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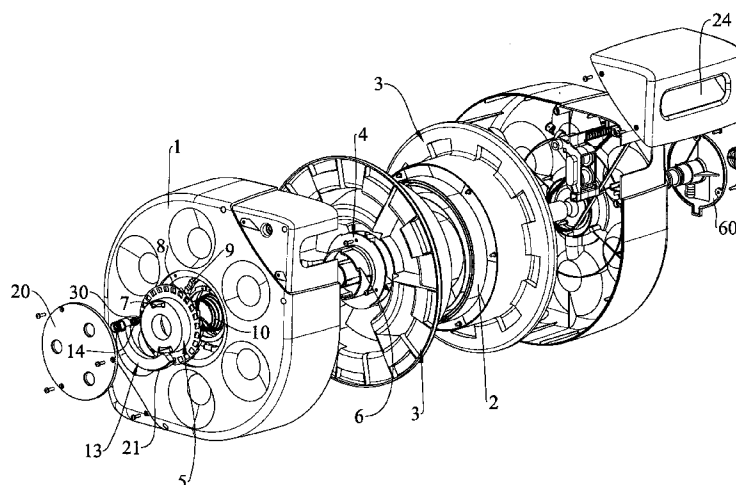
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
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(54) Title: ELASTIC REWINDING HOSE REEL WITH AUTOMATIC STOPPING DEVICE



(57) Abstract: A hose reel is described comprising a support casing (1), a drum (3) rotatably fitted inside said casing (1) and connected to it by elastic rewinding means (2). The drum (3) provides a flange (4) integral with it and couplable in rotation with a locking disc (5) equipped with teeth (8) engageable with opposing teeth capable of stopping its rotation. Elastic separation means (10) are provided between the flange (4) and the locking disc (5) to keep the latter in a first position axially distanced from said flange (4), teeth and counter-teeth means (51, 52) mutually engaged to allow the flange (4) to draw the locking disc (5) into integral rotation with it, and cam and counter-cam means (6, 7) which, in the event of said flange exceeding a predetermined threshold speed cause the axial displacement of said locking disc (5) into a second position adjoining said flange (4) in which its teeth (8) engage with said opposing teeth (9) to produce the consequent stopping of the rotation of said drum (3).

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“Elastic rewinding hose reel with automatic stopping device”.

* * * *

The present invention concerns an elastic rewinding hose reel with automatic stopping device.

5 The hose reel is a very useful tool when one needs to operate with very long flexible hoses, and comprises a drum rotatably coupled to a casing.

Hose reels are known in which, in order to facilitate the winding of the hose, the drum/casing coupling is made through elastic means which force the rotation of the drum in the direction usable for rewinding a partially or
10 totally unrolled hose.

Said known hose reels have the disadvantage that, once the operator has started the winding process, the drum tends to accelerate, making the manual stopping of the hose by the operator difficult and often forcing the end of the hose, usually fitted with a terminal lance, to finish its run
15 violently against the casing, with the consequent possibility of damage to both.

Hose reels are known including a device to slow the hose down, which reduces the speed of winding but does not solve the problem in the case of total rewinding of the hose. In this case also it is necessary to go back to the
20 casing and recover the hose.

Hose reels are also known having a hook fixed to the casing which can engage with teeth located on half the face of the drum. The interaction between hook and teeth locks the drum. The braking/locking action is performed solely by half the face of the drum, and for this reason the
25 stopping is not certain and depends on the angle of rotation of the drum with respect to the position of the hook.

If the hose has unrolled almost completely, and one decides to roll it up completely, the drum picks up such a speed that the end of the hose stops suddenly when it re-enters the casing. The problems of wear and tear
30 mentioned above present themselves once more.

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The object of the present invention is to create a hose reel comprising a stopping device capable of locking the drum in the event that its winding rotation speed exceeds a threshold value because of which the winding of the hose is judged to be excessive and harmful for the hose reel.

5 In accordance with the invention, this object is achieved with a hose reel comprising a support casing, a drum rotatably fitted inside said casing and connected to it by elastic rewinding means, characterised in that said drum provides a flange integral with it and couplable in rotation with a locking disc equipped with teeth and movable between a first position
10 axially distanced from said flange and a second position axially adjoining said flange in which said teeth on the locking disc engage with opposing teeth capable of arresting its rotation, there being provided elastic separation means interposed between said flange and said locking disc to maintain the latter in said first position, teeth and counter-teeth means respectively
15 integral with said flange and said locking disc which are mutually engaged so as to allow said flange to draw said locking disc into integral rotation with it, and cam and counter-cam means respectively integral with said flange and said locking disc which in the event of a predetermined threshold speed being exceeded by said flange cause the axial displacement of said locking
20 disc into said second position to produce the consequent stopping of the drum's rotation.

The threshold speed is established at the stage of designing and assembling the various components.

25 The end of the hose can always be recovered at a short distance from the operator and does not return violently into the casing.

 The opposing teeth which bring about the stopping of the integral rotation of the locking disc and the flange, and therefore of the drum, can be integral with the support casing of the drum, but preferably they are formed on a stopping disc which is axially held against said casing with the
30 interposition of a friction ring capable of allowing a limited rotation of said

stopping disc with respect to said casing in the event that the speed of rotation of said locking disc exceeds said predetermined threshold by a pre-established value.

5 In this way, if the rewinding speed were such as to bring about the engagement of the teeth on the locking disc with the opposing teeth, with sufficient force to cause possible failure and/or breakage, the stopping disc would be allowed a limited rotatory slipping movement against the friction ring, which would avoid a sudden and damaging impact between the teeth of the two discs coming into mutual engagement.

10 The slipping of the stopping disc against the friction ring would exhaust itself almost immediately as a result of the high frictional forces present, but it would be sufficient to absorb the powerful stresses which would otherwise develop at the moment of impact between the teeth on the locking disc and the opposing teeth.

15 These and other characteristics of the present invention will be made more clearly evident by the following detailed description of an example of its practical embodiment which is illustrated without limiting effect in the attached drawings, in which:

20 figure 1 shows an exploded perspective view of a hose reel according to the present invention;

figure 2 shows a side view of the hose reel;

figure 3 shows a sectional view along line III-III in figure 2 with the locking disc in a rest position;

25 figure 4 shows a view in partial section similar to that in figure 3 with the locking disc disconnected from the casing;

figure 5 shows a view in partial section similar to that in figure 3 with the locking disc connected to the casing;

figure 6 shows a sectional view along line VI-VI in figure 4;

figure 7 shows a sectional view along line VII-VII in figure 5;

30 figure 8 shows a perspective view from above of the locking disc;

figure 9 shows a perspective view from below of the locking disc;

figure 10 shows a plan view from below of the locking disc;

figure 11 shows a perspective view of the flange on the drum;

figure 12 shows a plan view from above of the flange on the drum;

5 figure 13 shows an exploded perspective view of a part of the hose reel of the present invention according to a preferred variant of it;

figure 14 shows in greater detail some elements of figure 13;

figure 15 shows a sectional view similar to that in figure 3, referring to the variant in figures 13 and 14;

10 figure 16 shows the same sectional view as in figure 15 with the locking disc in the position of stopping the rewinding movement.

The hose reel illustrated in the drawings comprises a casing 1 which rotatably supports a rotating drum 3 stressed in an angular rest position by a rewind spring 2 and having a flange 4 coupled in axially and rotatably
15 movable manner to a locking disc 5, having furthermore teeth 8 engageable with opposing teeth 9 on casing 1.

Said flange 4 includes teeth 51 engageable with counter-teeth 52 of disc 5 at the stage of unwinding and rewinding the hose and cams 6 engaged with counter-cams 7 on disc 5 (figures 8-12).

20 The disc 5 has an internal sleeve 11 mounted in axially and rotatably movable manner on a cylindrical connecting portion 12 of flange 4, a pre-compressed separating spring 10 being provided between disc 5 and flange 4 to keep disc 5 and flange 4, and therefore teeth 8 on disc 5 and opposing teeth 9 on casing 1, axially distanced .

25 The hose reel includes furthermore a curved brake shoe 13 (figure 1) pivoting on disc 5 by means of a pin 30, there being also provided a spring 14 (figure 1) near said pin 30 to keep said shoe adhering to a peripheral surface 15 of disc 5.

30 The shoe 13 includes an external portion 21 in friction material designed to interact with an internal annular surface 22 of casing 1 in order

to brake disc 5 with respect to drum 3.

The casing 1 includes a first cover 20 and a second cover 60 with an entry zone 23 (figure 3) for a flexible hose for fluid intake, an axial shank 61 equipped with seals, and an outlet port 24 (figure 1) for a flexible hose wound onto a peripheral surface 19 of drum 3.

The shank 61 has a central axial duct 16 for the passage of the fluid coming from an external source through a first nozzle 17 to which the above-mentioned intake hose is attached. A second nozzle 18 allows the fluid to enter the flexible hose (not shown) which is wound onto drum 3.

As regards operation, let us consider the hose reel in the configuration shown in figure 4, i.e. with the drum 3 free to rotate following forced rewinding by rewind spring 2.

At the rewind stage, cams 6 and counter-cams 7 are mutually engaged while disc 5 and flange 4 are kept separate by the force of separating spring 10.

If the end of the unrolled flexible hose is suddenly released, drum 3 accelerates suddenly and as a result of the engagement between teeth 51 and counter-teeth 52 draws disc 5 into its rotatory movement.

When a certain threshold speed is reached, previously defined at the construction stage, the cams 6 slide against the counter-cams 7 causing disc 5 to move axially closer towards flange 4 because the separating force of spring 10 is overcome by the engaging force of cams 6 with counter-cams 7.

The approach of disc 5 towards flange 4 continues until teeth 8 engage with opposing teeth 9 on casing 1, causing the stopping of the drum.

The spring 14 keeps the shoe 13 in close contact with surface 15 of disc 5.

Let us now consider the case where the operator releases the unrolled flexible hose progressively, i.e. without sudden acceleration.

When the above-mentioned threshold speed is reached, the shoe 13 moves outwards around pin 30 because the centrifugal force induced by the

speed of rotation is greater than the restraining force of spring 14.

The external portion 21 of shoe 13 interacts with the annular surface 22 of casing 1, slowing disc 5 with respect to drum 3.

5 A relative rotatory motion of disc 5 with respect to drum 3 is thus produced, which causes sliding of cams 6 on flange 4 against counter-cams 7 on disc 5.

Consequently, in virtue of the geometry of cams 6 and counter-cams 7, disc 5 is moved axially towards flange 4, thus causing the coupling of teeth 8 on disc 5 with the opposing teeth 9 on casing 1, which stops drum 3.

10 Essentially, in the first case the sliding of cams 6 against counter-cams 7, with the consequence that disc 5 approaches flange 4, is caused by the sudden acceleration, sufficient to induce a force such as to overcome the force of separation induced by spring 10.

15 In the second case, in the absence of a sudden acceleration, shoe 13 must intervene to cause the relative motion between disc 5 and flange 4.

As noted above, the threshold speed is set at the construction stage, taking the following principally into account:

- the elastic force of springs 2, 10 and 14;
- the connection between disc 5 and flange 4 on drum 3;
- 20 - the geometry of cams 6 and counter-cams 7;
- the sizing of superficial portion 21.

The variant shown in figures 13-16 allows possible failures or breakages of teeth 8 and 9 and the relative supports to be avoided in the event of powerful stresses due the high speed of rewinding.

25 According to this variant, a friction ring 25 in rubbery material is interposed between stopping disc 25 and casing 1; the interposition is such that the rotation of stopping disc 25 can produce a slight slipping of the latter against friction ring 26.

30 The effect of the interposition of friction ring 25 is that, in the event of sudden rewinding at a speed which exceeds the threshold speed previously

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mentioned by an amount such as to be able to cause failure or breakage of teeth 8 and 9 at the moment of their mutual engagement, the stopping disc is induced to rotate slightly, slipping against friction ring 26 before coming to a halt together with drum 1. Teeth 8 and 9 and the respective supports are thus preserved from the risk of breakage through excessively high impact stresses.

5

CLAIMS

1. Hose reel comprising a support casing (1), a drum (3) rotatably fitted inside said casing (1) and connected to it by elastic rewinding means (2), characterised in that said drum (3) provides a flange (4) integral with it and couplable in rotation with a locking disc (5) equipped with teeth (8) and movable between a first position axially distanced from said flange (4) and a second position axially adjoining said flange (4) in which said teeth (8) of the locking disc (5) engage with opposing teeth (9) capable of arresting its rotation, there being provided elastic separation means (10) interposed between said flange (4) and said locking disc (5) to maintain the latter in said first position, teeth and counter-teeth means (51, 52) respectively integral with said flange (4) and said locking disc (5) which are mutually engaged so as to allow said flange (4) to draw said locking disc (5) into integral rotation with it, and cam and counter-cam means (6, 7) respectively integral with said flange (4) and said locking disc (5) which in the event of a predetermined threshold speed being exceeded by said flange (4) cause the axial displacement of said locking disc (5) into said second position to produce the consequent stopping of the rotation of the drum (3).

2. Hose reel according to claim 1, characterised by comprising a braking means (13) rotatably coupled to the locking disc (5) by elastic means (14) capable, once the threshold speed has been exceeded, of interacting with a portion (22) of the casing (1) to slow the disc (5) with respect to the drum (3), thus causing the engagement of said cam means (6) with said counter-cam means (7), with the consequent axial approach of said locking disc (5) towards said cam means (6) causing the locking engagement of its teeth (8) with said opposing teeth (9), to produce the consequent halting of the rotation of the drum (3).

3. Hose reel according to claim 2, characterised in that said braking means (13) include a friction portion (21) capable of interacting with portion (22) of casing (1).

4. Hose reel according to any of claims 2-3, characterised in that said braking means comprises a shoe (13).

5 5. Hose reel according to any of the preceding claims, characterised in that said braking disc (5) comprises an internal sleeve (11) mounted in axially and rotatably movable manner on a cylindrical connecting portion (12) of the flange (4).

10 6. Hose reel according to any of the preceding claims, characterised in that said locking disc (5) comprises a protruberance (52) coupled by interference fit to a superficial portion (51) of flange (4), said coupling producing the integral rotation of the disc (5) with the drum (3) at the unrolling stage.

7. Hose reel according to any of the preceding claims, characterised in that said opposing teeth (9) are integral with said casing (1).

15 8. Hose reel according to any of the preceding claims, characterised in that said opposing teeth (9) are integral with a stopping disc (25) which is axially held against said casing (1) with the interposition of a friction ring (26) capable of allowing a limited rotation of said stopping disc (25) with respect to said casing (1) in the event that the rotation speed of said locking disc (5) exceeds said predetermined threshold by a pre-established value.

20 9. Hose reel according to claim 8, characterised in that said friction ring (26) is in rubbery material.

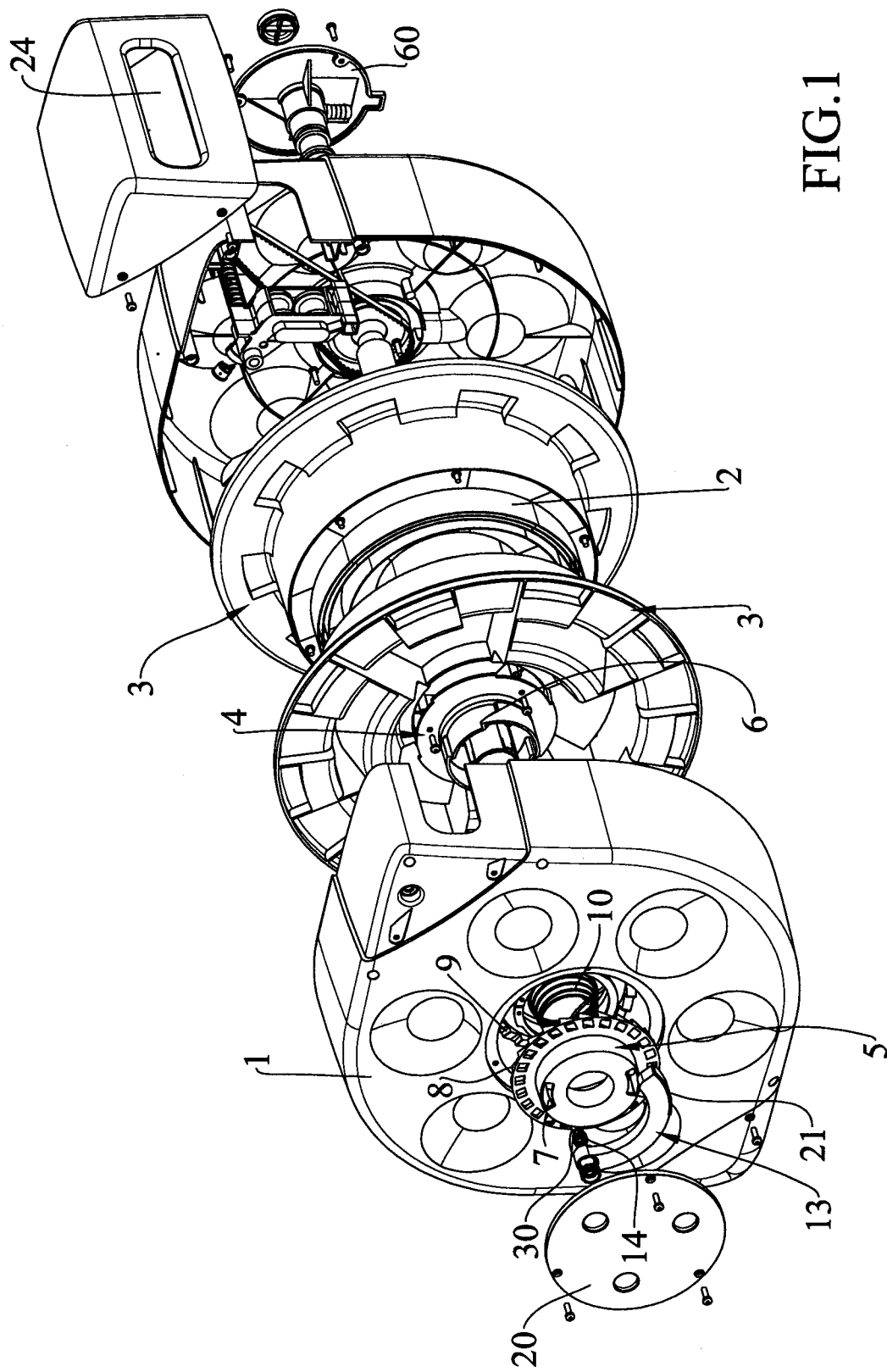


FIG.1

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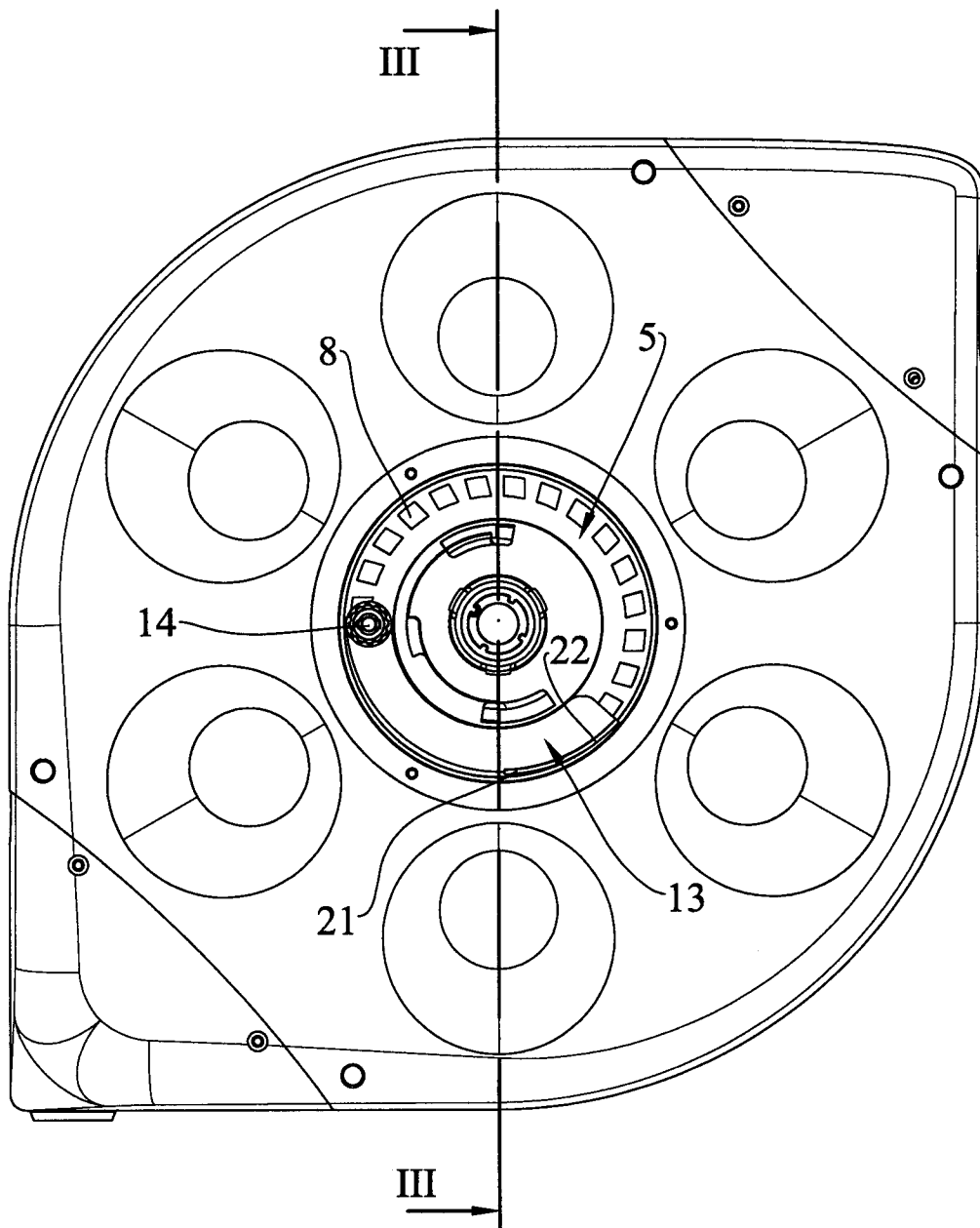


FIG.2

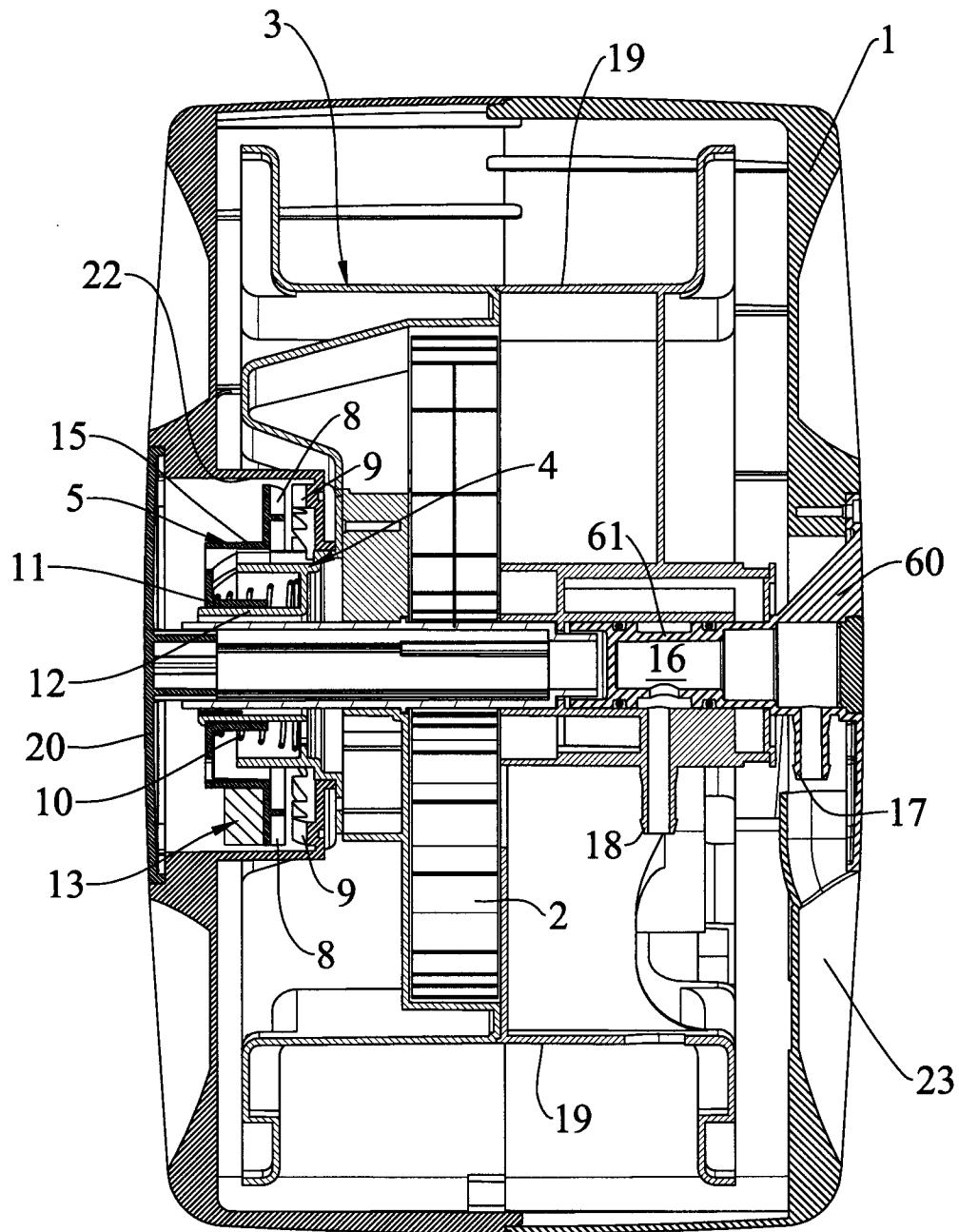


FIG.3

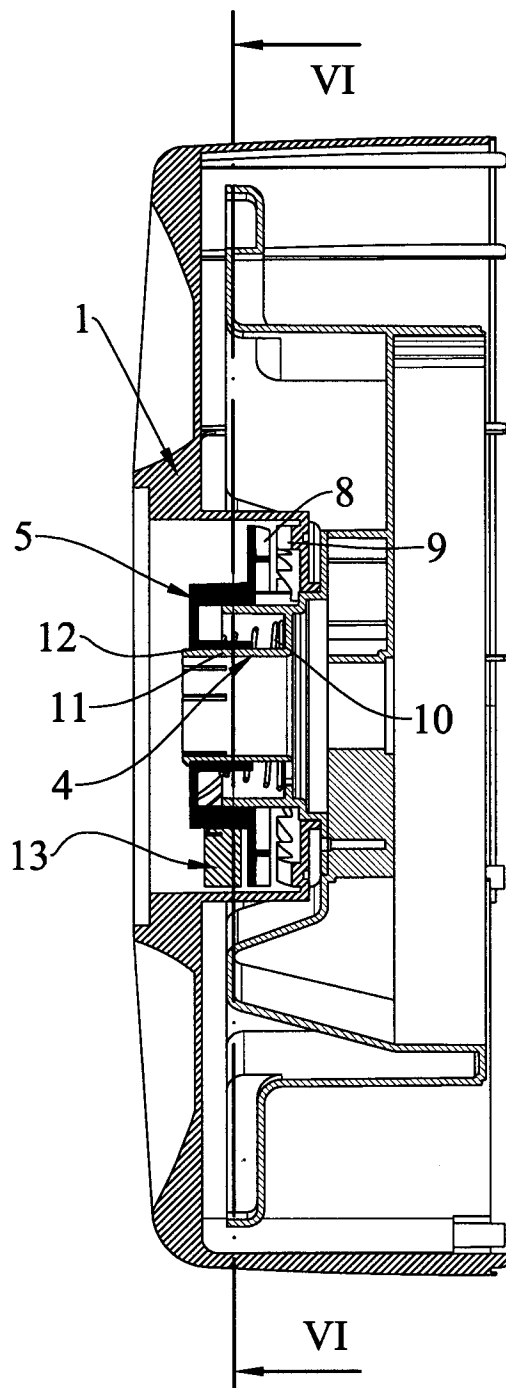


FIG. 4

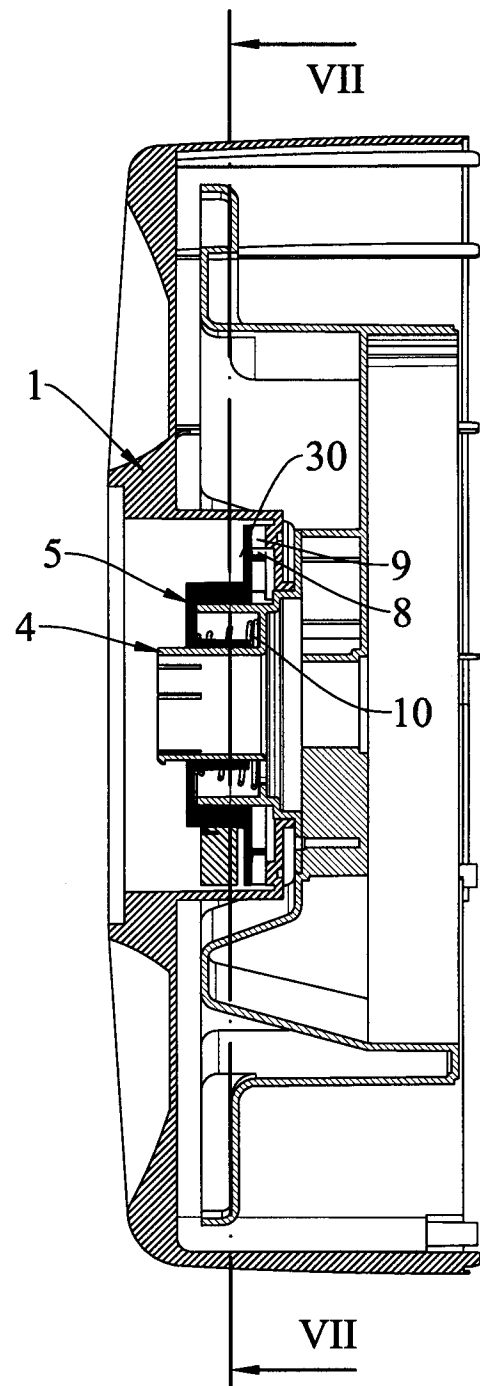


FIG. 5

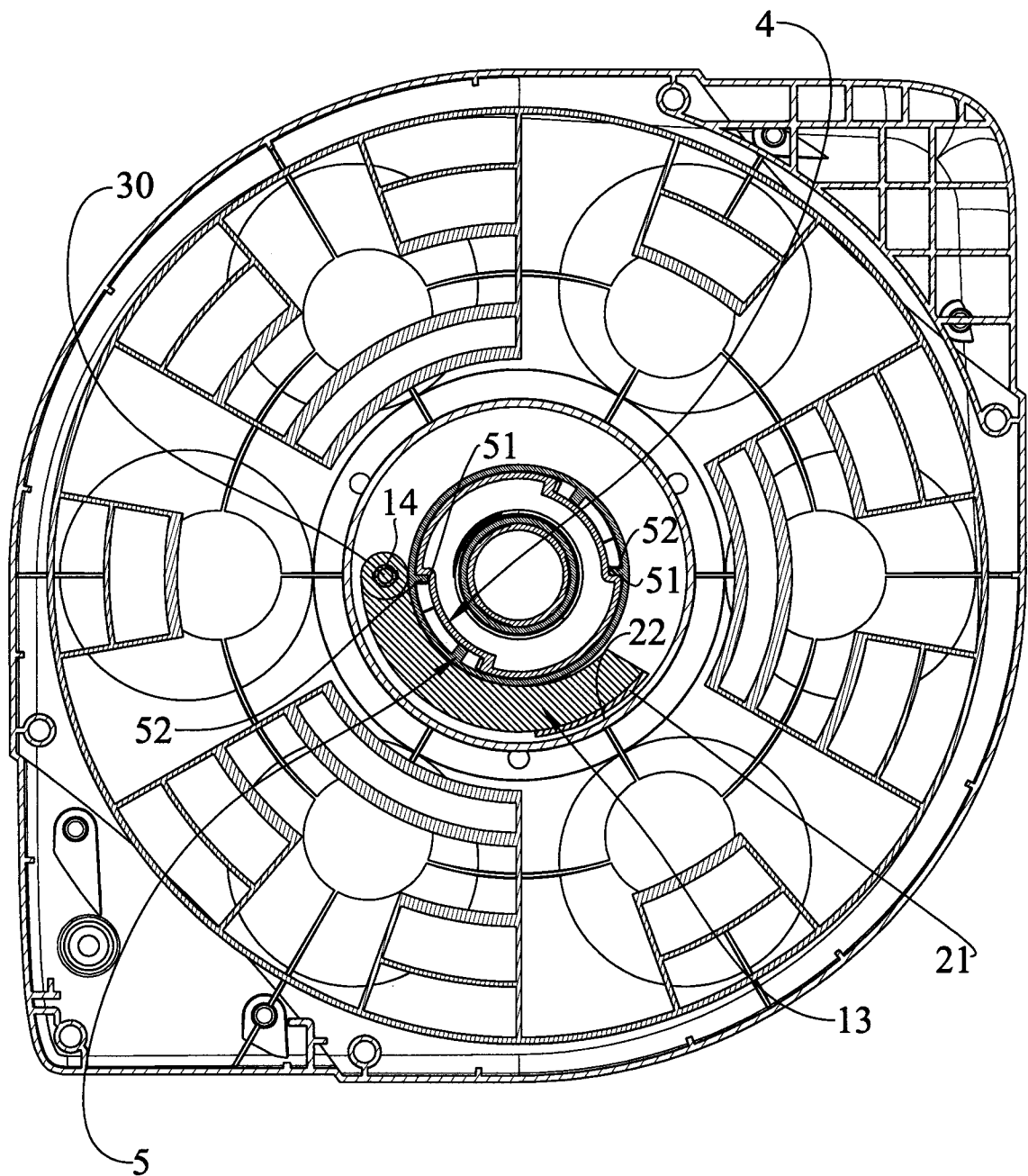


FIG.6

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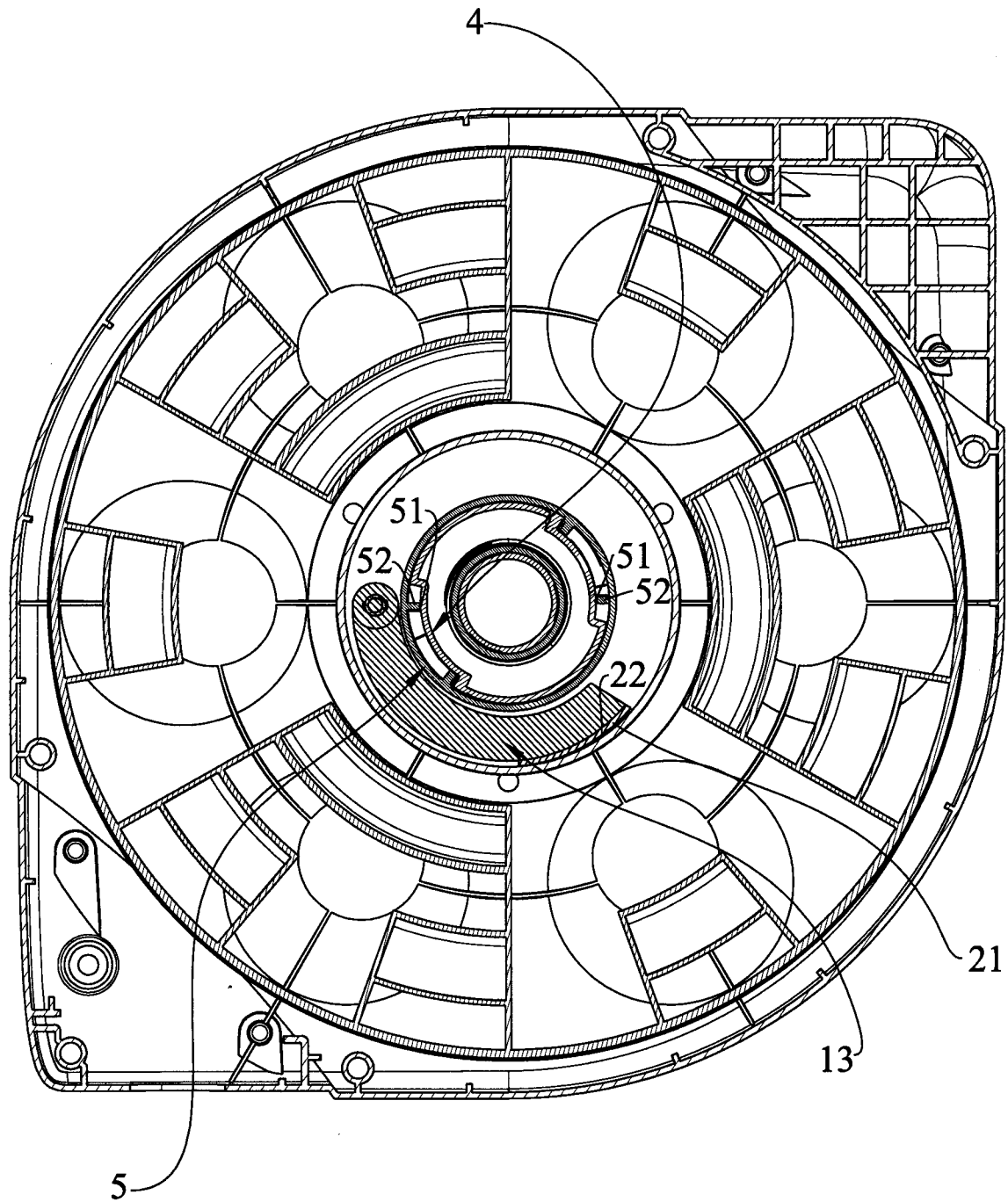


FIG.7

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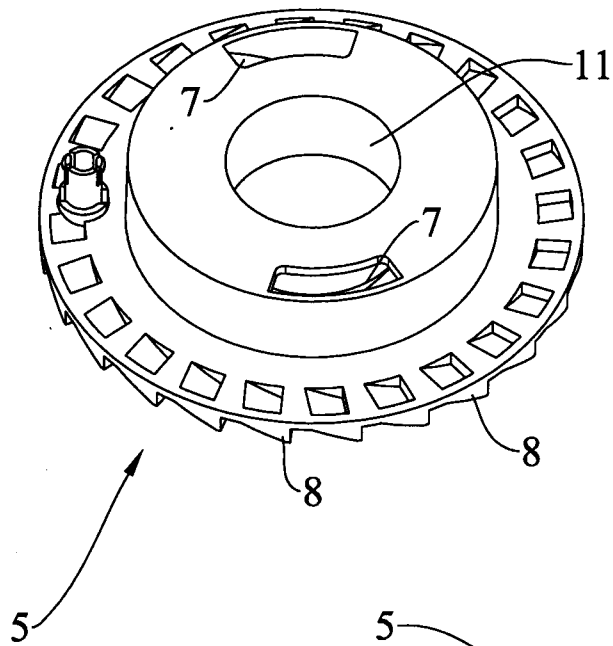


FIG. 8

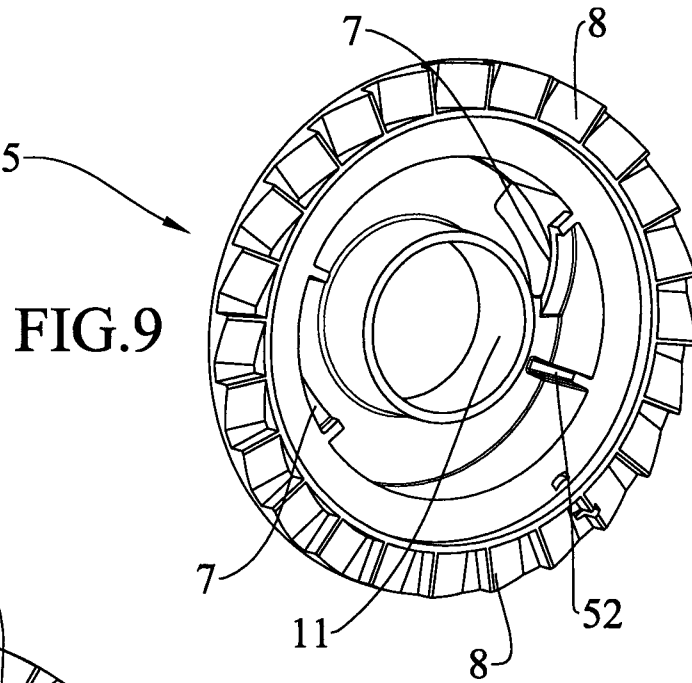


FIG. 9

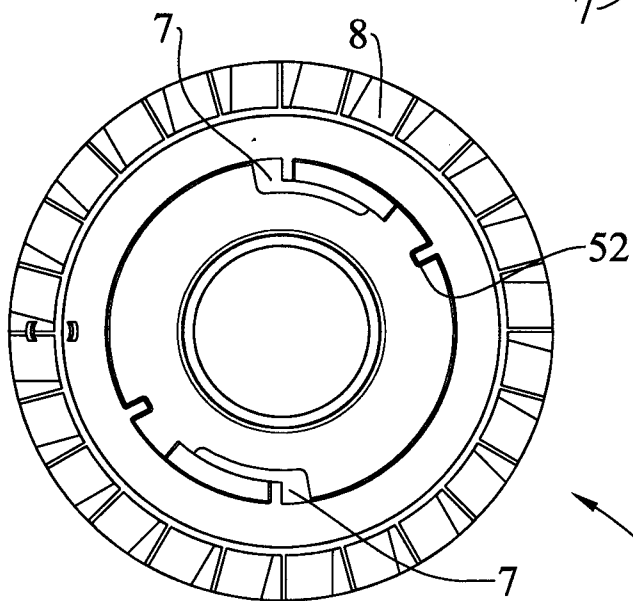


FIG. 10

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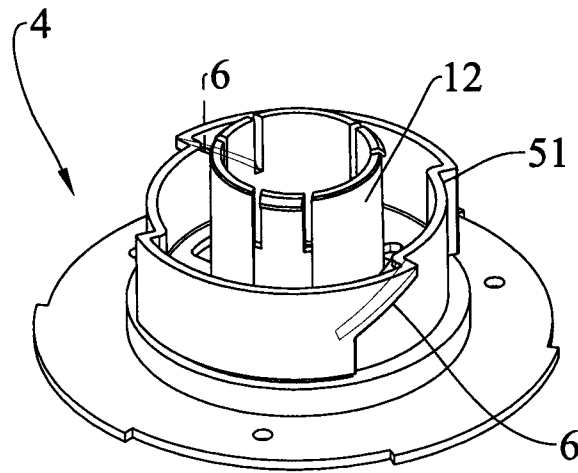


FIG.11

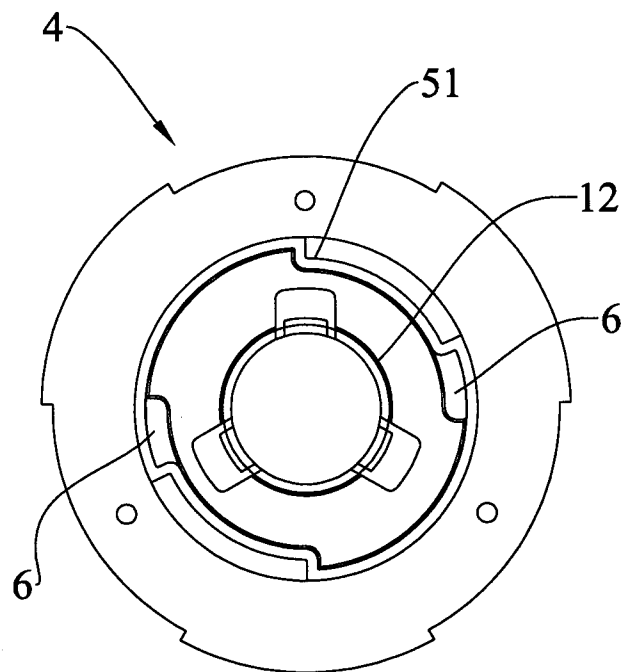


FIG.12

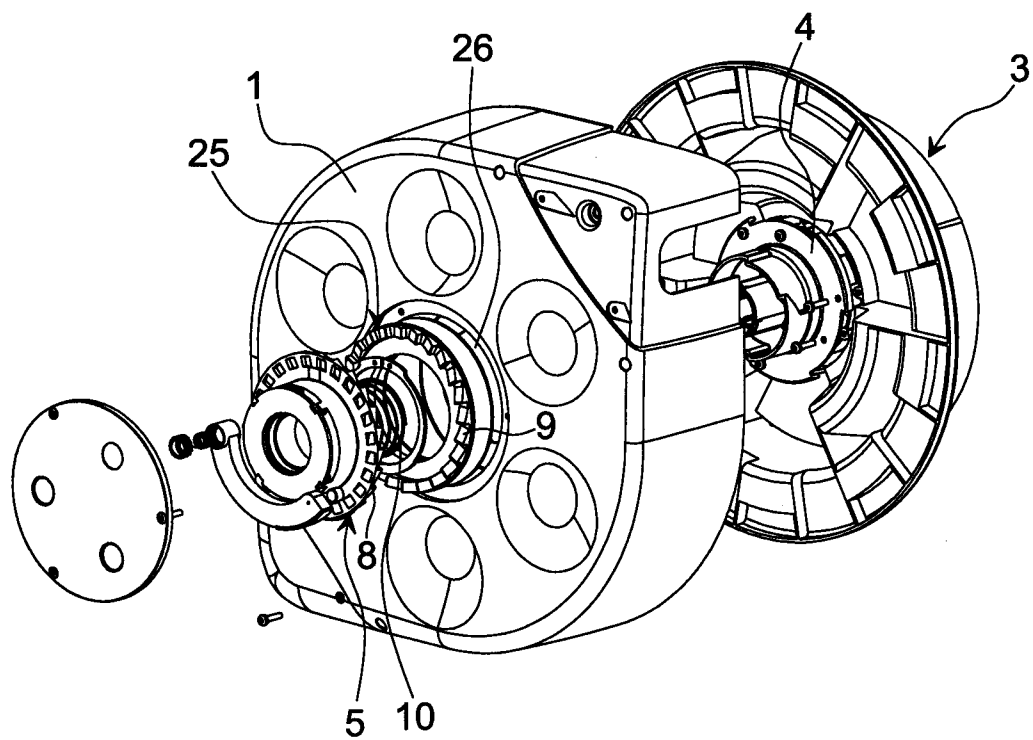


FIG.13

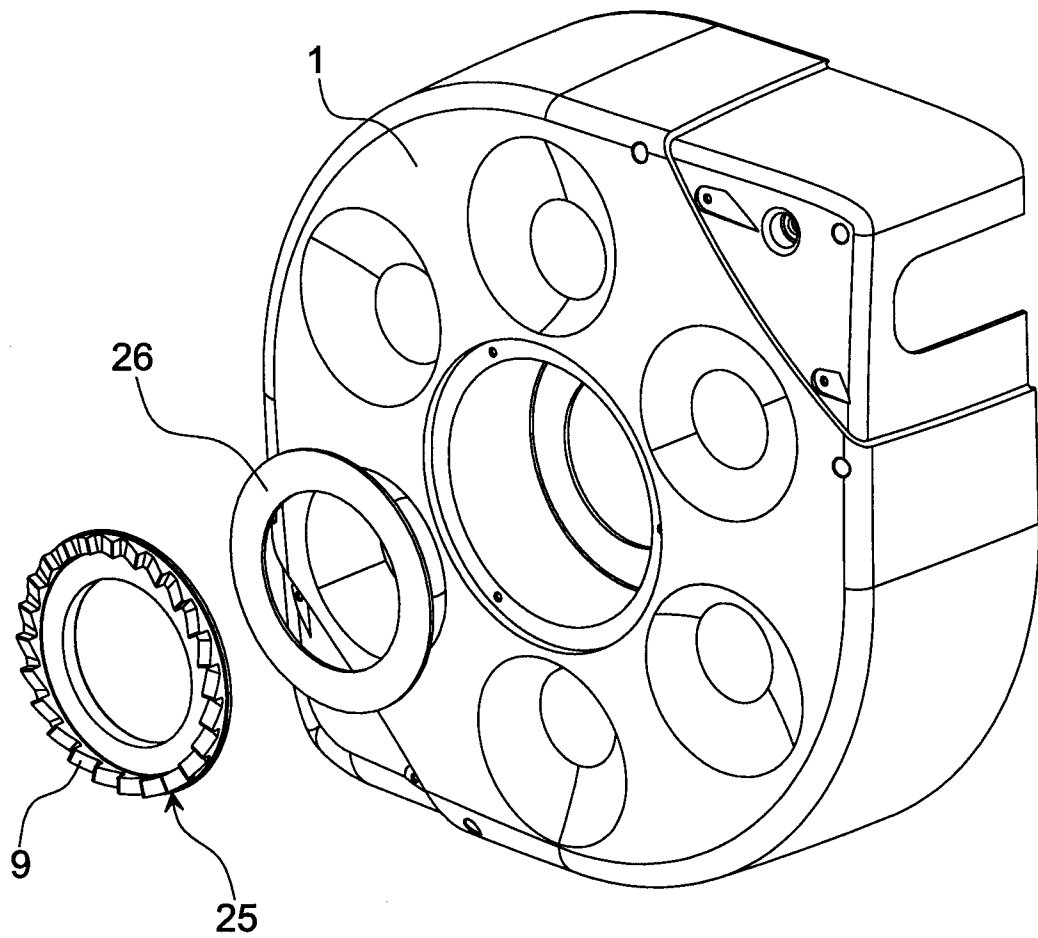


FIG.14

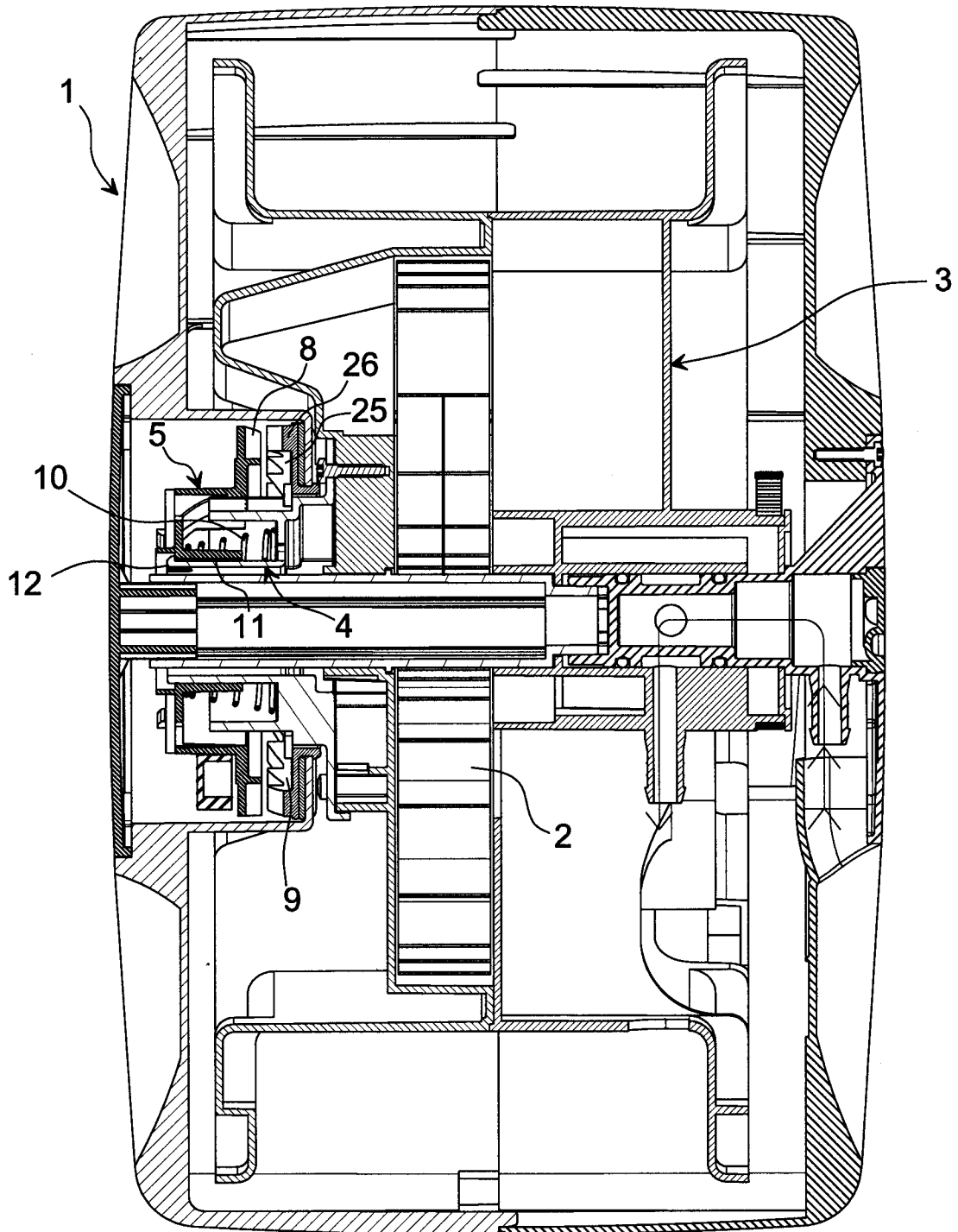


FIG.15

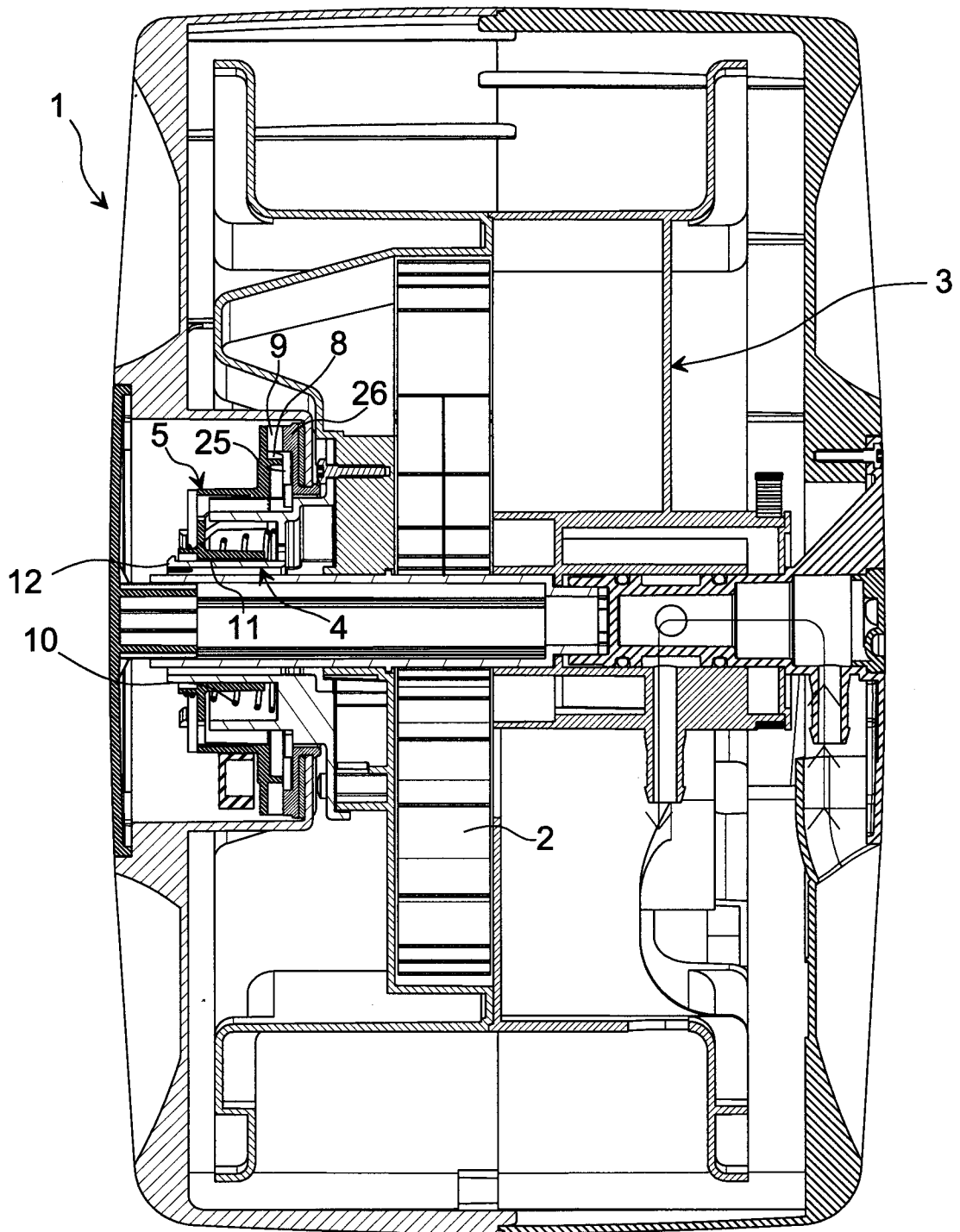


FIG.16

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2007/052919

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65H75/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 1 950 833 A (WOODFORD JOSEPH C) 13 March 1934 (1934-03-13) page 1, lines 1-6, 46-66 page 2, lines 98-125; figures -----	1
A	GB 1 495 652 A (GRAENGES FAHRZEUGTECHNIK) 21 December 1977 (1977-12-21) page 1, lines 16-48, 81-85, 89 page 2, lines 8-27, 38-58; figure 2 -----	1
A	US 2 584 559 A (DALRYMPLE WILLIAM P) 5 February 1952 (1952-02-05) column 1, lines 1-5, 48-55 column 2, lines 1-6 column 3, line 24 - line 44 column 4, line 11 column 5, line 51 - line 63; figure 2 ----- -/--	1

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

29 May 2007

Date of mailing of the international search report

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Lemmen, René

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/052919

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 202 21 032 U1 (RAPID MASCHINENFABRIK GMBH [DE]) 28 October 2004 (2004-10-28) paragraphs [0002], [0003], [0053] - [0057]; figures 22,23 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2007/052919

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 1950833	A	13-03-1934	NONE	
GB 1495652	A	21-12-1977	NONE	
US 2584559	A	05-02-1952	NONE	
DE 20221032	U1	28-10-2004	NONE	