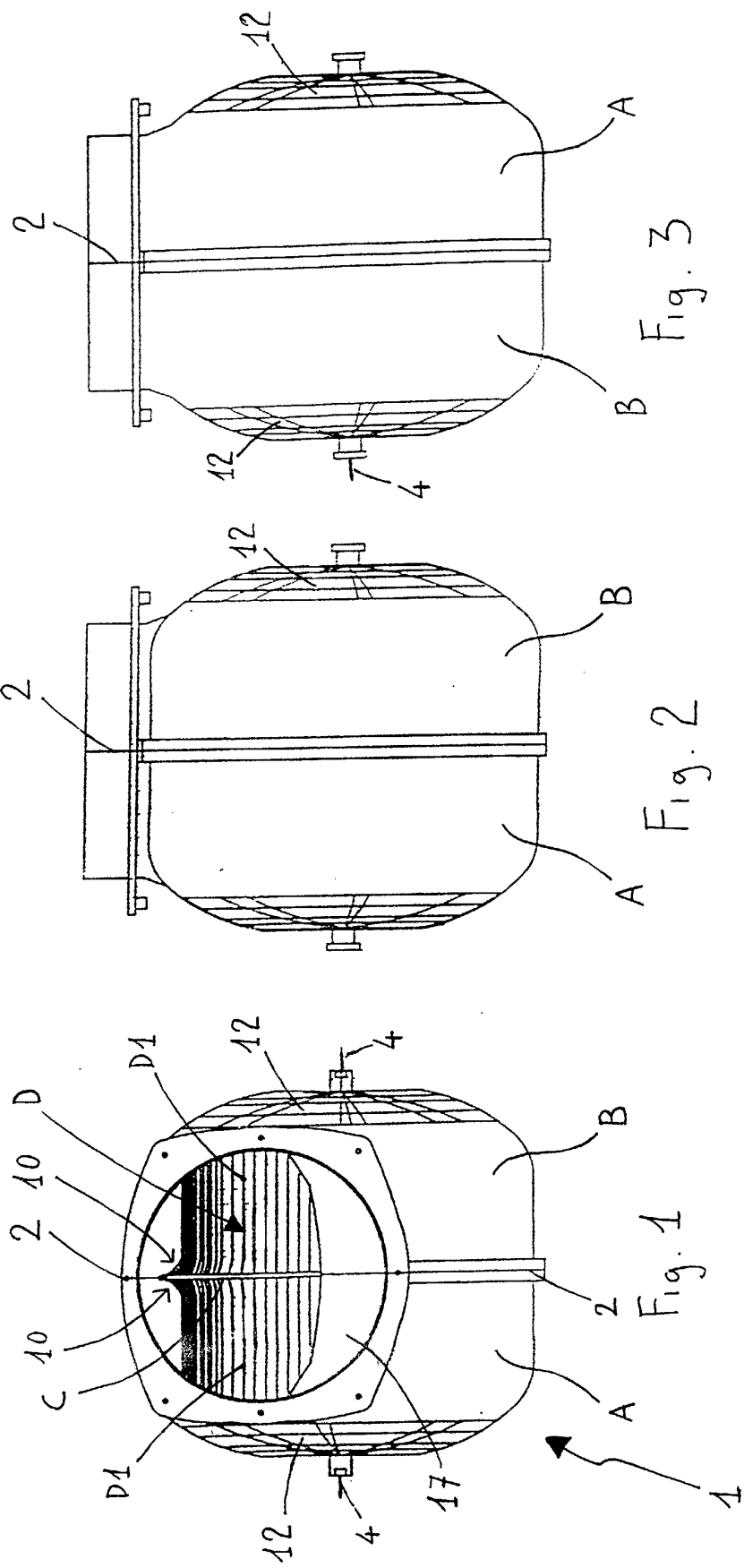
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with the arms (15), to define the component sections (16) of the air intake section (12), in order to provide uniform resistance to the transit of air in the whole of the intake section of the relevant half-auger (A,B).

13. Conveyor, according to one of the previous claims, **characterised by the fact** of having dynamic capacity devices (18,19;25,24) positioned between the aforementioned half-augers (A,B) and the aforementioned fan (D).

14. Conveyor, according to claim 13, **characterised by the fact that** the aforementioned dynamic capacity devices consist of cusp borders (18) that project from the half-augers (A,B), and are turned towards and facing, in close proximity with, the rings (19) connecting the free ends (20) of the vanes (D1), said cusp borders (18) and said rings (19) being capable of preventing the recirculation of air between the turn (17) in the conveyor (1) and the intake sections (12) of the half-augers (A,B).

15. Conveyor, according to claim 13, **characterised by** the fact that the aforementioned dynamic capacity devices consist of an edge (10) of the border (25) of the aforementioned plate (C) and a facing internal wall (24) of the aforementioned half-augers (A,B).



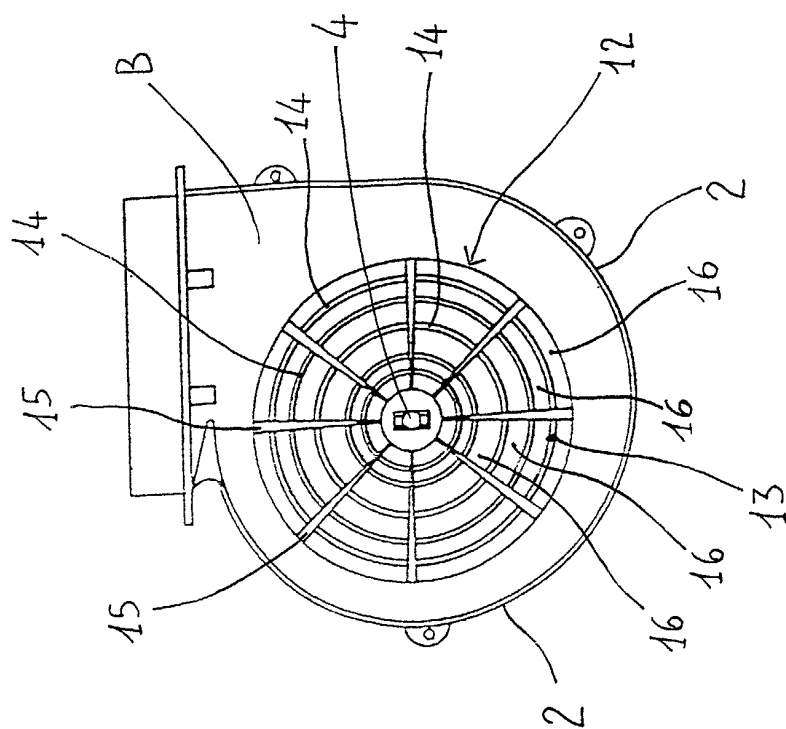


Fig. 5

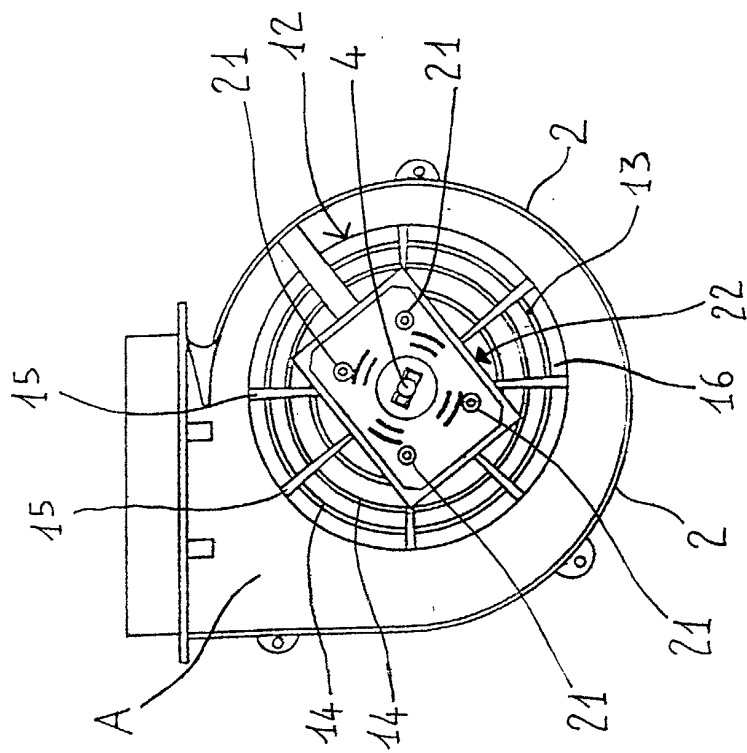


Fig. 4

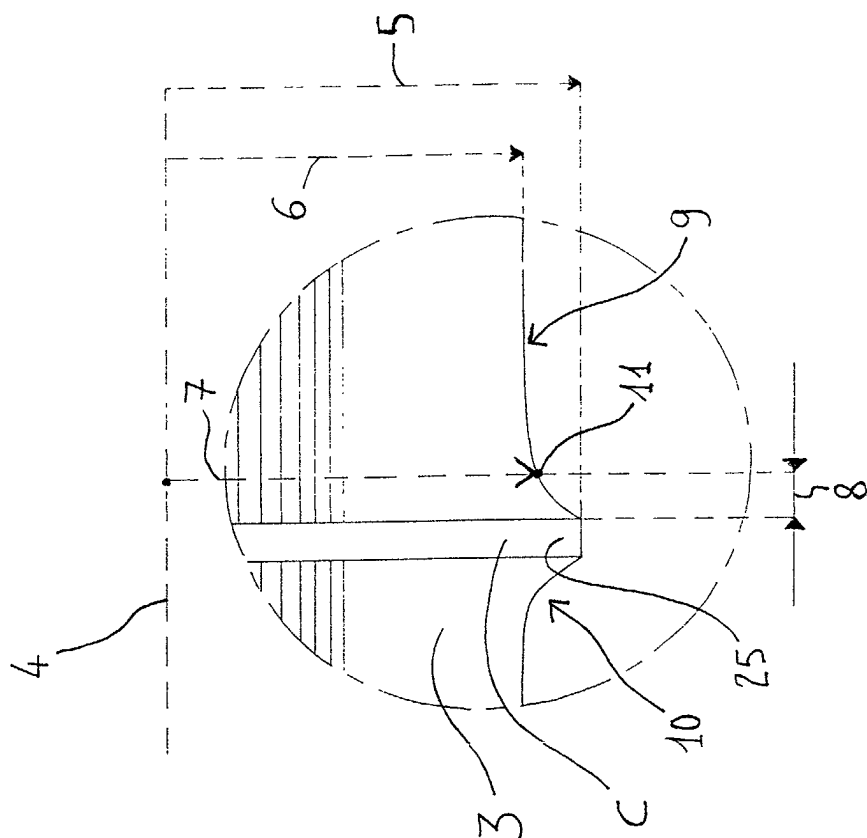


Fig. 7

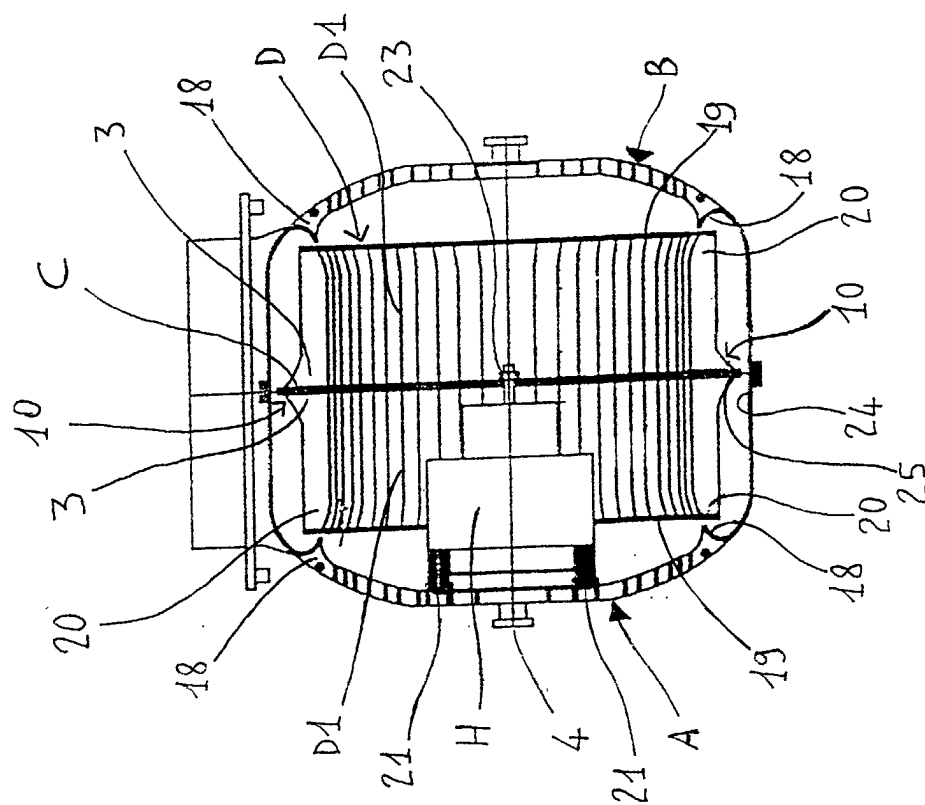


Fig. 6