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(54) Assembly for the regulation the quantity of regeneration salt taken from the salt tank of the decalcifier of a washing machine

(57) Assembly for the regulation of the quantity of regeneration salt which has to be removed by regeneration water from the salt tank (5) of the decalcifier (1) of a washing machine, comprising a part (17) for distribution of the regeneration water between at least a first (19) and a second (21) conduit of the decalcifier (1), of which conduits (19, 21) at least one (19) leads to removing of the regeneration salt, said distribution part (17) comprising a rotating gate valve (23) capable of adjusting the apertures for outflow of said regeneration water towards said conduits (19, 21), a small rod (25) for driving rotation of the gate valve (23) and an element (27) for selecting the required distribution of regeneration water attached to the end of the drive rod (25) opposite the gate valve (23), wherein said distribution part (17) is provided horizontally at the internal side of the upper covering wall of the salt tank (5).

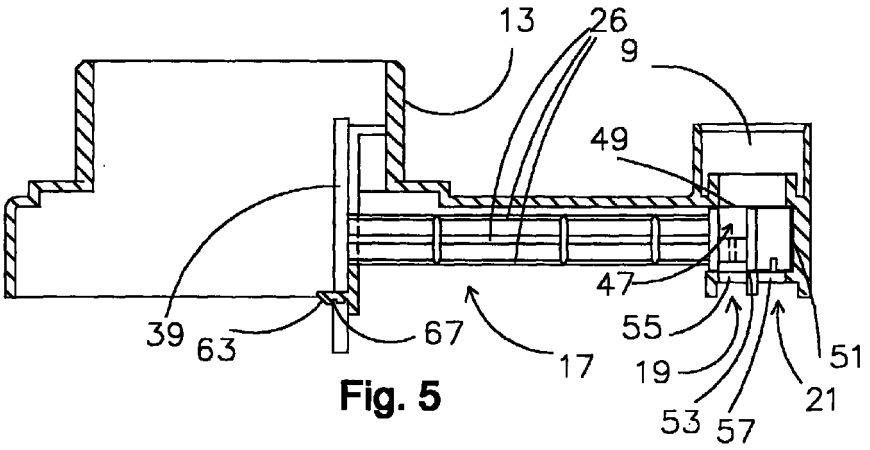

Fig. 5

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Description

[0001] The present invention relates to an assembly for the regulation of the quantity of regeneration salt to be taken from the salt tank of the decalcifier of a washing machine.

[0002] A decalcifier for washing machines of the known type comprises a tank for the ion exchanging resins for softening the washing water and a tank for the salt for regenerating the ion exchanging resins, communicating through the opening of a regeneration solenoid valve.

[0003] So as to regenerate the resins the salt is removed at opening of the regeneration solenoid valve by regeneration water taken from the water supplying the washing tub and accumulated in a special dispenser receptacle.

[0004] Given that the hardness of the washing water varies according to the water supply system from which it is taken, it is necessary to be able to regulate the quantity of regeneration salt to be removed in order to avoid unnecessary waste.

[0005] According to a known system for the regulation of the removal of salt from the decalcifier, the regeneration water is distributed between two or more conduits inside the salt tank and outflowing at a predetermined distance from the inlet section of the resins tank, so that for greater distances the regeneration water succeeds in removing increasing quantities of salt.

[0006] According to another system traditionally adopted, the removal of the salt can be controlled by sending only a part of the regeneration water for removal from the salt tank, while the remaining part is channelled directly towards the resins tank and is used for diluting the brine removed from the salt tank.

[0007] In both cases the regeneration water is distributed via a distribution part formed by a small vertical rotating rod whose lower shaped end forms on the bottom of the salt tank a gate valve which intercepts and conveys the regeneration water towards the conduit selected.

[0008] For the selection of a conduit the upper end of the small rod, situated in the area enclosed by the salt filler, is formed by an indicator plate provided with a notch for inserting the tip of a screwdriver or the like, capable of orientating the indicator plate itself in the various angular positions corresponding to the opening of each of the exit ways of the gate valve.

[0009] A disadvantage which occurs in traditional systems consists in the fact that the diameter of the rod must by very limited in order not to obstruct the operation of filling the salt through the relative filler.

[0010] The indicator plate, arranged horizontally, must also necessarily be small, therefore becoming accessible with difficulty for the operations both of simple reading and selection by the user.

[0011] The need for reduced transverse overall dimensions for the distribution part does not allow a free choice of the dimension and number of outflow apertures of the gate valve, reducing versatility of the distribution system.

[0012] Since the gate valve is immersed in the brine on the base of the salt tank, it is usually necessary to provide the distribution part with a small rubber part which creates a perfect seal between the gate valve and the conduits supplied thereby.

[0013] The rubber seal part increases the complexity of the system and has a significant effect on its overall cost as regards the distribution part.

[0014] Finally, in traditional systems of the type described above, the welding of the two half parts forming the decalcifier is in general also used to restrain the rod in the correct position inside the salt tank.

[0015] This complicates control of the operation of welding of the decalcifier which has to be performed with extreme precision if correct operation of the distribution part is not to be jeopardised.

[0016] The object of the present invention is that of providing an assembly for the regulation of the quantity of regeneration salt to be taken from the salt tank of the decalcifier of a washing machine which avoids the disadvantages suffered in a traditional system.

[0017] In particular one object of the present invention is that of providing an assembly for regulation of the quantity of regeneration salt to be taken from the salt tank of the decalcifier of a washing machine which is easily accessible and visible from outside the decalcifier without obstructing loading of the salt from the filler of the relative tank.

[0018] Another object of the present invention is that of providing an assembly for the regulation of the quantity of regeneration salt to be removed from the salt tank of the decalcifier of a washing machine formed by a small number of parts so as to be simple and inexpensive.

[0019] Yet another object of the present invention is that of providing an assembly for the regulation of the quantity of regeneration salt to be removed from the salt tank of the decalcifier of a washing machine which can be adapted with flexibility to various working conditions.

[0020] Another object again of the present invention is that of providing an assembly for the regulation of the quantity of regeneration salt to be removed from the salt tank of the decalcifier of a washing machine which can be positioned in the decalcifier with care and without complicating assembling of the same decalcifier.

[0021] These objects are achieved by providing an assembly for the regulation of the quantity of regeneration salt to be removed via regeneration water from the salt tank of the decalcifier of a washing machine for the regeneration of the ion exchanging resins contained in the resins tank of the decalcifier, comprising a part for the distribution of regeneration water between at least a first and a second conduit of the decalcifier, of which conduits at least one leads to removal of the regenera-

tion salt, said distribution part comprising a rotating gate valve capable of adjusting the apertures for outflow of said regeneration water towards said conduits, a rod for driving rotation of the gate valve, and a selector of the required distribution of regeneration water attached to the end of the drive rod opposite the gate valve, characterised in that said distribution part is arranged horizontally in the salt tank with the rod provided at the internal side of the upper covering wall of the salt tank and with the selector provided at the internal side wall of the salt tank filler.

[0022] The horizontal orientation of the distribution part advantageously allows the possibility of placing the drive rod of the gate valve outside of the space of the salt tank underneath the relative filler in such a way that there are no obstacles to loading the salt.

[0023] The drive rod and the gate valve which can be actuated thereby can consequently be dimensioned as required in such a way as to achieve regulation which can be set with versatility for several conditions of salt removal.

[0024] The selector is preferably formed by a wheel coaxial to the rod so as to have a large diameter without penalising the passage of the salt from the filler towards the base of the relative tank.

[0025] The selection wheel is thus fully visible and provides a clearly legible indication from the outside of the decalcifier to the user who has removed the plug from the filler of the salt tank, at the same time offering the further advantage of being able to be actuated directly by hand.

[0026] The distribution part is inserted in the upper part of the salt tank, where the regeneration water still has such a head as to guide it vertically downwards through the gate valve without axial overflows, and therefore makes the use of a rubber seal part on the body of the gate valve superfluous.

[0027] By saving the rubber part a reduction in the complexity and cost of the distribution part is achieved.

[0028] Other advantages of the present invention will be made clearer on reading the following description of a preferred embodiment which refers to the accompanying drawings in which:

Fig. 1 shows schematically the decalcifier-regeneration dispenser receptacle assembly of a washing machine;

Fig. 2 shows a side elevation enlargement of the distribution part of the present invention;

Fig. 3 is a section of the distribution part seen from line 3-3 of Fig. 2;

Fig. 4 is a section of the distribution part seen from line 4-4 of Fig. 2;

Fig. 5 is a sectioned and enlarged side elevation view of the upper half part of the tank comprising the distribution part of the present invention; and

Fig. 6 is a sectioned and enlarged front view of only the seat for housing the distribution part of the present invention.

[0029] In Fig. 1 the decalcifier 1 of a washing machine is composed of an ions exchanging resins tank 3 and of a salt tank 5 communicating via a regeneration solenoid valve (not shown).

[0030] On the decalcifier 1 a regeneration dispenser receptacle 11 is positioned whose base has a special mouth 2 for the inflow of water coming from an external water supply source. Part of this water is intended to be sent directly towards the resins tank 3 so as to be softened before being fed into the washing tub, while the remaining part is accumulated temporarily in a special compartment of the dispenser receptacle 11 in such a way as to be able to be fed, following energisation of the regeneration solenoid valve, towards the salt tank 5 for removal of the regeneration salt.

[0031] The resins tank 3 has, on the upper covering part, a mouth 7 which can be coupled to a pin 7', mounted on the base of the regeneration dispenser receptacle 11, wherefrom it receives the washing water to be softened, and on the lower part a mouth (not shown) which feeds the softened washing water into the washing tub.

[0032] The salt tank 5 has, on the upper covering part, a mouth 9 which can be coupled to a pin 9', mounted on the base of the regeneration dispenser receptacle 11, wherefrom it receives the regeneration water temporarily accumulated in the dispenser receptacle 11 itself, and a filler 13 fitted with a plug 15 for loading the salt.

[0033] As can be seen in particular from Fig. 5, for the regulation of the quantity of salt to be removed for regeneration of the resins a part 17 is provided which is attached at the upper covering wall of the salt tank 5 and which distributes the regeneration water between two conduits whose inlet section alone is shown in Fig. 5 with the reference numerals 19 and 21 respectively.

[0034] In the case in question the conduit 19 carries the regeneration water which traverses it for removal of the salt contained in the salt tank 5, while the other conduit 21 returns the regeneration water which traverses it to the resins tank 3 so as to dilute the brine removed by the regeneration water which has traversed the conduit 19.

[0035] Alternatively it can be foreseen that both conduits carry the regeneration water which traverses them for removal of the salt, and in this case the point of outflow of the two conduits on the base of the salt tank 5 should occur at a distance different from the inlet section of the resins tank 3.

[0036] The distribution part 17, as is also clear from the remaining figures, is formed by a rotating gate valve

23 which intercepts the regeneration water coming from the mouth 9 to then distribute it to the conduits 19 and 21, by a rod 25 with circular plan for driving the gate valve 23 and by a selector 27 of actuation of the drive rod 25.

[0037] The body of the rod 25 is formed by axial ribs 26 capable of opposing the deforming stresses of a thermal origin which intervene during the process of moulding, while at the rear base of the rod 25 a first solid disk 50 is formed and wherefrom the gate valve 23 extends axially and is in turn formed by two baffles 29 and 31 orientated perpendicularly one in relation to the other and joined by the interposition of a second disk 33 of identical shape and size to the first disk 50.

[0038] The first disk 50 is centred on the rear base of the rod 25 and in relation thereto has a slightly larger diameter.

[0039] The first baffle 29 projects axially from a section of the first disk 50 formed by imagining intersecting said disk 50 with two parallel planes perpendicular thereto, one of which planes passes from a diameter thereof.

[0040] Similarly the second baffle 31 projects axially from a section of the second disk 33 formed by imagining intersecting said disk 33 with two parallel planes perpendicular thereto, one of which planes passes from a diameter thereof.

[0041] The two disks 33 and 50 have the main task of preventing the regeneration water which traverses the gate valve 23 vertically from succeeding in overflowing axially.

[0042] Perpendicularly to the lateral edge of each baffle 29 and 31 respectively a slot 35 and 37 respectively is formed which, as we will see, forms a section for controlled passage of the regeneration water.

[0043] The selector 27 is formed by a selection wheel 39 mounted coaxially on the other end of the rod 25.

[0044] Along a circumference of the body of the selection wheel 39 an arched track 41 is formed, having an angular opening of 90°.

[0045] The track 41 passes through the thickness of the wheel 39 and its radially external edge forms four notches 43, angularly equidistant, to each of which a numerical impression 45, in a diametrically opposed point of the wheel 39, corresponds.

[0046] Finally the external edge of the wheel 39, in the sections between two successive numerical impressions 45, is knurled.

[0047] The distribution part 17 is inserted in a special seat formed on the internal side of the upper covering wall of the salt tank 5.

[0048] The distribution part 17 is supported by a U-shaped bracket 59 attached vertically near the internal side wall of the salt filler 13 so as to support, with its internal arched part 61, the front end of the rod 25, and by a seat 47 for engaging the gate valve 23 co-operating with the bracket 59 so as to support the distribution part 17 in a horizontal position.

[0049] Given that the selector lies in a vertical plane, the wheel can be provided with a large diameter, 5 cm here, without obstructing loading of the salt and at the same time being accessible and fully visible from outside the salt tank 5.

[0050] The engaging seat 47, also prolonging from the internal side of the upper wall of the salt tank 5, comprises an upper wall 49, a front wall 51 and a lower wall 53.

[0051] The seat 47 is shaped internally in such a way as to allow axial engaging and support during rotation of the gate valve 23 and therefore has a circular front aperture with diameter equal to the diameter of the disks 33 and 50.

[0052] The external side of the upper wall 49 opens upwards so as to form the mouth 9 for feeding the regeneration water to the gate valve 23, while in the lower wall 53 two openings 55 and 57 respectively, vertically aligned with a corresponding interception element 29 and 31 respectively, are capable of receiving the regeneration water from the outflow apertures of the gate valve 23 in such a way as to feed the inlet sections of the conduits 19 and 21 respectively.

[0053] The front wall 51 forms instead a striking surface for the rear base of the second baffle 31 of the gate valve 23.

[0054] In order to prevent the distribution part 17 from sliding axially in relation to the bracket 59 and to the seat 47, the front surface of the arched part 61 of the bracket 59 is provided with an element which can be engaged with the distribution part 17 itself.

[0055] In particularly a small tooth 63 is thus provided which can be snap-inserted in the track 41 of the selection wheel 27.

[0056] The selection wheel 27 is thus blocked in the groove 67 defined by the small tooth 63 and the axial translation of the distribution part 17 is prevented.

[0057] The rotation of the distribution part 17 is however permitted by the sliding of the small tooth 63 along the track 41.

[0058] The small tooth 63 also serves to indicate the obtaining of a selection set by the user, achieved when it reaches one of the angular positions of the track 41 occupied by the notches 43.

[0059] Advantageously the distribution part 17 is already supported in the correct working position by the upper cover of the decalcifier before the two half parts of the decalcifier are thermally welded one to the other. Thermal welding of the decalcifier does not play an active role in positioning of the distribution part 17 and can therefore be performed in an extremely random manner.

[0060] Operation of the assembly for the regulation of the quantity of regeneration salt to be removed from the decalcifier in accordance with the present invention can be inferred clearly from the accompanying drawings, and involves manual setting by the user by means

of the wheel 39 for selection of the required operating condition.

[0061] When a finger of the user acts on a knurled edge of the selector 27, the selection wheel 39 drives the drive rod 25 which in turn rotates the gate valve 23 supported rotatingly in its engaging seat 47, while the small tooth 63 traverses the track 41 until it stops on the notch 43 corresponding to the numerical impression of the required selection.

[0062] The operating conditions permitted in the present preferred embodiment are four.

[0063] By setting the selection wheel 39 at the numerical value "1", the baffle 29 is in a horizontal position while the baffle 31 is in a vertical position. On opening of the regeneration solenoid valve the regeneration water which, from the mouth 9, enters the salt tank 5 and finds the baffle 31 in the position which allows maximum outflow of water towards the underlying conduit 21, while the baffle 29 completely blocks the passage of the regeneration water towards the underlying conduit 19, with the exception of the slot 35 which allows a controlled passage of regeneration water.

[0064] The rate of flow of regeneration water through the controlled passage is defined with extreme precision by the dimensions of the slot. By way of an example, in the present invention, the controlled passage has an area of 4.5 mm^2 compared to an area of 100 mm^2 approximately of the relative baffles 19 and 21.

[0065] This setting of the selector 39 is very suitable for the case of regeneration of resins for very low hardness of the washing water, given that it performs minimum withdrawal of salt from the salt tank 5, diverting most of the regeneration water towards the resins tank 3 for the dilution of the salt removed from the salt tank 5.

[0066] The opposite situation occurs when the selection wheel is rotated through 90° in relation to the previous setting, moving onto the numerical value "4". In this case the baffle 29 is in a vertical position while the baffle 31 is in a horizontal position. On opening of the regeneration solenoid valve the regeneration water which, from the mouth 9, enters the salt tank 5 and finds the baffle 29 in the position which allows maximum outflow of water towards the underlying conduit 19, while the baffle 31 blocks completely the passage of the regeneration water towards the underlying conduit 21, with the exception of the slot 37 which allows controlled passage of regeneration water.

[0067] This setting of the selector 39 is very suitable for the case of regeneration of resins for very high hardness of the washing water, given that it performs maximum withdrawal of salt from the salt tank 5, diverting the minimum part of regeneration water towards the resins tank 3 for dilution of the salt removed from the salt tank 5.

[0068] The settings "2" and "3" of the selection wheel 39 refer to an intermediate operating condition between the two now shown for regeneration with average hardness values of the washing water. In this case the slant of the two baffles 29 and 31 regulates the amplitude of the passage apertures of the gate valve 23 in such a way that at setting "2" a greater quantity of regeneration water reaches the conduit 21, and at setting "3" a greater quantity of regeneration water reaches the conduit 19.

[0069] Clearly the present invention may undergo various changes without thereby departing from the general principle claimed.

[0070] In particular the distribution part, due to the very fact of being positioned in such a way as not to interfere substantially with the salt tank filler, can provide a gate valve formed by a higher number of interception elements than that illustrated hitherto for feeding a corresponding higher number of conduits of the decalcifier and obtaining distribution of regeneration water which is even more flexibly adaptable to the various working conditions.

Claims

1. An assembly for the regulation of the quantity of regeneration salt to be removed by means of regeneration water from the salt tank (5) of the decalcifier (1) of a washing machine for the regeneration of the ions exchanging resins contained in the resins tank (3) of the decalcifier (1), comprising a part (17) for the distribution of the regeneration water between a first (19) and at least a second (21) conduit of the decalcifier (1), of which conduits (19, 21) at least one (19) leads to withdrawal of the regeneration salt, said distribution part (17) comprising a rotating gate valve (23) capable of adjusting the apertures of outflow of said regeneration water towards said conduits (19, 21), and a rod (25) for driving rotation of the gate valve (23), said gate valve (23) extending axially from one end of said drive rod (25), and a selector (27) for setting the required distribution of regeneration water attached to the other end of the drive rod (25), characterised in that said distribution part (17) is arranged horizontally in the salt tank (5) with the rod (25) provided at the internal side of the upper covering wall of the salt tank (5) and with the selector (27) provided at the internal side wall of the salt tank filler (13).

2. An assembly according to claim 1, characterised in that said selector (27) is in the form of a selection wheel (39) mounted coaxially to the drive rod (25).

3. An assembly according to any one of the previous claims, characterised in that said gate valve (23) comprises in axial succession a first (29) and respectively at least a second (31) element for interception of the regeneration water associated with said first (19) and respectively at least a second (21) conduit of the decalcifier (1) and rotating

around the axis of the rod (25) with a predetermined angle one in relation to the other.

4. An assembly according to the previous claim, characterised in that adjacent interception elements (29, 31) are in the form of flat baffles (29, 31) joined by the interposition of a corresponding separation element (50, 33) in such a way as to prevent the regeneration water from overflowing axially from one to the other.

5. An assembly according to any one of the previous claims, characterised in that said rod (25) has a circular plan and is formed by axial ribs (26) capable of opposing the deforming stresses of a thermal origin which intervene during the process of moulding of the rod (25).

6. An assembly according to the previous claim, characterised in that the rear base of the rod (25) and the interception element (29) adjacent thereto are joined with the interposition of a corresponding element of separation (50) in such a way as to prevent the regeneration water from overflowing axially from the gate valve (23) to the rod (25).

7. An assembly according to any one of claims 4 to 6, characterised in that each of said separation elements (50, 33) has the shape of a solid disk with a diameter no smaller than the diameter of the rod (25) and coaxial to the rod (25), while each of said interception baffles (29, 31) projects axially from a section of said disk (50, 33) formed by intersecting said disk (50, 33) with two parallel planes perpendicular thereto, one of which passing through one of its diameters.

8. An assembly according to any one of claims 4 to 7, characterised in that said first and at least a second interception element (29, 31) are orientated perpendicularly one in relation to the other.

9. An assembly according to any one of claims 4 to 8, characterised in that an opening is provided through the thickness of each of said interception elements (29, 31) in such a way as to allow controlled passage of the regeneration water.

10. An assembly according to the previous claim, characterised in that said opening has the shape of a slot (35, 37) formed perpendicularly to the side edge of the interception element.

11. An assembly according to any one of the previous claims, wherein the salt tank (5) comprises a filler (13) for loading the salt and a mouth for feeding the regeneration water, characterised in that it provides first means of supporting the distribution part (17) on the internal side of the upper covering wall of the salt tank (5) vertically aligned below the mouth for feeding regeneration water, and second means for supporting the distribution part (17) on the internal wall of the filler (13) of the salt tank (5).

12. An assembly according to the previous claim, characterised in that said first means comprise a vertical U-shaped bracket (59) attached cantilevered to the internal wall of the filler (13) of the salt tank (5) in such a way as to support with its arched part the end of the rod (25) on the side of the selector (27).

13. An assembly according to any claim 11 and 12, characterised in that said second support means are in the form of a seat (47) for axial engaging of the gate valve (23).

14. An assembly according to the previous claim, characterised in that said axial engaging seat (47) defines internally a circular engaging area having a diameter equal to the diameter of said separation elements (50, 33).

15. An assembly according to any claim 13 and 14, characterised in that said engaging seat (47) comprises an upper wall (49) formed by said mouth for feeding regeneration water into the salt tank (5), communicating with the gate valve (23), a rear wall (51) which acts as a stop surface for the gate valve (23) in the position of engaging in the relevant seat (47), and a lower wall (53) provided with a first (55) and at least a second (57) opening vertically aligned with a corresponding one of said interception elements (29, 31) so as to send the water received from the gate valve (23) towards a corresponding one of said conduits (19,21) of the decalcifier (1).

16. An assembly according to any claim 11 to 15, characterised in that said first support means and said selector comprise means which can be reciprocally engaged to lock axial sliding of the rod (25) without preventing its rotation.

17. An assembly according to the previous claim, characterised in that said reciprocally engagable means are in the form of a small tooth (63) extending from the front surface of the U-shaped bracket (59) and of an arched track (41) formed through the thickness of the selector (27), said tooth (63) defining a groove which can be slidingly snap-hooked on an arched edge of said track (41).

18. An assembly according to the previous claim, wherein the front surface of the selection wheel (39) provides a series of angularly spaced impressions (43), each of which corresponds to a working condi-

tion which can be selected by the user, characterised in that a working condition is selected when the tooth (63) reaches a position diametrically opposite the impression (43) corresponding to the chosen working condition.

19. An assembly according to any one of claims 8 to 18, characterised in that four different working conditions are provided which can be obtained by rotating the selector (27) by steps of 300, with the first working condition corresponding to a vertical arrangement of an interception element (31) and horizontal of the other interception element (29).

20. An assembly according to any one of the previous claims, characterised in that the selector (27) can be actuated manually by the user.

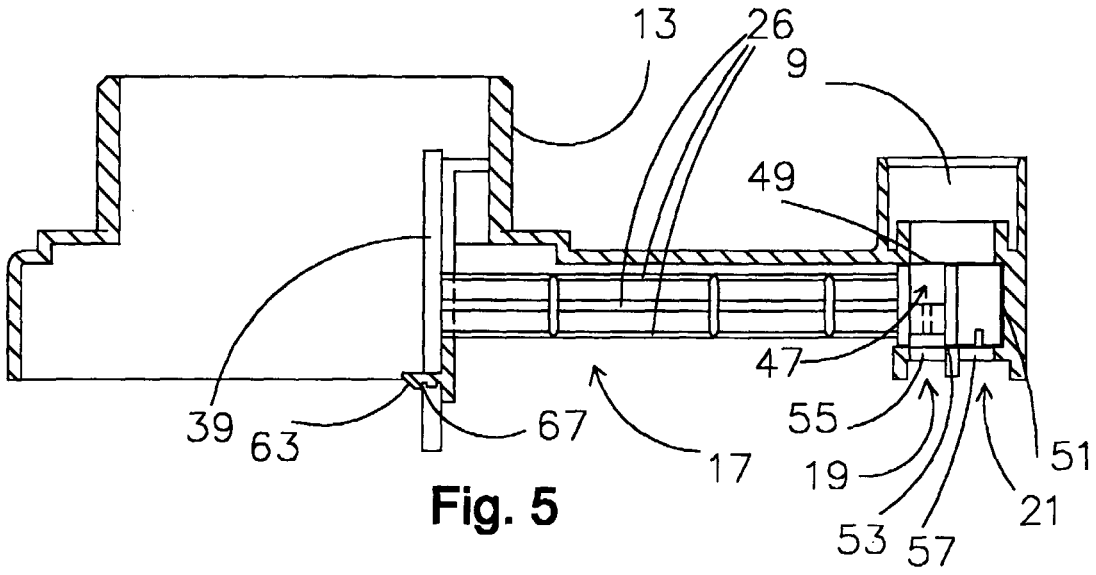

Fig. 5

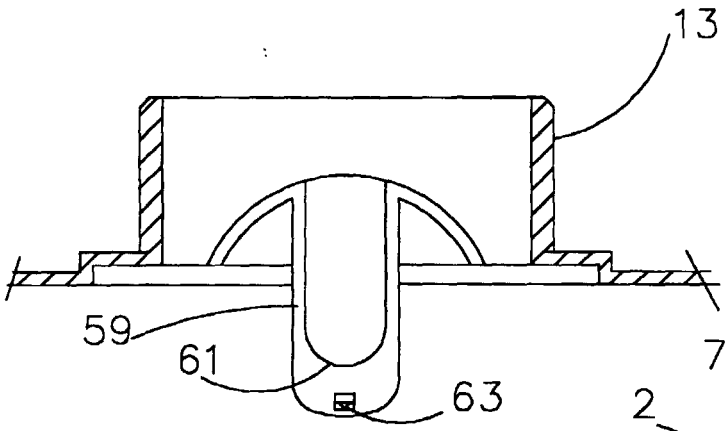

Fig. 6

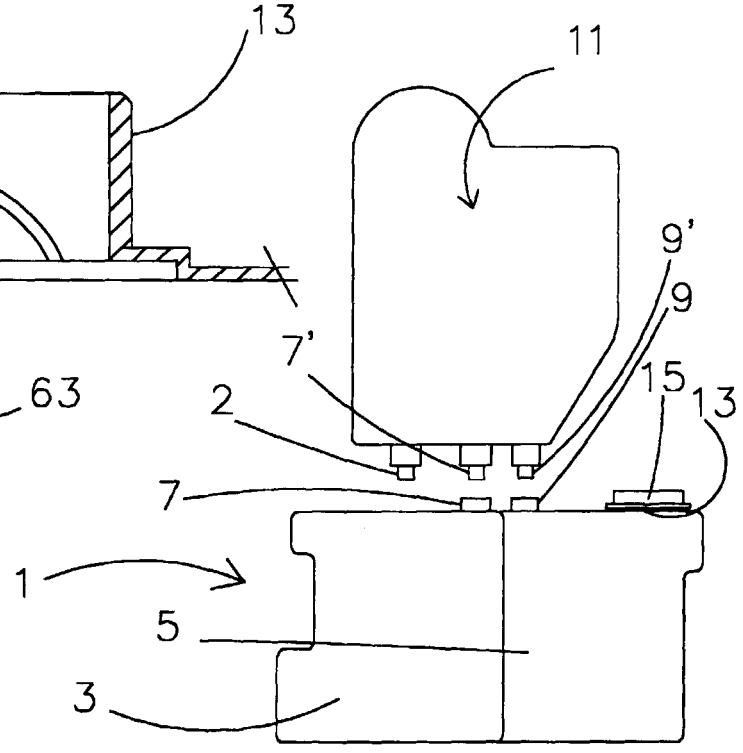

Fig. 1

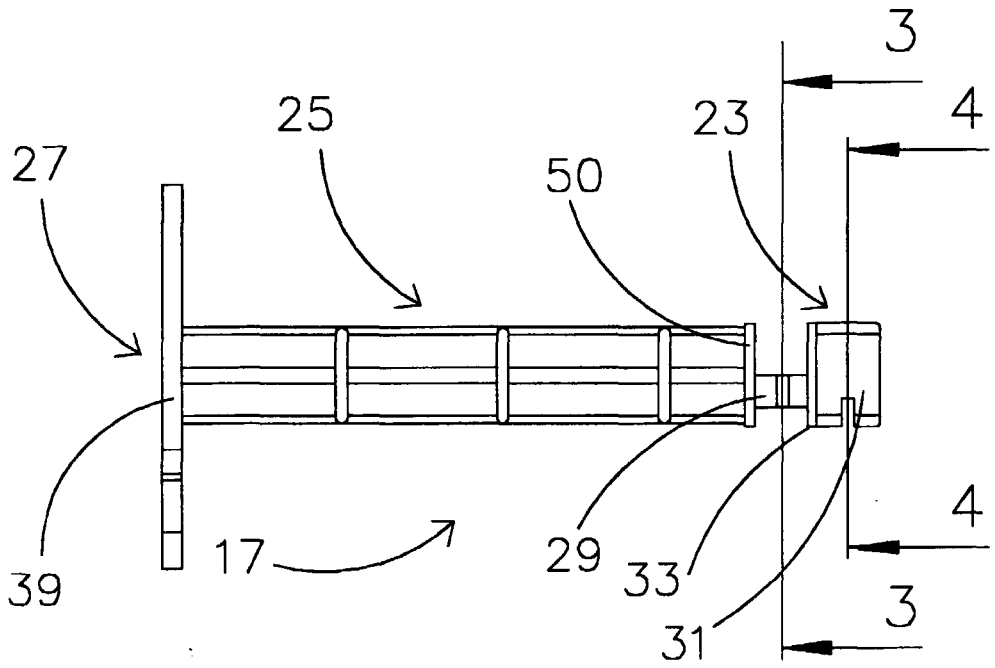

Fig. 2

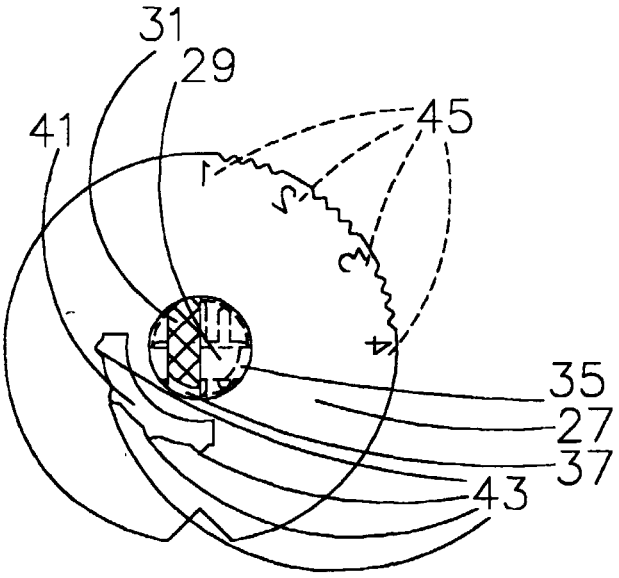

Fig. 4

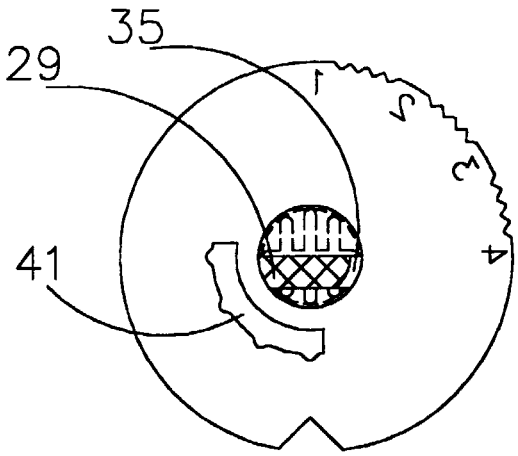

Fig. 3