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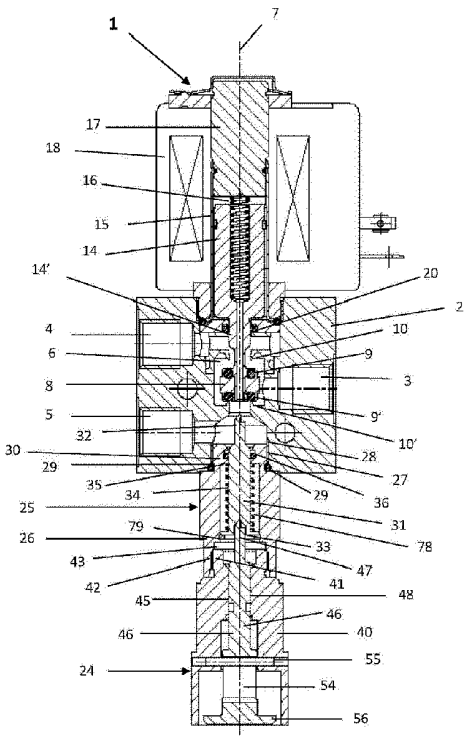
(54) **Solenoid valve with manual override and sealing adapter.**

(57) A solenoid valve comprises solenoid means for moving a valve poppet, as well as a manual override. An adapter is provided between the manual override and the valve poppet. The adapter comprises an adapter housing part delimiting an adapter cylinder part within which an intermediate operator organ is moveable. The adapter housing part connects sealing to a main valve housing. The override housing part is connected by means of a removable connection to the adapter housing part. A manually operable operator organ of the override, the intermediate operator organ and the valve poppet are associated to each other such that a manual operation of the override causes the intermediate operator organ to move the valve poppet independent of the solenoid means. Sealing means are provided between the intermediate operator organ and the adapter cylinder part for preventing medium to flow out of the valve via the adapter.



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Title: Solenoid valve with manual override and sealing adapter.

The invention relates to a solenoid valve comprising a valve poppet which is controllably moveable under the influence of electromagnetic forces, which valve further comprises a manual override functionality, also referred to as a mechanical override functionality, via which the valve poppet can be moved towards a desired position independent of any possible electromagnetic forces acting upon the valve poppet at the same time.

Such solenoid valves with mechanical or manual overrides are already known in a number of variants. The overrides are mostly formed by some kind of operating pin which, from a position outside the valve housing, can be manually pushed inwards in order to displace the valve poppet towards another aimed position. Thus the override functionality can be used to override the operation of the solenoid(s). This may be beneficial when a machine is being installed which comprises one or more of such solenoid valves, because the override then makes it possible to perform certain control activities and adjustments to the machine and in particular to the solenoid valve(s) thereof. After the machine has been properly tuned, the overrides are no longer immediately necessary and it is even often required to have them removed or at least inactivated in such a way that they can not be tempered with by unauthorized personnel.

US-4,574,843 shows a solenoid valve with a spring centred valve poppet which is moveably guided in two opposite longitudinal directions inside a bore of a valve housing. At both ends of the housing electrically operable solenoid means are provided. Each solenoid means comprises a pole body mounted fixedly against the housing. Through the pole body a pin is moveably guided in the longitudinal direction. The pin at one side lies against the valve poppet. A tubular sleeve is connected at one side to the pole body by means of a quenching operation. At the other side the sleeve is connected to a so-called tail piece also by means of a quenching operation. Through the sleeve an armature of the solenoid means is moveably guided back and forth. The armature lies against the pin and, upon operation of the solenoid means, the armature is able to move the pin in the longitudinal direction and have it push against the valve poppet. Override cartridges are screwed into the tail pieces with O-rings being placed in between as sealing means. Each override cartridge comprises an outwardly threaded body with a central bore which forms a cylinder inside which an operating piston is movably guided. The piston is provided with a circumferential groove in which an O-ring as sealing means is placed. At its inward end the piston is provided with a thickened head

thickened head which forms a blocking means in the outward direction because it is too big to enter the cylinder. The piston can be manually pushed inwards into the direction of the armature. This can be done from outside the cartridge, for example by means of a pointed tool. Thus it is possible to push the armature forward together with the pin and valve poppet independent of a possible simultaneous operation of the solenoid means.

Both override cartridges can be quickly removed from the valve by unscrewing them out of their respective tail pieces. Subsequently they can be replaced by suitable sealing plugs being screwed into the tail pieces. Thus the override functionalities can truly be eliminated from the valves such that from that moment on the valves can no longer be tempered with or accidentally operated.

A disadvantage with this known valve construction with override functionality is that the connections between the valve and the overrides are complex, vulnerable to damage and expensive. Furthermore the removal of the overrides also means that medium which at that moment is present inside the valve can immediately start to leak out. This makes it impossible to remove the overrides as long as the valve is still under pressure and filled with pressurized medium, because then the medium would start to spout out of the tail pieces. Also the pressure then could cause the override to be forcefully launched away as soon as its connection is unscrewed far enough. This could even lead to a risk of serious injury to the person standing in front of the valve. In most cases this shall mean that a machine of which the valves form part, first needs to be shut down, and the valves be depressurized, before it is possible to safely remove the overrides from its solenoid valve. Subsequently the overrides then need to be replaced while the machine is still shut down and the valve is still depressurized, by suitable caps which are capable to prevent leakage such that the machine can be started again including a placing of the valve under pressure again.

The invention aims to overcome the abovementioned disadvantages at least partly and/or to provide a usable alternative. In particular the invention aims to provide a solid and user-friendly override functionality for a solenoid valve which can be used during test phase of a machine and which can be easily and quickly removed afterwards before switching to an operational phase under all kinds of circumstances, including circumstances that the valve is still in operation and/or under pressure.

This aim is achieved by a solenoid valve according to claim 1. The valve comprises a main valve housing with at least an inlet and outlet port and a bore extending there between. A valve poppet is moveably guided in a longitudinal direction within the bore to control medium flow between the ports through the valve. The valve further comprises electrically operable solenoid means associated with the valve poppet for moving the valve poppet within the bore in dependence of electricity being fed to the solenoid means. A manual override is provided for offering the ability to override the electrically operable solenoid

means by manually moving the valve poppet in the longitudinal direction within the bore independent of the solenoid means. For this the manual override comprises an override housing part within which a manually operable operator organ is moveably guided while at the same time moving the valve poppet along with it in the longitudinal direction. According to the invention an adapter is provided between the manual override and the valve poppet. This adapter comprises an adapter housing part which delimits an adapter cylinder part within which an intermediate operator organ is moveably guided. The adapter housing part connects sealing to the main valve housing while at the same time the bore is in flow communication with the adapter cylinder part. The override housing part is connected by means of a removable connection to the adapter housing part. The manually operable operator organ, the intermediate operator organ and the valve poppet are associated to each other such that a manual operation of the manually operable operator organ causes the intermediate operator organ to move the valve poppet in the longitudinal direction to another position inside the bore independent of the solenoid means. First sealing means, like for example a rubber ring, are provided between the intermediate operator organ and the adapter cylinder part for preventing medium to flow out of the valve via the adapter.

Thus a solenoid valve is obtained with a solid and constructional simple override functionality. The big advantage is that owing to the provision of the adapter, the override can be easily and reliably used during the start-up/test phase of a machine in which the valve is present, while as soon as the machine is started-up and properly tuned, and the manual override function is not required anymore or even not allowed anymore, it can be removed under process pressure situation, without causing any leakage or any other process interruptions. The adapter then is well able to keep the valve sealed at that position. Adding of a plug or other kind of cap is no longer necessary to prevent leakage.

In an embodiment the sealing connection between the adapter housing part and the main valve housing is achieved by the adapter housing part forming an integral part of the main valve housing. Depending on the design of the valve housing the functionality of the adapter can easily be integrated therein, guaranteeing a perfect leakage free sealing connection between the main valve housing and adapter housing part.

In another embodiment the sealing connection between the adapter housing part and the main valve housing is achieved by the adapter housing part being a separate distinctive part which is connected by means of a removable connection to the main valve housing, with second sealing means, like for example a rubber ring, being provided between the adapter housing part and the main valve housing. By constructing the adapter as a separate part it can more easily be kept multifunctional for all kinds of valve types. Also this makes it possible to add it more easily to already existing valve designs and replace it if other kinds of connections are required and/or other kinds of overrides are to be coupled thereto.

The removable connection between the adapter housing part and the main valve housing preferably is a screw connection. This makes it possible to quickly and reliably connect the two parts together. The connection between the adapter housing part and the main valve housing can however also be of other types, like for example a pin-groove, bayonet or snap connection. It may also be a welded or glued connection and/or make use of separate connection elements like bolts.

In an advantageous embodiment the removable connection between the override housing part and the adapter housing part is chosen complementary to the removable connection between the adapter housing part and the main valve housing. This makes it possible to first mount the adapter housing part thereto or to leave it behind and directly mount the override housing part to the main valve housing. In this way it gives an engineer the full freedom make use of the adapter or not. Also it makes it possible to start mounting the adapter in between already existing connections between solenoid valves and overrides.

In a preferred embodiment the intermediate operator organ comprises an adapter piston part complementary to the adapter cylinder part. This makes it possible for the piston part to easily slide into and out of the cylinder part without running a risk of slanting or tilting because of a substantially play free receiving of the piston part inside the cylinder part. In order to further improve the sealing between the piston part and the cylinder part the adapter piston part or the adapter cylinder part may comprise a circumferential groove inside which the first sealing means are placed.

In order to prevent the intermediate operator organ to be pressed out of the adapter housing part because of medium pressure inside the valve, it preferably comprises blocking means for blocking an outward movement away from the valve poppet relative to the adapter housing part. The blocking means may for example be formed by inwardly and/or outwardly projecting flange parts of the adapter housing part and intermediate operator organ respectively which form cooperating abutting surfaces of the intermediate operator organ and the adapter housing part. Instead of the cooperating abutting surfaces forming integral parts of the adapter housing part and intermediate operator organ, they can also be formed by one or more retainers mounted thereto.

Although no longer necessary, a plug may still be provided which is connectable by means of a connection to the adapter housing part after the override has been removed. The plug may then prevent dirt accumulation or intrusion at the location of the adapter and/or attempts to still try to temper with the valve via the adapter.

By choosing the connection between the plug and the adapter housing part complementary to the removable connection between the override housing part and the adapter housing part, effective use can be made of those connection means and no separate connection needs to be provided.

Medium pressure inside the valve and/or a spring present inside the valve can be used to let the intermediate and manually operable operator organs move back to their original starting positions after the override has been operated and released again. In addition or in the alternative the intermediate operator organ can be biased inside the adapter housing part by means of a spring. Thus the reliability of the adapter gets higher and it can be guaranteed that the intermediate operator organ is always automatically pushed back towards its starting position. No medium pressure or valve spring is necessary for this.

In the alternative or in addition the manually operable operator organ of the override can also be biased inside the override housing part by means of a spring. If a spring is provided inside the adapter then this spring may make the use of a spring inside the override unnecessary. For some types of manually operable operator organs. like ones that have to be pressed inwardly, it may be advantageous to use the combination of an adapter with spring and an override without spring, since otherwise it may get too hard for an operator to manually operate the assembly of override, adapter and valve. For other types of manually operable operator organs. like ones that have to be screwed/rotated inwardly, it does not have to be a problem if the override is also provided with a spring.

Further preferred embodiments of the solenoid valve are stated in the dependent sub claims.

The invention also relates to a method for installing a machine which is equipped with at least one solenoid valve according to one of the preceding claims.

The invention shall be explained below in more detail with reference to the accompanying drawings, wherein:

Fig. 1a shows a cross sectional view of a preferred embodiment of the solenoid valve according to the invention;

Fig. 1b shows a cross sectional view of a preferred embodiment of the solenoid valve according to the invention without override;

Fig. 1c shows a cross sectional view of a preferred embodiment of the solenoid valve according to the invention in override position;

Fig. 2 shows the adapter and override of fig. 1 separately;

Fig. 3 shows an assembly of the adapter of fig. 1 in perspective together with a variant override of the manual screw type;

Fig. 4 shows a variant of fig. 1 with the override of the manual screw type of fig. 3;

Fig. 5 shows a variant of fig. 1 with the adapter connected to the valve housing by means of a pin-groove connection;

Fig. 6 shows a side and cross-sectional view of a variant of fig. 1 with the override connected to the adapter by means of a quick snap connection;

Fig. 7 shows a side and cross-sectional view of a variant of fig. 1 with the override connected to the adapter by means of a bayonet connection;

Fig. 8 shows a side and cross-sectional view of a variant of fig. 1 with the adapter housing part being formed integrally with the main valve housing; and

Fig. 9 shows a variant of fig. 1 with the adapter without spring and with the override including a spring.

In fig. 1 the entire solenoid valve has been given the reference numeral 1. The valve 1 comprises a main valve housing 2 with ports 3, 4, 5. The ports may perform differing functions in dependence of the valve being closed or opened. For example in a so-called normally closed position NC, port 5 may form an inlet port, whereas port 3 forms an outlet port and port 4 forms an exhaust port. For example in a so-called normally open position NO, port 4 may form an inlet port, whereas port 3 forms an outlet port and port 5 forms an exhaust port. In another example the valve can be operated in two directions and the port 3 then may form an inlet port.

A bore 6 extends in a longitudinal direction 7 through the housing 2 and connects at respective positions to the ports 3-5. A valve poppet 8 is movable in the longitudinal direction 7 through the bore 6 between a first and second position. The valve poppet 8 comprises two sealing rings 9, 9' which in the first and second position can come to lie sealing against complementary seats 10, 10' which delimit respective openings of the bores towards the respective ports 4, 5. In the first position, which is shown in fig. 1, the valve poppet 8 brings the port 3 in flow communication with the port 4 and at the same time closes it of from the port 5. In the second position, which is not shown in fig. 1, the valve poppet 8 can bring the port 3 in flow communication with the port 5 and at the same time close it of from the port 4.

The valve poppet 8 is fixedly connected to a stem part of a solenoid core 14. The core 14 is moveably guided in the longitudinal direction 7 inside a cylindrical sleeve 15 which is connected fixed and sealing to the housing 2. The core 14 and valve poppet 8 are biased towards the first position by means of a spring 16. Above the core 14 an electrically magnetisable solenoid base 17 is provided which is fixedly connected to the sleeve 15. The solenoid core 14 and solenoid base 17 form part of solenoid means 18. If the solenoid means 18 are fed with electricity, the base 17 gets magnetised and starts to exert a pulling force to the core 14, and thus is able to move the core 14 together with the valve poppet 8 connected thereto, towards the second position. Thus the valve poppet can be moved from its first position towards its second position. As soon as the solenoid means 18 are no longer

energized, the core 14 no longer shall be attracted by the base 17 and the spring 16 shall cause the core 14 and valve poppet 8 to be pushed back to the first position again.

The bore 6 extends throughout the whole height of the housing 2. At the one outer end, in the situation shown the upper end, of the bore 6 the solenoid means 18 are sealingly mounted to the main valve housing 2 by means of suitable sealing connections. With this the movable core 14 of the solenoid means 18 is sealed relative to the bore 6 by means of a sealing ring 20 through which a piston part 14' of the core 14 is guided. Thus any pressurized medium, like fluids or gasses, can not escape from the valve 1 via the solenoid means 18.

At the other outer end, in the situation shown the lower end, of the bore 6 an assembly of an override 24 and an adapter 25 is mounted. This assembly is shown in more detail in fig. 2 and 3.

The adapter 25 comprises an adapter housing part 26 which at its upper side is equipped with an outer threaded section 27 which is screwed into a complementary inner threaded section 28 of the bore 6. In order to obtain a sealing connection between the adapter housing part 26 and the main valve housing 2, an O-ring 29 is placed in a groove at the end of the threaded section 27.

The adapter housing part 26 delimits an adapter cylinder part 30 which is coaxial with the bore 6 and also extends in the longitudinal direction 7. Inside this cylinder part 30 an intermediate operator organ 31 is moveably guided. The operator organ 31 comprises a slender pin shaped tip 32, an enlarged flange part 33, and an adapter piston part 34. The pin shaped tip 32 is able to partly fit into and abut against an outer end of the assembly of the valve poppet 8 and core 14. A front end of the adapter piston part 34 is complementary to a front segment of the cylinder part 30 and is able to smoothly move therein in the longitudinal direction 7. A spring 78 between the adapter housing part 26 and the intermediate operator organ 31 biases the organ 31 towards a starting position in which it lies with its enlarged flange part 33 against a retainer ring 79. The spring 78 is placed around the adapter piston part 34 inside an enlarged segment of the adapter cylinder part 30. The retainer ring 79 is mounted inside a groove which is present inside said enlarged segment of the adapter cylinder part 30. In this way no medium pressure or spring in the valve is needed to let the intermediate operator organ 31 move back to it's original starting position.

In the position shown in fig. 1 the flange part 33 abuts against the retainer ring 79. This prevents the operator organ 31 to be pressed further into the cylinder part 30. From the position shown the operator organ 31 only has the freedom to move forward in the longitudinal direction 7. Between the operator organ 31 and the adapter housing part 26 an O-ring 36 is placed for maintaining a sealing engagement between them. The O-ring 36 in

this case is placed in a groove which is present inside the front segment of the adapter cylinder part 30.

The override 24 comprises an override housing part 40 which at its upper side is equipped with an outer threaded section 41 which is screwed into a complementary inner threaded section 42 of a bore 43 inside the adapter housing part 26. In order to obtain an even further improved sealing connection between the override housing part 40 and the adapter housing part 26, an O-ring may be placed in a groove at the end of the threaded section 41.

The override housing part 40 delimits an override cylinder part 45 which is coaxial with the adapter cylinder part 30 as well as with the bore 6 and thus also extends in the longitudinal direction 7. Inside this cylinder part 45 a manually operable operator organ 46 is moveably guided. The operator organ 46 comprises a slender pin shaped tip 47 and an override piston part 48. The pin shaped tip 47 is able to partly fit into and abut and push against an outer end of the intermediate operator organ 31. The piston part 48 is complementary to the cylinder part 45 and is able to smoothly move therein in the longitudinal direction 7. In the position shown in fig. 1 a small clearance is present between the manually operable operator organ 46 and the intermediate operator organ 31. Between the operator organ 46 and the override housing part 40 an O-ring may be placed for maintaining an even further improved sealing engagement between them.

The operator organ 46 at its lower end part comprises a transverse slit 54 extending over a certain length in the longitudinal direction 7. A pin 55 extends in the transverse direction through the slit 54. The pin 55 is fixedly mounted to the override housing part 40. In the position shown in fig. 1 the pin 55 abuts against an end of the slit 54 and thus delimits a movement of the manually operable operator organ 46 in the outwards direction.

At its free lower end the operator organ 46 comprises a push button part 56. An operator has the option to push this button part 56 inwards until it abuts against an inner wall of the override housing part 40 or until the other end of the slit 54 abuts against the pin 55. See fig. 1c. With this inwards movement of the button part 56, the manually operable operator organ 46 starts to force the intermediate operator organ 31 to move along inwards as soon as they start abutting against each other. This in turn forces the valve poppet 8 to move along as soon as the intermediate operator organ 31 starts to abut against it. Thus the assembly of the override 24 and the adapter 25 together make it possible to manually move the valve poppet 8 against the action of the spring 16 towards its second position. It is not necessary to activate the solenoid means 18 for this. As soon as the button part 56 is loosened again, the springs 16 and 78 shall cause the valve poppet 8 and the operator organs 31 and 46 to move back again to their first and starting positions respectively.

If it is no longer desired to provide the solenoid valve 1 with the override functionality, the override 24 can simply be dismounted from the adapter 25 by unscrewing. See fig 1b. The adapter 25 then can remain in place, that is to say can remain being sealingly connected to the main valve housing 2. Owing to the sealing connection between the adapter housing part 26 and the main valve housing 2 and the sealing engagement between the intermediate operator organ 31 and the adapter housing part 26, the bore 6 remains sealingly closed at the side of the connection with the adapter 25. Any pressurized or non-pressurized medium present inside the lower part of the bore 6, thus is unable to escape from the valve 1 via the side of the adapter 25. Should the bore 6 be filled with pressurized medium then the flange 33 prevents the intermediate operator organ 31 to be pressed out of the adapter housing part 26.

If desired a suitable cap, plug or the like 80 can be screwed into the threaded section 42 of the adapter 25 after the override 24 has been removed. In order to form a seal against dust and dirt, an O-ring 81 is placed between the cap 80 and the adapter housing part 26.

The threaded sections 27, 28 and 41, 42 are fully complementary to each other. This makes it possible for an engineer, if for whatever reason he prefers this, to dispense with the adapter 25 and to directly connect the override 24 with the main valve housing 2. Since the override 24 also has sealing means between its operator organ and housing, the override itself is also able to maintain a sealing connection with the valve 1.

It is only possible to safely screw either the adapter 25 either the override 24, or if desired even the mentioned cap, plug or the like 80 into the main valve housing 2, when the valve 1 is not under pressure. As soon as this is the case, and it is not desired or possible to take the pressure of the valve 1, then it is most advantageous if the adapter 24 is connected thereto, because only then it is possible to remove the override 24 without immediately causing a dangerous outburst of pressurized medium.

It is possible to connect another type of override with the adapter. One such variant is shown in fig. 4. Here the override no longer has a push button, but now is equipped with a rotation knob 60. Owing to a screw connection, the rotation knob 60 can only be rotated relative to the override housing part 40 while at the same time moving forward in the longitudinal direction. With this forward movement it pushes against the manually operable operator organ 46 and forces this to move along. In this case the operator organ 46 is biased relative to the housing part 40 by means of a first spring 61, while at the same time the knob 60 is biased relative to the operator organ 46 by means of a second spring 62. Like in the embodiment of fig. 1-2 a pin-slit connection 54, 55 again sets the boundaries for the freedom of movement of the knob 60.

Instead of using a screw connections between the adapter and the valve housing and/or between the override and the adapter it is also possible to use other kinds of

connections, like pin-groove connections (fig. 5), snapping connections (fig. 6), bayonet connections (fig. 7), etc.

For example fig. 5 shows an embodiment in which the front end of the adapter housing part 26 is simply slit into a complementary part of the bore 6 inside the main valve housing 2 and is kept in position therein by means of locking pins 65 screwed into the housing 2 and gripping onto the front end of the adapter housing part 26. The adapter housing part 26 is even provided with a suitable groove or openings 66 at its front end for the pins 65 to grip more stable into.

For example fig. 6 shows an embodiment in which the override 24 is provided with a backwards slidable biased ring 70 via which snapping ball bearings 71 can be released from gripping into complementary cut-outs 72 at the outer circumference of the adapter housing part 26. When released, the override 24 can be simply pulled of the adapter 25.

For example fig. 7 shows an embodiment in which the override 24 is provided with outwardly projecting pins 75 which can be placed into complementary bayonet shaped slits 76 which are provided into the adapter housing part 26. The override 24 can then be simply connected to the adapter 25 by placing the pins 75 into the slits 76 and then rotating them relative to each other until the pins 75 have reached the curved ends of the slits 76. A spring 77 is provided in between the adapter 25 and the override in order to keep the bayonet connection biased.

The adapter housing part 26 does not necessarily have to be made as a distinctive component. It is also possible to integrate it into the main valve housing 2. An example hereof is shown in fig. 8.

For example fig. 9 shows an embodiment in which the adapter is not provided with a spring to return the intermediate operator organ 31 to its original starting position. The pressure of the medium and the spring 16 behind the valve poppet 8 of the valve provide the force to move the organ 31 back to its original starting position. Further it is noted that in fig. 9, between the operator organ 46 and the override housing part 40, an O-ring 49 is placed for maintaining a sealing engagement between them.

In fig. 9 no retainer is present. Instead a front side wall part 35 of the adapter housing part 26 serves as blocking means against which a flange part 33 of the organ 31 abuts.

Furthermore the embodiment of fig. 9 differs from the one of fig.1 in that the override 24 itself is now provided with a spring 50. This spring 50 biases the manually operable operator organ 46 in an outer direction.

Besides the embodiments shown numerous variants are possible. For example the various parts can be given different dimensions and can be made out of all kinds of materials. It is also possible to use two assemblies of adapters and overrides at opposite sides of the valve such that the valve poppet can be manually moved in both directions.

Likewise it is also possible to use two sets of solenoid means at opposite sides of the valve such that the valve poppet can be moved under the influence of electro-magnetic forces in two directions. If desired the assembly of adapter and override can also be used on other types of solenoid valves, like ones having more or less inlet and outlet ports. The operator organs do not necessarily have to be placed in line with the longitudinal moving direction of the valve poppet. They can also be placed under a slight angle thereto, as long as they are able to exert a pushing force in the longitudinal direction against the valve poppet.

Thus according to the invention a multi-functional solenoid valve with removable override functionality is provided which gives both an engineer and an operator a lot of freedom during installation and operation since the override can be removed even with the valve being placed under pressure.

C O N C L U S I E S

1. Een magneetklep, omvattende:

- een hoofdklepbehuizing met ten minste een inlaat- en uitlaatpoort en een boring die zich daartussen uitstrekt, binnenin welke boring een kleporgaan beweegbaar is in een langsrichting om een mediumstroom tussen de poorten te regelen door de klep;
- elektrisch bedienbare magneetmiddelen verbonden met het kleporgaan voor het bewegen van het kleporgaan binnenin de boring in afhankelijkheid van elektriciteit die gevoed wordt aan de magneetmiddelen; en
- een handmatige overruler van de elektrisch bedienbare magneetmiddelen voor handmatig bewegen van het kleporgaan in de langsrichting binnenin de boring onafhankelijk van de magneetmiddelen,

waarbij de handmatige overruler een overrulerbehuizingsdeel omvat waarbinnen een handmatig bedienbaar bedieningsorgaan beweegbaar is terwijl tegelijkertijd het kleporgaan meebewogen wordt in de langsrichting,

met het kenmerk, dat

een adapter voorzien is tussen de handmatige overruler en het kleporgaan, welke adapter een adapterbehuizingsdeel omvat dat een adaptercilinderdeel begrenst waarbinnen een tussenliggend bedieningsorgaan beweegbaar is,

waarbij het adapterbehuizingsdeel afdichtend aansluit op de hoofdklepbehuizing met de boring in verbinding met het adaptercilinderdeel,

waarbij het overrulerbehuizingsdeel door middel van een verwijderbare verbinding verbonden is met het adapterbehuizingsdeel,

waarbij het handmatig bedienbare bedieningsorgaan, het tussengelegen bedieningsorgaan en het kleporgaan zodanig met elkaar verbonden zijn dat een handmatige bediening van het handmatig bedienbare bedieningsorgaan tot gevolg heeft dat het tussengelegen bedieningsorgaan het kleporgaan in de langsrichting beweegt naar een andere positie binnenin de boring onafhankelijk van de magneetmiddelen, en

waarbij eerste afdichtingsmiddelen voorzien tussen het tussengelegen bedieningsorgaan en het adaptercilinderdeel voor het voorkomen dat medium uit de klep stroomt via de adapter.

2. Een magneetklep volgens conclusie 1, waarbij de afdichtende verbinding tussen het adapterbehuizingsdeel en de hoofdklepbehuizing verkregen is doordat het adapterbehuizingsdeel een integraal deel vormt van de hoofdklepbehuizing.

3. Een magneetklep volgens conclusie 1, waarbij de afdichtende verbinding tussen het adapterbehuizingsdeel en de hoofdklepbehuizing verkregen is doordat het adapterbehuizingsdeel door middel van een verwijderbare verbinding verbonden is met de hoofdklepbehuizing, waarbij tweede afdichtingsmiddelen voorzien zijn tussen het adapterbehuizingsdeel en de hoofdklepbehuizing.

4. Een magneetklep volgens conclusie 3, waarbij de verwijderbare verbinding tussen het adapterbehuizingdeel en de hoofdklepbehuizing een schroefverbinding is.

5. Een magneetklep volgens conclusie 3 of 4, waarbij de verwijderbare verbinding tussen het overrulerbehuizingsdeel en het adapterbehuizingsdeel complementair is aan de verwijderbare verbinding tussen het adapterbehuizingsdeel en de hoofdklepbehuizing.

6. Een magneetklep volgens een van de voorgaande conclusies, waarbij het tussengelegen bedieningsorgaan een adapterzuigerdeel omvat dat complementair is aan het adaptercilinderdeel.

7. Een magneetklep volgens conclusie 6, waarbij het adapterzuigerdeel of het adaptercilinderdeel een omtrekgroef omvat waarin de eerste afdichtingsmiddelen geplaatst zijn.

8. Een magneetklep volgens een van de voorgaande conclusies, waarbij het tussenliggende bedieningsorgaan blokkeermiddelen omvat voor het blokkeren van een naar buiten gerichte beweging van het kleporgaan af ten opzichte van het adapterbehuizingsdeel.

9. Een magneetklep volgens conclusie 8, waarbij de blokkeermiddelen gevormd zijn door naar binnen en/of naar buiten toe uitstekende flensdelen of een tegenhouder welke samenwerkende aanslagvlakken vormen van het tussengelegen bedieningsorgaan en het adapterbehuizingsdeel.

10. Een magneetklep volgens een van de voorgaande conclusies, waarbij een plug voorzien is die door middel van een verbinding verbindbaar is met het adapterbehuizingsdeel nadat de overruler verwijderd is.

11. Een magneetklep volgens conclusie 10, waarbij de verbinding tussen de plug en het adapterbehuizingsdeel complementair is aan de verwijderbare verbinding tussen het overrulerbehuizingsdeel en het adapterbehuizingsdeel.

12. Een magneetklep volgens een van de voorgaande conclusies, waarbij het tussengelegen bedieningsorgaan voorgespannen is binnenin het adapterbehuizingsdeel door middel van een veer.

13. Een magneetklep volgens een van de voorgaande conclusies, waarbij het handmatig bedienbare bedieningsorgaan voorgespannen is binnenin het overrulerbehuizingsdeel door middel van een veer.

14. Een magneetklep volgens een van de voorgaande conclusies, waarbij het overrulerbehuizingsdeel een overrulercilinderdeel begrenst waar binnenin het handmatig bedienbare bedieningsorgaan beweegbaar is.

15. Een magneetklep volgens een van de voorgaande conclusies, waarbij het handmatig bedienbare bedieningsorgaan een overrulerzuigerdeel omvat dat complementair is aan het overrulercilinderdeel.

16. Een magneetklep volgens conclusie 15, waarbij het overrulerzuigerdeel of het overrulercilinderdeel een omtrekgroef omvat waarin derde afdichtingsmiddelen geplaatst zijn.

17. Een magneetklep volgens een van de voorgaande conclusies, waarbij het handmatig bedienbare bedieningsorgaan blokkeermiddelen omvat voor het blokkeren van een naar buiten gerichte beweging weg van het kleporgaan ten opzichte van het overrulerbehuizingsdeel.

18. Een magneetklep volgens conclusie 17, waarbij de blokkeermiddelen gevormd zijn door naar binnen en/of naar buiten toe uitstekende flensdelen of een tegenhouder welke samenwerkende aanslagvlakken vormen van het handmatig bedienbare bedieningsorgaan en het overrulerbehuizingsdeel.

19. Een magneetklep volgens een van de voorgaande conclusies 1-18, waarbij het overrulerbehuizingsdeel door middel van een schroefverbinding verbonden is met het adapterbehuizingsdeel.

20. Een magneetklep volgens een van de voorgaande conclusies 1-18, waarbij het overrulerbehuizingsdeel door middel van een bajonetverbinding verbonden is met het adapterbehuizingsdeel.

21. Een magneetklep volgens een van de voorgaande conclusies 1-18, waarbij het overrulerbehuizingsdeel door middel van een snapverbinding verbonden is met het adapterbehuizingsdeel.

22. Werkwijze voor het installeren van een machine die is uitgerust met ten minste een magneetklep volgens een van de voorgaande conclusies, omvattende de stappen:

- montage van de magneetklep inclusief de adapter en overruler aan de machine;
- plaatsing van de magneetklep onder druk van een medium;
- controle en indien nodig tunen van de machine terwijl de overruler handmatig bediend wordt; en
- verwijdering van de overruler van de adapter terwijl de magneetklep onder druk gehouden wordt van het medium.

Fig 1a

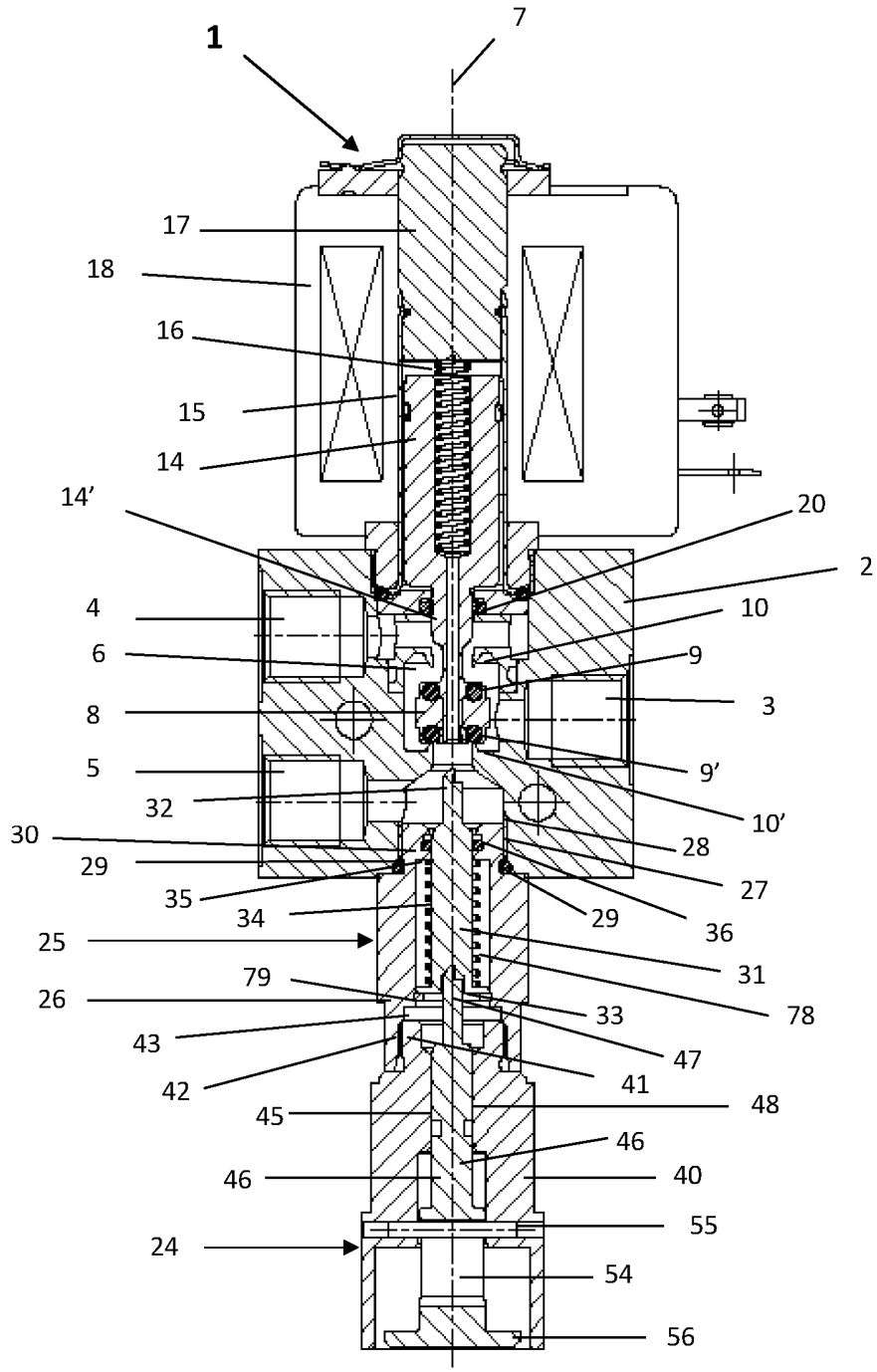
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Fig 1b

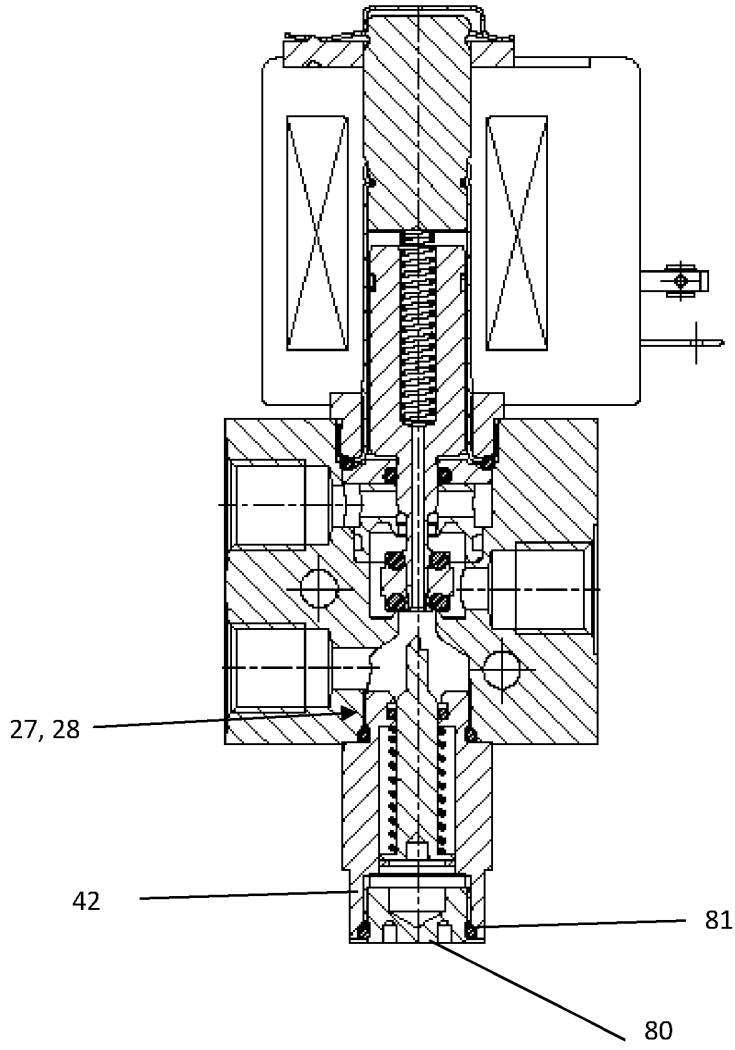


Fig 1c

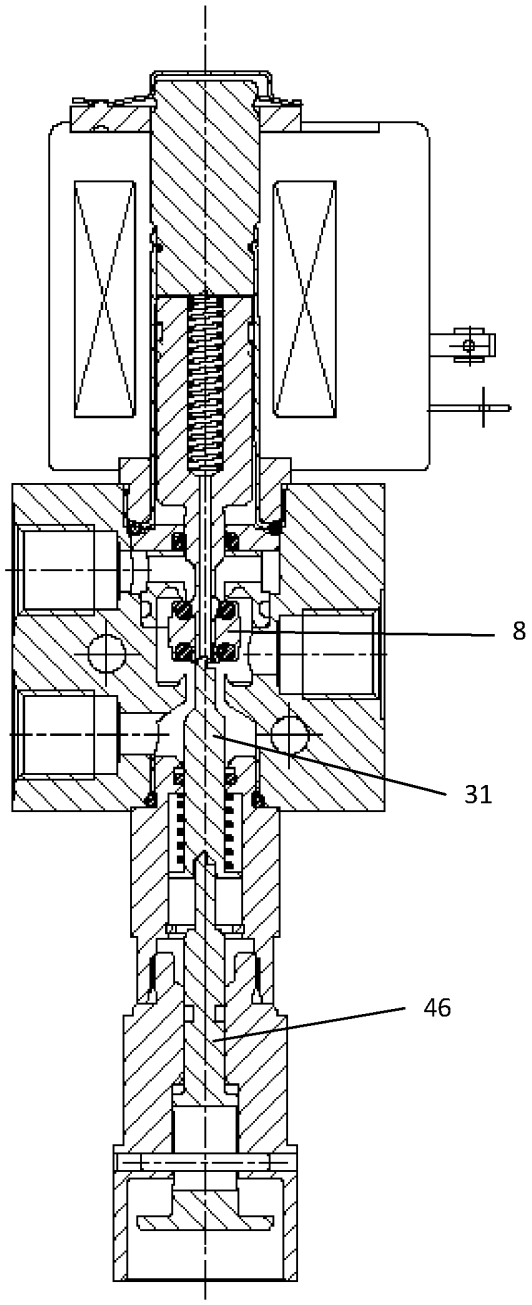


Fig 2

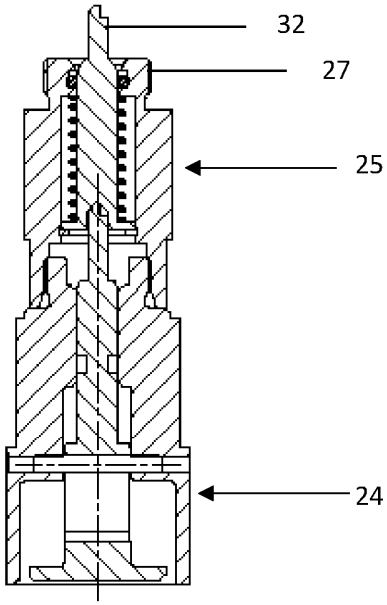


Fig 3

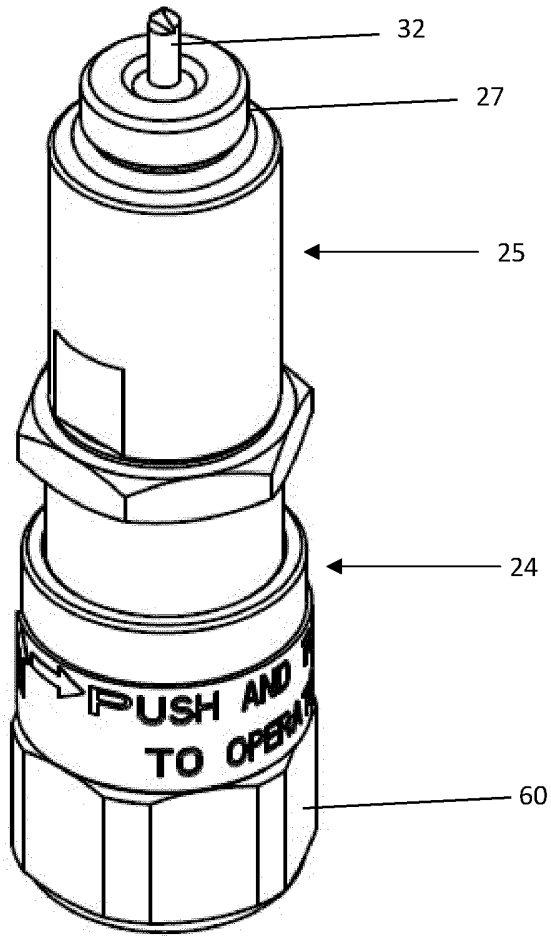


Fig 4

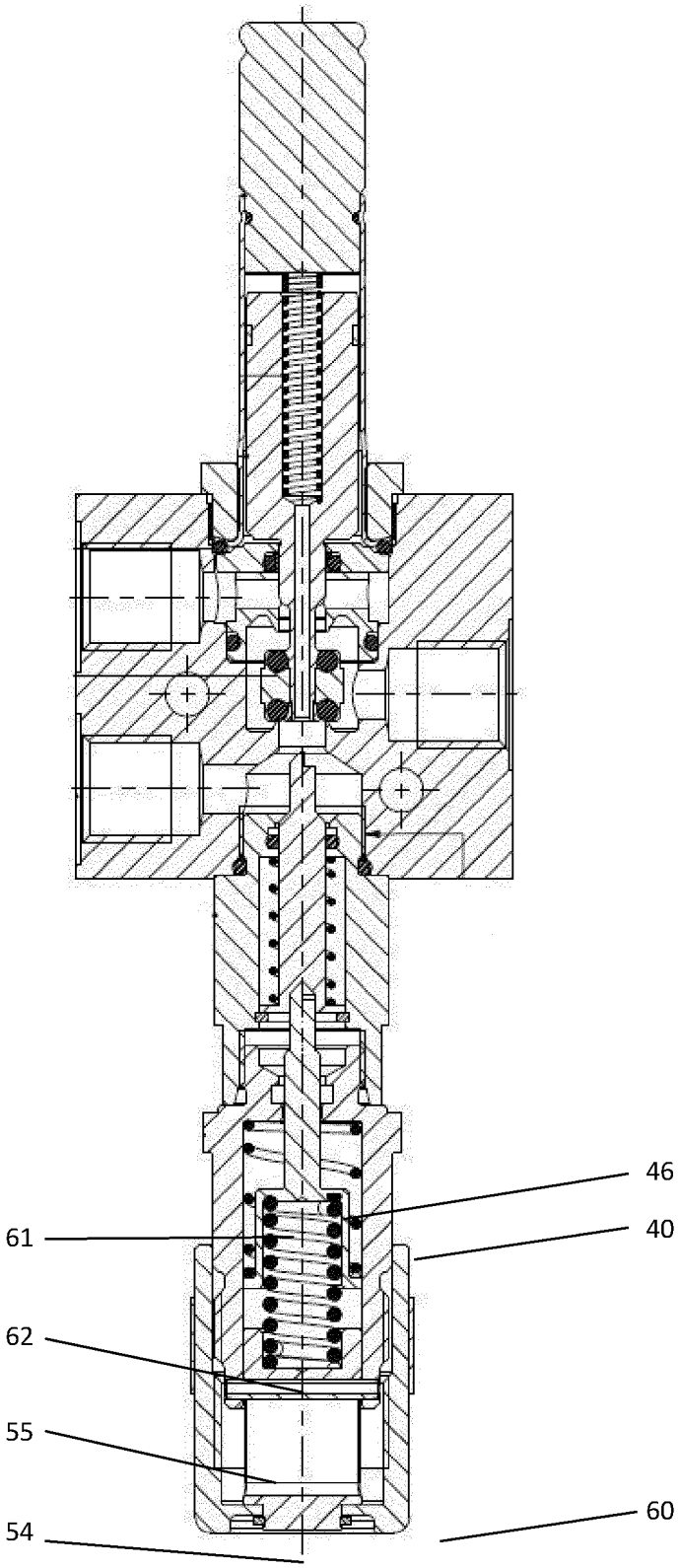


Fig 5

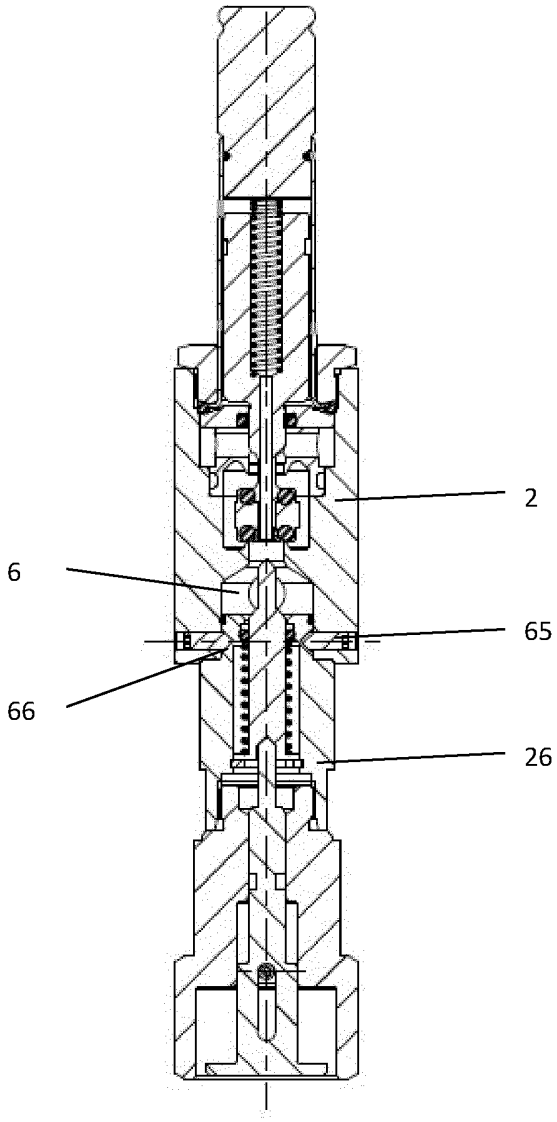
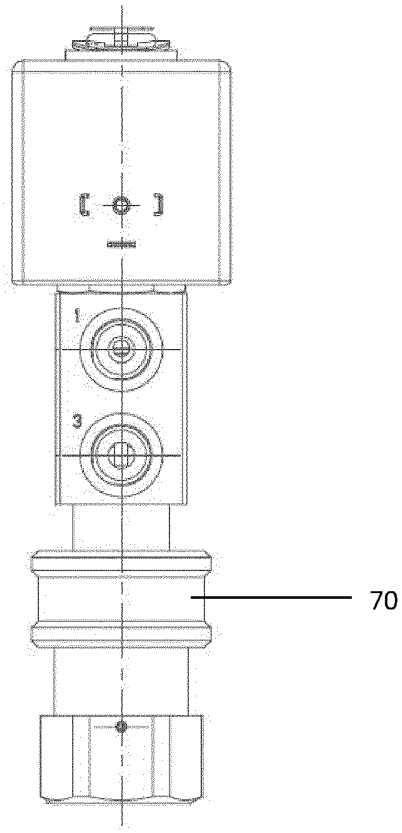


Fig 6



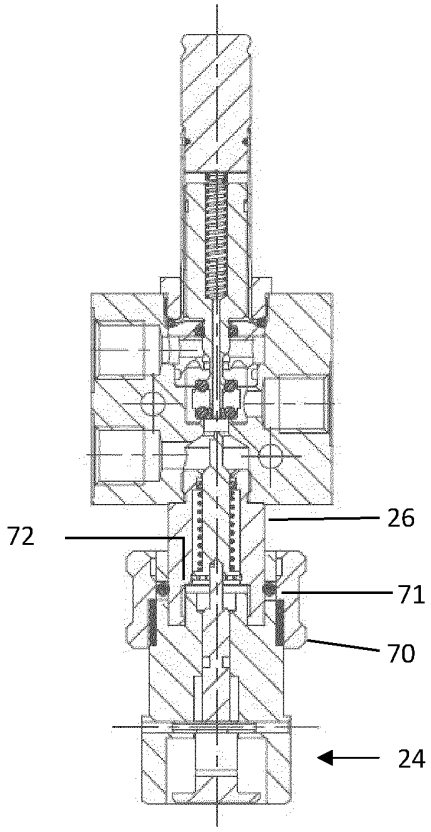


Fig 7

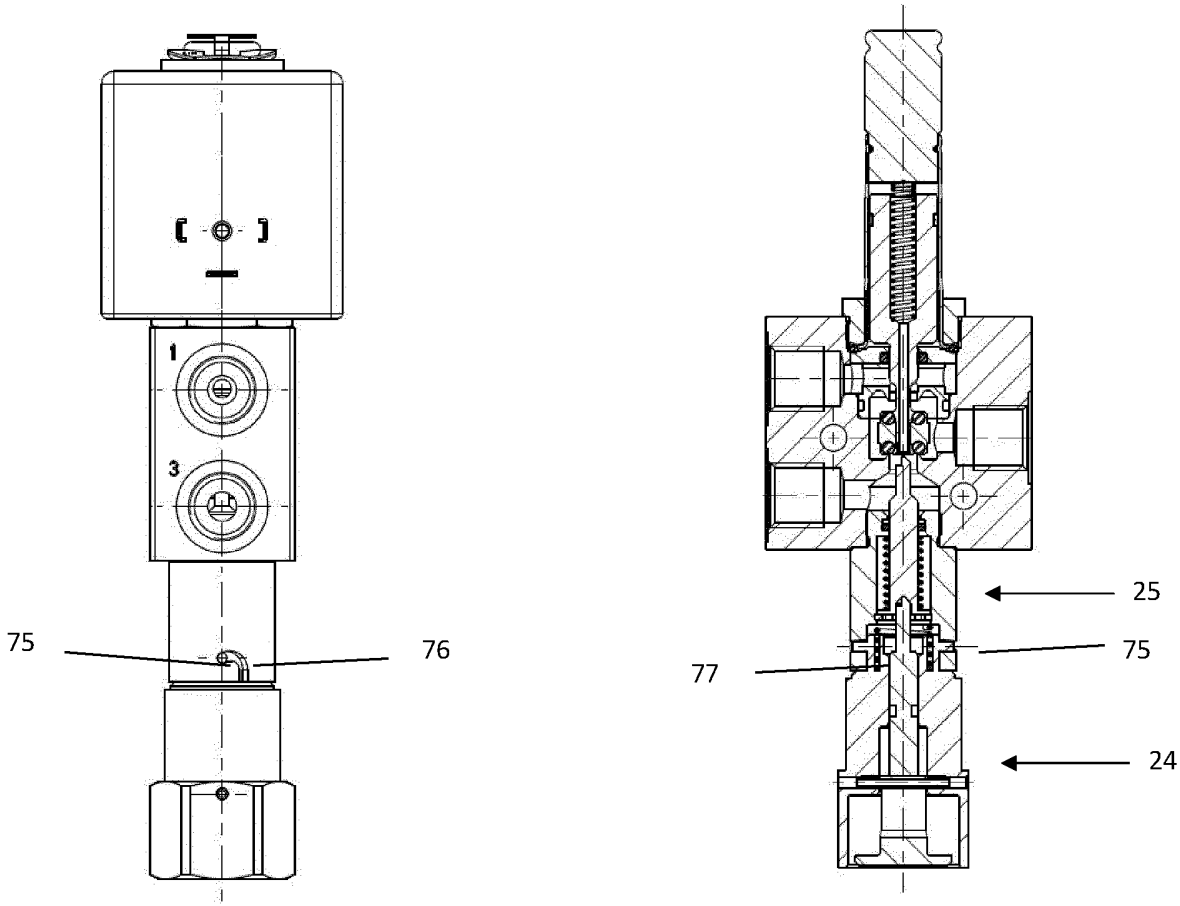


Fig 8

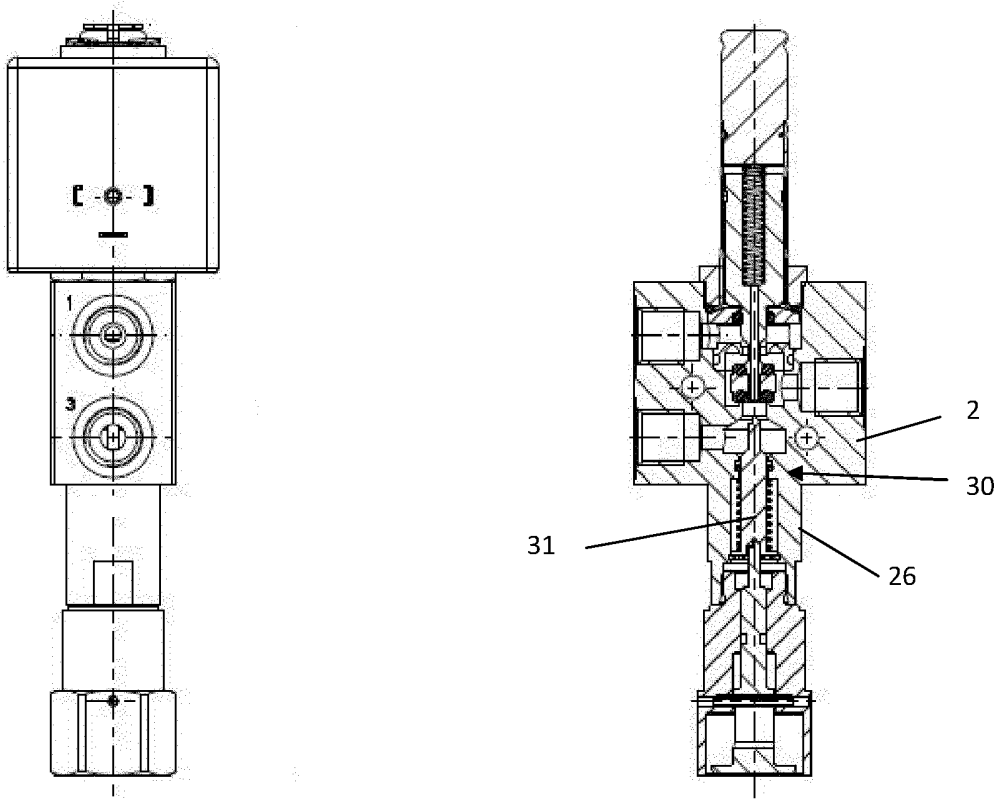
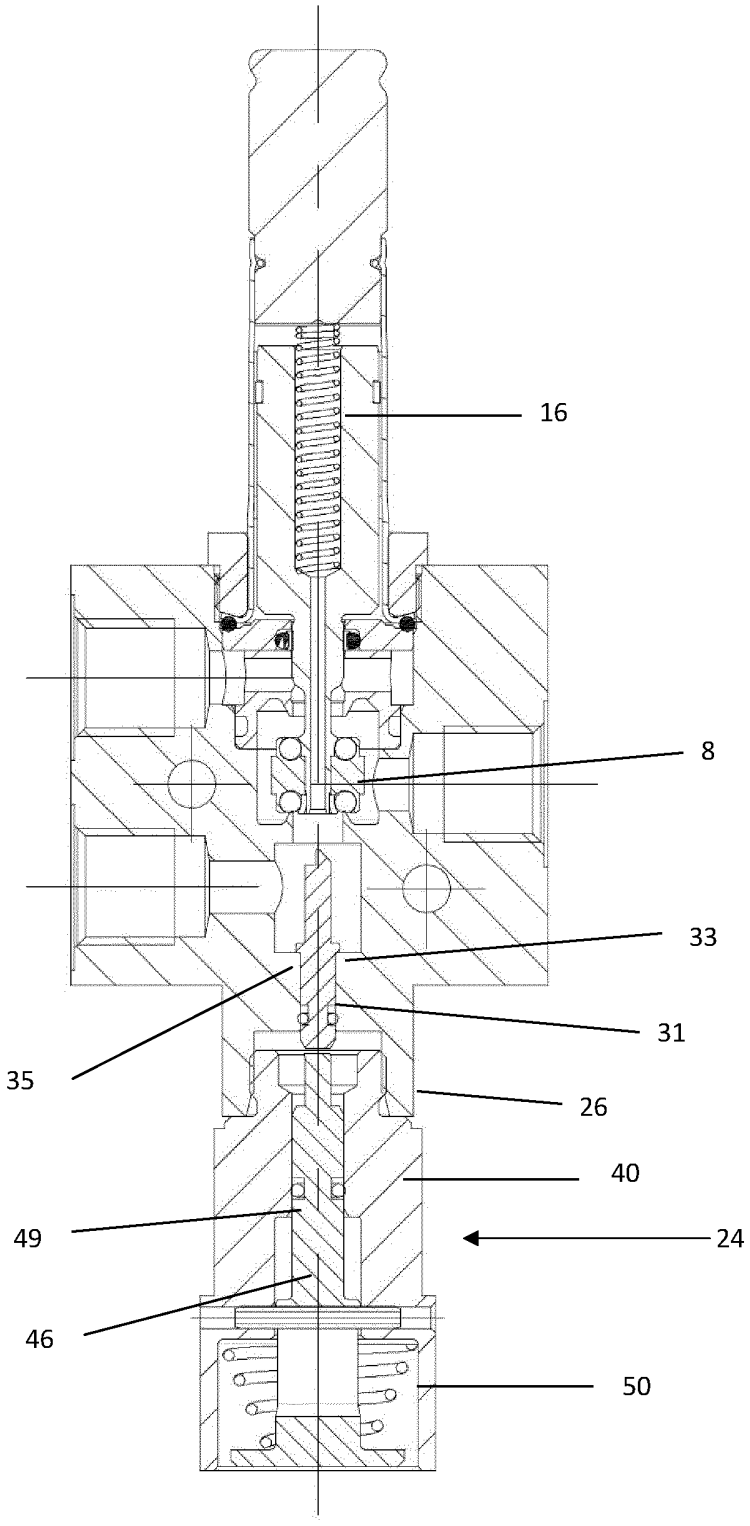


Fig 9



SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	P30794NL00/RR
Nederlands aanvraag nr. **2008884**	Indieningsdatum **25-05-2012**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **Asco Controls B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **08-09-2012**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN58793**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

F16K11/07;F16K31/06

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**F16K**

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III.	☐ **GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES**	(opmerkingen op aanvullingsblad)
IV.	☐ **GEBREK AAN EENHEID VAN UITVINDING**	(opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2008884

A. CLASSIFICATIE VAN HET ONDERWERP
INV. F16K11/07 F16K31/06
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
F16K

Onderzochte andere documentatie dan de mimimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	DE 20 2010 017049 U1 (THOMAS MAGNETE GMBH [DE]) 10 maart 2011 (2011-03-10) * alinea [0010] - alinea [0014]; figuren 1,2 *	1-22
X,D	US 4 574 843 A (LOUP RONALD L [US] ET AL) 11 maart 1986 (1986-03-11) in de aanvraag genoemd * kolom 6, regel 47 - kolom 9, regel 28; figuren *	1-22
X	DE 43 43 879 A1 (REXROTH MANNESMANN GMBH [DE]) 14 juni 1995 (1995-06-14) * kolom 4, regel 5 - kolom 6, regel 65; figuren *	1-22

-/--

[X] Verdere documenten worden vermeld in het vervolg van vak C.

[X] Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
28 januari 2013	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Ceuca, Antonio

1

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2008884

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	US 2 695 154 A (DILLMAN EARNEST J) 23 november 1954 (1954-11-23) * kolom 2, regel 3 - kolom 3, regel 55; figuur 1 *	1-22
X	US 4 679 017 A (MISHLER RALPH E [US] ET AL) 7 juli 1987 (1987-07-07) * kolom 9, regel 38 - kolom 11, regel 2; figuren 10,11,13,14 *	1-22

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2008884

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
DE 202010017049 U1	10-03-2011	CN 202612802 U	19-12-2012
		DE 202010017049 U1	10-03-2011
		FR 2969733 A3	29-06-2012
		IT MI20110408 U1	25-06-2012
US 4574843 A	11-03-1986	GEEN	
DE 4343879 A1	14-06-1995	GEEN	
US 2695154 A	23-11-1954	GEEN	
US 4679017 A	07-07-1987	EP 0242557 A1	28-10-1987
		JP 62228631 A	07-10-1987
		US 4679017 A	07-07-1987

Agentschap NL
Ministerie van Economische Zaken, Landbouw en Innovatie

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN58793	25.05.2012		NL2008884

International Patent Classification (IPC)
INV. F16K11/07 F16K31/06

Applicant
Asco Controls B.V.

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

	Examiner
	Ceuca, Antonio

Application number

WRITTEN OPINION

NL2008884

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing:

   ☐ contained in the application as filed.

   ☐ filed together with the application in electronic form.

   ☐ furnished subsequently for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	3-5, 18-22
	No:	Claims	1, 2, 6-17
Inventive step	Yes:	Claims	
	No:	Claims	1-22
Industrial applicability	Yes:	Claims	1-22
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Box No. VII Certain defects in the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

D1 DE 20 2010 017049 U1 (THOMAS MAGNETE GMBH [DE]) 10 maart 2011 (2011-03-10)

D2 US 4 574 843 A (LOUP RONALD L [US] ET AL) 11 maart 1986 (1986-03-11) in de aanvraag genoemd

D3 DE 43 43 879 A1 (REXROTH MANNESMANN GMBH [DE]) 14 juni 1995 (1995-06-14)

D4 US 2 695 154 A (DILLMAN EARNEST J) 23 november 1954 (1954-11-23)

D5 US 4 679 017 A (MISHLER RALPH E [US] ET AL) 7 juli 1987 (1987-07-07)

2 The present application does not meet the criteria of patentability, because the subject-matter of claim 1 is not new.

D1 (paragraphs 10 - 14; figures 1, 2) discloses (the references applying to this document):

Een magneetklep, omvattende:

- een hoofdkleepbehuizing (2) met ten minste een inlaat- en uitlaatpoort en een boring die zich daartussen uitstrekt, binnenin welke boring een kleporgaan bewegbaar is in een langsrichting om een mediumstroom tussen de poorten te regelen door de klep;

• elektrisch bedienbare magneetmiddelen (12) verbonden met het kleporgaan voor het bewegen van het kleporgaan binnenin de boring in afhankelijkheid van elektriciteit die gevoed wordt aan de magneetmiddelen; en

• een handmatige overruler (23) van de elektrisch bedienbare magneetmiddelen voor handmatig bewegen van het kleporgaan in de langsrichting binnenin de boring onafhankelijk van de magneetmiddelen,

waarbij de handmatige overruler (23) een overrulerbehuizingsdeel (21) omvat waarbinnen een handmatig bedienbaar bedieningsorgaan beweegbaar is terwijl tegelijkertijd het kleporgaan meebewogen wordt in de langsrichting,

en waarin een adapter (3) voorzien is tussen de handmatige overruler (23) en het kleporgaan, welke adapter een adapterbehuizingsdeel (see figures) omvat dat een adapterclilinderdeel begrenst waarbinnen een tussenliggend bedieningsorgaan (17) beweegbaar is,

waarbij het adapterbehuizingsdeel afdichtend aansluit op de hoofdkleepbehuizing (2) met de boring in verbinding met het adaptercilinderdeel, waarbij het overrulerbehuizingsdeel (21) door middel van een verwijderbare verbinding verbonden is met het adapterbehuizingsdeel,

waarbij het handmatig bedienbare bedieningsorgaan, het tussengelegen bedieningsorgaan (17) en het kleporgaan zodanig met elkaar verbonden zijn dat een handmatige bediening van het handmatig bedienbare bedieningsorgaan tot gevolg heeft dat het tussengelegen bedieningsorgaan (17) het kleporgaan in de langsrichting beweegt naar een andere positie binnenin de boring onafhankelijk van de magneetmiddelen, en

waarbij eerste afdichtingsmiddelen (18) voorzien tussen het tussengelegen bedieningsorgaan (17) en het adaptercilinderdeel voor het voorkomen dat medium uit de klep stroomt via de adapter.

3 The present application does not meet the criteria of patentability, because the subject-matter of claim 1 does not involve at least an inventive step.

3.1 D2 (col. 6, line 47 - col. 9, line 28; figures), which may be considered to represent the most relevant state of the art, discloses a valve from which the subject-matter of claim 1 differs in that:

3.1.1 "de handmatige overruler een overrulerbehuizingsdeel omvat"

3.1.2 The problem to be solved by the present invention may therefore be regarded as providing a housing for a manual actuator.

3.1.3 The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step for the following reasons:

The feature "overrulerbehuizingsdeel" is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

4 The same reasoning as above (§3) for claim 1 applies, mutatis mutandis, with regard to documents D3, D4 respectively D5 (wherein the difference of the subject matter of claim 1 with regard to D5 is that the actuator is applied to a valve). The subject matter of claim 1 is therefore considered not inventive also with regard to these documents (D3 - D5).

5 The present application does not meet the criteria of patentability, because the subject-matter of claim 22 does not involve an inventive step.

5.1 Each of the cited documents (D1 - D5) at least implicitly disclose a method according to this claim, see the passages cited in the search report and paragraphs 2 - 4 above.

6 Dependent claims 2-21 do not seem to contain any features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and/or inventive step, see D1 - D5 and the references applying to these documents cited in the search report.

Re Item VII

Certain defects in the application

1 The features of the claims are not provided with reference signs placed in parentheses.