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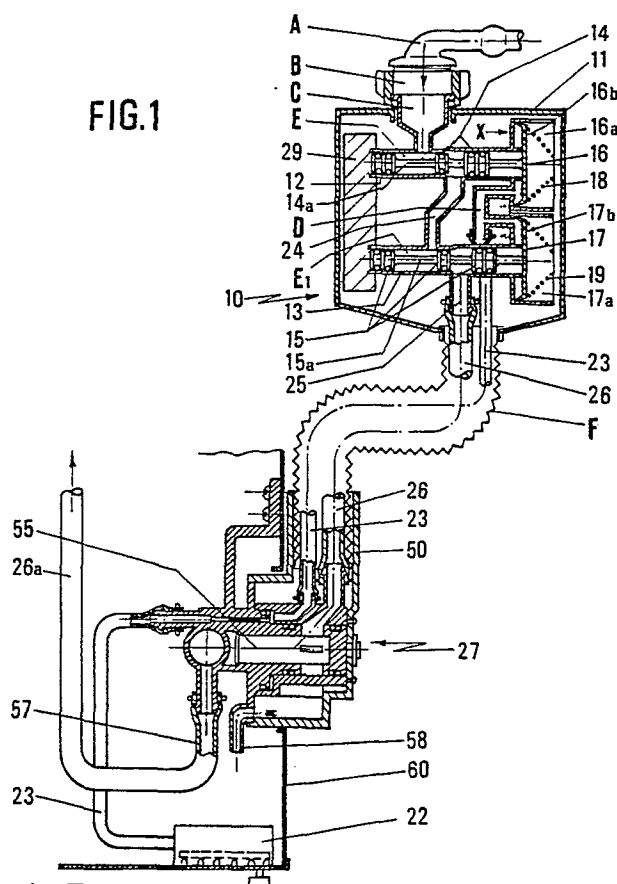
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54 **Antiflood device for washing machines.**

57 Antiflood device comprising a couple of pneumatic valves, a couple of hydraulic valves and a feed pipe ending in a rapid attachment, for washing machines in general, the pneumatic valves being activated by an electropump placed on the bottom, inside of the machine, characterized by the fact that a couple of pneumatic valves are fixed to a couple of hydraulic valves activated in corresponding cylinders that may be intercommunicating, for the water feed to the tank of the machine.

FIG.1



ANTIFLOOD DEVICE COMPRISING TWO PNEUMATIC VALVES AND A FEED PIPE WITH RAPID ATTACHMENT FOR WASHING MACHINES

Washing machines are generally provided with at least one electrovalve hydraulically connected to the water supply tap and electrically connected to the timer or programmer which controls the valve or valves on opening or closing according to the stages of each washing cycle.

The electrovalves used in proximity of the water intake should be electrically insulated and water-tight.

Various systems are known for automatically closing the electrovalves when flooding occurs due to a breakdown in the machine. Said systems are not always valid if the electrovalve or electrovalves jam on opening for any unforeseen reason.

The main purpose of the present invention is the construction of an antiflooding device provided with a couple of pneumatic valves which control the water feed to the machine and is substantially characterized by:

- two valves, comprised of independent cylinders and pistons which are activated in synchronism on opening while, on closing, they move independently one from the other;
- should one of the valves block for any reason during the closing phase, it does not interfere with the closing of the other valve which, on complete closure is locked in the closed position;
- the device is entirely made of electrically insulated material;
- the piping connecting the valve casing to the machine comprises a tube section for pneumatically connecting a vibration pump placed at the bottom of the machine, to the inside of the cylinders of the two valves; a second tube section for the water feed, from the device to the machine; a third tube section which contains and protects the first two and ends in a rapid attachment, coupled to said tube sections and attachable to a complementary organ leading into the tank of the machine and fixed to the body of said machine and pneumatically connected to the vibration pump.

Detailed characteristics of the device are now described with reference to the attached drawings, in which:

Figure 1 illustrates a section of the device according to a vertical plane passing through the axis of the feed pipe;

Figure 2 is a view of the two parts, separated, that constitute the rapid attachment coupled in Figure 1;

Figure 3 is a top view of said attachment;

Figures 4, 5 and 6 illustrate the functional layout of the automatic means that lock one of the valves in the closed position if the other jams in the open position;

Figure 7 is a side view of the stopping means that act on the extremities of the valve stems;

Figure 8 is a variation of Figure 7;

Figure 9 is a plane view of the mechanism which controls the synchronized opening of the two valves;

Figure 10 is a side view of part of the same mechanism;

Figure 11 is a structural variant of the device in Figure 1;

Figure 12 is a particular of Figure 11;

Figures 13 to 16 illustrate a variant of the safety means in Figures 4 to 10.

With reference to Figures 1, 2 and 3 the device, indicated as a whole by 10, comprises a casing 11, which can be linked to the water source -A- by means of the screw nut -B-. Said casing contains the cylinders 12, 13 which intercommunicate by means of a tubular branch 24. Three groups of pistons are slidably mounted at a prefixed distance in the cylinders 12, 13 and are provided with "OR" sealing strips and are fixed to corresponding stems 14a, 15a. Said stems are also fixed to disc valves 16, 17 slidably mounted in cylindrical chambers 16a, 17a coaxial to and intercommunicating with the cylinders 12, 13. Rated springs 18, 19 keep the disc valves in the position as shown in Figure 1, corresponding to closed valves. Gauged balancing holes bored in the discs 16, 17 are indicated 16b, 17b. The collecting duct -D- intercommunicates the chambers 16a, 17a and is pneumatically connected to the tube section 23 arriving from the electric vibration pump 22, placed inside and on the bottom of the machine and electrically connected to the programmer or timer of said machine. The cylinder 13 is provided with a tubular appendix 25 connected to the tube section 26 which, by means of the rapid attachment connection indicated as a whole by 27, feeds the water into the tank of the machine (not illustrated). -F- indicates a tube-sheath which contains and protects the tube sections 23 and 26.

Considering that the piston groups 14, 15 spaced along the corresponding stems 14a, 15a, when the two valves are closed, Figure 1 in the corresponding cylinders define symmetric chambers -E-, -E1-respectively, the device works in the following way:

When the device is inactive, the valves are closed, Figure 1; the water being fed from -A- flows into -C- and into chamber -E-, but no further. When the machine is running the programmer or timer feeds electricity to the vibration pump 22, said pump being of limited size, of the type used for aquariums. The pump 22 feeds compressed air into chambers 16a, 17a through the tube section 23 and the collector -D-, downstream of the disc valves 16, 17. When the air pressure prevails over the reaction of the springs 18, 19 it forces the valves 16, 17 to slide together with the pistons 14, 15. The longitudinal and contemporary movement of the pistons 14, 15 in the direction indicated by the arrow X, lets in the water which, from -C- passes on to the chamber -E-, through the tube 24, to -E1- and, through appendix 25, tube 26 and connection pipe 27, enters the tank of the machine.

With the two valves open, and the continued action of the pump 22, the excess compressed air flows out through the gauged holes 16b, 17b transversally bored in the discs. When the pump 22 stops, the valves 16, 17 under thrust by the springs 18, 19, return to the closed position.

Figure 1 schematically illustrates the mechanism 29 which, if one of the valves jams in the open position, blocks the other in the closed position. This mechanism is described below with reference to Figures 4 to 10 in which the parts corresponding to the parts in Figure 1 are marked by the same reference numerals.

According to a preferred version of the invention the mechanism comprises: a couple of independent stops such as "C"-shaped juxtaposed, coplanar clamps 32, 33 with reciprocally interfering arms, shown in detail in Figure 8. Said clamps, slidably mounted on a vertical plane, transverse with respect to the longitudinal axis of the stems 14a, 15a of the valves, Figure 4, as a result of the thrust of the elastic means 36, are able to engage the grooves 30, 31 made in the stems 14a, 15a and present a bevelled inside edge 32b, 33b. The ends of the stems 14a, 15a are tapered and connected to the part with a larger diameter by means of short, inclined planes 14b, 15b parallel to the slope of the bevelled sections 32b, 33b.

With the valves in the rest position, i.e. closed, Figures 1 and 4, the grooves 30, 31 are free from the clamps, whose bevelled edges 32b, 33b, pushed by the spring 36, lean in the opposite position on the jacket of the stems 14a, 15a. The pump 22, controlled by the timer of the machine, brings the valves into the position as shown in Figure 5. When the pump 22 stops, so does the supply of compressed air downstream of the discs 16, 17. The reaction of the springs 18, 19 pushes the valves back into position as shown in Figure 4. If, on closing, both the valves are working regularly, the

branches 32a, 33a of the stops 32, 33 return from the position shown in Figure 5 - valves open - to the position shown in Figure 4 - valves closed - pushed by the inclined planes 14b, 15b which act on the bevels 32b, 33b against the reaction of the rated springs 36.

If, for some reason, one of the two valves, for example the one indicated by 17, jams in the open position, Figure 6, while the other regularly returns to the closed position, the branch 32a of the stop 32, pushed by the spring 36, is released into the groove 30 of the stem 14a and blocks valve 16 in the closed position. In these conditions the water delivery cannot go further than the chamber -E- of the device, Figure 1, or the chamber -E1- if the jammed valve is 18.

According to a structural variant of the stopping means, which cooperate with the extremities of the valve stems, said means can be structured in the form of a couple of levers 37, 38, crossing each other as X, revolving with respect to the pins 37a, 38a, Figure 8.

It is indispensable that, on opening, the movement of the valves is synchronous and uniform so that the mechanism only intervenes when one of the valves jams on closing. In fact, any differing air pressure values in the chambers 16a, 17a, would alter the synchronism of the movement on opening the two valves with the danger that the slower valve could block in the closed position.

In order to ensure the synchronous opening of the two valves, particularly at the beginning of the opening movement and until the grooves of both the stems have not overtaken the transverse plane of interference with the stops 32, 33, synchronizing means are provided, as illustrated in Figures 9, 10.

A lever 25, with double cross transverse branches 25a, 25b, presents the extremities of the branch 25 mounted linked in fixed parallel support slots 41. A traction spring 39 is anchored to the double cross lever at a fixed point 42.

When the valves are closed the spring 39 holds the lever 25 in the position as shown by the continuous lines in Figure 10, therefore while the transverse branch 25a engages the corresponding transverse concave grooves 15d, symmetrically borne by the stems 14a, 15a of both the valves, the other transverse branch 25b of the double cross lever engages the peak of an obtuse angle which is to be found in a fixed bracket 44, made up of a sector 43 sloped with respect to a second sector 43b, parallel to the axis of the valve stems.

When the valves begin to open the compressed air sent to the chambers 16a, 17a by the pump 22, downstream of the discs 16, 17, could reach the two chambers with different pressure values which would tend to differentiate the speed of advancement and opening of the valves. This, or

any other cause that could differentiate the speed of advancement of the valves on opening, could cause the slower valve to block in the closed position. The stems 14a, 15a being initially coupled, in such a way that they can be automatically separated by the transverse branch 25a, are initially forced to advance in synchronism. The angular movement imposed on the lever 25 by the sliding of the stems in the direction indicated by the arrow -X- in Figure 10, causes the transverse branch 25a to travel along the sloped sector 43 of the bracket 44, forces the pins 25c to move along the holes 40 while the branch 25a disconnects from both the stems. The reaction of the spring 39 brings the lever 25 back to the original position against a fixed point stop 42. When the valves return to the closed position the bevelled part 45 of both the stems comes into contact with the branch 25a of the lever 25 and, overcoming the reaction of the spring 39, takes the mechanism back to the position indicated by continuous lines in Figure 10. The components of the mechanism are sized so as to guarantee that when the stems 14a, 15a disconnect from the common engagement 25a, the concave grooves 30, 31 of said stems have passed beyond the transverse plane of interference with the stops 32, 33.

In the variant in Figure 11, the tube section 113 which communicates with the connection -A-, -B- to the water supply, is contained in the casing 112. Its extremity 114, funnel-shaped, is connected to the tube section 26 which feeds water to the tank of the machine. The pneumatic pump 22, of the vibration, centrifugal or any other suitable type, feeds compressed air to the cylinders 116, 117 through the tube section 26a, the rapid release valve 115 and the tube section 26. The pistons 118, 119 respectively slide in said cylinders against the reaction of the spring 120. At the extremities of the shafts of said pistons the extremities of levers 121, 122 are articulated which engage the stems 140, 141 respectively of valves 123, 124 and present the opposite extremity articulated at fixed points 125, 126 of the tubular body 113.

In the position illustrated in Figure 11, the valves 123, 124 are closed. The water flowing into chamber -C- goes no further. When the pump 22 starts up, the compressed air overcomes the reaction of the spring 20, pushes the pistons 118, 119 to run in the direction indicated by the arrows causing the levers 121, 122 to open the valves 123, 124. The water being fed from -C- through the duct -D- passes into the chamber -E- and, through duct -F- and tube section 26, reaches the tank of the machine. The open position of the valves 123, 124 is shown in Figure 12.

The rapid escape valve 115, provided with an overflow opening, as is known, works in the follow-

ing way: when the pump 22 is running, the light elastic membrane 128, under pressure, closes the discharge 129, the compressed air reaches the tube section 26 thanks to the perimetral deformation of said membrane (see particular -H-). When the pump stops the reflux of compressed air raises the membrane 128, as shown by -G-, and allows the air to leave through the discharge 129.

The safety mechanism, already described in Figures 4 to 10 is indicated by 29.

According to a structural variant of said safety mechanism, with reference to Figures 13 to 16, a guide 131 is slidably mounted, against the reaction of a return spring 139. The guide 131 supports the movable clamping hinged elements 132, 133, reciprocally drawn together in contrast with the spring 138, reacting to compression. The elements 132, 133 are provided with concave grooves engaged by the stems 140, 141 of the pistons 118, 119. The fixed stops are indicated 134, 135 and 136, 137. The pump 22 activates the pistons 118, 119 illustrated in the rest position in Figure 13. Said pistons advance in parallel in the direction indicated by the arrow -I- as they are linked to the clamping elements hinged on the guide 131. When the profiles of the opposite sides of the elements 132, 133 come into contact with the fixed stops 134, 135, they are forced to converge, as illustrated in Figure 14, thereby freeing the stems 140, 141 of the pistons which, having overcome the first critical phase, as previously described, complete the rest of the run independently the one from the other until they reach the position illustrated in Figure 15.

If when the valves close, one of the pistons or the valve associated to one of the pistons jams in the open position, the valve and piston that are working return to the initial position while the others remain in the blocked position, as shown in Figure 16. The spring 139 brings the guide back to the start position.

The safety mechanism according to the variant described is structurally simpler than that shown in Figures 4 to 10, but in comparison, has the disadvantage of not blocking the water delivery to the tank of the machine in case of breakdown of one of the valves.

In Figures 1, 2 and 3, one extremity of the corrugated tube -F- which contains and protects the tube sections 23 and 26, is connected to the bottom of the device 10 while the opposite extremity is connected to the duct 50 of the rapid attachment 27. The collar 52 is fixed in said duct, for example, by means of screws 50, Figures 2, 3, said collar being provided with coupling sockets 53, 54, respectively to connect the tube sections 26 for the water and 23 for the air. The cylindrical and concave part 55, fixed to the machine 60 is coupled in the coupled to the collar 52; said part

55 is provided with annular, pneumatic and hydraulic "OR" sealing strips. The water being fed through the radial windows 56 reaches the socket 57 connected to the tube branch 26a which inputs into the tank of the machine; the socket 58 is for the discharge of any small quantities of drawn water collected in a special container placed inside, on the bottom of the machine. The closed bottom of the part 55 supports the short cylindrical diametrically bored pin 55a which, when the two parts of the attachment are coupled, Figures 1, 2, projects through the transverse opening 52a made in the duct 50.

When the attachment is coupled as in Figure 1, a split pin 59 is inserted and spread open in the diametral hole in the pin 55a thus longitudinally blocking the two coupled parts. The duct 50 remains free to move around the axis of the pin 55a which allows for the best positioning of the tube group 23, 26, -F-, both for mounting and for any changes in position of the machine.

The device is not limited to the example described and illustrated but can comprise any other similar or equivalent solution.

Claims

1. Antiflood device characterized by the fact that one or two pneumatic valves are used in place of one or two electrovalves; said pneumatic valves being activated by a suitable source of compressed air of any known type, and being able to intercept the water fed to the tank of the machine until the compressed air supply starts to function and, by means of pneumatic cylinders and relative pistons, controls the opening of said valves.

2. Antiflood device having pneumatic valves and feed pipe with rapid attachment means for washing machines, characterized by the fact that it comprises a couple of disc valves (16, 17) acting in corresponding chambers (16a, 17a) against the reaction of rated springs (18, 19), said chambers communicating with cylinders (12,13) in each of which are to be found working, sealingly, three piston groups (14, 15) fixed to stems (14a, 15a) connected to said valves (16, 17); each piston group defines the inside of the corresponding cylinder (12, 13) in chambers (-E-, -E1-) which do not communicate with the two valves in the closed position but which intercommunicate, with the valves in the open position, by means of a fixed tube connection (24); a cylinder (12) connected to the water supply (-A-, -B-), the other cylinder (13) connected to a tube section (26) which by means of a rapid attachment pipe union (27) to the machine (60) feeds water to the tank of the said machine; a pneumatic connection (-D-), common to

the two chambers (16a, 17a) is connected by means of a tube section (23) to an electropump (22) connected to the timer of the machine and situated on the bottom, inside of said machine, said pump having the purpose of feeding compressed air downstream of the valves (16, 17) in the closed position; a safety mechanism (29) forces the valves (16, 17), on opening, to move in synchronism; automatic stop means (32, 33) are provided to block one of the two valves in the closed position if, for any reason, the other valve jams in the open position; also characterized by the fact that the tube sectors (23, 26) which respectively pneumatically connect the valves to the pump (22) and feed the water to the machine, are connected to the rapid attachment pipe union and are contained in a third, protective tube sector (-F-).

3. Antiflood device according to Claim 1, characterized by the fact that the safety mechanism for blocking one of the valves in the closed position if the other jams in the open position, comprises stops (32, 33), which cooperate with elastic means (36) which automatically engage concave grooves (30) each radially supported by the stems (14a, 15a) of the two valves.

4. Antiflood device according to Claim 1, characterized by the fact that the free ends of the stems of the valves are provided with short inclined sections (14b, 15b), transverse with respect to the axis of the said stems; said sections cooperating with corresponding bevelled sections (32b, 33b) of the stop means (32, 33).

5. Device according to Claim 1, characterized by the fact that, during the initial opening phase of the valves, the stems (14a, 15a) are transversely engaged by a rod (25a) being part of a mechanism which comprises elastic attracting means (39), in order to achieve longitudinal, synchronous movement of both the stems, until the grooves (30) have passed the transverse plane of interference with the stops (32, 33).

6. Antiflood device for washing machines, according to Claims 1 and 4, characterized by the fact that the rod (25a) that engages the seats (15d) in the stems (14a, 15a) is part of a mechanism comprising a double cross lever (25, 25a, 25b) hinged linked (25c) to openings (40) of fixed brackets (41).

7. Antiflood device according to Claims 1 and 5, characterized by the fact that the extremities of a branch (25b) of the double cross lever (25) are mobile with respect to inclined planes (43) of the fixed brackets (43a).

8. Device according to Claim 1 characterized by the fact that the pump (22) is a vibration electropump.

9. Device for washing machines according to Claim 1, characterized by the fact that the means for the synchronous advancement of the valve stems (14, 15) comprise a rod (25a) which transversely engages both the stems in corresponding concave seats, from which said rod is disconnected when said stems, in synchronism, have completed a longitudinal run having a prefixed amplitude.

10. Antiflood device according to Claim 1, and according to a variant (Figures 11 to 16), characterized by the fact that a couple of pneumatic pistons (118, 119) control the synchronism, on opening, against the reaction of the spring (120), of the corresponding valves (123, 124) by means of levered articulations (121, 122).

11. Device according to Claims 1 and 10, characterized by the fact that the safety mechanism that ensures the synchronous movement of the valves (123, 124) on opening, comprises a guide (131) slidably mounted with respect to a fixed support (130), Claim 1, against the reaction of elastic means (139), also characterized by the fact that elements (132, 133) are articulated with respect to said guide, activated by clamping movements which constrain the valve (123, 124) stems (140, 141) until coming into contact with fixed stops which cause the valve stems to disconnect from said elements.

12. Antiflood device according to Claim 1, characterized by the fact that the tube section (26) for the water, the tube section (23) for the compressed air and the tube section (-F-) that contains and protects the first two sections, end in a pipe union (50) to which they are sealingly connected; the tube section (26) coupled to a socket (53); the tube section (23) coupled to a socket (54); the tube section (-F-) directly connected to a cylindrical part of the pipe union containing said sockets.

13. Device according to Claims 1 and 9, characterized by the fact that the part (50) of the rapid attachment is complementary to a second part (55) fixed to the body of the machine (60).

14. Rapid attachment according to Claims 1 and 9, characterized by the fact that the fixed part (55) is provided with "OR" sealing strips and with a short pin (55a), diametrically bored, projecting from a holed seat borne by the mobile part; said pin receiving a split pin (59) which, spread open, blocks the mobile part (50) longitudinally with respect to the fixed part.

15. Rapid attachment for the tube sections (26, 23) for the supply of water and compressed air, according to Claims 1 and 11, characterized by the fact that the mobile part of the attachment or pipe union (50) is angularly mounted movable with respect to the fixed part of the body (60) of the machine in order to provide optical positioning, with

no torsion, of the tube group that connects the device to the machine.

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FIG.1

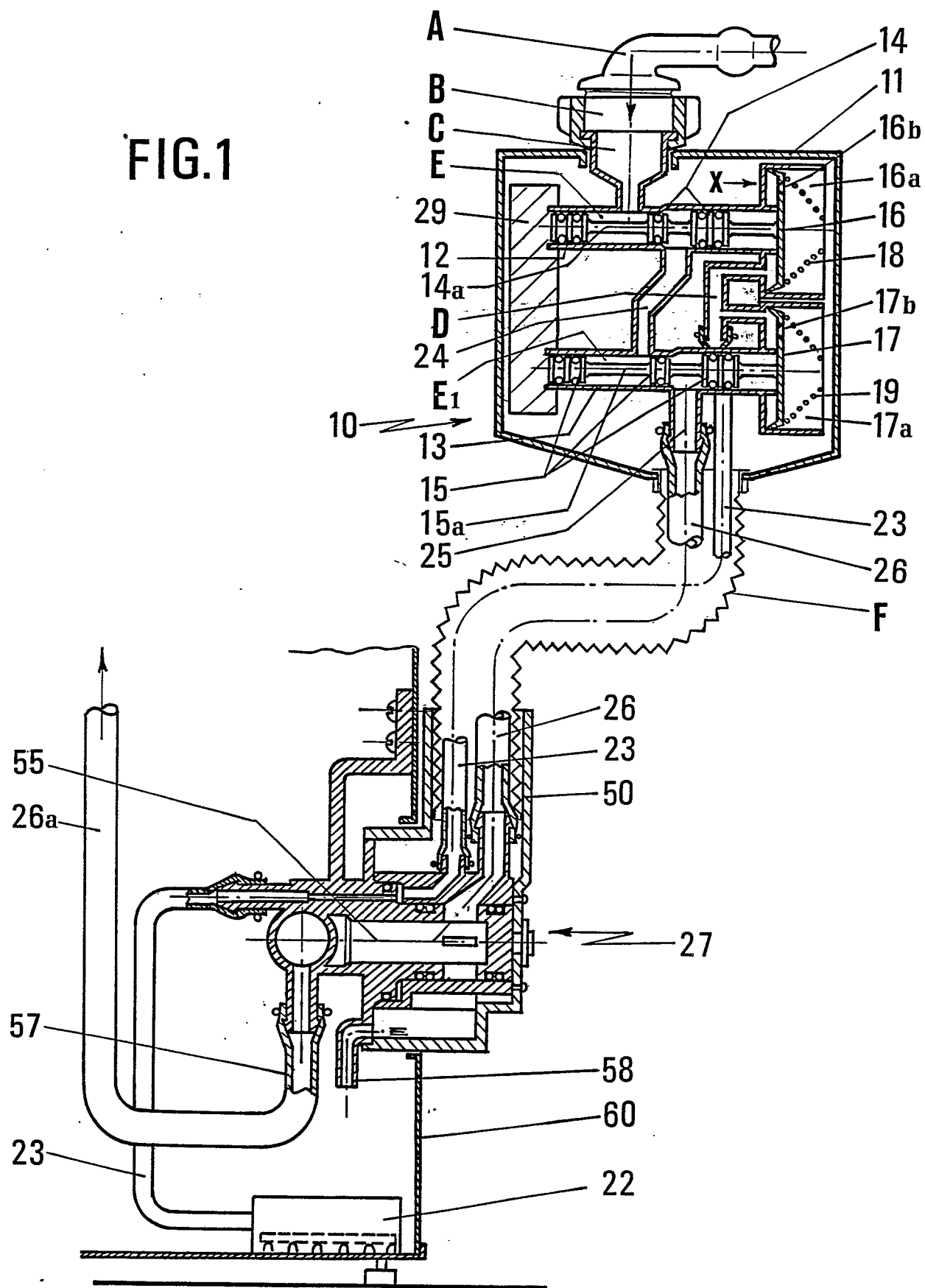


FIG.2

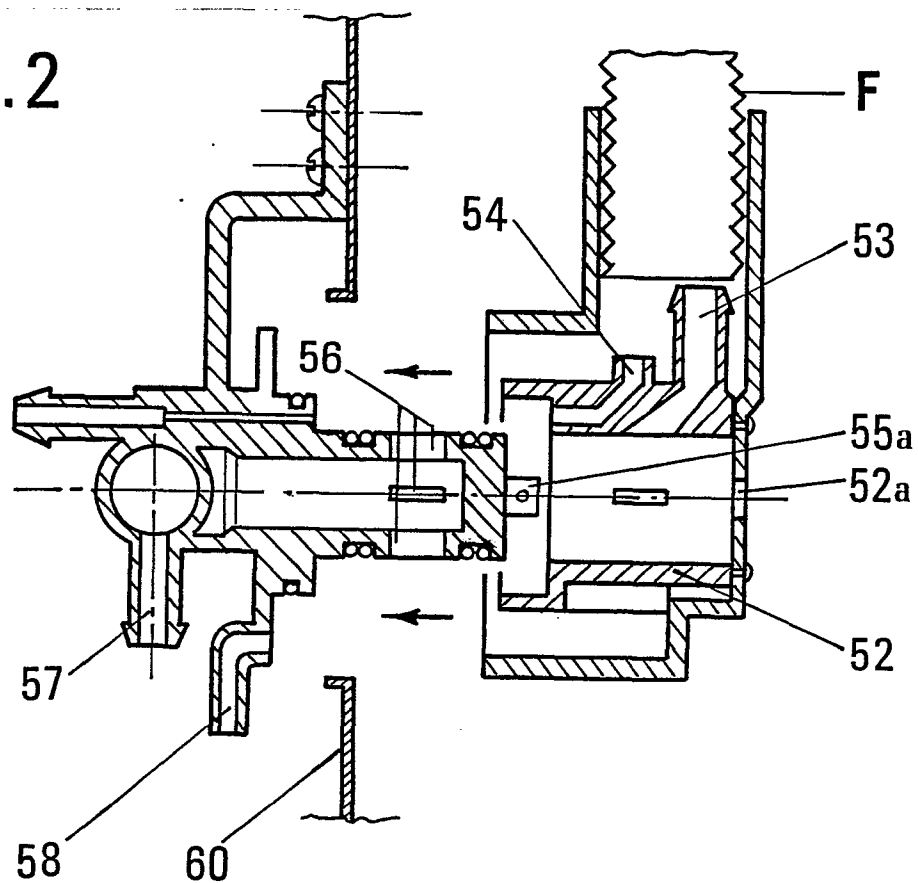
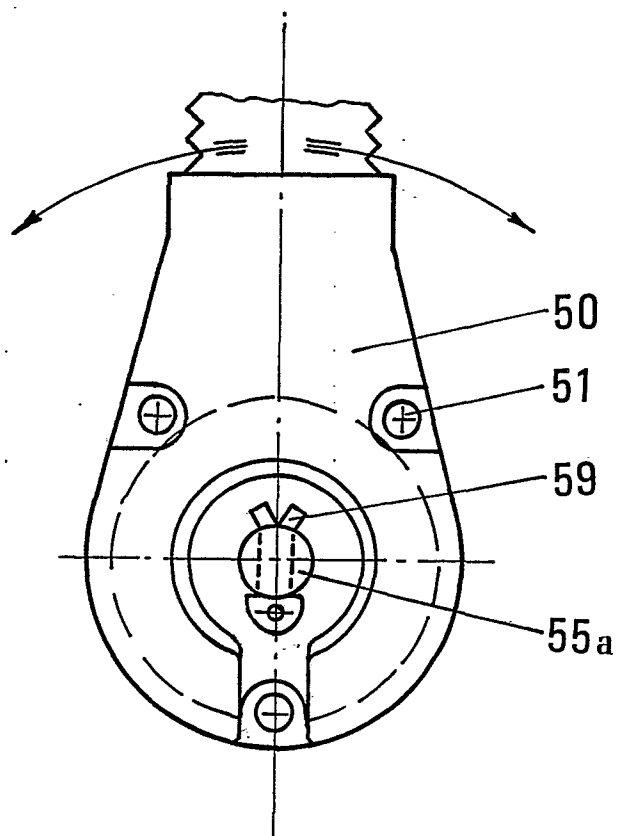


FIG.3



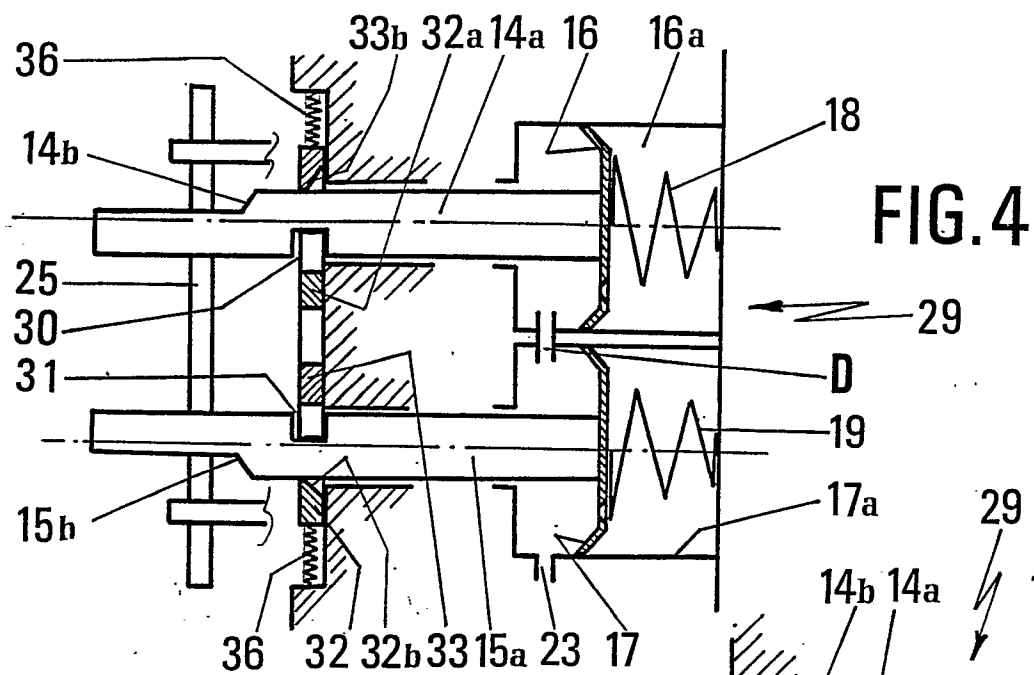


FIG. 4

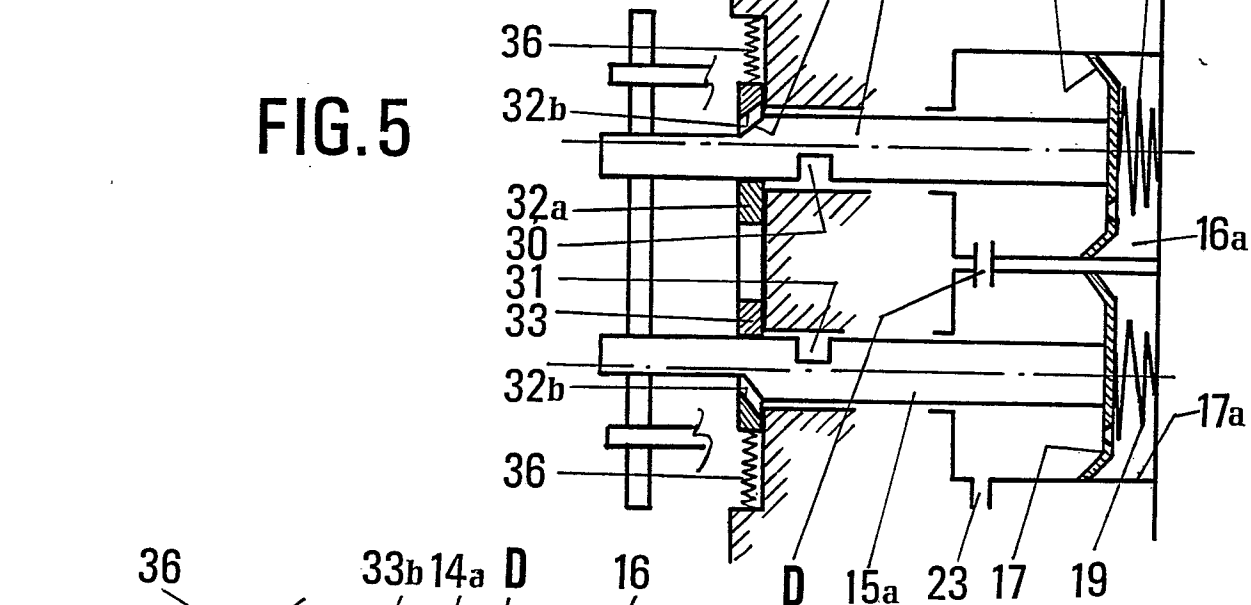


FIG. 5

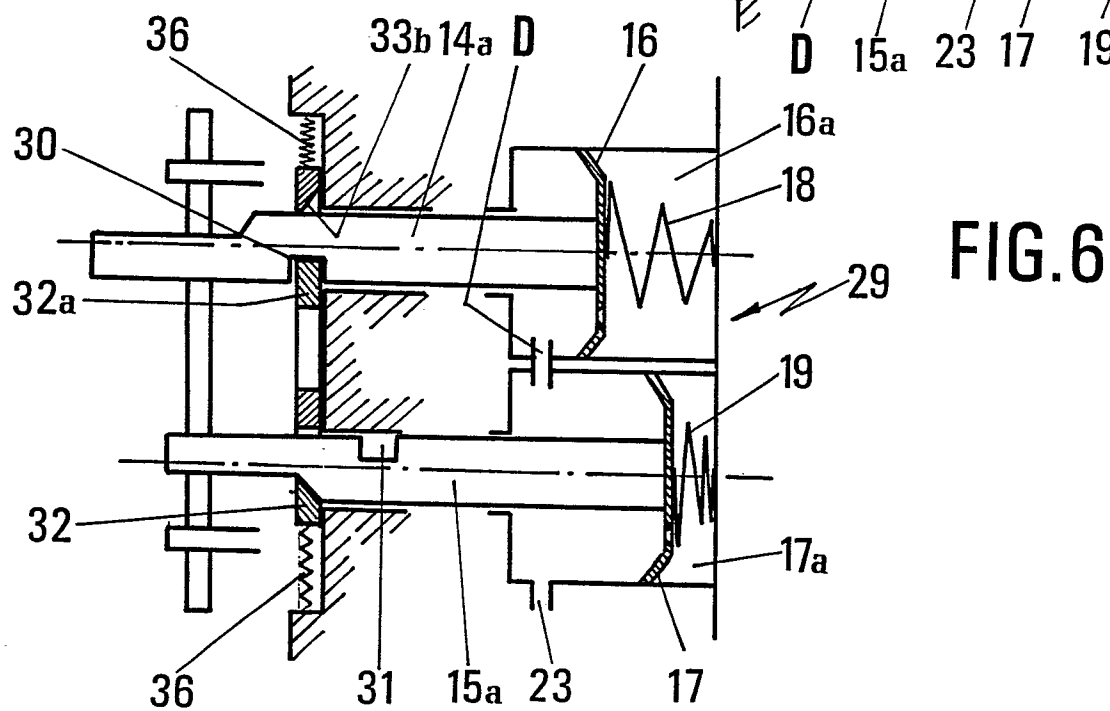


FIG. 6

FIG.7

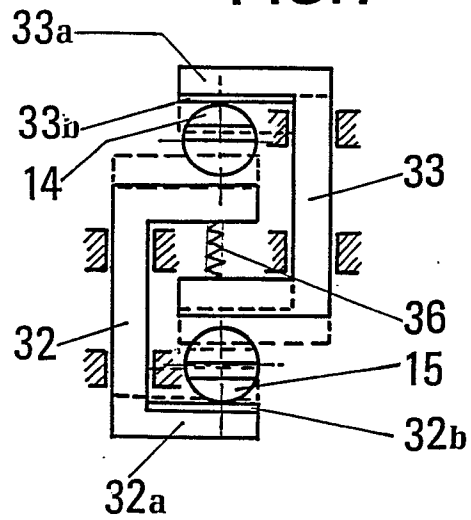


FIG.8

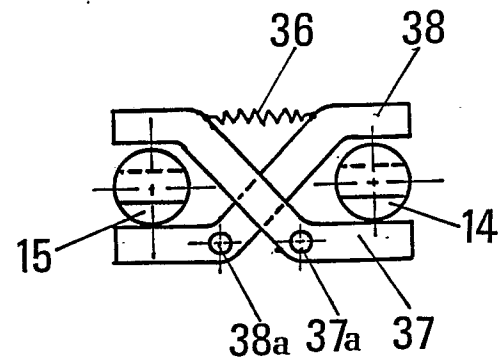


FIG.9

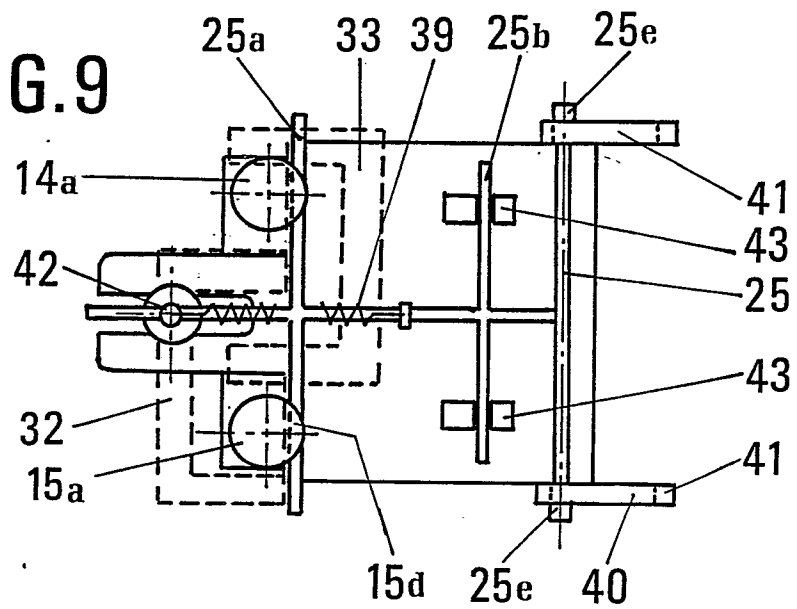


FIG.10

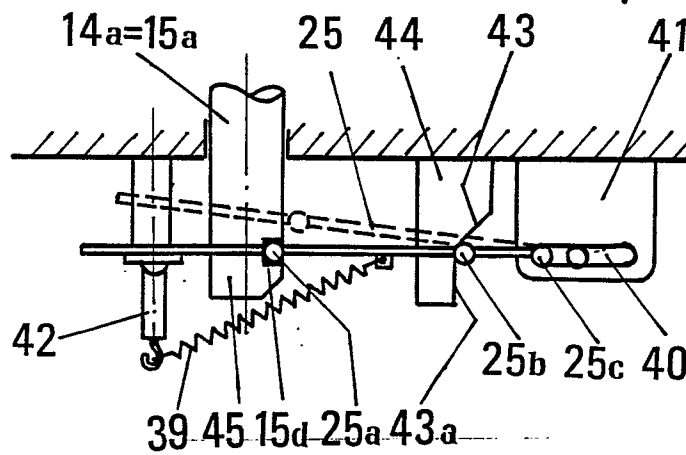


FIG.11

FIG.12

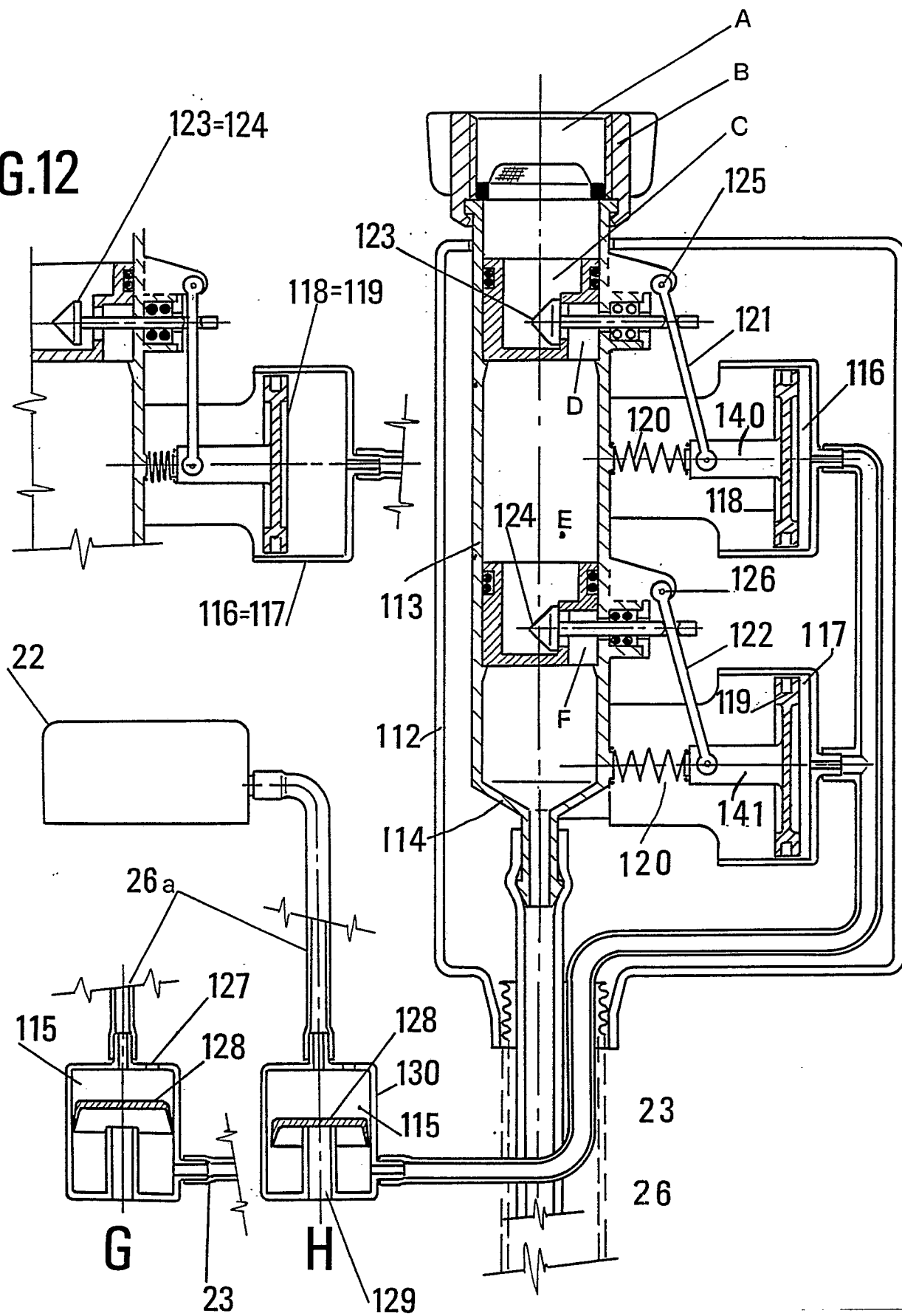


FIG.13

FIG.14

FIG.15

FIG.16

