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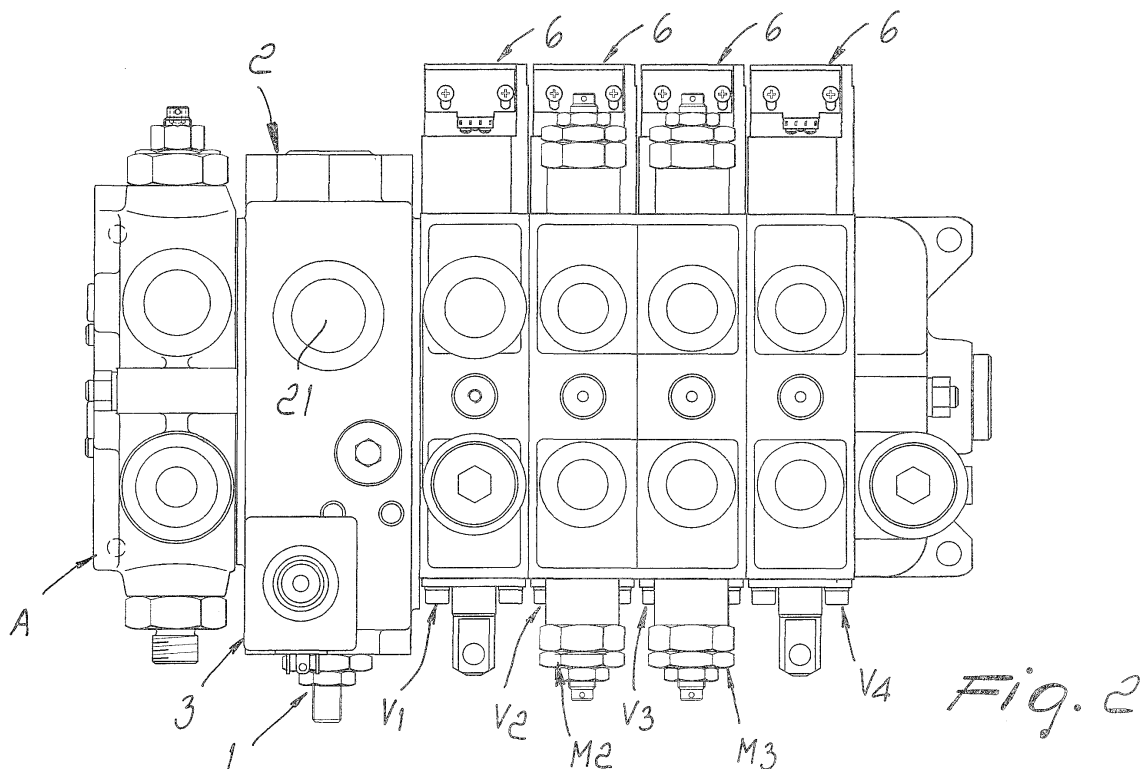
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(54) Safety device for hydraulic distribution units

(57) A safety device (1) for hydraulic distribution units, which comprises a first normally-closed flow control unit (2) which can be associated with the input of a distribution unit (D), of the type which comprises at least one slider which can move with a reciprocating motion along a corresponding receptacle formed in a body for opening and closing ports for the passage of a working

fluid, first driving means (3) for opening the first flow control unit (2) and first means (4) for sensing the position of an operator at a control post for actuating the distribution unit (D), which are functionally associated with the driving means, the first sensing means (4) being suitable to activate the first driving means (3) to open the first flow control unit (2) if the operator is located at the control post.



EP 1 772 631 A2

Description

[0001] The present invention relates to a safety device for hydraulic distribution units, such as in particular selector valves.

[0002] It is known that power-using machines are generally provided with a hydraulic system for supplying the fluid power toward a distribution unit, which is constituted by one or more selector valves (of the modular and/or monolithic type), for actuating respective movements of the equipment with which said machines are provided.

[0003] In the case of lift trucks, for example, said distribution units allow to operate certain movements, including the lifting and lowering of the load by means of the extension of the lifting arm, the traversal of said arm, and the lateral movement of the load.

[0004] According to the ISO 3691/1 standard, which is soon to come into force, manufacturers will be required to comply with new safety standards, producing power using machines which are suitable to ensure that the activation of the hydraulic services supplied by the distribution units is intentional and is performed exclusively by the operator on board the machine.

[0005] Secondly, according to a further requirement the hydraulic services must be activated exclusively following an intentional action of the operator, correctly located on board the machine, on the control elements, so as to avoid for example situations of potential danger if the load lifted by the movement unit of a lift truck descends autonomously and independently of any intentional actuation of the corresponding control by the operator.

[0006] However, currently the applicant is not aware of any devices which allow to adapt the hydraulic systems in use on power-using machines to these safety requirements prescribed by the above cited standard.

[0007] The aim of the present invention is to provide a safety device for hydraulic distribution units which allows to inhibit any unintentional activation of the movements of the hydraulic services without the operator being correctly positioned on board the machine or in any case in the post assigned to the control of these services.

[0008] Within this aim, an object of the present invention is to avoid accidental activations of the hydraulic services which are not the consequence of an intentional actuation of the corresponding controls by the operator.

[0009] Another object of the present invention is to provide a device with a structure which is simple, relatively easy to provide in practice, safe in use, effective in operation, and has a relatively low cost.

[0010] This aim and these and other objects, which will become better apparent hereinafter, are achieved by the present safety device for hydraulic distribution units, characterized in that it comprises a first normally-closed flow control unit which can be associated with the input of a distribution unit, of the type which comprises at least one slider which can move with a reciprocating motion along a corresponding receptacle formed in a body for

opening and closing ports for the passage of a working fluid, first driving means for opening the first flow control unit and first means for sensing the position of an operator at a control post for actuating said distribution unit, which are functionally associated with said driving means, the first sensing means being suitable to activate said first driving means to open said flow control unit if the operator is located at the control post.

[0011] Further characteristics and advantages of the present invention will become better apparent from the following detailed description of some preferred but not exclusive embodiments of a safety device for hydraulic distribution units, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a hydraulic diagram of a first embodiment of the safety device according to the invention applied to a modular distribution unit;

Figure 2 is a side view of the device and of the distribution unit of Figure 1;

Figure 3 is a hydraulic diagram showing the device of Figure 1 arranged in line with modular selector valves;

Figure 4 is a perspective view of a possible embodiment of the first flow control unit with the corresponding electric valve of the device of Figure 1;

Figure 5 is a sectional view of the first flow control unit of Figure 4 with the corresponding electric valve;

Figure 6 is a perspective view of an alternative embodiment of the first flow control unit with the corresponding electric valve of the device of Figure 1;

Figure 7 is a sectional view of the first flow control unit of Figure 6 with the corresponding electric valve;

Figure 8 is a hydraulic diagram of a second embodiment of the safety device according to the invention;

Figure 9 is a perspective view of the first flow control unit with the corresponding electric valve of the device of Figure 8;

Figure 10 is a perspective view of the second flow control unit with the corresponding electric valve of the device of Figure 8;

Figure 11 is a sectional view of the second flow control unit of Figure 10 with the corresponding electric valve;

Figure 12 is a hydraulic diagram of a third embodiment of the safety device according to the invention;

Figure 13 is a sectional view of the first flow control unit, with the corresponding electric valve, of the device of Figure 12;

Figure 14 is another sectional view of the first flow control unit of Figure 13;

Figure 15 is a sectional view of the second flow control unit, with the corresponding electric valve, of the device of Figure 12;

Figure 16 is another sectional view of the second flow control unit of Figure 15;

Figure 17 is a front view of the second sensing means and of the corresponding means for coupling to the

body of the distribution unit of the device according to the invention;

Figure 18 is a partially sectional view of Figure 17.

[0012] With reference to the figures, the reference numeral 1 generally designates a safety device for hydraulic distribution units.

[0013] The device 1 can be applied in particular to selector valves of the type conventionally used in power-using machines to actuate the corresponding equipment and services.

[0014] The device 1 comprises a normally-closed flow control unit 2, which is associated with the input of a conventional distribution unit D which is powered by means of a working fluid such as oil or the like.

[0015] More particularly, the flow control unit 2 is suitable to be interposed between the distribution unit D and a unit for feeding the working fluid toward said distribution unit in a modular architecture (see the hydraulic diagrams of Figures 1, 8 and 12), to be arranged in line with modular or monolithic selector valves, keeping unchanged the functions it performs (Figure 3), and to be integrated in an appropriately provided monolithic selector valve (a solution which is not shown).

[0016] The distribution unit D is of the modular type, which comprises at least one slider which can move with a reciprocating motion along a corresponding receptacle which is formed in a body for opening and closing passage ports for the working fluid, such as oil or the like.

[0017] The feeder unit consists of a hydraulic power-using machine, generally constituted by a volumetric pump of the piston, gear, vane type etc.

[0018] In the particular embodiments of the invention shown in the figures, the flow control unit 2 is interposed between the distribution unit D and a feeder device A (input head or manifold).

[0019] If adjustment devices such as priority valves, valves and electric valves for connection to the discharge, pressure limiting valves, or other auxiliary elements are associated with the input of the distribution unit D, the flow control unit 2 is interposed between said devices and the distribution unit D.

[0020] The device 1 further has first driving means, constituted by a first electric valve 3 for opening the flow control unit 2, and first means 4 for sensing the placement of an operator at a control post which is appropriately provided for the operation of the distribution unit D.

[0021] The first sensing means 4 activate, for example by means of an electrical signal, the intervention of the first electric valve 3 to open the first flow control unit 2 if the operator is present at said control post.

[0022] The first sensing means 4 can be positioned for example at a seat provided in the control post and can be sensitive to the weight of the operator correctly placed so as to rest on said seat.

[0023] The first sensing means 4, for example, can control a first microswitch 5, which is connected electrically to the first electric valve 3 and which, by tripping

under the weight of the operator, closes the corresponding electric circuit.

[0024] If the operator is not present at the control post assigned to the operation of the distribution unit D, therefore, said unit remains isolated, since it is not supplied with the working fluid.

[0025] However, the first sensing means 4 might also be positioned at a safety belt provided in the control post and might allow to control the closure of the first microswitch 5 only if said belt is closed by the operator located in the control post.

[0026] Preferably, the device 1 further has second means 6 for sensing the actuation of the distribution unit D, which are associated functionally with the first electric valve 3.

[0027] The second sensing means 6 activate the delivery of the first electric valve 3 in order to open the first flow control unit 2 if the distribution unit D is activated by the operator.

[0028] This avoids, for example, accidental movements of the equipment served by the distribution unit D in the absence of an intentional control performed by the operator on said unit.

[0029] Preferably, the second sensing means 6 are associated with the slider of the distribution unit D so as to detect longitudinal movements of said slider along the corresponding receptacle, which indicate that the hydraulic function is activated.

[0030] Different applications of the second sensing means 6 are in any case foreseeable; they might be coupled for example to the control element (lever, pedals or others) that actuates the sliding of the slider.

[0031] The second sensing means 6 can actuate a second microswitch 7, which is connected electrically to the first electric valve 3 and trips if the slider moves, closing the corresponding electric circuit; as an alternative, the second sensing means 6 can control a magnetoinductive sensor.

[0032] In the absence of intentional operation of the distribution unit D, it therefore remains isolated, since it is not supplied with the working fluid.

[0033] Advantageously, the first and second sensing means 4 and 6 are connected in series to each other and to the first electric valve 3, so as to allow the intervention of the first electric valve 3 in order to open the first flow control unit 2 when both of the following safety conditions occur: the operator is positioned in the control post of the distribution unit D and said unit is operated intentionally.

[0034] The device 1 comprises means 8 for coupling the second microswitch 7 to the slider of the distribution unit D.

[0035] The coupling means 8 comprise a block 9 for supporting the second microswitch 7, which can be associated with the body of the distribution unit D and is provided internally with a cavity 10, which is open toward said body so that it is connected to the corresponding receptacle, a terminal element 11 which is rigidly associated with the slider and is arranged so that it can slide

along the cavity 10 and cooperates with the second microswitch 7, the movable element 12 of which protrudes inside the cavity 10 through a hole provided in the block 9.

[0036] The terminal element 11 can slide from an inactive configuration, in which the second microswitch 7 is in such a position so as to keep the corresponding electric circuit open; any movement of the terminal element 11 from said inactive position trips the second microswitch 7, which provides clearance to the first electric valve 3 for the opening of the first flow control unit 2.

[0037] The terminal element 11 is provided with a groove 11a in which the moving element 12 engages in the inactive position.

[0038] Further, the terminal element 11 is provided with a shank 11b which is threaded externally and is directed toward the opening of the cavity 10 for coupling to the slider.

[0039] The coupling means 8 comprise means for the return of the terminal element 11 to the inactive position and therefore of the slider to the neutral configuration which are of the elastic type and provide a helical compression spring 13 which is interposed between the shoulders formed by two cups 14, one fitted on the terminal element 11 and the other centered on the shank 11b and kept in position toward the opening of the cavity 10 by a ring 15.

[0040] The block 9 can be fixed to the body of the distribution unit D by way of threaded elements 16.

[0041] If the distribution unit D is constituted by a plurality of modular selector valves assembled together, the second sensing means 6 have a second microswitch 7 which is applied to the slider of each selector valve by way of respective coupling means 8.

[0042] The various second microswitches 7 are connected electrically in parallel to each other and in series to the first microswitch 5.

[0043] Different embodiments of the invention are possible.

[0044] In a first embodiment, shown in Figures 1 to 7, the first electric valve 3 is of the fluid-operated type and is suitable to process a first driving fluid for opening the first flow control unit 2.

[0045] The driving fluid can be fed to the first electric valve 3 by the feeder means of the distribution unit D, preferably by interposing a pressure reduction valve, or by additional feeder means.

[0046] In detail, the first flow control unit 2 comprises a first valve body 17, which is provided with a first seat 18 which is associated with the delivery of the first electric valve 3 and is connected to at least one first input port 19 for the working fluid, at least one output port 20 for the working fluid which can be associated with the input of the distribution unit D, and at least one discharge port 21 for said fluid.

[0047] A first contoured shuttle 22 for opening and closing the first ports 19, 20 and 21 is accommodated so that it can slide along the first seat 18 and can move alternately between an inactive configuration and an ac-

tive configuration by way of the thrust applied by the first driving fluid to a first working surface 22a thereof.

[0048] The first seat 18 and the first shuttle 22 may have many shapes, as shown for example in Figures 4 to 7.

[0049] In the inactive configuration, the first shuttle 22 is suitable to connect the first input and discharge ports 19 and 21, isolating the first output port 20, while in the active configuration the first shuttle 22 is arranged so as to connect the first input and output ports 19 and 20, isolating the first discharge port 21.

[0050] The first input port 19 can be associated with the feeder means of the distribution unit D.

[0051] When the first shuttle 22 is in the inactive configuration, the first flow control unit 2 thus closes the flow of working fluid from the feeder means to the distribution unit D.

[0052] As a consequence of the opening of the first electric valve 3 and of the delivery of the driving fluid, the first shuttle 22 moves to the active configuration, opening the passage for the working fluid toward the distribution unit D.

[0053] Advantageously, the first seat 18 is formed by a through hole which is provided in the first valve body 17 and is closed at the ends by respective first sealing plugs 23.

[0054] The first flow control unit 2 has first means 24, preferably of the elastic type, for returning the first shuttle 22 to the inactive configuration.

[0055] Said first return means are constituted by a helical compression spring, which is interposed between the bottom of a longitudinal dead hole 25, which is provided in the first shuttle 22 and is open at the first working surface 22a and the first plug 23a which faces it; the other first plug 23b provides the head of the hydraulic cylinder for the actuation of the first shuttle 22 and constitutes a stroke limiting abutment thereof in the inactive configuration.

[0056] In the first embodiment of the invention shown in Figures 1 to 7, the first valve body 17 is also provided with at least one port 26 for the return of the working fluid from the discharge of the distribution unit D, which is connected to the first seat 18.

[0057] In this case, the first shuttle 22 in the inactive configuration is arranged so as to connect the first input and discharge ports 19 and 21 and isolate both the first output port 20 and the return port 26 so as to prevent both sending working fluid to the input of the distribution unit D and the backflow of the working fluid from the discharge of said unit.

[0058] Conversely, in the active configuration the first shuttle 22 connects the first input port 19 to the output port 20 and simultaneously connects the return port 26 to the first discharge port 21.

[0059] If the distribution unit D is constituted by one or more selector valves, each provided with its own maximum-pressure valve, there are return ports 26 which can be associated with both valves; in Figure 1, for example,

the reference numerals 26a and 26b designates the return ports which can be coupled respectively to the discharges of the maximum-pressure valves and to the discharges of the selector valves provided in the distribution unit D.

[0060] It is possible to insert in the device 1 a maximum-pressure valve between the first output and discharge ports 20 and 21, or between the first discharge port 21 and the return port 26, in order to avoid hammering in the case of intervention for closure.

[0061] With the first shuttle 22 in the inactive position, it is possible to avoid movements of the equipment served by the distribution unit D which are not due to an intentional operation of the controls of said unit by the operator and to provide an additional safety against the descent of overhead loads caused by seepage of the working fluid.

[0062] The device 1 can be provided with mechanical means for the actuation of the sliding of the shuttle 22 from the inactive configuration to the active configuration in emergency conditions, so as to allow for example to reposition the equipment served by the distribution unit D even if the hydraulic system fails.

[0063] Figures 1 and 2 are an operating diagram and a side view of the device 1 according to the first embodiment, applied to a distribution unit D which is constituted by four assembled selector valves, designated by the reference signs V1, V2, V3 and V4, in which the two central sections are associated with respective maximum-pressure valves, designated by the reference signs M2 and M3.

[0064] Figure 3 instead illustrates an operating diagram of the first embodiment of the invention arranged in line with modular or monolithic selector valves.

[0065] In a second embodiment, shown in Figures 8 to 11, the first flow control unit 2 (Figure 9) does not have the return ports 26 and the device 1 has a second normally-closed flow control unit 27 suitable to be associated with the discharge of the distribution unit D, and second driving means 28, which are constituted by a second electric valve for the delivery of a second driving fluid for opening the second flow control unit 27 which is functionally associated with at least the first sensing means 4.

[0066] More particularly, the second flow control unit 27 can be interposed between the discharge of the distribution unit D and a conventional discharge unit for the collection, disposal and/or recovery of the working fluid.

[0067] The second driving fluid can be fed to the second electric valve 28 by the feeder means of the distribution unit D, preferably by interposing a pressure reduction valve, or by additional feeder means, which optionally coincide with the ones that feed the first electric valve 3.

[0068] The first sensing means 4 activate, for example by means of an electrical signal, the delivery of the second electric valve 28 to open the second flow control unit 27 if the operator is present at said control post.

[0069] Preferably, the second electric valve 28 is as-

sociated functionally also with the second sensing means 6, which, in detail, activate the delivery of the second electric valve 28 in order to open the second flow control unit 27 in case of activation of the distribution unit D by the operator.

[0070] In particular, the connection of the first and second sensing means 4 and 6 to the second electric valve 28 can be in series in order to achieve an actuation which is fully similar to the actuation of the first electric valve 3.

[0071] The second flow control unit 27 comprises a second valve body 29, which is provided with a second seat 30 which is associated with the delivery of the second electric valve 28 and is connected to at least one second input port 31 for the working fluid which can be associated with the discharge of the distribution unit D and at least one second output port 32 for said working fluid.

[0072] A second shuttle 33 is accommodated so that it can slide along the second seat 30 and is shaped to open and close the second ports 31 and 32 and is allowed to move alternately between an inactive configuration and an active configuration by way of the thrust applied by the second driving fluid to a second working surface 33a.

[0073] In the inactive configuration, the second shuttle 33 is suitable to keep isolated the second ports 31 and 32, while in the active configuration it is positioned so as to connect said second ports.

[0074] The second outlet port 32 can be associated with the discharge unit.

[0075] When the second shuttle 33 is in the inactive configuration, therefore, the second flow control unit 27 closes the flow of working fluid from the discharge of the distribution unit D toward the discharge unit.

[0076] Following the opening of the second electric valve 28 and of the delivery of the second working fluid, the second shuttle 33 moves to the active configuration, opening the passage for the working fluid toward the discharge unit.

[0077] The second shuttle 33 is arranged in the inactive configuration when the first shuttle 22 also is in the inactive configuration; likewise, the second shuttle 33 is arranged in the active configuration when the first shuttle 22 also is in the active configuration.

[0078] The second flow control unit 27 further comprises second means 34 for returning the second shuttle 33 to the inactive configuration, which are preferably of the elastic type.

[0079] Like the first embodiment described earlier, this second embodiment of the device 1 also can have mechanical means for actuating the sliding of the first and second shuttles 22 and 33 from the inactive configuration to the active configuration in emergency conditions, which allow to reposition the equipment served by the distribution unit D even in case of failure of the hydraulic system.

[0080] In a third embodiment of the invention shown in Figures 12 to 16, finally, the device 1 is provided with

a first flow control unit 2 and a second flow control unit 27, which are arranged respectively upstream and downstream of the distribution unit D in a manner similar to said second embodiment.

[0081] However, in the third embodiment the first flow control unit 2 comprises a first block 35, inside which ducts for connection to the working fluid supply unit, to the input of the distribution unit D and to the working fluid discharge unit are provided.

[0082] The first electric valve 3 is associated with the first block 35 and, differently from the preceding embodiments, is not of the fluid-operated type and actuates the translational motion of a flow control element in order to open and close the connecting ducts inside the first block 35.

[0083] Likewise, the second flow control unit 27 comprises a second block 36, in which ducts for connection to the output of the distribution unit D and to the working fluid discharge unit are provided.

[0084] The second electric valve 28 is associated with the second block 36 and, differently from the preceding embodiment, is not of the fluid-operated type and actuates the translational motion of a flow control element in order to open and close the connecting ducts inside the second block 36.

[0085] The first and second sensing means 4 and 6 are associated electrically in series with the two electric actuation valves 3 and 28.

[0086] The operation of the third embodiment of the invention is fully similar to the operation of the second embodiment.

[0087] When the operator is located in the control post and intentional actuation of the distribution unit D is verified and the first and second sensing means 4 and 6 activate the corresponding electric circuits, the first electric valve 3 allows to feed the distribution unit D with the intended flow-rate of pressurized fluid and at the same time the second electric valve 28 actuates the opening of the connection between the output of the distribution unit D and the discharge unit, allowing the normal operation of the machine.

[0088] When instead the first and second sensing means 4 and 6 do not verify one of the two safety conditions (operator located in the control post of the distribution unit D and intentional actuation of said unit), the electric valves 3 and 28 return to the inactive position, diverting toward the discharge the flow that passes through the first block 35 and arrives from the means for feeding the working fluid and closing the connecting duct of the second block 36 between the outlet of the distribution unit D and the discharge unit.

[0089] In practice it has been found that the described invention achieves the intended aim and objects.

[0090] In particular, the device according to the invention allows to ensure completely safe operation of machines served by a hydraulic system which comprises a distribution unit for selective supply of fluid power toward the various user devices that are provided.

[0091] Moreover, it is noted that the device according to the invention can be fitted both on newly-built distribution units and on existing distribution units.

[0092] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0093] All the details may further be replaced with other technically equivalent ones.

[0094] In practice, the materials used, as well as the shapes and dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

[0095] The disclosures in Italian Patent Application No. MO2005A000256, from which this application claims priority, are incorporated herein by reference.

[0096] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

25 Claims

1. A safety device for hydraulic distribution units, **characterized in that** it comprises a first normally-closed flow control unit which can be associated with the input of a distribution unit, of the type which comprises at least one slider which can move with a reciprocating motion along a corresponding receptacle formed in a body for opening and closing ports for the passage of a working fluid, first driving means for opening the first flow control unit and first means for sensing the position of an operator at a control post for actuating said distribution unit, which are functionally associated with said first driving means, the first sensing means being suitable to activate said first driving means to open said first flow control unit if the operator is located at the control post.
2. The device according to claim 1, **characterized in that** said first flow control unit is suitable to be interposed between said distribution unit and a unit for feeding the working fluid toward said distribution unit.
3. The device according to one or more of the preceding claims, **characterized in that** said first driving means are of the fluid-operated type and are suitable to process a first driving fluid for opening the first flow control unit.
4. The device according to one or more of the preceding claims, **characterized in that** said first driving means comprise at least one first electric valve.
5. The device according to one or more of the preceding

claims, **characterized in that** said first sensing means comprise at least one first microswitch or a first position sensor which is connected electrically to said first driving means.

6. The device according to one or more of the preceding claims, **characterized in that** said first sensing means are located at said control post.
7. The device according to one or more of the preceding claims, **characterized in that** said first sensing means are arranged at a seat provided in said control post.
8. The device according to one or more of the preceding claims, **characterized in that** said first sensing means are arranged at a safety belt provided in said control post.
9. The device according to one or more of the preceding claims, **characterized in that** it comprises second means for sensing the actuation of said distribution unit which are functionally associated with said first driving means, the second sensing means being suitable to activate said first driving means to open said flow control unit in case of activation of said distribution unit by the operator.
10. The device according to one or more of the preceding claims, **characterized in that** said first and second sensing means are associated in series with said first driving means.
11. The device according to one or more of the preceding claims, **characterized in that** said second sensing means can be associated with said slider in order to detect its movement.
12. The device according to one or more of the preceding claims, **characterized in that** said second sensing means comprise at least one second microswitch or a second position sensor, which can be coupled to said slider and is connected electrically to said first driving means.
13. The device according to one or more of the preceding claims, **characterized in that** it comprises means for coupling said second sensing means to said distribution unit.
14. The device according to one or more of the preceding claims, **characterized in that** said coupling means comprise a block for supporting said second sensing means which can be associated with said body and is provided internally with a cavity which is open toward said body, a terminal element which can be associated rigidly with said slider and is arranged so that it can slide along said cavity starting from an

inactive position, which corresponds to the neutral configuration of said slider and cooperates with said second sensing means, and means for the return of said terminal element to the inactive position.

15. The device according to one or more of the preceding claims, **characterized in that** said terminal element is provided with a groove in which said second microswitch engages in the inactive position.
16. The device according to one or more of the preceding claims, **characterized in that** said first return means are of the elastic type.
17. The device according to one or more of the preceding claims, **characterized in that** said first flow control unit comprises a first valve body which is provided with a first seat which is associated with the delivery of said first driving means and is connected to at least one first input port, at least one first output port which can be associated with the input of said distribution unit and at least one first working fluid discharge port, and at least one first contoured shuttle for the opening and closure of said first ports, and is accommodated so that it can slide along said first seat and can move alternately between an inactive configuration and an active configuration by way of the action of the thrust applied by the first driving fluid to a working surface thereof, the first shuttle being suitable, in the inactive configuration, to connect the first input and discharge ports, isolating the first output port and, in the active configuration, to connect the first input and output ports, isolating the first discharge port.
18. The device according to one or more of the preceding claims, **characterized in that** said first input port can be associated with said feeder means.
19. The device according to one or more of the preceding claims, **characterized in that** said first valve body comprises at least one port for the return of the working fluid from the discharge of said distribution unit which is connected to said first seat, the first shuttle being suitable, in the inactive configuration, to connect the first input and discharge ports, isolating the first output port and the return port and, in the active configuration, to connect the first input port to the first output port and the return port to the first discharge port.
20. The device according to one or more of the preceding claims, **characterized in that** said first flow control unit comprises first means for the return of said first shuttle to the inactive configuration.
21. The device according to one or more of the preceding claims, **characterized in that** said first return means

are of the elastic type.

22. The device according to one or more of the preceding claims, **characterized in that** it comprises a second normally-closed flow control unit suitable to be associated with the discharge of said distribution unit and second driving means for opening the second flow control unit which are functionally associated with at least said first sensing means, the first sensing means being suitable to activate said second driving means to open said second flow control unit if the operator is positioned at the control post.
23. The device according to one or more of the preceding claims, **characterized in that** said second flow control unit is suitable to be interposed between the discharge of said distribution unit and a working fluid discharge unit.
24. The device according to one or more of the preceding claims, **characterized in that** said second driving means are of the fluid-operated type and are suitable to process a second working fluid to open the second flow control unit.
25. The device according to one or more of the preceding claims, **characterized in that** said second driving means comprise at least one second electric valve.
26. The device according to one or more of the preceding claims, **characterized in that** said second driving means are functionally associated with said second sensing means, which are suitable to activate the second driving means to open said second flow control unit if said distribution unit is activated by the operator.
27. The device according to one or more of the preceding claims, **characterized in that** said first and second sensing means are associated in series with said second driving means.
28. The device according to one or more of the preceding claims, **characterized in that** said second flow control unit comprises a second valve body provided with a second seat which is associated with the delivery of said second driving means and is connected to at least one second input port for the working fluid which can be associated with the discharge of said distribution unit and at least one second output port for said working fluid and a second shuttle which is shaped so as to open and close said second ports and is accommodated so that it can slide along said second seat and can move alternately between an inactive configuration and an active configuration by way of the action of the thrust applied by the second driving fluid to a working surface thereof, the second shuttle being suitable, in the inactive configuration,

to isolate the second input and output ports and, in the active configuration, to connect said second ports.

29. The device according to one or more of the preceding claims, **characterized in that** said second output port can be associated with said discharge unit.
30. The device according to one or more of the preceding claims, **characterized in that** said second flow control unit comprises second means for the return of said second shuttle to the inactive configuration.
31. The device according to one or more of the preceding claims, **characterized in that** said second return means are of the elastic type.
32. The device according to one or more of the preceding claims, **characterized in that** it comprises means for the actuation of the sliding of said first shuttle and/or of said second shuttle from the inactive configuration to the active configuration in emergency conditions of the mechanical type.
33. The device according to one or more of the preceding claims, **characterized in that** said first and/or second driving means are fed by said feeder means, a pressure reduction valve being arranged upstream of said driving means.
34. The device according to one or more of the preceding claims, **characterized in that** it comprises additional feeder means for feeding said first and/or second driving means.
35. The device according to one or more of the preceding claims, **characterized in that** said first flow control unit comprises a first block, inside which ducts for connection to said working fluid feeder unit, to the input of said distribution unit and to a working fluid discharge unit are provided, said first driving means being suitable to actuate the translational motion of a flow control element for opening and closing the connecting ducts within said first block.
36. The device according to one or more of the preceding claims, **characterized in that** said second flow control unit comprises a second block, inside which ducts for connection to the output of said distribution unit and to a working fluid discharge unit are provided, said second driving means being suitable to actuate the translational motion of a flow control element for opening and closing the connecting ducts within said second block.

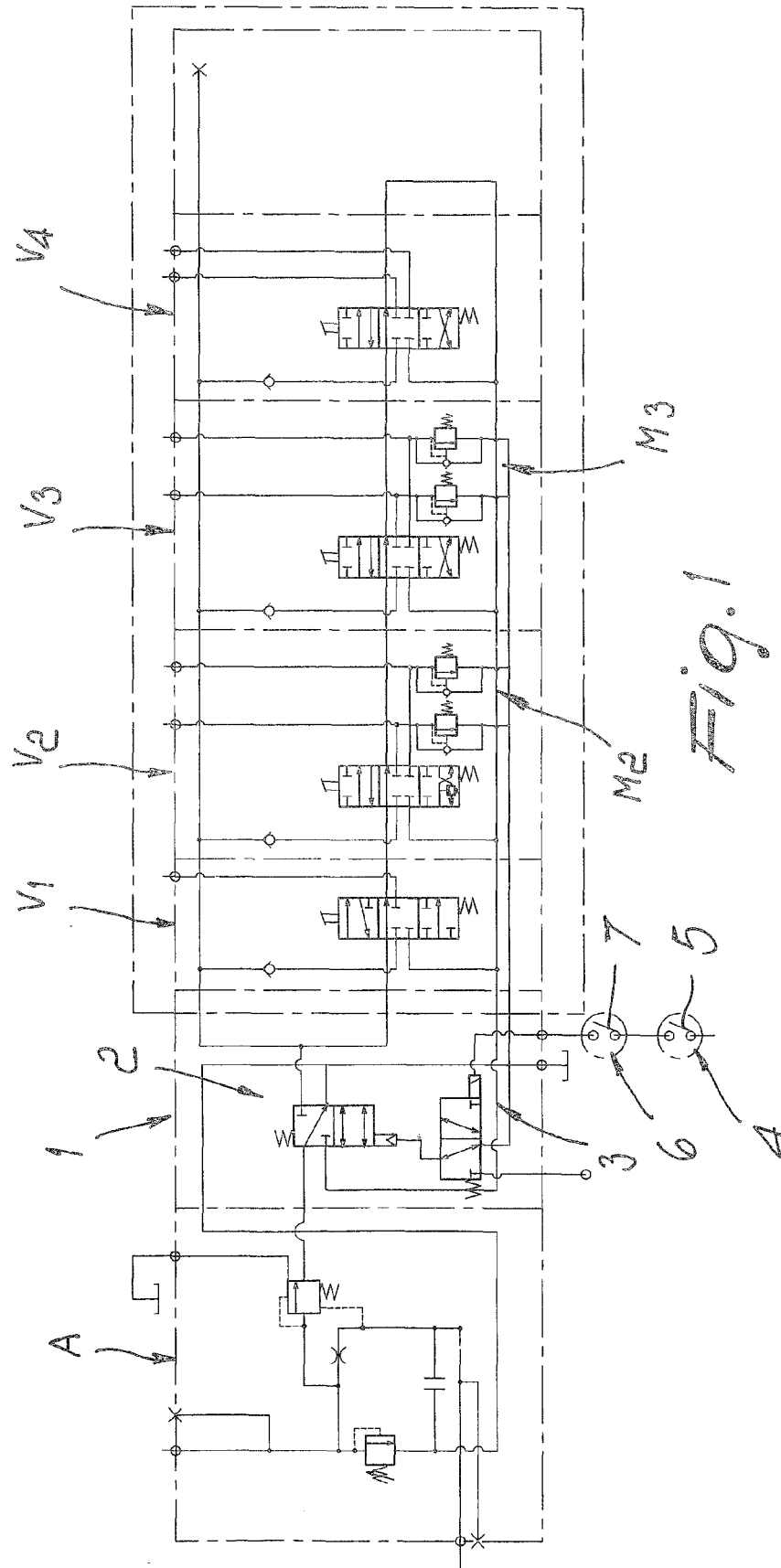
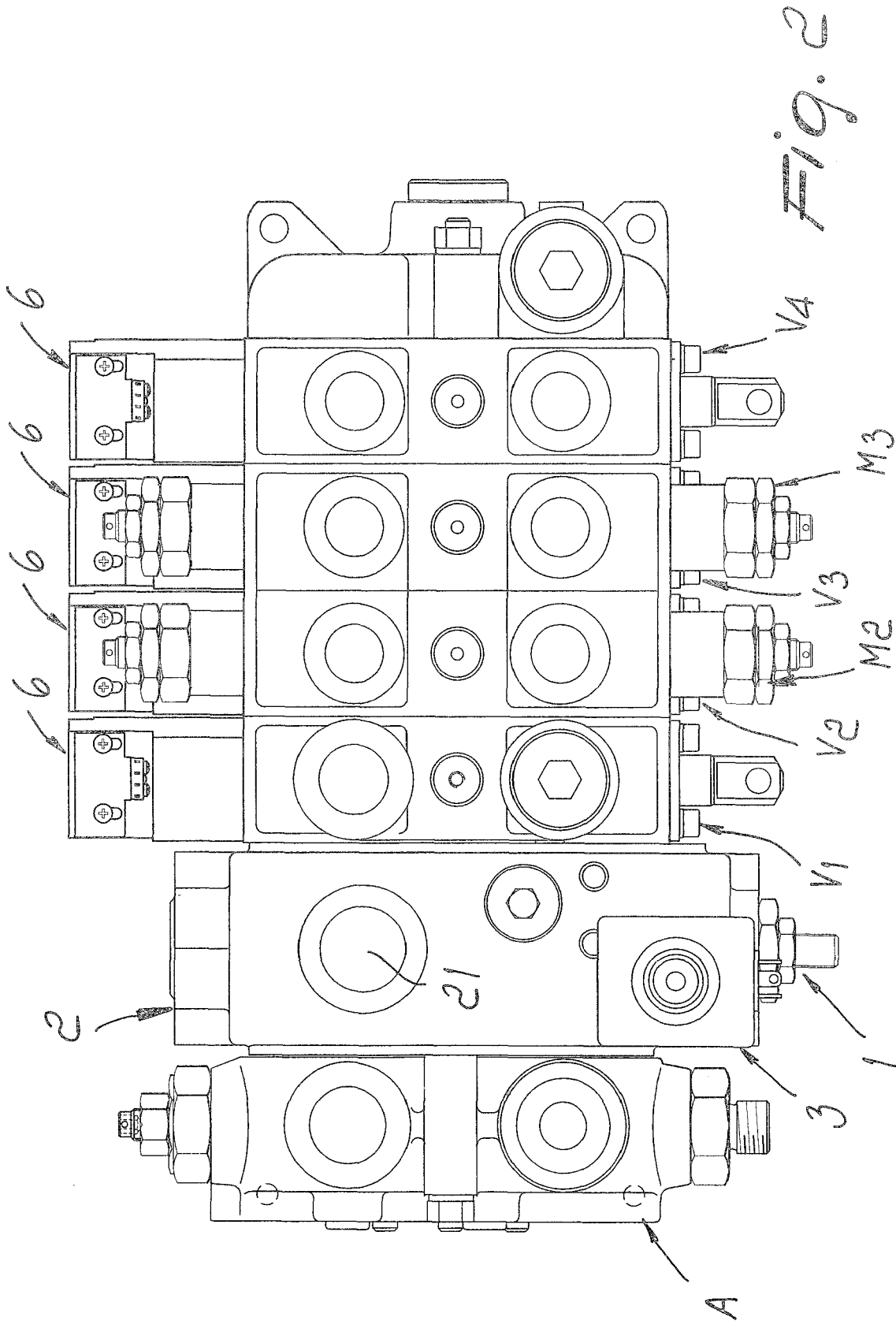
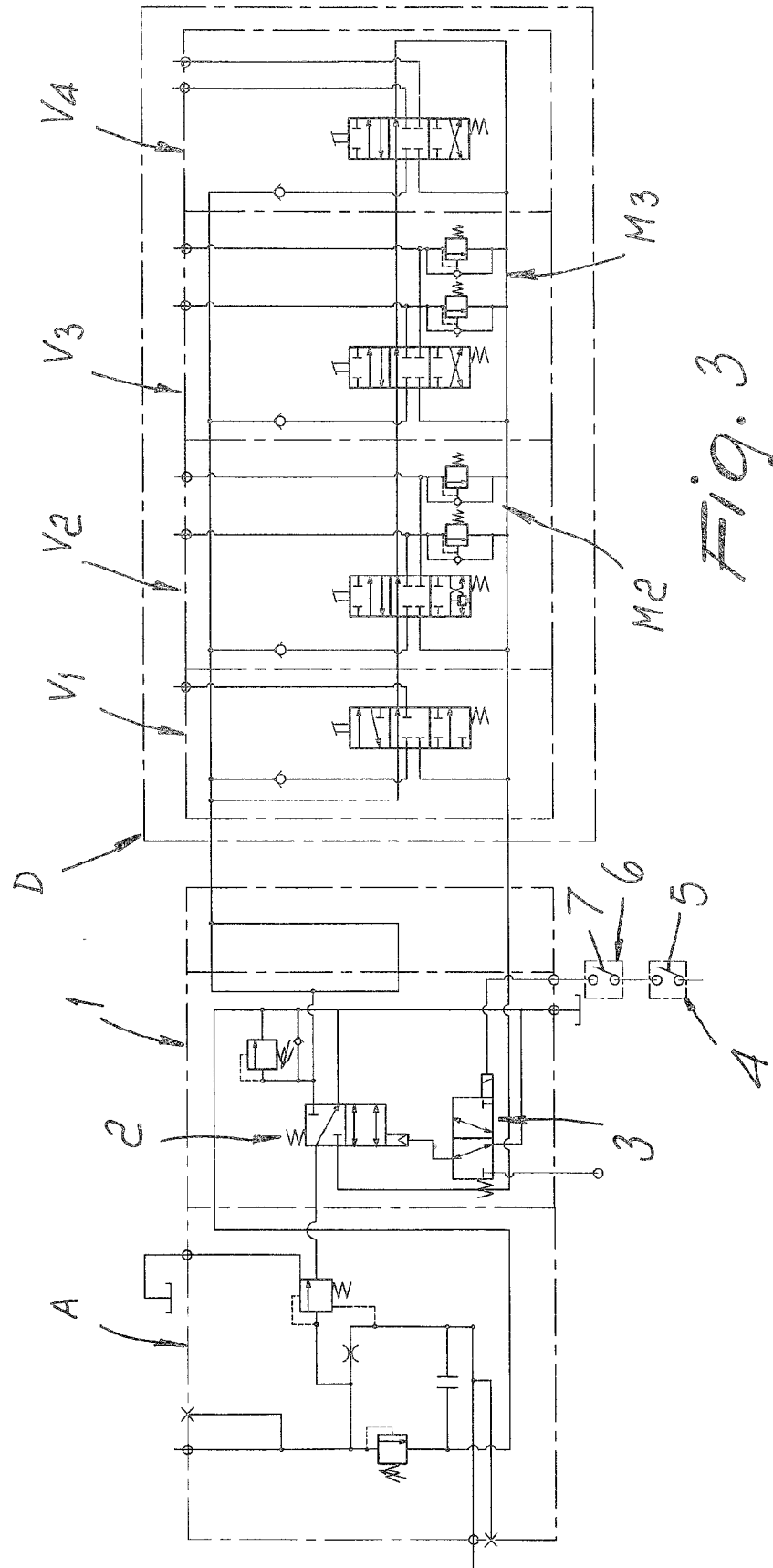
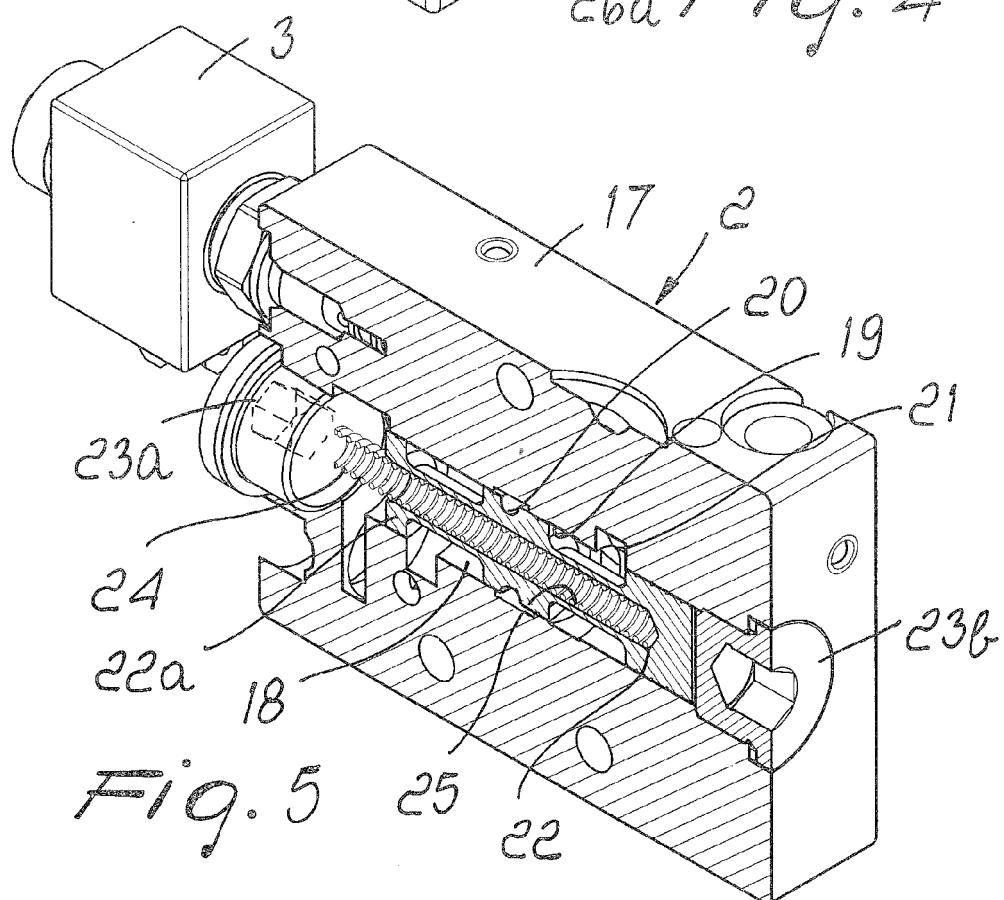
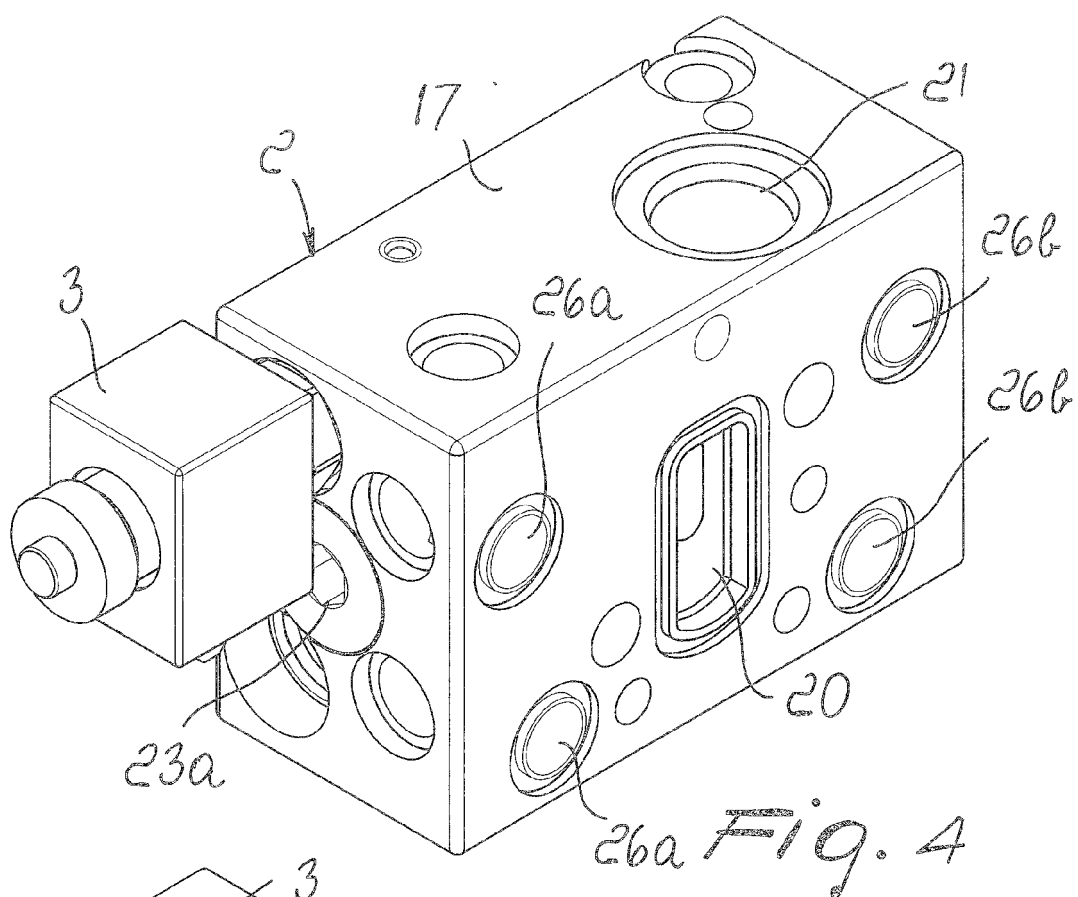
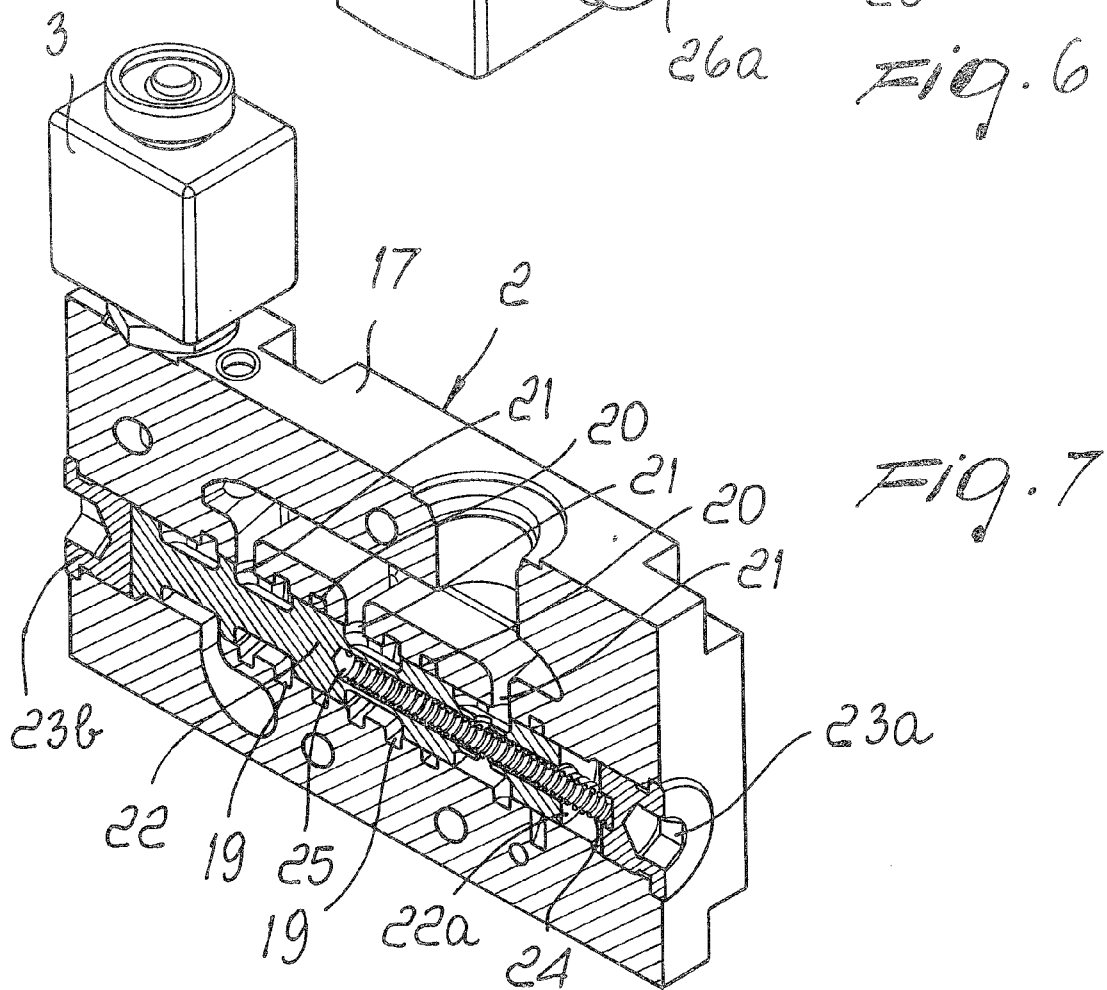
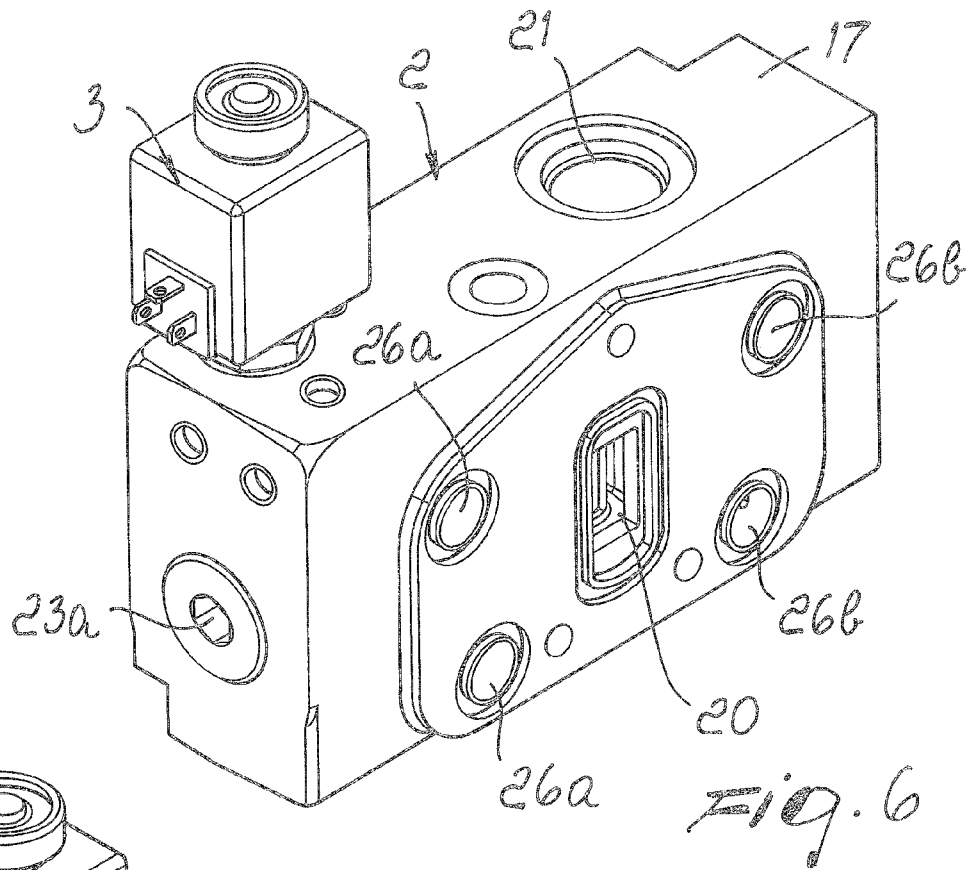


Fig. 1









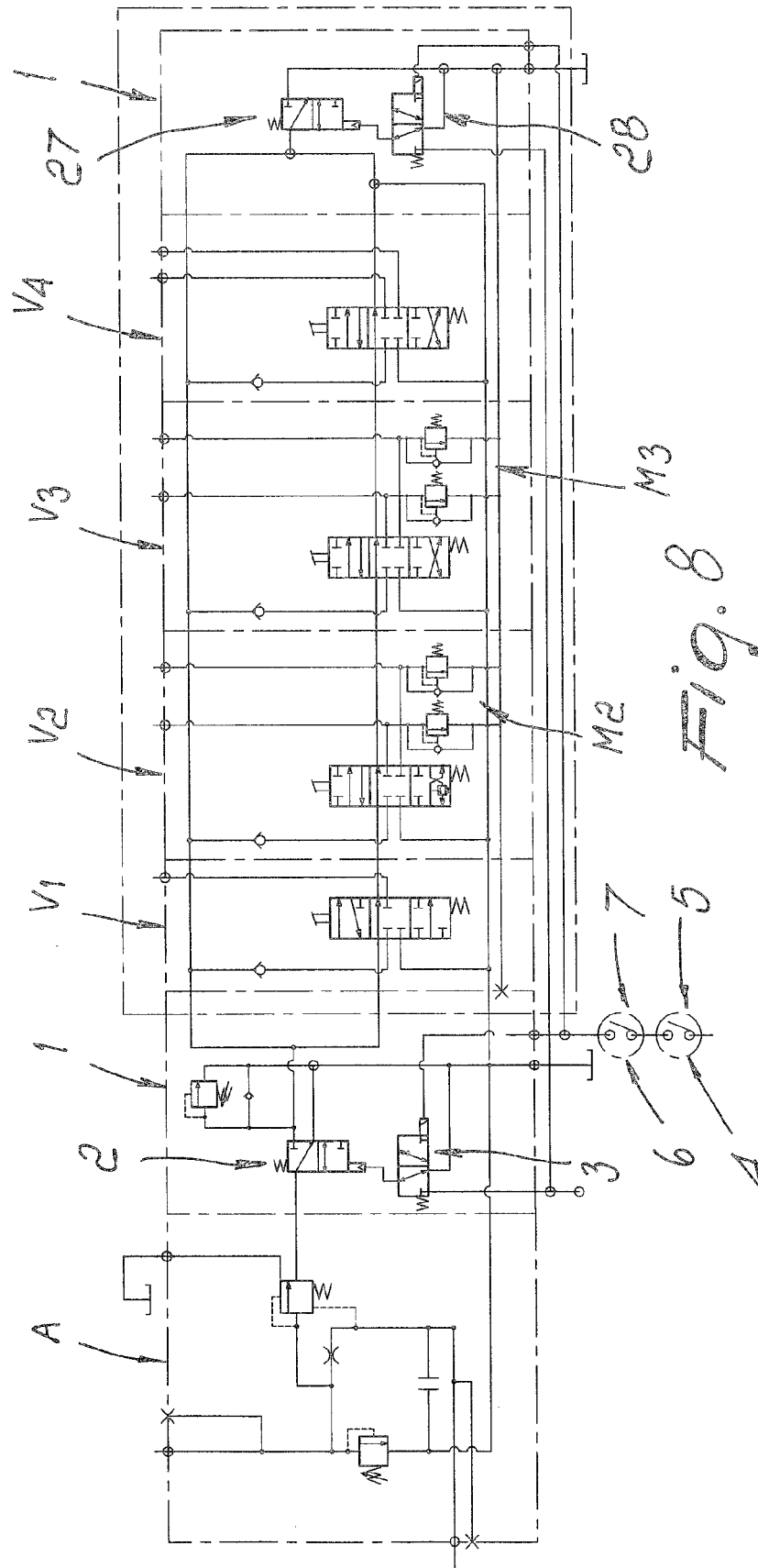


Fig. 8

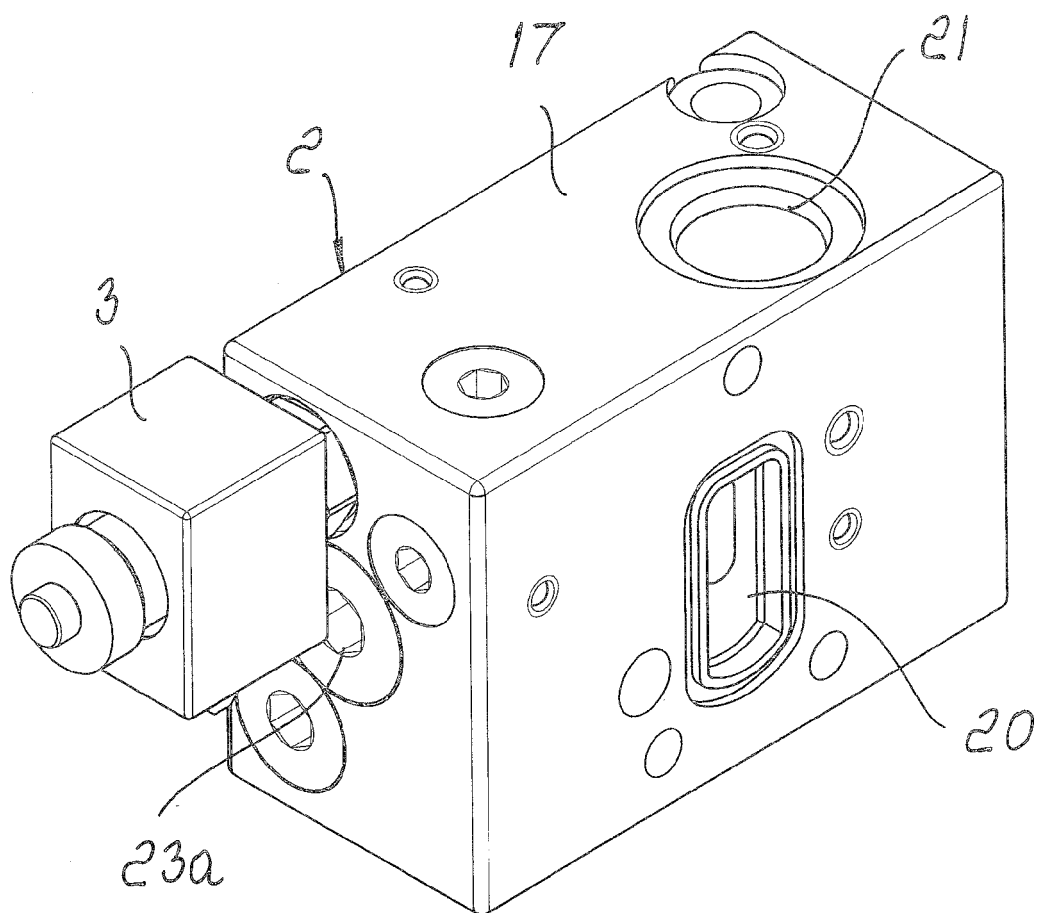
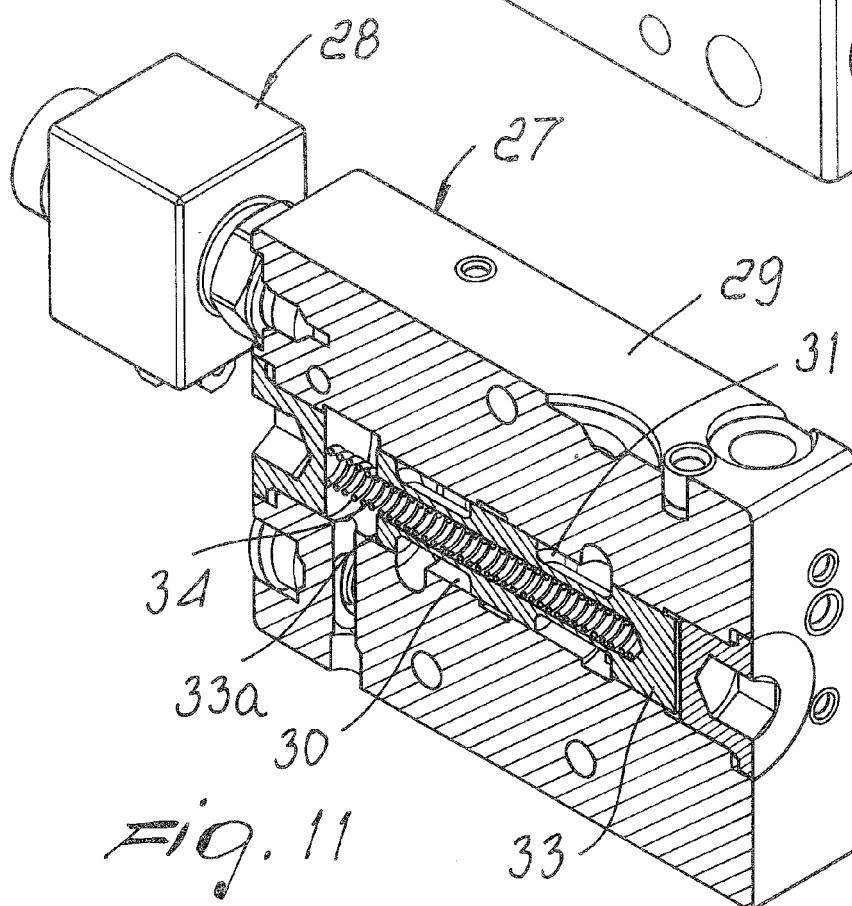
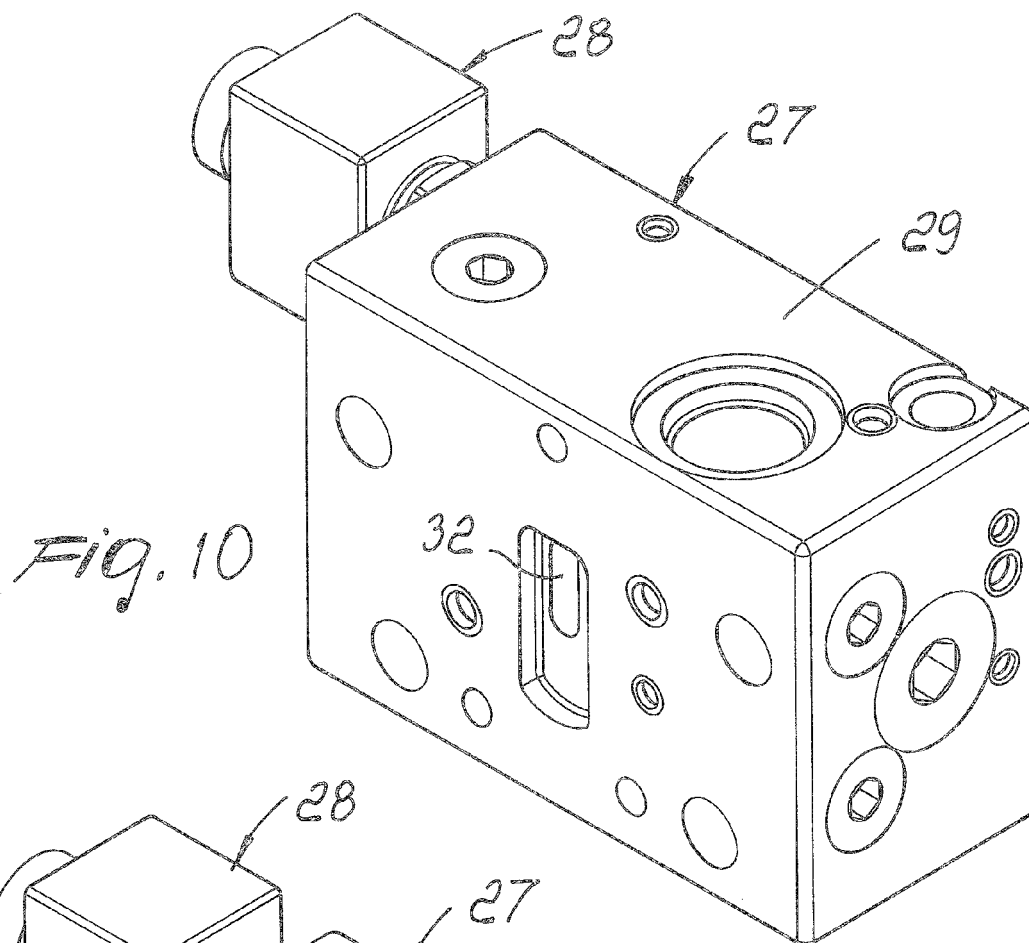
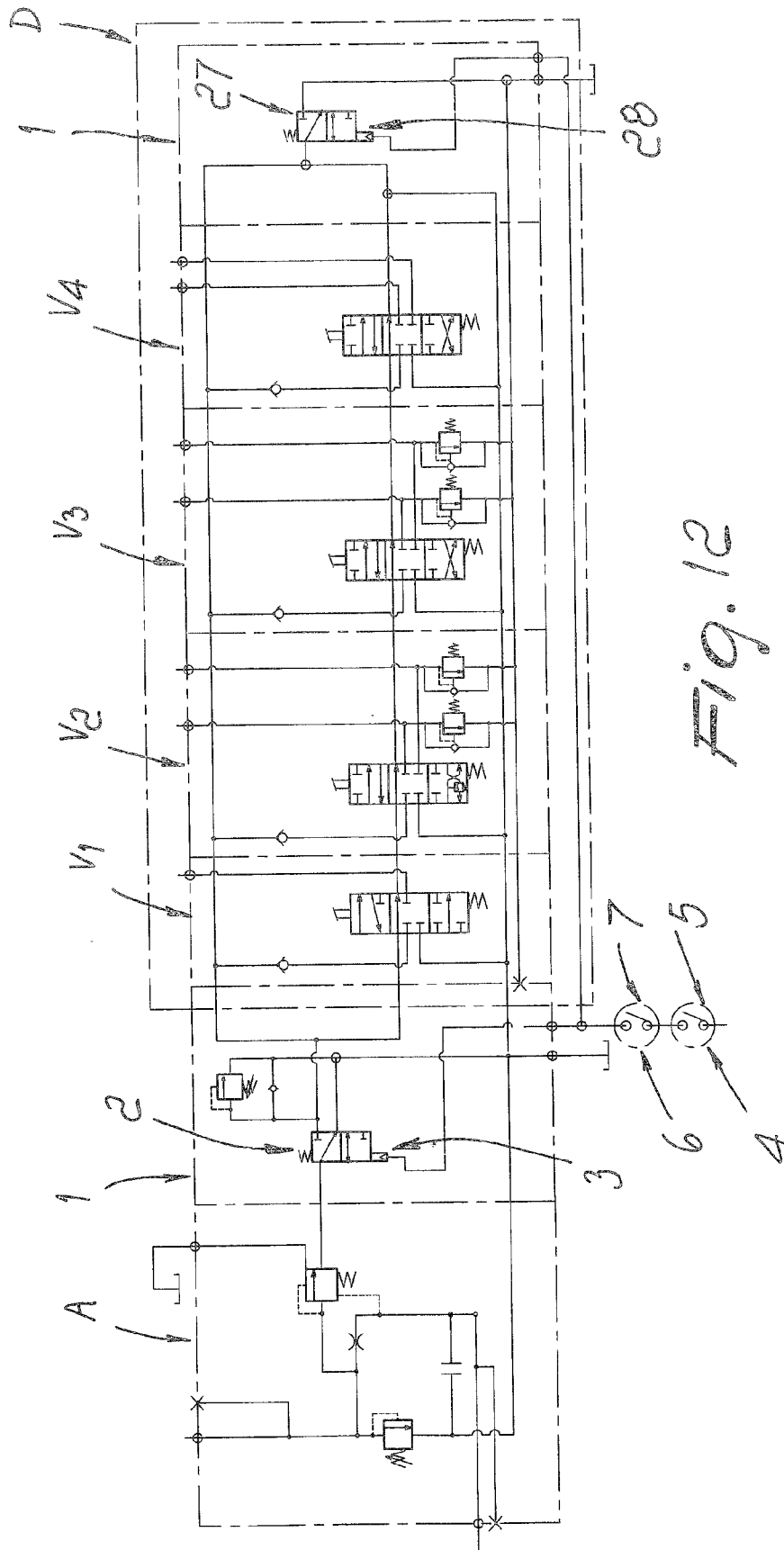
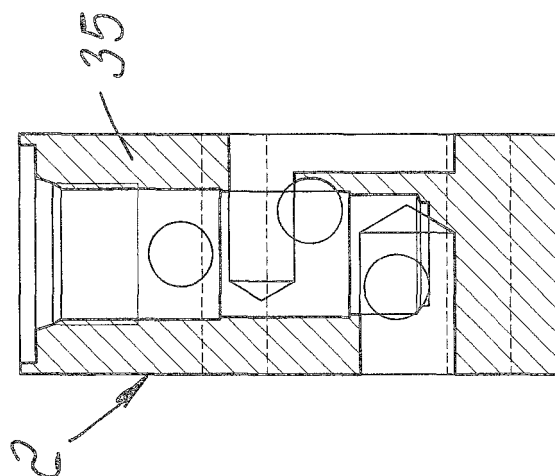
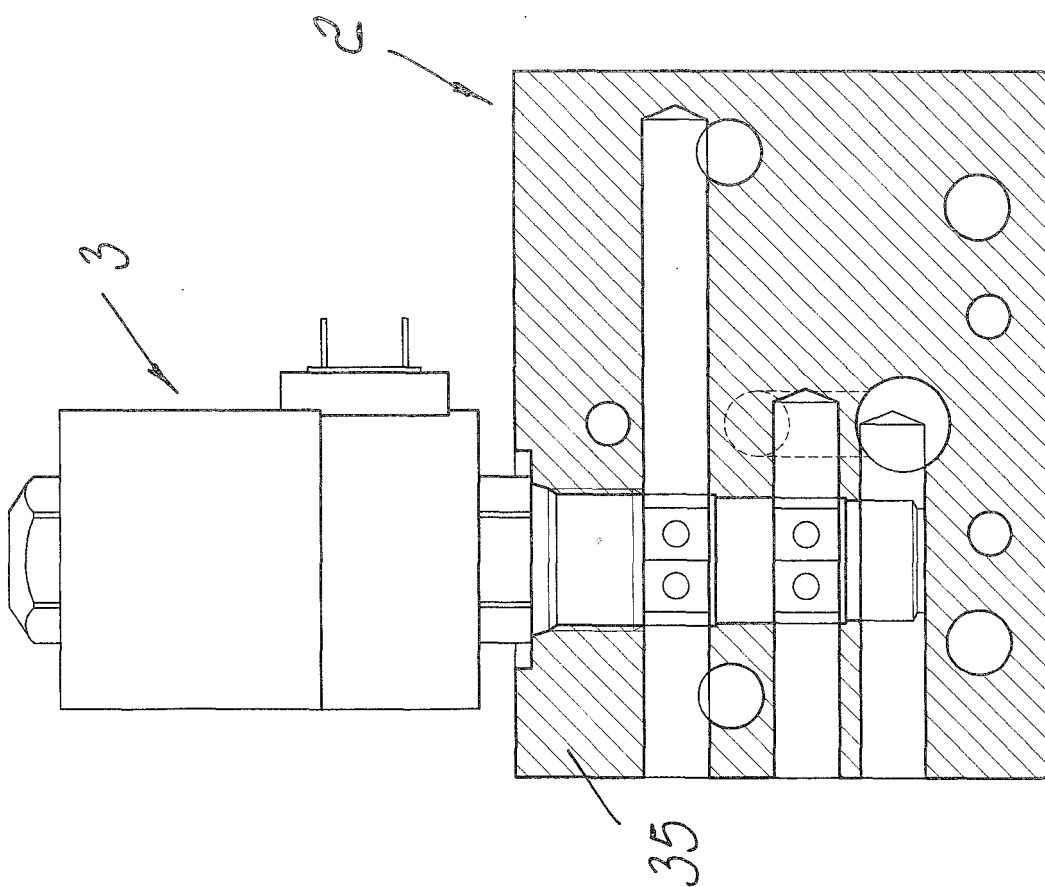
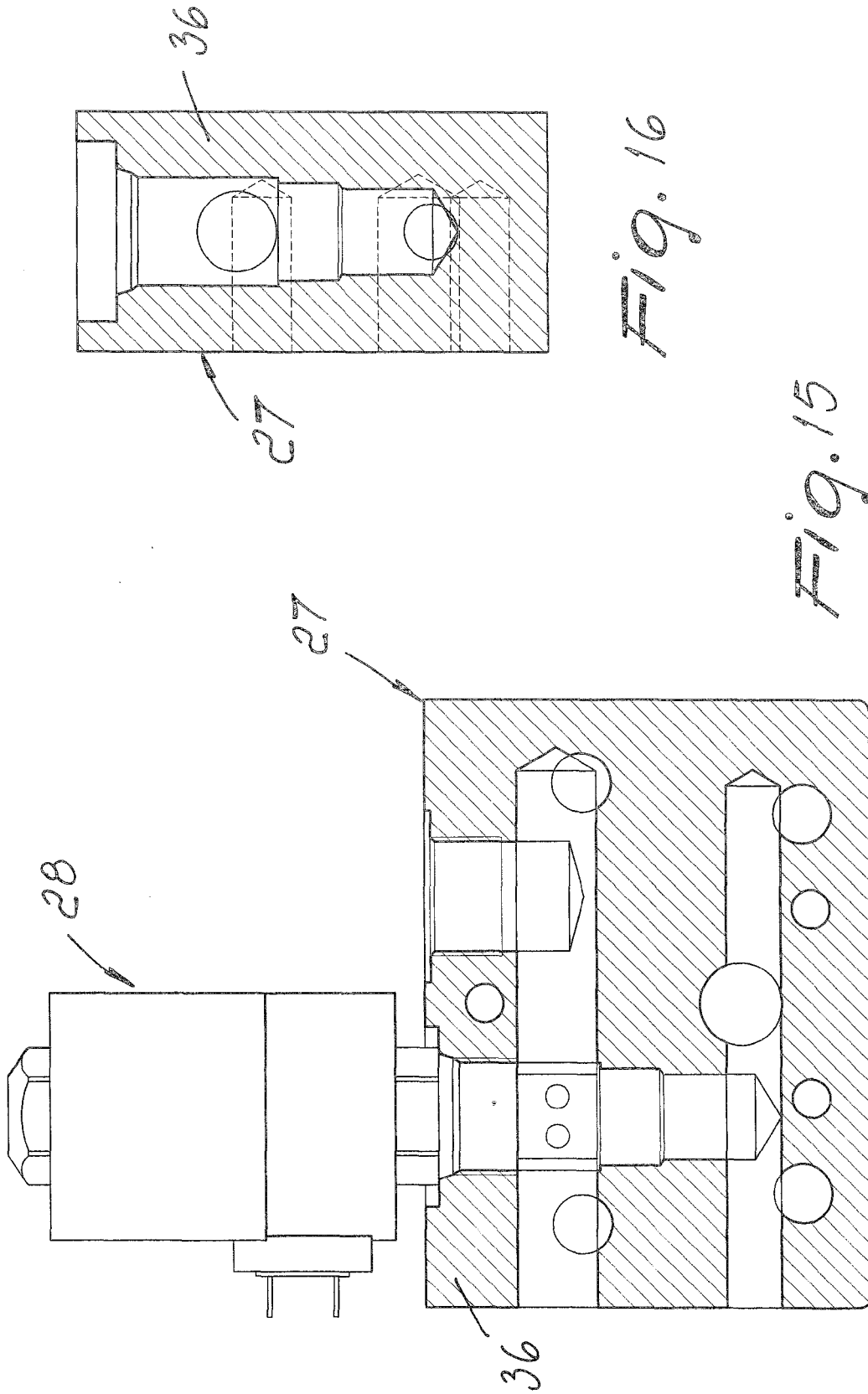


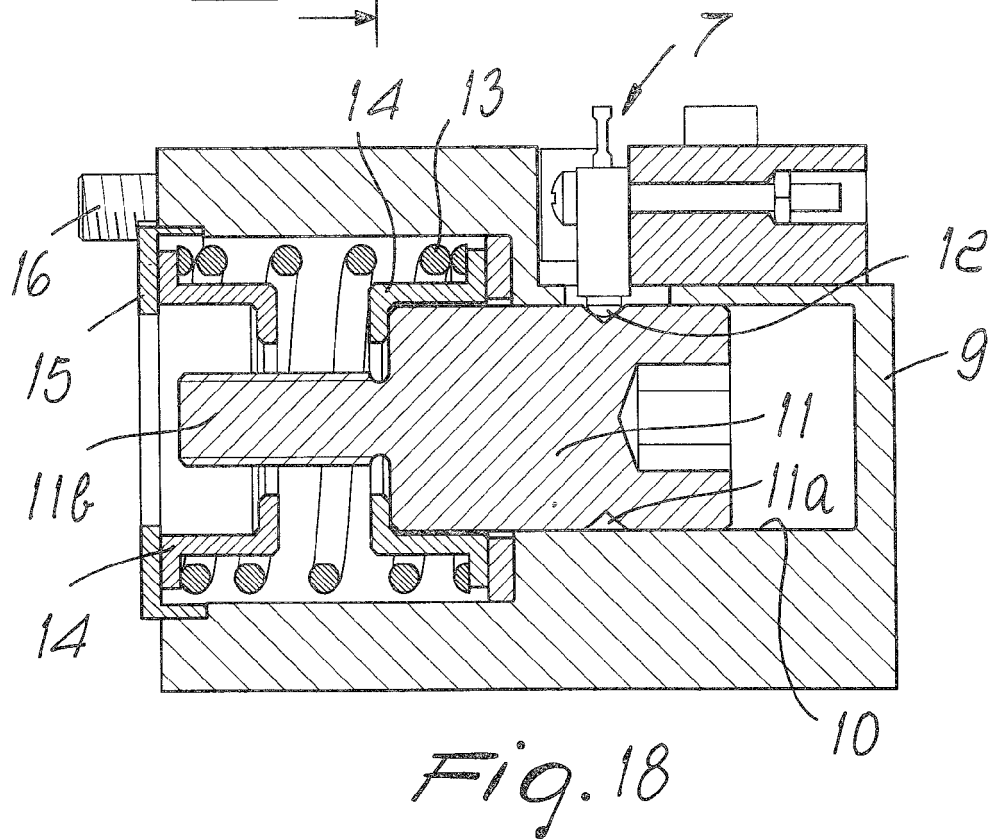
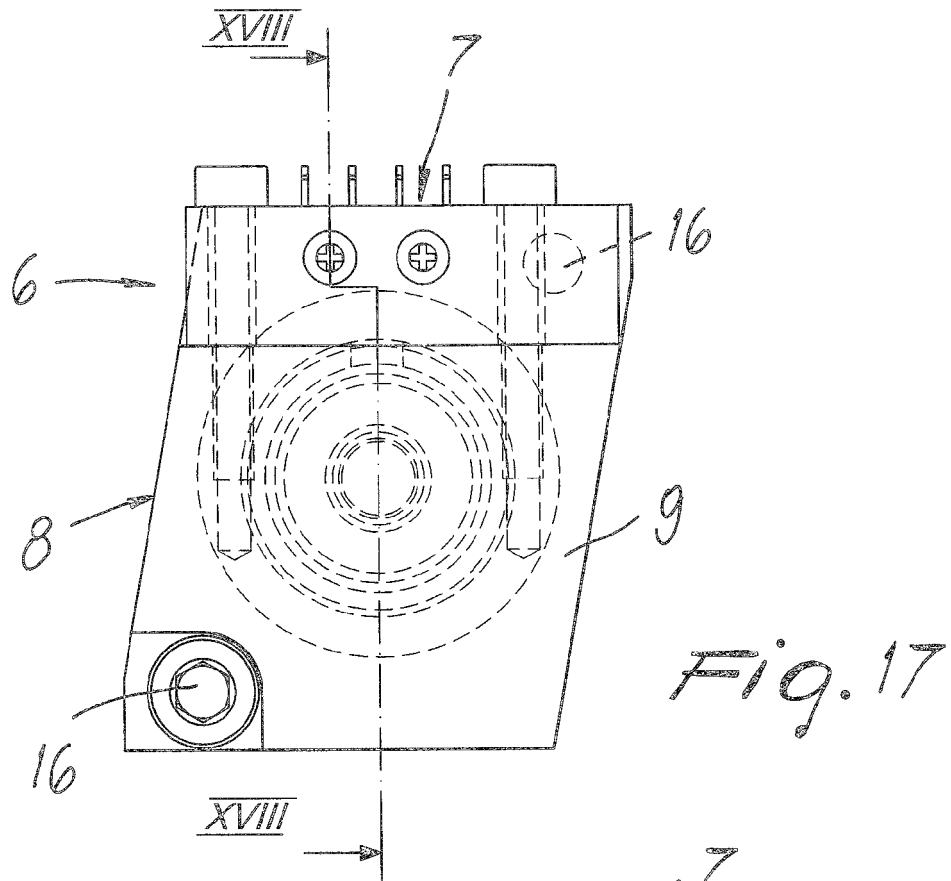
Fig. 9











REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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