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(54) Device for blocking the plug of a bath-tub

(57) The invention relates to a device for blocking the water discharging plug of bath-tubs, of a type operatively associated with a handle (1) for opening and closing the water discharging plug, wherein the handle is provided with a pinion-rack system (9) for converting the rotary movement thereof into a translatory movement adapted to open and close the plug, characterized in that the device comprises a resilient element (7), associated with the rack, and including a tooth (6) engaging with a corresponding fixed housing (8).

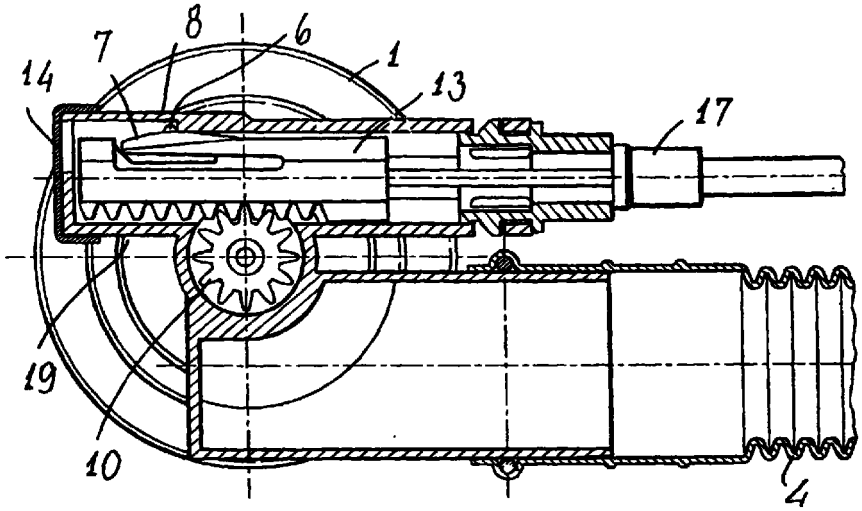

FIG. 1

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a device for blocking the water discharging plug in a bath-tub.

[0002] Prior mechanisms for opening and closing the water discharging outlet of a bath-tub have conventionally the following mode of operation.

[0003] A manual turning of a handle causes a pinion, rigid with the handle, to turn thereby linearly entraining a rack.

[0004] Said rack is provided with a seat therein is housed one of the two end portions of a driving cable, thereby the entraining movement is transmitted, through the overall length of the driving cable, to operating elements causing the water discharging plug of the bath-tub to be opened and closed.

[0005] The mentioned operating elements usually comprise a pawl which, by turning about its seat, transforms the movement from a linear to a rotary movement, by causing, by a pin rigid therewith, the resting point of the plug to be displaced along its axis, so as to either raise or lower the plug.

[0006] The above mentioned prior mechanisms, however, are affected by a great drawback consisting of the fact that, as the plug is in an open condition, the water stream passing about the plug would tend to entrain the plug therewith, thereby causing said plug, if it is not braked, to accidentally reclose the water outlet before a full discharging of the water itself.

[0007] A prior approach for overcoming the above mentioned problem provides to increase the friction of the disclosed device, comprising the handle, driving cable and pawl element.

[0008] This approach, on the other hand, has been found as unsatisfactory, since it involves an inevitable decrease of the handling characteristics of the assembly as well as a stiffening of the component parts thereof.

[0009] An alternative prior approach provides to use specifically designed mechanisms to prevent the plug for reclosing the outlet, and locking said plug in a raised position.

[0010] However, the latter solutions would involve rather complex constructions as well as a great increase of the related cost.

[0011] Moreover, the solutions of the second mentioned type involve a further problem: more specifically, if the bath-tub user presses by a foot the plug blocked in an open position, then the pressing effort will be fully discharged to the inner driving elements for opening and closing the plug, which would damage the opening and closing mechanism, preventing the latter from properly closing.

[0012] Thus, it should be apparent that it would be desirable to provide a device for blocking the water discharging plug in bath-tubs, allowing to overcome the above mentioned problems.

SUMMARY OF THE INVENTION

[0013] Accordingly, the aim of he present invention is to provide such a device for blocking the water discharging plug in bath-tubs, allowing to slightly lock the rack, at the end of stroke position thereof, to provide a stable condition of the plug in its raised condition, while preventing the raised plug from being downward entrained by the water stream being discharged.

[0014] Within the scope of the above mentioned aim, a main object of the present invention is to provide such a device for blocking the plug of a bath-tub allowing the plug to be easily unlocked as a force applied to said plug exceeds a given amount, for example as a user presses by a foot on the plug itself.

[0015] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, are achieved by the present invention which specifically relates to a device for blocking the water discharging plug in a bath-tub, of the type operatively coupled to a handle for opening and closing said plug, wherein said handle comprises a pinion-rack system for transforming a rotary movement of said handle into a translation movement to open and close said plug, characterized in that said device comprises a resilient element associated with said rack and having a tooth engaging with a corresponding fixed housing.

[0016] According to a preferred embodiment of the invention, said fixed housing is formed in the rack sliding seat.

[0017] The resilient element, in particular, has a curved profile, thereon said blocking tooth is arranged, said blocking tooth having a curved surface for engaging with said fixed housing.

[0018] The resilient element and related blocking tooth are arranged on the side of said rack opposite to the toothed side thereof.

[0019] Said resilient element is specifically adapted to allow the tooth to be disengaged from its fixed housing, as the effort applied on the plug exceeds a given value.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Further advantages and characteristics of the present invention will become more apparent hereinafter from the following detailed disclosure, given by way of an illustrative but not limitative example, and with reference to the accompanying drawings, where:

Figure 1 is a cross-sectional view, from the bottom, of a handle provided with a pinion-rack assembly for driving a water discharging plug, the assembly including the plug blocking device according to the present invention;

Figure 2 is a further side cross-sectional view of the system shown in Figure 1;

Figure 3 is a bottom view of the system shown in the previous figures, in its blocking position, with the plug in an open position;

Figure 4 is a bottom view of the system shown in the previous figures, in a free condition thereof, the plug being closed;

Figure 5 is a side view, as partially cross-sectioned, of the inventive system, in a blocking position thereof, the plug being open;

Figure 6 is a further side view of the driving assembly for driving the plug drive cable, including the blocking device according to the invention; and

Figure 7 is a top plan view of the guide assembly of Figure 6;

Figure 8 illustrates a variation of the inventive device, for driving and blocking the water discharging plug of bath-tubs, as seen in a cross-sectioned side view;

Figure 9 illustrates the detail, already shown in Figure 8, of said device, as cross-sectioned along a section plane A-A;

Figure 10 illustrates the device shown in Figures 8 and 9 in an end of stroke position thereof;

Figure 11 is a side cross-sectioned view illustrating another position of the device according to the invention;

Figure 12 illustrates a thermoplastic material insert, to be engaged in a brass body, according to a modified embodiment shown in Figures 8, 9 and 10;x

Figure 13 is a side view showing the rack designed for cooperating with the plastic material insert shown in Figure 12;

Figure 14 is a side view of the mentioned rack;

Figure 15 is a cross-sectioned side view of the drive cable, made as a single piece of a thermoplastic material and being provided with two co-molded end portions, with respect to the sheath thereof;

Figure 16 shows another modified embodiment of the drive cable shown in Figure 15, including a connecting pin for rigidly connecting the body, sheath and sheath attachment pawl.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] In the following disclosure reference will be made to a preferred embodiment of the present invention, which has been illustrated as a not limitative example of several possible variations of the invention.

[0022] More specifically, the device for blocking the water discharging or outlet plug in bath-tubs according to the present invention, is coupled to a handle 1 which is operated for opening or closing said plug.

[0023] As shown, the handle 1 is provided with a pinion 9, in turn arranged inside a sealing gasket 5, and being connected to a drive assembly 13 provided for driving a control cable 17.

[0024] The control cable 17, preferably made of a stainless steel braided or twisted assembly, operates on driving elements provided for opening and closing the outlet plug.

[0025] The driving assembly 13 substantially comprises a rack, adapted to transform a rotary movement of the handle 1 into a translation movement of the driving or control cable 17.

[0026] In turn, the translation movement of the control cable 17 is transmitted, as is known in the art, to a pawl element which, by turning about a seat thereof, will transform the movement from a translating to a rotary movement, to provide, by a pin rigid with said pawl, a displacement of the resting or bearing point, to cause the outlet plug to be raised or lowered.

[0027] The control cable 17 driving assembly 13 comprises a resilient element 7, including a tooth 6 engaging with a corresponding fixed housing 8.

[0028] The blocking tooth 6 is provided with a curved surface for engaging with the fixed housing 8, whereas the resilient element 7 is provided with a curvilinear profile, thereon said blocking tooth 6 is arranged.

[0029] Preferably, the resilient element 7 and related blocking tooth 6 are arranged on a side of said rack opposite to the rack teeth 19.

[0030] The operation of the plug blocking device according to the present invention is as follows.

[0031] As the handle 1 is turned in a set direction, it will cause the plug to be raised, whereas, as said handle is turned in an opposite direction, it will cause said plug to be lowered.

[0032] Thus, the plug will open or respectively close the water outlet of the bath-tub.

[0033] More specifically, the rotary movement of the handle 1 will cause the pinion 9, rigid with the handle 1, to turn and the rack 13 to be linearly entrained.

[0034] As shown, said rack comprises a seat therein one of the two end portions of the control cable 17 is arranged.

[0035] Thus, the mentioned entrainment movement will be transmitted, for the overall length of the control cable 17, to a pawl that, by turning about the seat thereof, will transform the movement from linear to

rotary.

[0036] A pin, rigid with said pawl, will in turn cause the upper plug bearing point to be displaced along the axis thereof, to raise or lower said plug.

[0037] The rack has the tooth 6 thereof, formed on the resilient element 7, constituting an integrating part of said rack.

[0038] The tooth 6, as the rack, by sliding inside its seat 14, arrives at an end of stroke position thereof (with the outlet plug being fully opened) will engage with the housing 8 to be pressed thereagainst by the resilient nature of said resilient element 7.

[0039] Thus, the sliding friction of said rack will be instantaneously increased, to block in its position the rack.

[0040] Accordingly, the outlet plug will be held in an open condition until the user, by operating the handle 1, will reclose said plug.

[0041] Likewise, if the effort applied on the plug exceed a given amount, then the outlet plug will be automatically unlocked, while preventing any damages to the opening and closing elements for said plug.

[0042] With reference to Figures 8 to 16, a second modified embodiment of the subject device is herein shown.

[0043] This modified embodiment, clearly shown in said Figures 8 to 16, comprises a tightly closed body, preferably made of brass, inside which is provided a thermoplastic material insert, to be engaged in said brass body.

[0044] Thus, since said brass body is tightly closed, it will prevent foreign materials from entering the mechanism as the subject device is originally installed.

[0045] In particular, the outer brass body tight connection, in cooperation with the modified construction of the subject device, will prevent, as stated, any foreign materials from entering the brass body, since between the inside of the outer body and the environment no opening is provided.

[0046] This results has been achieved by specifically contouring the inside of the outer brass body 23, as well as of the plastic material insert, and by providing the mentioned blocking tooth 6 cooperating with the resilient element 7.

[0047] In this second modified embodiment, the insert 14 is engaged on the brass body by the resilient latching elements 20, holding it in its seat.

[0048] Thus, the insert 14, together with the brass body 23, will provide a seat in which the body of the rack 19 is slidably housed.

[0049] Said rack 19 is provided with a resilient element 7, having a curved contour, thereon the blocking tooth 6 is arranged.

[0050] Said blocking tooth 6 engages, in an end of stroke position thereof, with an inward projecting step 48 formed in said insert 14.

[0051] Figures 10 and 11 show the position assumed by the rack 13, and according by the blocking tooth 6, as it is rectilinearly slidingly reciprocated in the seat of the brass body 23.

[0052] As is clearly shown in Figures 10 and 11, as the blocking tooth 6 applied to the rack 13 is driven toward its end of stroke position, shown in Figure 10, it will slide along a slanted surface provided in the body of the inner step 48.

[0053] After having passed said step 48, providing a stop for the blocking tooth 6, it will be possible, by suitably urging the control or driving handle, to cause the tooth 6 and rack 13 to overcome this obstacle.

[0054] In particular, this can be obtained owing to the resilient nature of the resilient element 7, which has a cantilever curved profile thereon said blocking tooth 6 is arranged.

[0055] Thus, owing to the resilient nature of the element 7, the lug of this element can be deflected to allow the rack and stop tooth 6 to slide in contact of the inner wall of the thermoplastic material insert shown in Figure 11.

[0056] In this connection it should be pointed out that the seat formed inside the plastic material body 13 has high mechanical sliding characteristics, due to the used materials to be held in mutual contact during said sliding movement.

[0057] Another feature to be considered is that the subject device allows the control cable 17 to be easily attached.

[0058] In fact, said thermoplastic material insert 14 is provided with a seat 24' adapted to engage with the control cable 17, having specifically designed constructional features to improve the operation and strength of the subject device.

[0059] More specifically, said control cable 17 is made as a single piece, as is clearly shown in Figure 9 of a thermoplastic material.

[0060] The two end portions 40 and 41 are co-molded with the sheath and are designed for providing a high mechanical strength.

[0061] Inside the sheath 42 a steel cable 45 is provided for transmitting the plug opening and closing movement.

[0062] In order to prevent a possible disengaging of the fin elements 33, a fixed element 25 is provided.

[0063] Figure 16 shows another embodiment of the subject device and of the sheath to which the control cable is applied.

[0064] The sheath, in particular, is coupled to an outer brass body 31, having a closing cover 36 and an inner step 37, therewith the blocking tooth 6 provided on the resilient element 7 can engage.

[0065] The main feature of the sheath shown in Figure 16 is that the inner element 25 and the sheath-control cable 35 assembly fixing teeth 33 are made rigid with one another by a steel pin 34.

[0066] The outer closing cover 36 will prevent any undesired materials from entering the brass body 31, thereby allowing the device to safely operate.

[0067] From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

Claims

1. A device for blocking the outlet plug in bath-tubs, of the type operatively associated with a handle for opening and closing said outlet plug, wherein said handle is provided with a pinion-rack assembly for transforming a rotary movement of said handle into a translatory movement for opening and closing said outlet plug, characterized in that said device comprises a resilient element, associated with said rack, and provided with a tooth engaging with a corresponding fixed housing.

2. A device for blocking the outlet plug in bath-tubs, according to Claim 1, characterized in that said fixed housing is made in a sliding seat of said rack.

3. A device for blocking the outlet plug in bath-tubs, according to Claim 1 or 2, characterized in that said resilient element is provided with a curved profile thereon said blocking tooth is arranged.

4. A device for blocking the outlet plug in bath-tubs, according to Claim 3, characterized in that said blocking tooth is provided with a curved surface for engaging with said fixed housing.

5. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said resilient element and related blocking tooth are arranged on a side of said rack opposite to a toothed side thereof.

6. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said resilient element is so designed as to allow said tooth to disengage from said fixed housing as a force applied on said plug exceeds a set value.

7. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said translatory movement of said rack is transmitted, by a control cable, to a pawl which, by turning about a seat thereof, is adapted to transform the movement from a translating to a turning movement, thereby causing, by a pin rigid with said pawl, a displacement of a bearing point to raise or lower said outlet plug.

8. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said device comprises a brass tightly closed body inside which is engaged a thermoplastic material insert.

9. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said device comprises an outer brass body in which is engaged an insert held in said body by resilient latching means.

10. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said insert, together with said brass body, provides a seat therein said body of said rack is slidably engaged.

11. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said rack is provided with a resilient element having a curved profile and thereon said blocking tooth is arranged.

12. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said blocking tooth engages, at an end of stroke position thereof, with a step formed in said plastic material insert and inward projecting.

13. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said rack and blocking tooth engage with an inner step formed in the body of said insert.

14. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said inner step, operating as a stop element for said blocking tooth at an end of stroke position thereof, allows said tooth and rack to be disengaged owing to the resilient nature of said resilient element having a cantilever curved profile and thereon said blocking tooth is arranged.

15. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said resilient element is provided with a lug which can be deflected to allow said rack-blocking tooth to slide in contact with an inner wall of said thermoplastic material insert.

16. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said thermoplastic material insert is provided with a seat therein said control cable can be engaged, said control cable being made as a single piece.

17. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims,

characterized in that said control cable is provided with two end portions which are co-molded with the cable sheath, in said sheath being provided a steel cable for opening and closing said outlet plug.

18. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said device comprises moreover an element engaged in said sheath for preventing fin elements from disengaging.

19. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said device comprises a sheath applied to a brass outer body having a closure cover and an inner step therewith said blocking tooth arranged on said resilient element can engage.

20. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said sheath is provided with an inner element, as well as with teeth for fixing the control cable-sheath assembly, said elements being made rigid with one another by a steel pin engaged in a seat transversal of the longitudinal axis of the sheath.

21. A device for blocking the outlet plug in bath-tubs, according to one or more of the preceding claims, characterized in that said device comprises an outer body made of brass or other metal materials, provided with an outer closure cover preventing undesired materials from entering inside said brass body which is tightly closed.

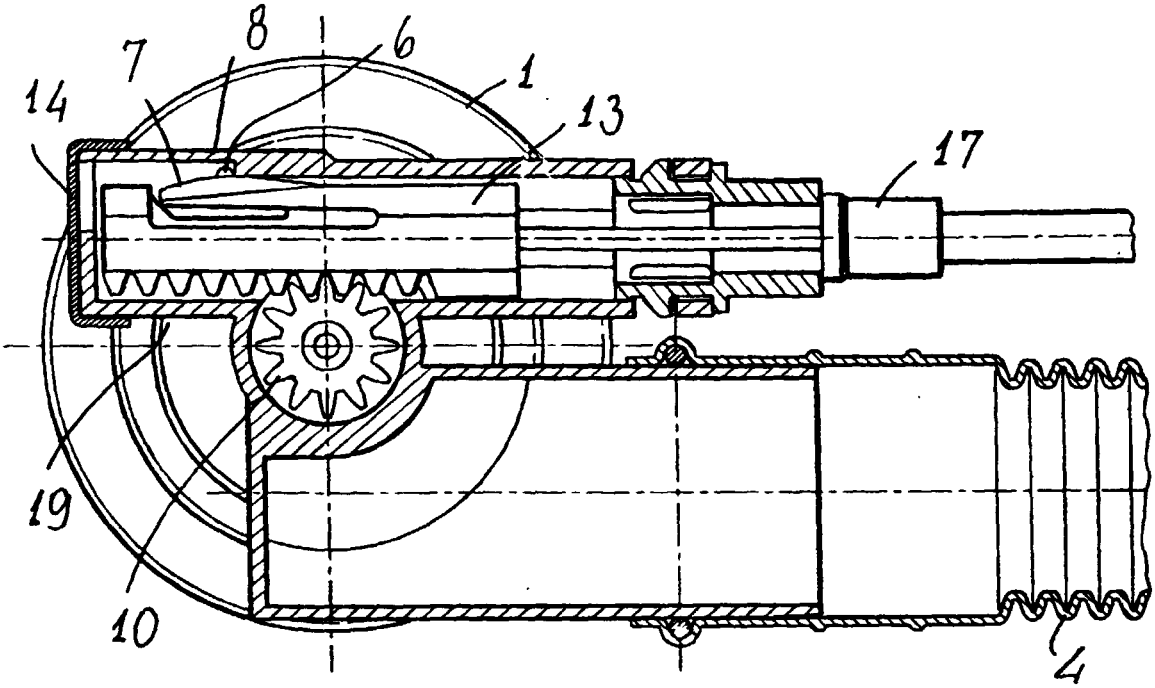


FIG. 1

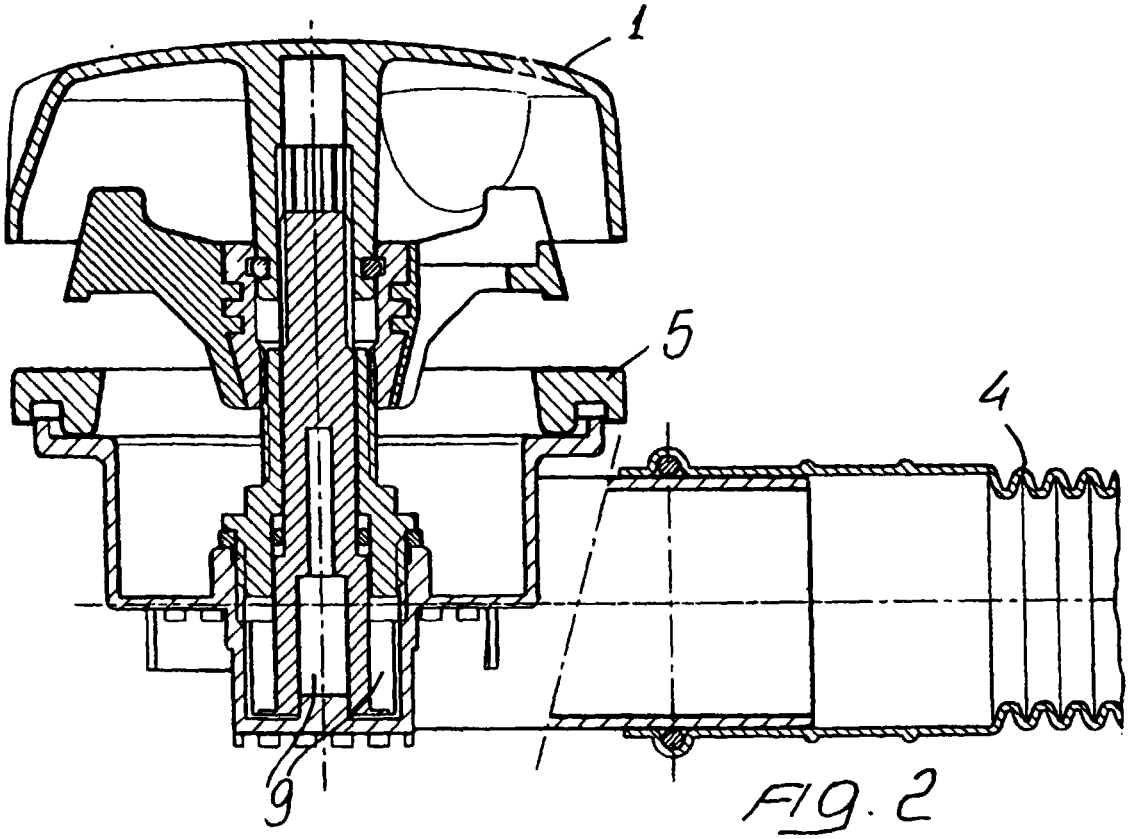


FIG. 2

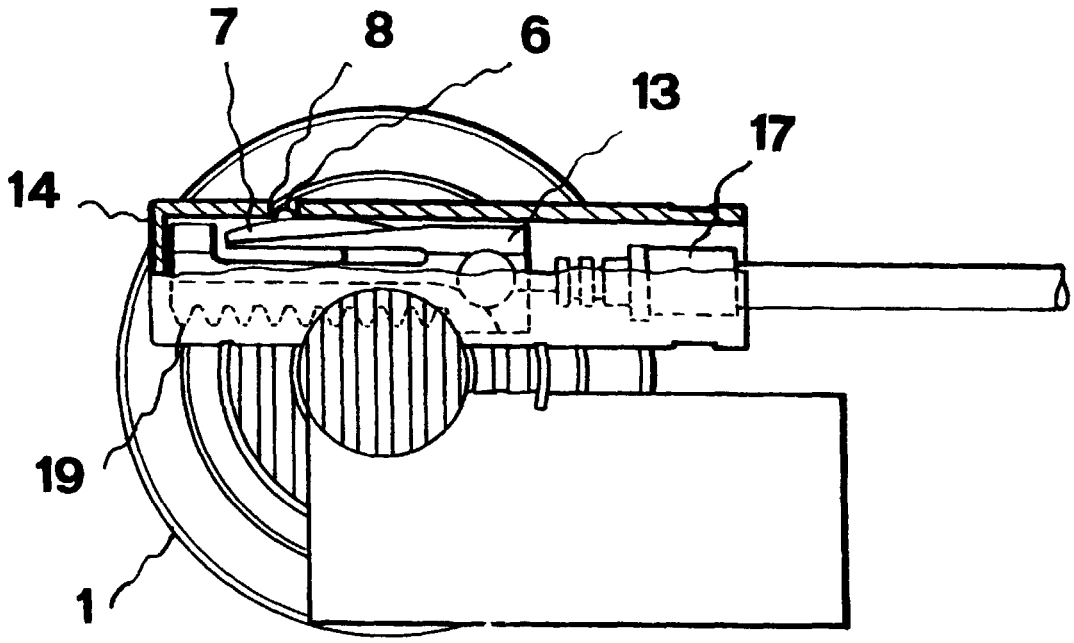


FIG. 3

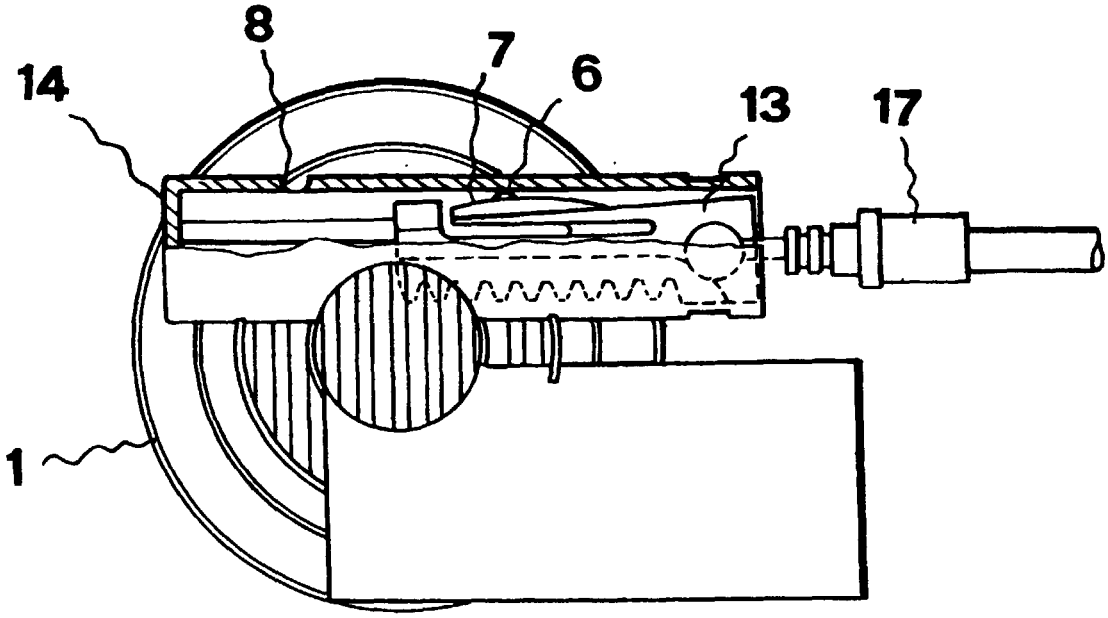


FIG. 4

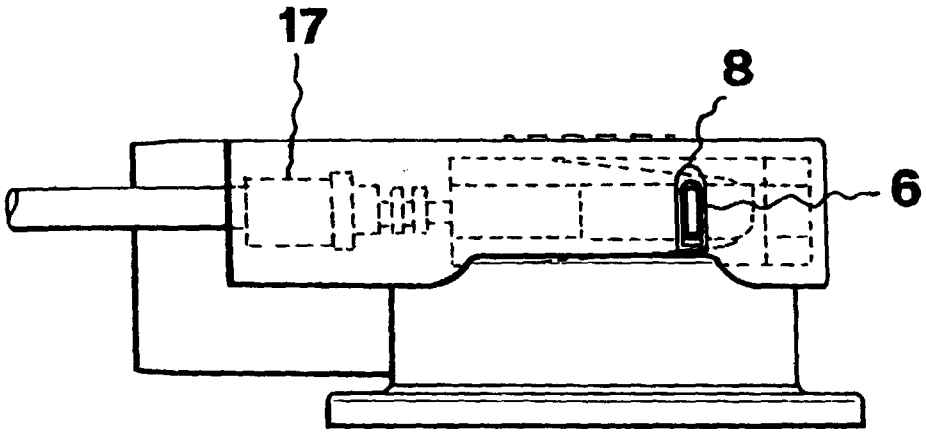


FIG. 5

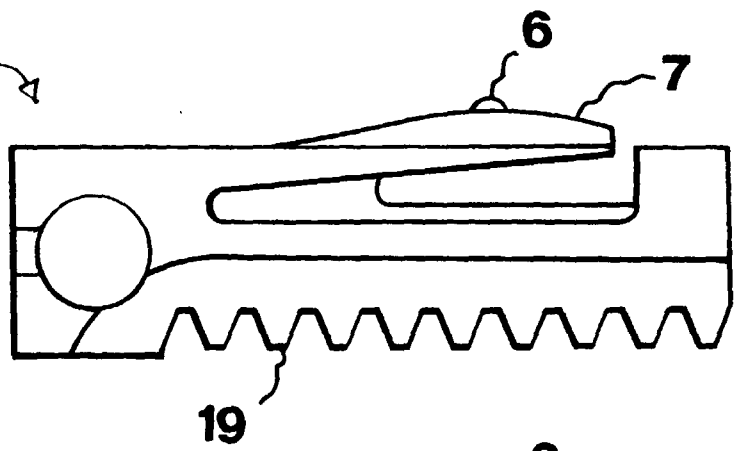


FIG. 6

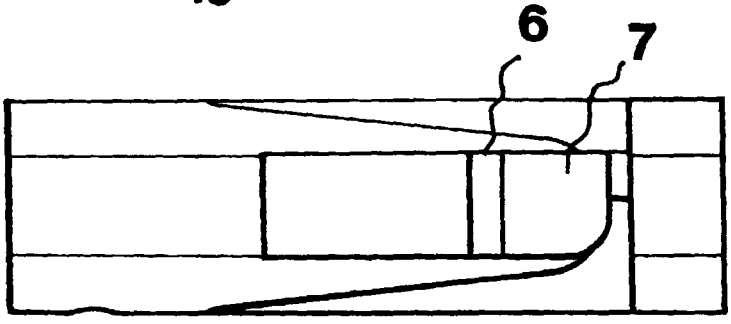


FIG. 7

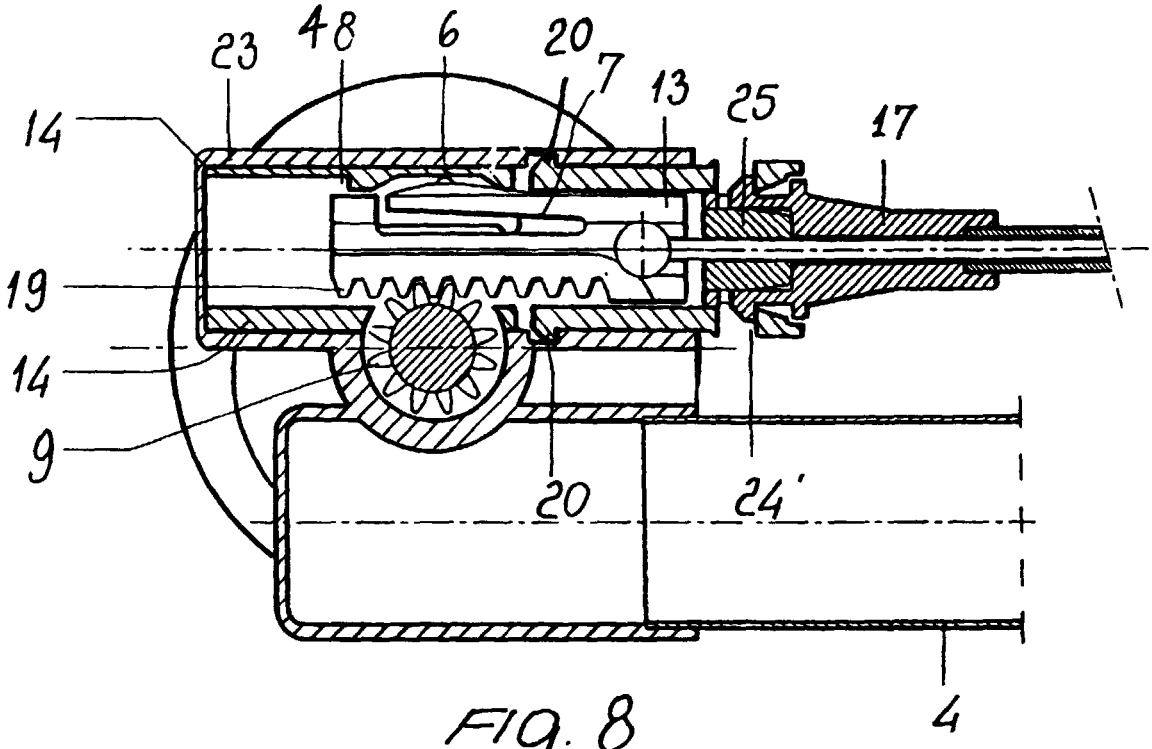


FIG. 8

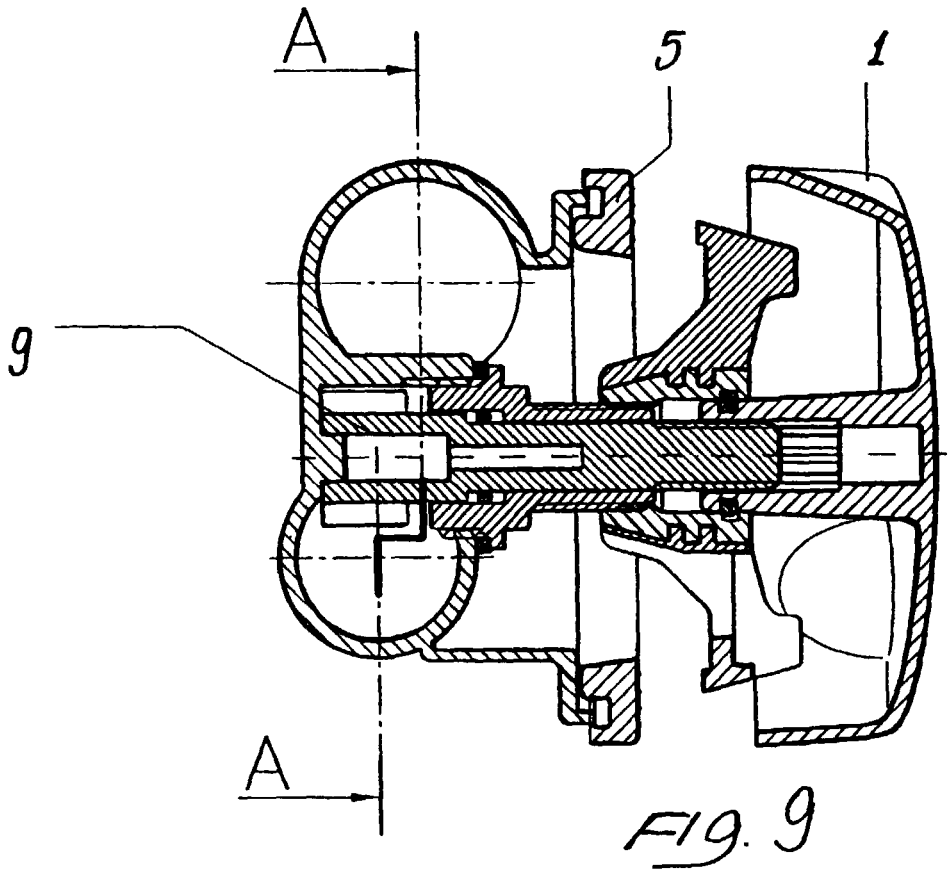


FIG. 9

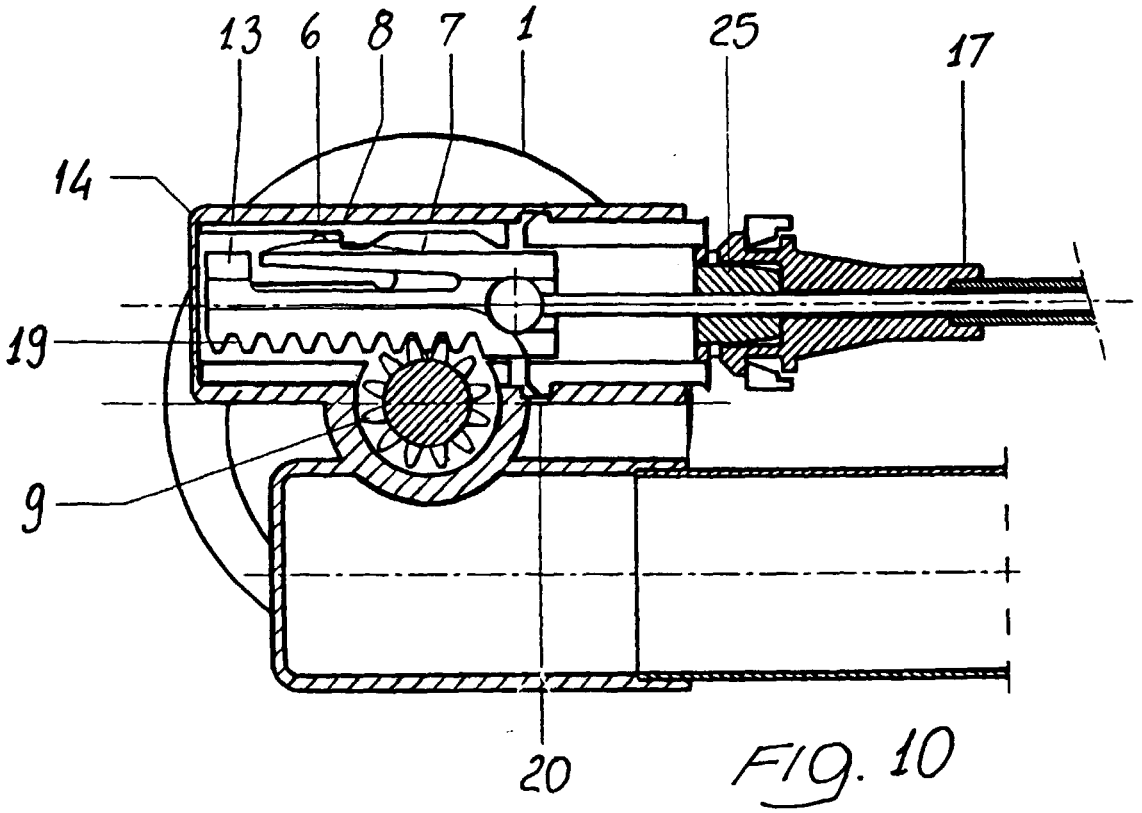


FIG. 10

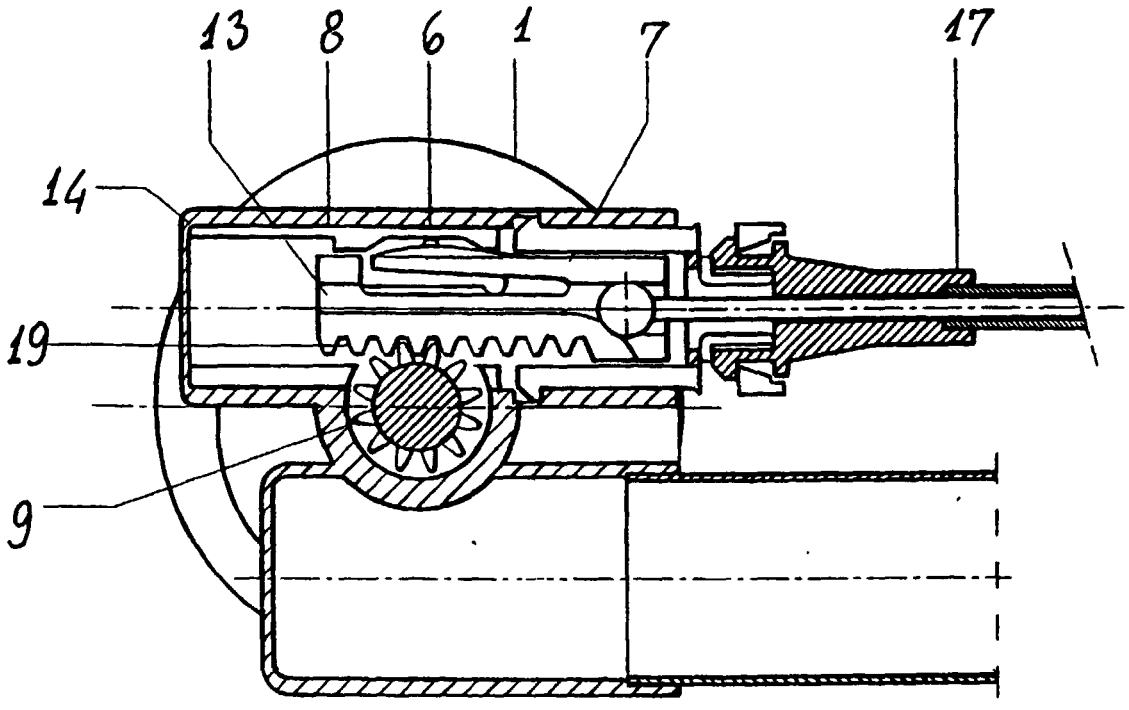
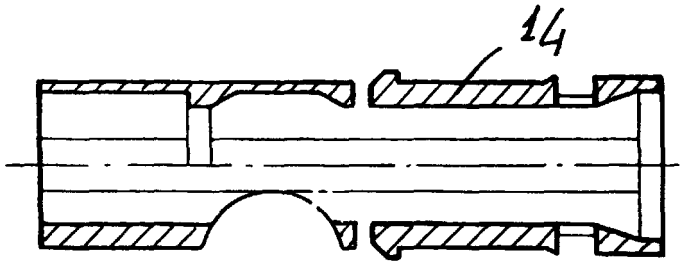


FIG. 11



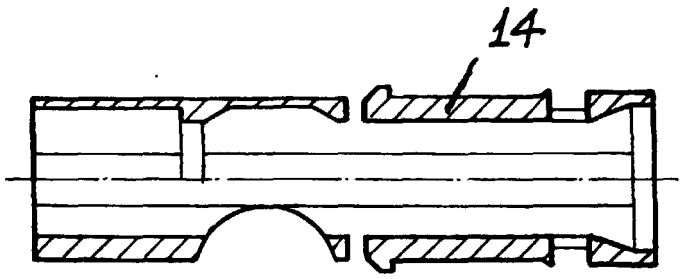


FIG. 12

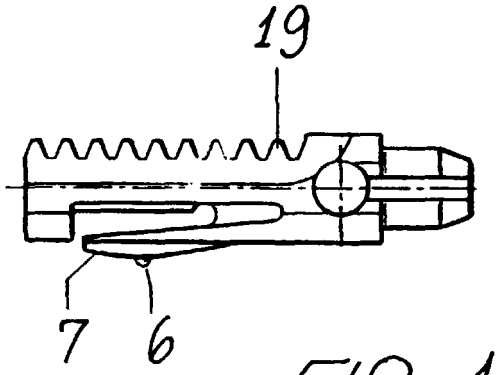


FIG. 13

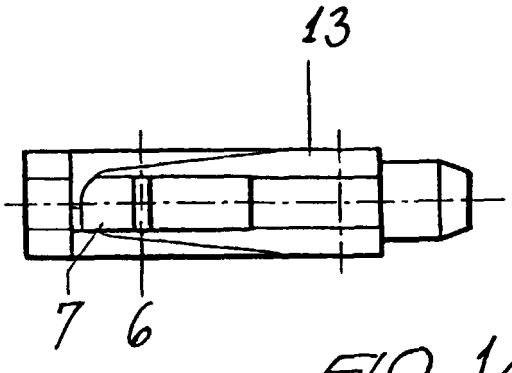


FIG. 14

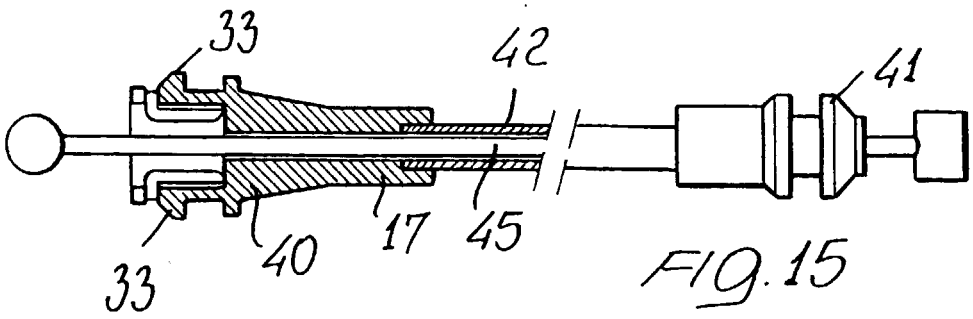


FIG. 15

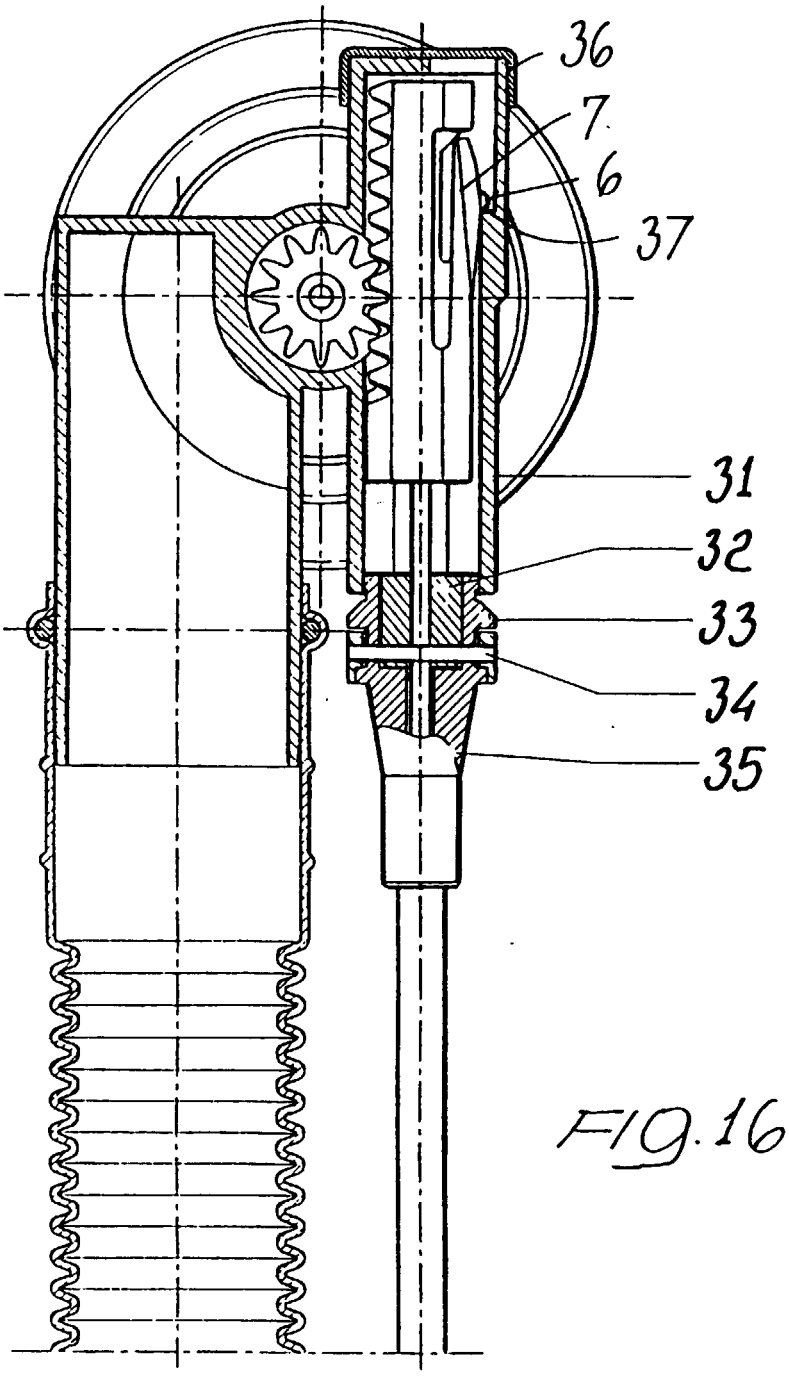


FIG. 16