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(54) Device for cyclically varying the water flow for hydromassage delivery nozzles

(57) A device for cyclically varying the water flow for delivery nozzles of hydromassage baths is provided with a closing member (30) housed inside a cylindrical body (26) located between the delivery nozzle (10) and the water supply pipe (16). The closing member (30) is actuated by a propeller (38), arranged inside the sleeve (28), via a mechanism (40) comprising an endless screw (42) and a helical gear (44).

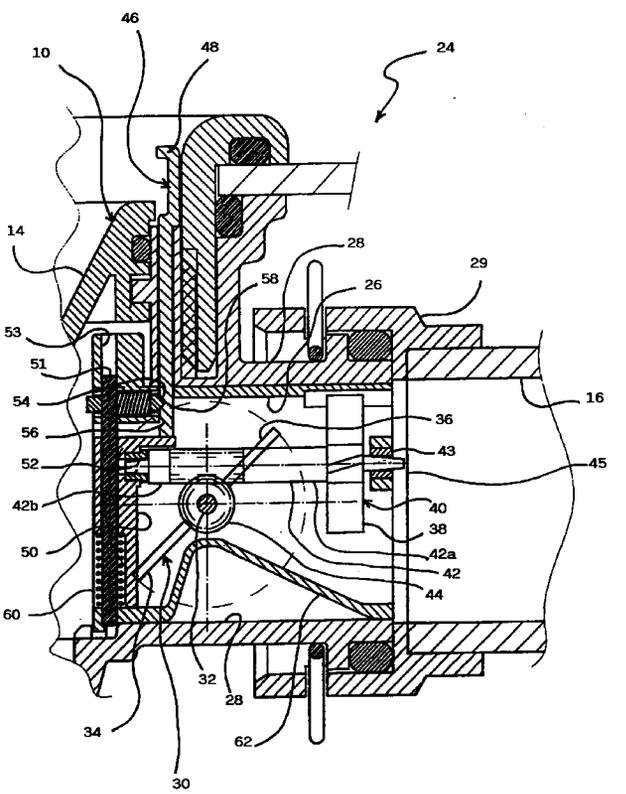

FIG. 2

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Description

The present invention relates to a device for cyclically varying the water flow for delivery nozzles of hydromassage baths.

In the hydromassage sector the use of pulsating jets emerging from the nozzles is known, said jets having a cyclically variable intensity so as to create a more beneficial effect on the user's body.

Various solutions have been proposed and realized, such as for example the use of suitable devices for varying the speed of the pump which supplies the delivery nozzles.

Such a solution, however, has proved to be unsatisfactory since it requires the use of control and regulating devices of a certain complexity. This results in increased costs as well as more frequent breakage of the said devices, giving rise to undesirable problems. Moreover, since all the nozzles are supplied by the same pump, the cyclical regulation has a single effect, namely all the nozzles deliver a jet having the same intensity at the same time.

Another solution of the known art consists in the use of a closing member housed inside a body, the interior of which is in communication with the delivery nozzle and the pipe for supplying water to the nozzle. The closing member, which is connected to a suitable actuating device powered for example by the electric mains, assumes positions variable between a position where it intercepts the water flow and a position where it allows the water to pass through, thus varying in a pulsating manner the intensity of the jet.

However, this latter solution also has some drawbacks. In fact, since each nozzle is provided with a closing member and hence a corresponding actuating device, the cost of such a solution is considerable and the electrical power consumption is high.

The aim of the present invention, therefore, is to provide a device for varying in a pulsating manner the hydromassage flow delivered by the nozzles, said device having a simple design and hence a limited cost. Moreover, another requirement is that the power consumption should be low and that the pulsating jet can be formed independently for each nozzle.

This aim is achieved by means of a device of the type indicated above, namely of the type comprising a closing member housed inside a substantially cylindrical body located in a seat of a delivery nozzle, said body being designed to place the interior of the delivery nozzle in communication with the water supply pipe, characterized in that said closing member is rotatable and kinematically connected to driving means arranged inside the body of the device and actuated by the water flow such that, when there is a variation in its position with respect to the direction of the flow, the quantity of water delivered by the nozzle varies cyclically.

It can be easily understood that the device in question does not require any external power source in order to operate it. Moreover each nozzle, if provided with such a device, delivers a jet which varies in a pulsating manner independently of the intensity of the jet of the other nozzles. Moreover the device can be easily disassembled and removed, thus enabling the cleaning, maintenance and repair operations to be performed more easily and quickly in the event of malfunctions.

In a particular embodiment of the invention the device comprises a propeller connected to an endless screw engaging with a gear wheel connected to the closing member.

The device is therefore easy to produce, economical and reliable.

These and further characteristic features and advantages of the invention will emerge more clearly from the following detailed description, provided by way of a non-limiting example, with reference to the following accompanying drawings, in which:

- Figure 1 is a longitudinal section, in elevation view, through a delivery nozzle containing the variation device according to the present invention;
- Figure 2 shows, on a larger scale, the device illustrated in Figure 1 in a first limit position where the endless screw is engaged with the gear wheel;
- Figure 3 is a figure similar to Figure 2 with the device shown in a second limit position where the endless screw is disengaged from the gear wheel;
- Figure 4 is a partial cross-section through the variation device, showing the closing member arranged in the closed position;
- Figure 5 is a partial cross-section through the variation device along the propeller itself.

In Figure 1, 10 denotes overall a delivery nozzle fixed, in a manner known per se, to a wall 12 of a hydromassage bath.

The nozzle 10 comprises a body 14, the interior of which is connected to a water supply pipe 16 and an air supply pipe 18. The body 14 has moreover housed inside it a Venturi tube device, denoted overall by 20, for mixing the water and the air supplied by the respective pipes, thus forming a hydromassage jet which emerges from the nozzle 10.

The nozzle 10 further comprises a discharge valve 22 arranged on the bottom of the body 14 and actuated by an opening device 23 so as to allow emptying of the hydromassage system once the bath has been completed. For more details about this device, reference should be made to the patent application filed on 4 March 1994 in the name of the same Applicant.

If we now consider the subject of the invention, it can be noted that the nozzle 10 comprises a device for regulating the water flow, denoted overall by 24 and more clearly illustrated in Figures 2 and 3 to which specific reference shall be made in the remainder of the present description.

The device 24 comprises a substantially cylindrical body 26 housed inside a seat 28 formed in the body 14 of the nozzle 10. The free end of the seat 28 of the nozzle

10 is fixed to the water supply pipe 16 by means known per se and denoted overall by 29. Consequently the cylindrical body 26 places the interior of the body 14 of the nozzle 10 in communication with the water supply pipe 16.

The cylindrical body 26 has a closing member 30 rotatably housed inside it by means of a pin 32 arranged along a transverse axis of the body itself, the function of which is to make the water jet emerge from the nozzle in a pulsating manner. The closing member 30 comprises two lugs 34, 36 which extend on opposite sides of the pin 32; with regard to the design of the lugs 34, 36, however, reference should be made to the description which follows.

For operation of the closing member 30, the device 24 comprises a propeller 38, the axis of which is substantially parallel to the longitudinal axis of the cylindrical body 26 and which is kinematically connected to the closing member 30 by means of a mechanism 40.

The mechanism 40 comprises an endless screw 42 meshing with a helical gear wheel 44. The screw 42 has longitudinally opposite ends 42a, 42b. The end 42a is supported by a bearing 43 housed in a suitable seat formed in a cross-piece 45 arranged transversely with respect to the cylindrical body 26; furthermore, in the vicinity of the same end 42a, the screw 42 is coaxially connected to the propeller 38. The gear wheel 44 is instead coupled to the screw in the vicinity of the end 42b and is coaxially connected to the closing member 30. The device 24 comprises an engaging and support member 46 having the function of supporting and displacing the end 42b of the endless screw 42 between a first and a second limit position, illustrated in Figures 2 and 3, in which, respectively, the endless screw 42 meshes with the helical gear 44 and in which the said screw is disengaged from the gear 44.

In the first limit position (Figure 2), in the presence of a water flow, the propeller 38 and the closing member 30 rotate and hence a water jet with a pulsating intensity is formed, while in the second limit position (Figure 3) the closing member 30 does not rotate and the jet has a constant intensity.

More specifically, the engaging member 46 comprises a sliding component 48 extending along a transverse axis of the cylindrical body 26 and perpendicularly with respect to the axis of the helical gear 44. The end of the sliding component 48 inside the cylindrical body 26 is fixed to a rod 50 which houses a bearing 52 for supporting the end 42b of the endless screw 42, while the opposite end of the sliding component 48 projects outside the seat 28 of the nozzle 10 and is bent in an "L" shape so as to facilitate manual displacement thereof by the user.

The rod 50 is integral with a bar 51 sliding in a guide 53 formed in the seat 28 of the nozzle 10 having the function of facilitating displacement of the engaging member 46 from one limit position to the other.

The sliding component 48 is provided with two notches 54, 56 into which, in each of the aforementioned limit positions, a projection 58 provided in the seat 28 of the nozzle 10 engages, thus making it easier for the user to recognize the two limit positions.

In order to facilitate the return movement of the engaging member 46 from the first limit position where the endless screw 42 is in mutual engagement with the helical gear 44 into the second limit position where the screw 42 is disengaged from the gear 44, a spring 60 is provided in between the rod 50 and the cylindrical body 26. In the limit position where the screw 42 and gear 44 are engaged with each other (see Figure 2), the spring 54 is compressed, thus facilitating displacement of the screw 42 from the first limit position into the second limit position.

In order to allow the endless screw 42 to oscillate about the bearing 43 so as to be able to pass from one limit position to the other, the bearings 43 and 52 which respectively support the two ends 42a, 42b of the screw 42 are bearings of the self-aligning type.

From Figure 4 it can be noted that the two lugs 34 and 36 of the closing member 30 have a semi-circular shape without the central portion in that rotation thereof must not interfere with the endless screw 42, with the helical gear 44 and with a recess 62 of the cylindrical body 26 arranged on the opposite side of the screw 42 with respect to the wheel 44. Moreover, the surface area of the two lugs 34, 36 is different such that the resultant force of the pressures acting on them is different. Consequently, when the endless screw 42 is in engagement with the helical gear 44, the resultant force generates a moment which causes the closing member 30 to rotate; when, on the other hand, the screw 42 is disengaged from the wheel 44, the resultant force causes the two lugs 34, 36 to be arranged parallel to the direction of the water flow so that the closing member 30 interferes with the water flow as little as possible.

Finally, from Figure 5 it can be noted that the propeller 38 comprises four blades 64.

Operation of the device, which is per se evident on the basis of what has been said above, is as follows:

Starting from the first limit position where the endless screw 42 is disengaged from the wheel 44 (Figure 3), lowering the sliding component 48 and hence also the rod 5 causes lowering of the end 42b of the screw 42 and hence engagement of the same with the helical gear 44. If the supply pump is operating, the water flow which passes through the cylindrical body 26 causes rotation of the propeller 38 and, in succession, the screw 42, the wheel 44 and the closing member 30. Consequently the quantity of water which passes through the device 24 and which emerges from the nozzle 10 varies cyclically from a maximum value, in the situation where the vanes 34, 36 of the closing member 30 are arranged parallel to the direction of the flow, to a minimum value, in the situation where the said vanes are arranged transversely with respect to the direction of the flow. Obviously, when the endless screw 42 is disengaged from the wheel 44, the closing member 30 is arranged, as already explained

above, parallel to the direction of the flow, so that the jet emerging from the nozzle has a constant intensity.

Finally, it is obvious that functionally or conceptually equivalent modifications or variations fall within the protective scope of the present invention.

Claims

1. Device for cyclically varying the water flow for delivery nozzles of hydromassage baths, of the type comprising a closing member (30) housed inside a substantially cylindrical body (26) located in a seat (28) of a delivery nozzle (10), said body (26) being designed to place the interior of the delivery nozzle (10) in communication with the water supply pipe (16), characterized in that said closing member (30) is rotatable and is kinematically connected to driving means (38) actuated in conjunction with the water flow such that, when there is a variation in its position with respect to the direction of the flow, the quantity of water delivered by the nozzle (10) varies cyclically.

2. Device according to Claim 1, characterized in that said driving means (38) are arranged inside the cylindrical body (26) and are actuated by the water flow.

3. Device according to Claim 2, characterized in that said driving means comprise at least one propeller (38) designed to be connected to the closing member (30) via transmission means (42, 44).

4. Device according to Claim 3, characterized in that there is only one said propeller (38) and said transmission means consist of a mechanism (40) comprising an endless screw (42) and a gear wheel (44).

5. Device according to Claim 4, characterized in that the propeller (38) is connected to the endless screw (44) and the closing member (30) is connected to the gear wheel (44).

6. Device according to Claim 5, characterized in that it comprises an engaging member (46) designed to displace the endless screw (42) from a first limit position where the screw (42) engages with the wheel (44) and a second limit position where the screw (42) is disengaged from the wheel (44).

7. Device according to Claim 6, characterized in that said engaging member (46) consists of a sliding component (48) which is designed to support, at one of its ends, one end (42b) of the endless screw (42) and the opposite end of which emerges from the seat (28) of the nozzle (10) and can be operated manually so as to be able to displace the screw (42) from one limit position to the other.

8. Device according to Claim 7, characterized in that said endless screw (42) is supported at one end (42a) by a cross-piece (45) arranged transversely inside the cylndrical body (26).

9. Device according to Claim 7 or 8, characterized in that the endless screw (42) is supported at its two ends (42a, 42b) respectively by means of self-aligning bearings (43, 52) which allow the said screw to oscillate about the bearing (43) in order to pass from one limit position to the other.

10. Device according to any one of Claims 7 to 8, characterized in that the sliding component (48) or the seat (28) of the nozzle (10) is provided with two notches (54, 56) while the other of said sliding component (48) or seat (28) is provided with a projection (58) so that, in the two limit positions, the projection (58) engages in one of the two notches (54, 56).

11. Device according to any one of the preceding Claims 4 to 10, characterized in that said gear wheel (44) is of the helical type.

12. Device according to any one of the preceding claims, characterized in that said closing member (30) comprises at least one lug (34) pivotably hinged along the transverse axis of the cylindrical body (26).

13. Device according to Claim 12, characterized in that said closing member (30) comprises two lugs (34, 36) extending on opposite sides with respect to the axis of the closing member (30).

14. Device according to Claim 13, characterized in that said two lugs (34, 36) have a different superficial area such that the thrust produced on each lug by the water flow is different.

15. Device according to Claim 13 or 14, characterized in that said two lugs (34, 36) have a substantially semi-circular shape.

16. Device according to Claim 15, characterized in that said two lugs (34, 36) have, in the central portion and extending from the peripheral edge, a recess so that rotation of the closing member (30) does not interfere with the endless screw (42) and the gear wheel (44).

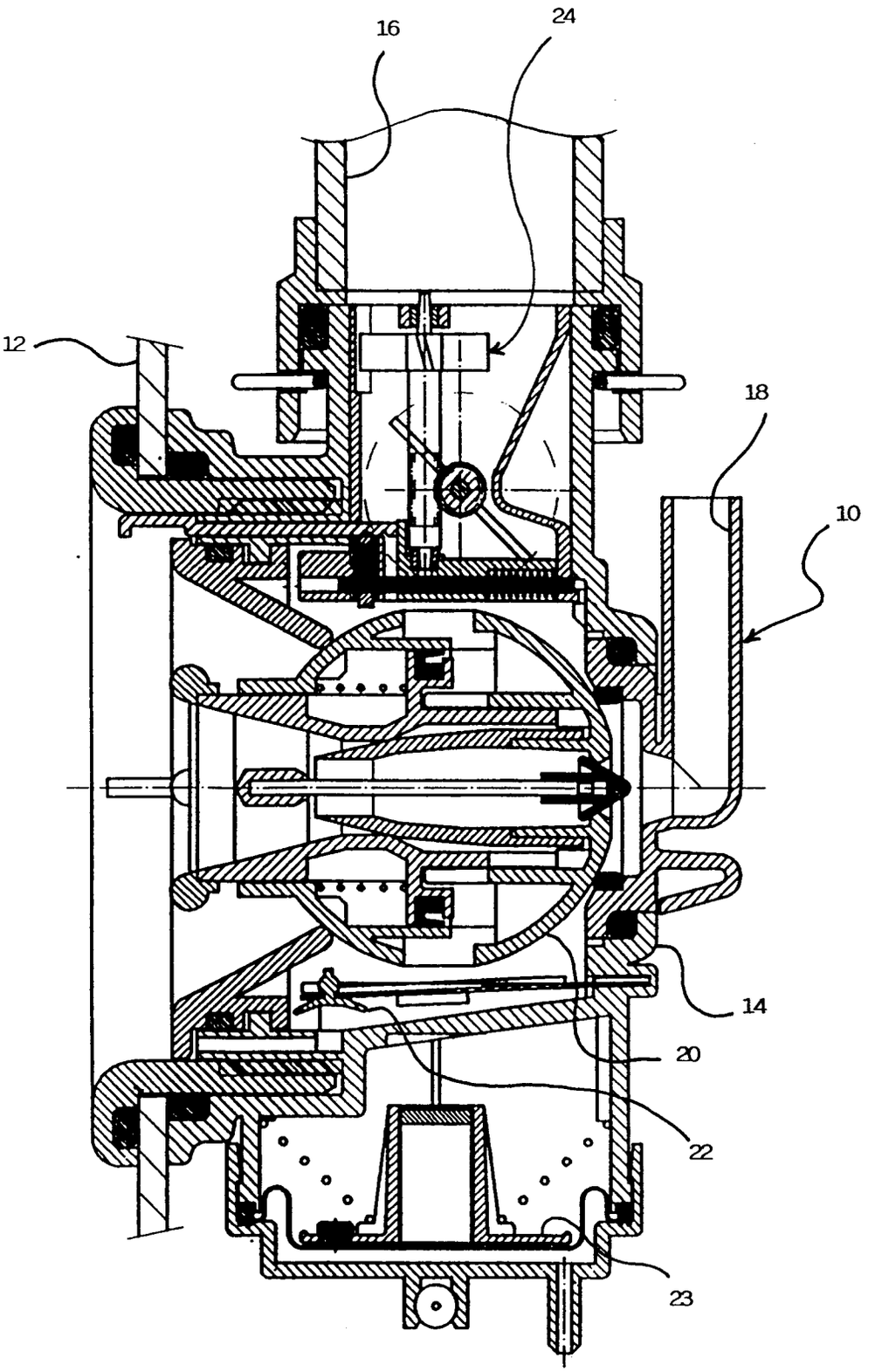

FIG. 1

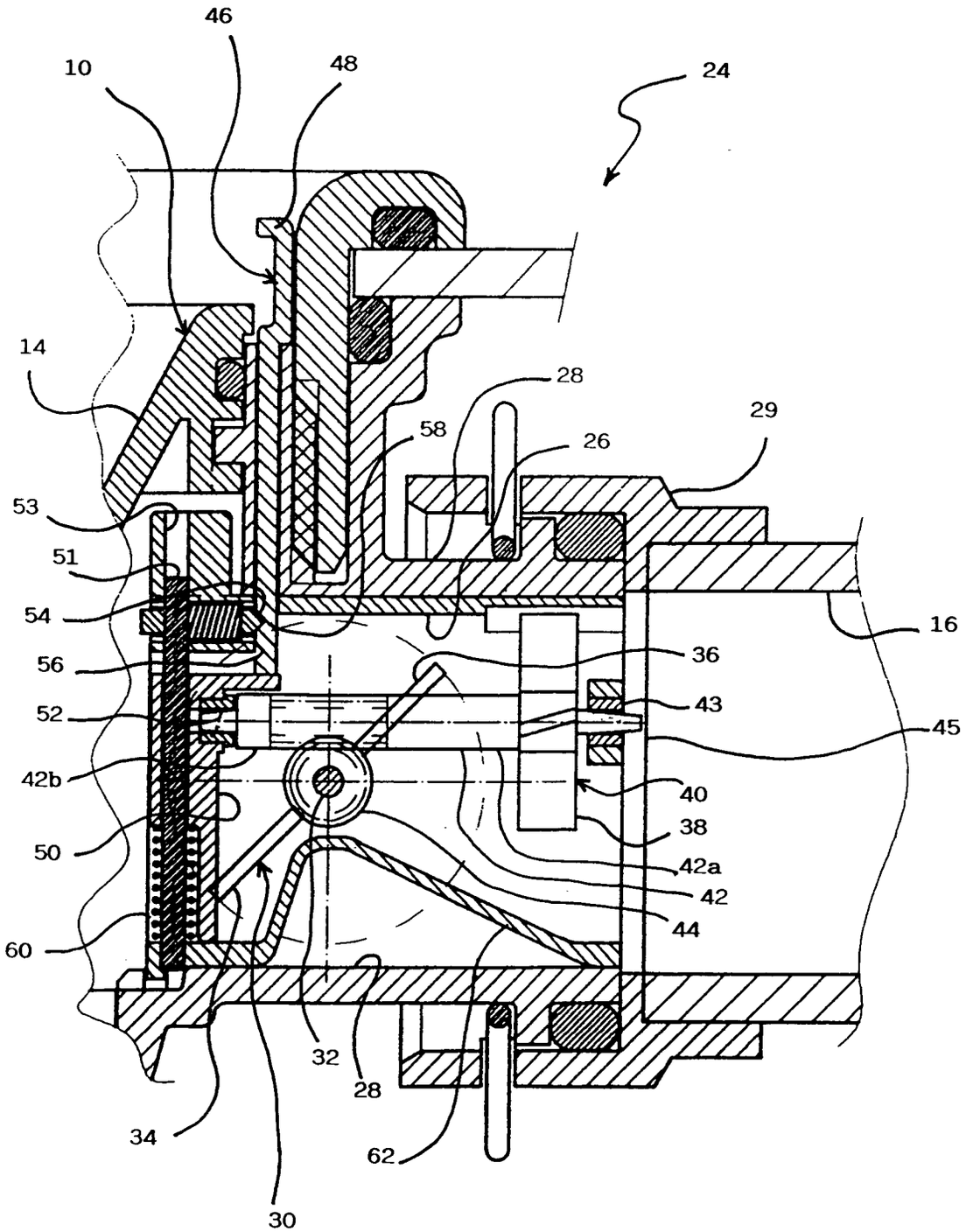
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FIG. 2

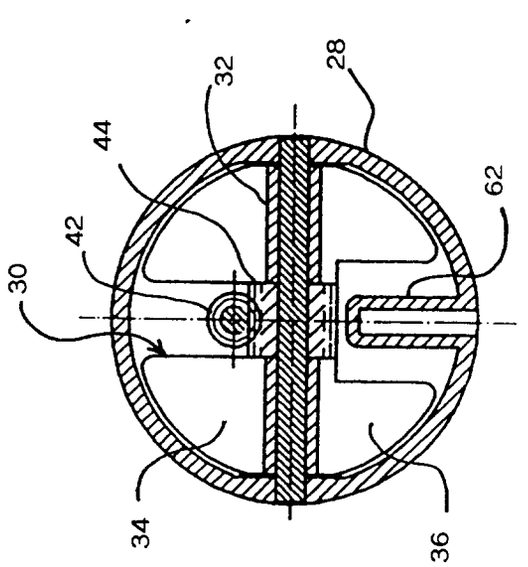

FIG. 4

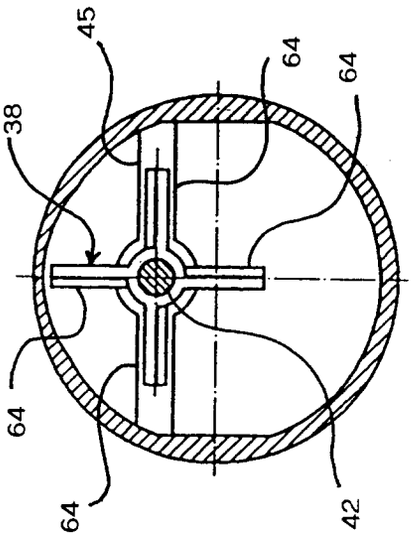

FIG. 5

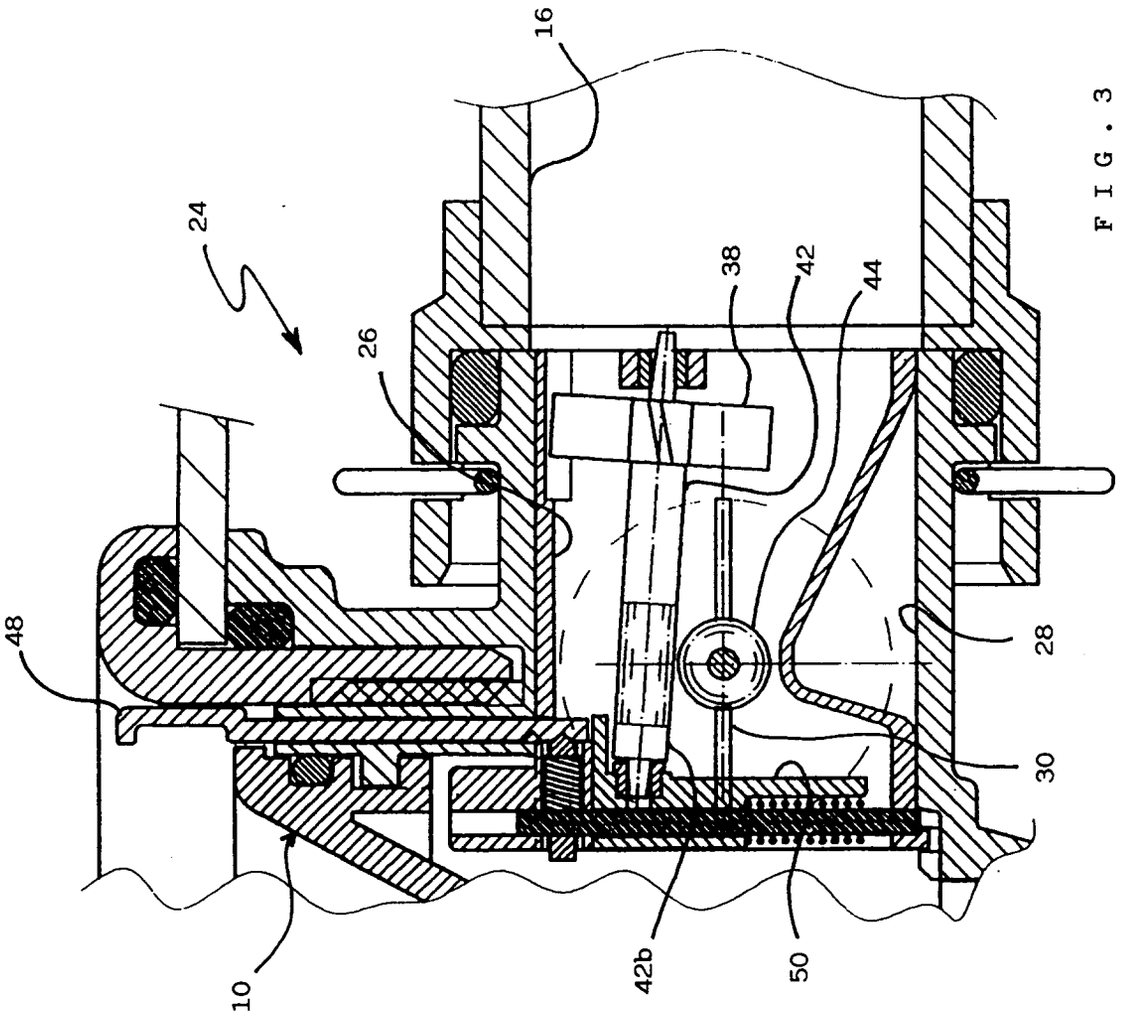

FIG. 3