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(54) **Fan rotor**

(57) A fan in plastic material of motor-driven fan for a motor vehicle cockpit comprising: a first cap-shaped portion (10), integral to a rotor (26) of an electric motor and provided with centred holes (8) for the passage of the shaft of the motor around which rotates the cap itself; a second portion in the shape of a fan wheel (11) which is integrally in rotation with the cap (10), and provided with a series of bladings (17) which are equally orientated and angularly distanced from each other on a circumferential extension; the fan is characterised by the fact that the cap (10) and the fan wheel (11) are two distinct elements provided with respective unmatched snap coupling means (13, 23) to render them integral in rotation as a single body.

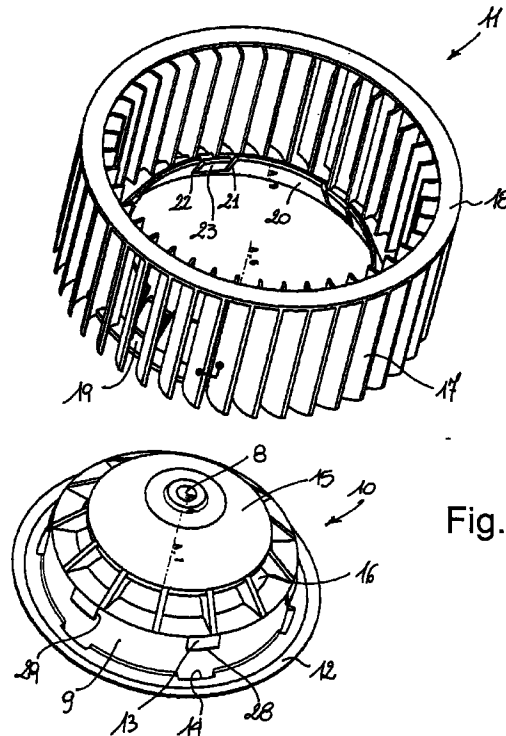


Fig. 1

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Description

[0001] The present invention refers to a fan in plastic material of motor-drive fan for a motor vehicle cockpit.

[0002] Fans for ventilating a motor vehicle cockpit of well-known types are generally comprised of an electric motor with a rotor which rotatably drags a disc wheel in plastic material; the rotor is integral in rotation with the disc wheel by means of a cap-shaped portion provided with a centred hole in which the motor shaft is inserted with negative allowance and on which the cap rotates; therefore the latter is obtained in a single piece with the disc wheel.

[0003] The fact that the disc wheel and the cap are realised in plastic material in a single piece is the source of a whole range of inconvenient problems.

[0004] First of all, the cap should be as rigid as possible and should also be provided with a precisely obtained centred hole because the motor shaft on which the cap is keyed rotates at a high number of revolutions, this means that it is sufficient the hole be slightly misaligned to cause the disc wheel takes on a rotating motion even if slightly oscillating around the axis of the motor shaft to generate an unacceptable imbalance.

[0005] All the above is obviously to be avoided in that the piece should already be, of itself, perfectly balanced. Independently, therefore, of the precision with which the diameter of the hole in the cap should be realised, the latter must be realised in such a way as to be well centred and co-axial on a piece of large dimension like the cap-disc wheel group.

[0006] A second inconvenience arises from the necessity to realise a non-ovalised disc wheel on its external diameter, at the same time as realising a sufficiently centred and co-axial cap.

[0007] Finally, as seen, the cap must be realised in rigid material, as it is the element which renders the shaft integral in rotation with the motor, while the disc wheel should preferably be realised in softer material, inferior material so as to avoid the generation of resonance and, consequently, noise during rotation; for these reasons, realising the group as a single element only adds to the compromise of a material which is neither too soft nor too rigid, with the result that it is not possible to optimise either of the two characteristics mentioned above.

[0008] The aim of the present invention is to realise a cap-disc wheel group capable of overcoming all the above-mentioned inconveniences and which will permit the optimisation of the choice of materials used for the realisation of the two components which make up the group.

[0009] For this and other aims which will be better understood hereinafter the present invention proposes the realisation of a fan in plastic material of motor-drive fan for a motor vehicle cockpit comprising:

a first cap-shaped portion, integral to the rotor of an

electric motor and provided with a centred hole for the passage of the motor shaft around which the cap itself rotates;

a second portion in the form of a disc wheel, integral in rotation with the cap, and provided with a series of bladings which are equally orientated and angularly distanced on a circumferential extension; characterised by the fact that:

the cap and the disc wheel are two separate elements provided with respective unmatchable snap coupling means to render them integral in rotation as a single body.

[0010] There now follows a description of a fan according to the present invention with reference to the attached drawings, in which:

Figure 1 shows an exploded view of the elements which make up the fan according to the present invention;

Figure 2 shows the elements illustrated in Figure 1 during the assembly stage;

Figure 3 shows a section of Figure 2 along the line III-III with the assembled electric motor shown in the form of a diagram.

[0011] The fan according to the present invention is made up of two separate components; a cap 10 and a disc wheel 11.

[0012] The cap 10 presents a border 12, which is substantially in the form of a tapered cone, and a series of projections 13 which are suitably angularly distanced along the main body 9 of the cap itself.

[0013] In correspondence to each projection 13 are obtained through slits between the body 9 and the turned up border 12.

[0014] Openings 16 are obtained, following well-known procedure, between the upper surface 15 of the cap 10 and the body 9, in such a way as to permit the passage of air in the cap to cool the electric motor.

[0015] A through hole 8 is obtained in a central position on the surface 15 for the force fitting of the shaft 7 (Figure 3) of the electric motor.

[0016] The disc wheel 11 is comprised of a number of bladings 17 which are equally orientated and angularly distanced on a ring defined by two circular bands 18 and 19 which support them at their extremities. The lower band 19, that is the one with the aim of abutting against the border 12 of the cap 10 during the assembly of the two elements, has a border 20 turned towards the interior of the disc wheel itself.

[0017] Along the border 20 are obtained pairs of notchings 21 and 22; between each pair of notchings there is an elastically yieldable fin 23. There is an equal number of fins 23 in correspondence to the projections 13 of the cap, and they are angularly distanced from

each other in the same way as the projections are angularly distanced from each other, and each fin has a circumferential extension which is substantially equal to that of each projection 13.

[0018] Figure 3 shows the cap-disc wheel group after it has been assembled together with the motor, in which it can be identified the containment box 24, the support 25 for the electric circuit, the stator 27 and the rotor 26. The cap 10 is integral with the rotor 26 and is mounted onto the shaft 7 with which it rotates.

[0019] The assembly of the cap-disc wheel group is carried out as follows: the two elements are brought closer to each other, as can be observed in Figure 2, in such a way that the fins 23 of the disc wheel face the projections 13 of the cap 10. When the two elements are coupled the fins 23 are first bent towards the bladings 17 so that they slide over the projections 13, then they open out again automatically to abut against the lower border 28 of projections 23. During this coupling movement the border 12 of the cap 10 bends slightly under the pressure of the border 19 of the disc wheel. When the fins 23 are positioned against the lower border 28 of the projections 13 the group is perfectly coupled in an axial direction because it is then necessary to use a tool, inserted through the holes 14 of the border 14, in order to rotate the fins 23 to free them from the position in which they are constrained under the projections 13.

[0020] It should be pointed out that the disc wheel cannot rotate on the cap because the sections of the turned up border 20 of the disc wheel, comprised between each fin 23, laterally abut against the lateral faces 29 of two adjacent projections 13; this means that the disc wheel 11 cannot shift or rotate at all in relation to the cap 10 on which it is constrained.

[0021] This characteristic is of fundamental importance because the cap-disc wheel group must function as if it were a single body in order to avoid any play, oscillation or shift which might cause the fan to make a noise or might even effect its performance after a short time.

[0022] As the disc wheel and the cap are two separate bodies they can be realised in different materials, so that it is possible to overcome the previously mentioned inconveniences presented by fans currently available on the market and permitting optimal molding conditions for each of the two elements.

[0023] It should also be pointed out that as the disc wheel is simpler to produce than the cap, greater flexibility in terms of production is possible.

Claims

1. A fan in plastic material for ventilating the interior of a motor vehicle cockpit, of the kind comprising;

- a first cap shaped portion (10), integral to the rotor (26) of the electric motor and provided

with centred holes (8) for the insertion of the shaft (7) of the motor around which rotates the cap itself.

- a second portion in the form of a disc wheel (11), integral in rotation with the cap (10), and provided with a series of bladings (17) which are equally orientated and angularly distanced on a circumferential extension; characterised by the fact that: the cap (10) and the disc wheel (11) are two separate elements provided with respective unmatchable snap coupling means (13, 23) to render them integral in rotation as a single body.

2. Fan according to Claim 1, characterised by the fact that the reciprocal coupling means are formed of fins (23) which extend in elastically yieldable fashion from one of the extremities (19) of the disc wheel (11) towards its interior to slide over projections (13) of the cap (10) and to abut against their lower border (28).

3. Fan according to Claim 2, characterised by the fact that the tongues/flaps/fins (23) are formed by means of notches (21, 22) obtained in a border (19) turned up towards the interior on one of the extremities of the disc wheel (11); the sections (20) of the border are comprised between the fins (23) and are each suitable for being positioned between the sides (29) of two adjacent projections (13).

4. Fan according to Claim 2, characterised by the fact that, in the cap (10), there is obtained an elastically yieldable perimeter border (12) along which are obtained through holes (14) in correspondence to the projections (13).

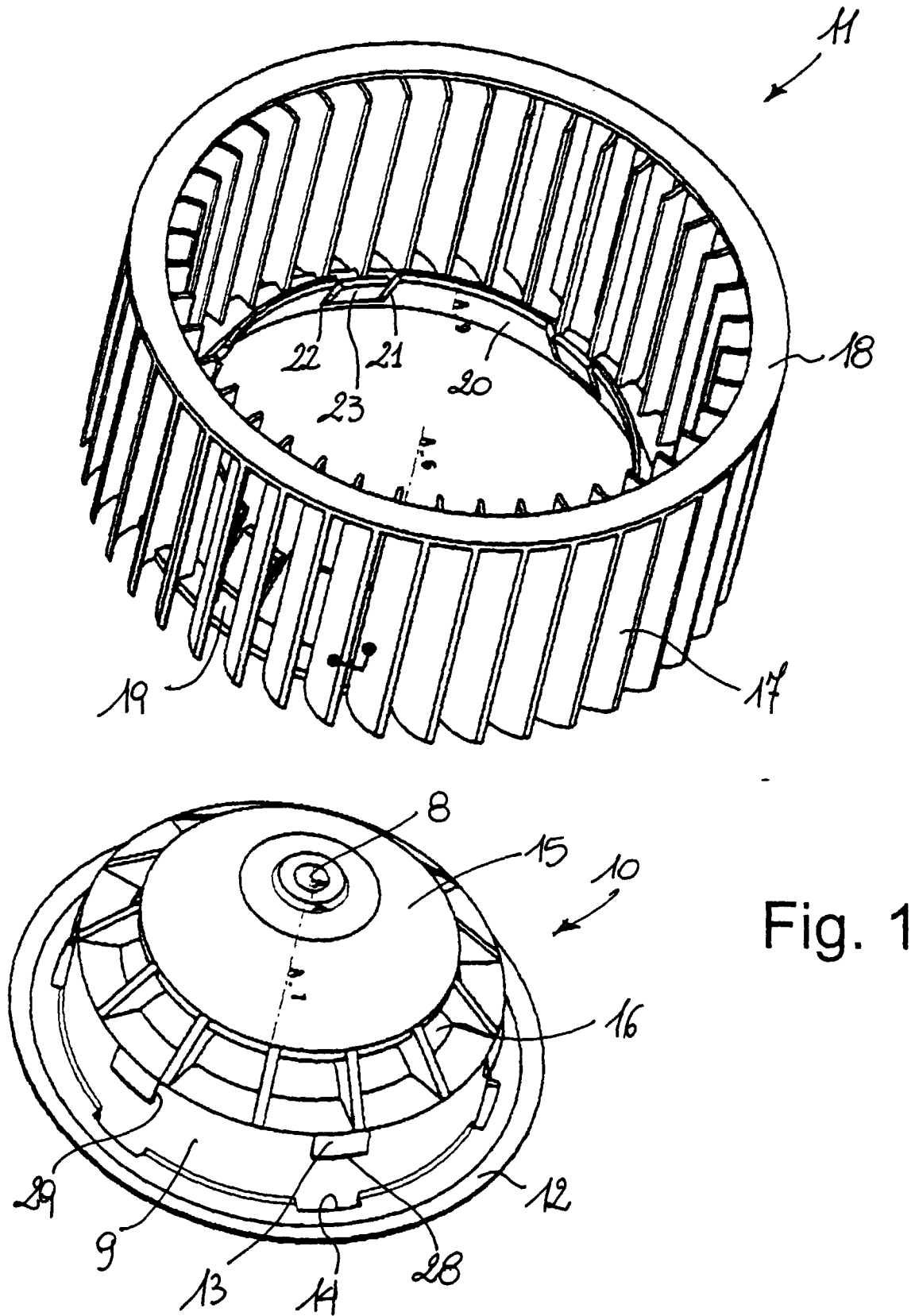


Fig. 1

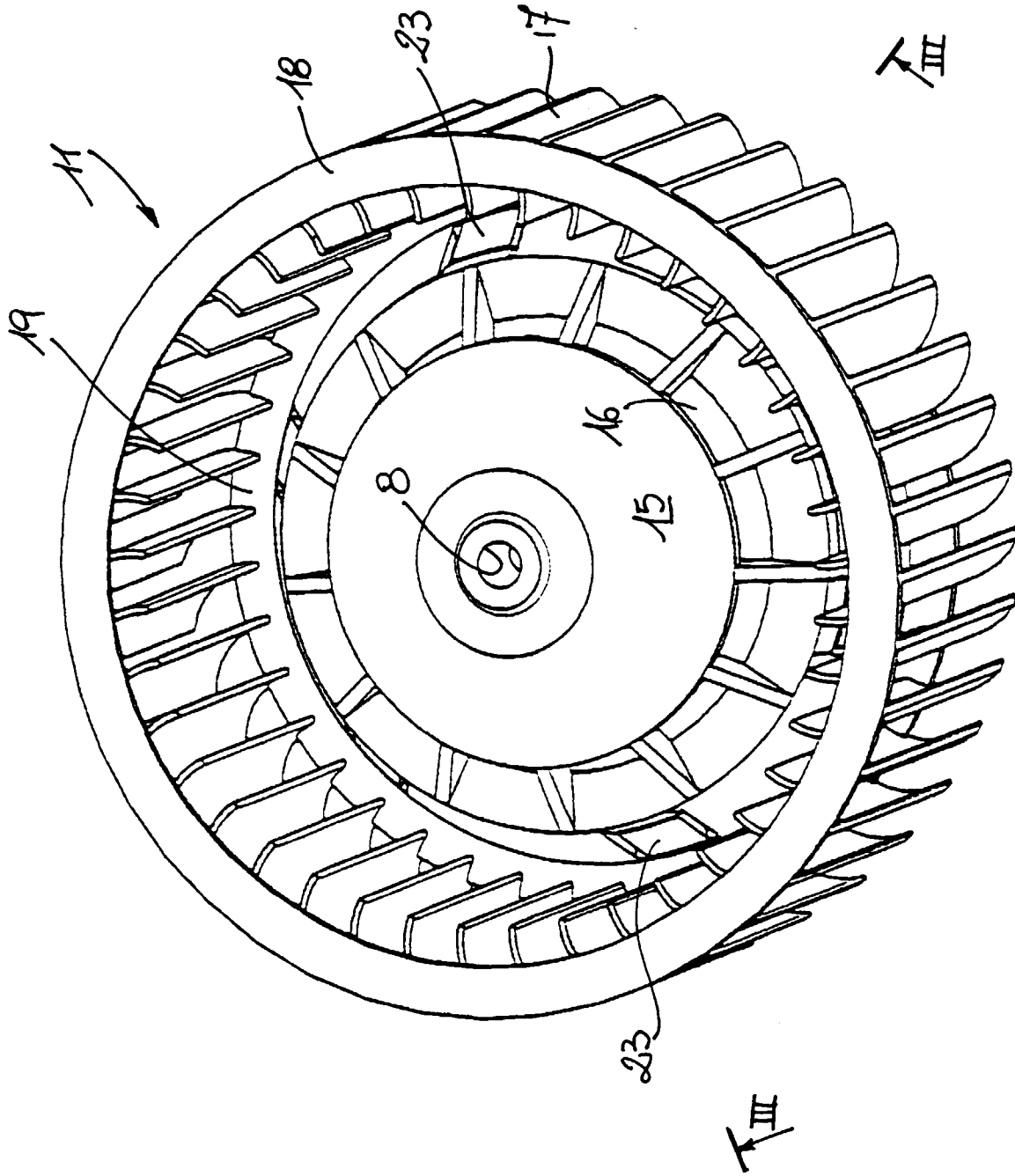


Fig. 2

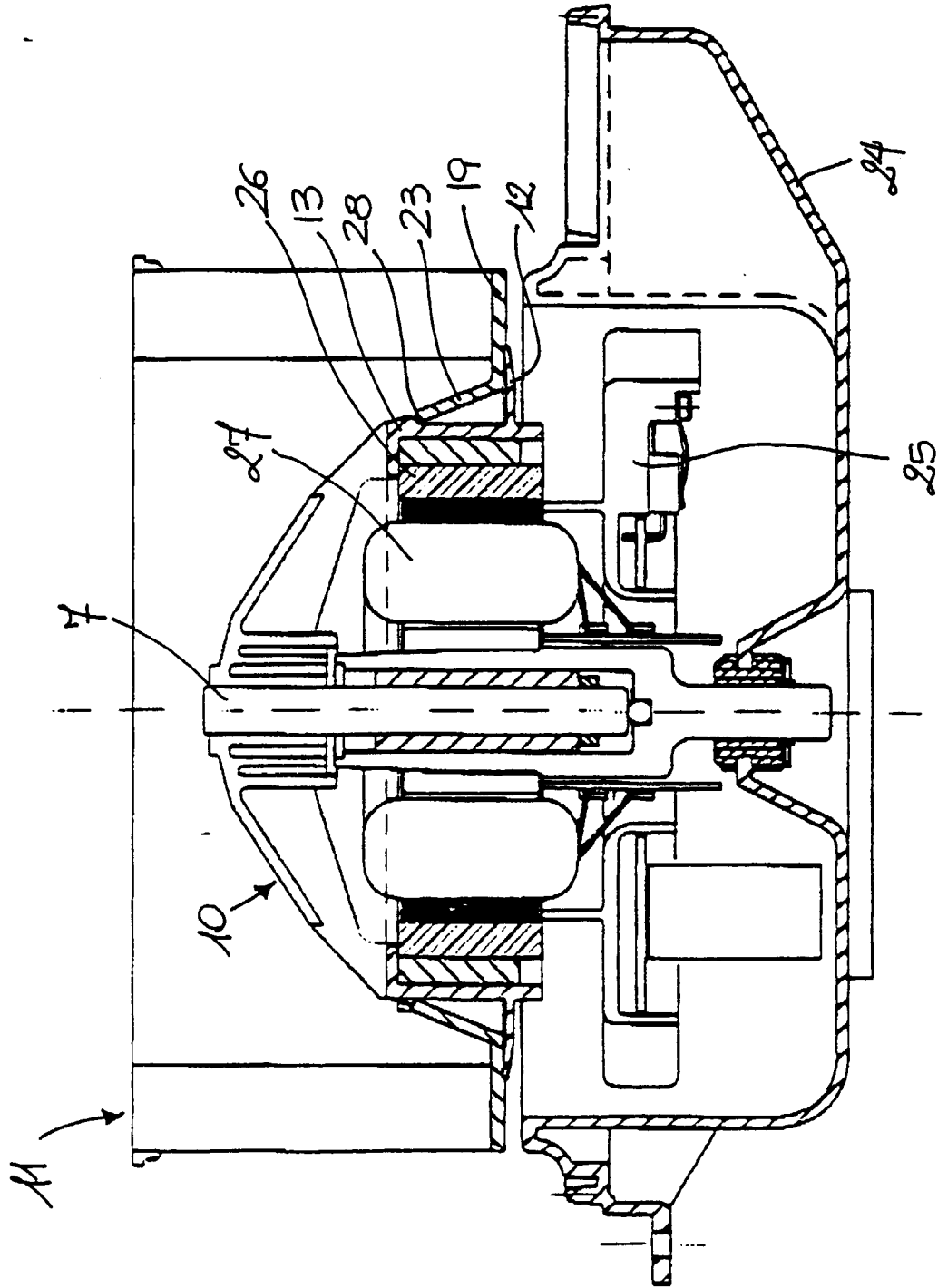


Fig. 3