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(54) **DEVICE FOR SUPPLYING WATER IN A PRESSURISED WATER SYSTEM FOR USE AT WASHING FACILITIES**

(57) The invention relates to a water system comprising a circuit with a water drive pump that rotates due to the action of a motor, a discharge valve, and a washing spray gun including an activation trigger. When the trigger is actuated, pressurised water flows from the outlet nozzle of the gun and, when the trigger is released, the

flow of water from the nozzle is interrupted, thereby stopping the rotation of both the motor and the drive pump. The device comprises a first pressure switch (1) and a second pressure switch (2) together with a non-return valve (6) and a discharge valve (3) having a hydraulic pilot acting against the resistance of a spring (3b).

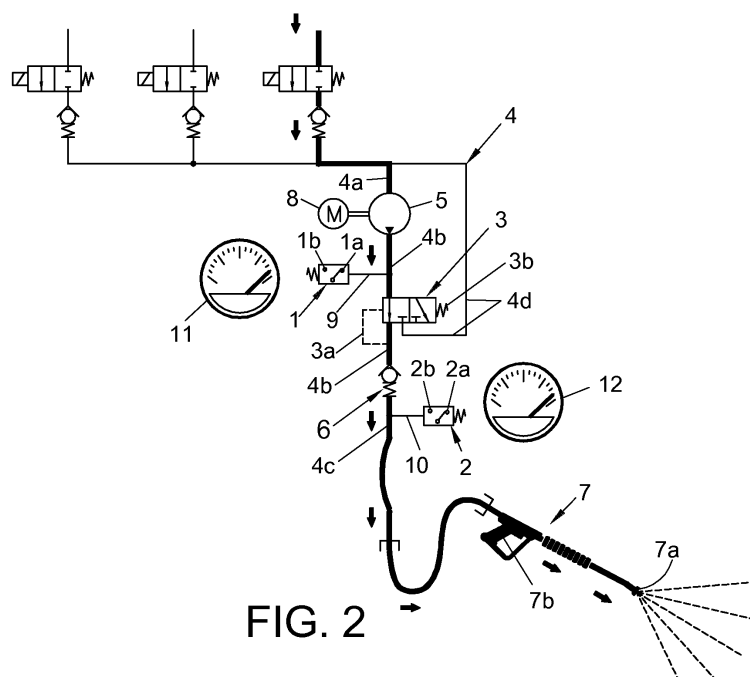


FIG. 2

Description

SUBJECT MATTER OF THE INVENTION

[0001] The present invention, as stated in the title of this specification, relates to a device for supplying water in a pressurised water system for use at washing facilities comprising a circuit with a water drive pump, a discharge valve, and a washing spray gun including an activation trigger. When the trigger is actuated, pressurised water flows from the outlet nozzle of the gun and, when the trigger is released, the flow of water from the nozzle is interrupted.

[0002] Based on this premise, the aim of the invention are characteristic detection means for activating and deactivating the pump for driving the water that reaches the washing spray gun, said detection means being connected to the washing spray gun, in such a way that when the flow of water from the nozzle of the gun is interrupted when the trigger is released, a pressure variation is generated in the circuit which deactivates the drive pump, the drive pump being activated once again when the trigger of the gun is newly actuated.

BACKGROUND OF THE INVENTION

[0003] Pressure washing systems which have a gun with an actuation valve that is activated by means of a trigger in order to allow water to flow from an outlet nozzle are currently known. The water flow normally incorporates various cleaning products.

[0004] Traditionally, when a washing programme is selected a drive pump starts and the system circuit remains pressurised as it waits for the valve of the gun to be actuated, at which point the water flows to the outlet nozzle thereof.

[0005] In this situation, if the valve of the nozzle is closed during the washing process, the drive pump discharges the entire volume of water through a discharge valve that limits the pressure of the system circuit to prevent excess pressure, which could damage the various components. When the valve of the gun is opened again, the washing flow is re-established and the discharge valve closes.

[0006] This safety device makes it possible to maintain the pressure in the gun even when the valve remains closed, but it involves an energy cost since the pump motor continues to operate even if the washing spray gun is not being used.

[0007] There are solutions to overcome this problem, such as that of patent with publication no. US 4387850, which describes a remote control system for washing facilities that stops the drive pump when it is detected that the washing spray gun is not being used, and starts the drive pump when the said gun is actuated. This system uses a volume control to detect the flow of water to the pump inlet, in such a way that the drive pump is stopped a certain amount of time after it has been detected that

water is not flowing.

[0008] Another solution described in patent with publication no. US 2014203102 uses a wireless transmitter which detects when the trigger of the gun is actuated and controls the starting and stopping of the high-pressure drive pump.

DESCRIPTION OF THE INVENTION

[0009] In order to achieve the objectives and overcome the disadvantages mentioned in the preceding paragraphs, the invention proposes a device for supplying water in a pressurised water system for use at washing facilities wherein the pressurised water system comprises a circuit which includes at least one water drive pump that rotates by means of a motor, and a washing spray gun with an outlet nozzle from which a stream of water flows when the said gun is activated due to the action of a trigger built into the gun.

[0010] The circuit includes a first pressure switch and a second pressure switch together with a non-return valve and a three-way two-position discharge valve having a hydraulic pilot acting against the resistance of a spring, these two valves being inserted between the drive pump and the gun, while at the outlet of the drive pump there is an outflow section of the circuit where the discharge valve is mounted first followed by the non-return valve.

[0011] The discharge valve is also connected to one end of a lateral diversion, while the other end of this lateral diversion is connected to an inflow section which is coupled to the outflow section of the circuit, the drive pump being located between these two sections.

[0012] As the water flows from the outlet nozzle of the gun, the two pressure switches detect pressure in the circuit and said pressure switches generate electrical signals which keep the motor rotating, whereas when the flow of water from the nozzle of the gun stops, the first pressure switch does not detect pressure and generates another electrical signal which stops the rotation of the motor.

[0013] The first pressure switch is connected to the outflow section of the circuit at the outlet of the drive pump, before the discharge valve; whereby a pressure drop in the water in said outflow section of the circuit is detected by the first pressure switch, the latter generating an electrical signal which stops the rotation of the motor that actuates the drive pump when the trigger of the gun is released.

[0014] The second pressure switch is connected to a terminal section of the circuit where the gun is connected, the terminal section starting from the non-return valve; the gun and the second pressure switch being connected to the terminal section of the circuit, whereby a pressure drop in the water in said terminal section is detected by the second pressure switch.

[0015] The hydraulic pilot of the discharge valve is connected to the outflow section of the circuit at a point lo-

cated between the discharge valve and the non-return valve.

[0016] In this situation, a pressure drop in the water in said terminal section is detected by the second pressure switch, the latter generating an electrical signal which starts the rotation of the motor that actuates the drive pump when the trigger of the gun is actuated.

[0017] The device of the invention therefore comprises detection means for activating or deactivating the motor that actuates the drive pump, depending on whether or not the gun is being used. To this end, the device has been designed to comprise the two pressure switches that detect pressure differences in the circuit and send signals to the control system, which stops or starts the motor of the drive pump.

[0018] For the purpose of helping to make this specification more readily understandable, a set of drawings constituting an integral part of the same has been included below, wherein by way of illustration and not limitation the object of the invention has been represented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

Figure 1 - Shows a schematic view of a pressurised water circuit which includes a device for supplying water in a pressurised water system for use at washing facilities, the subject-matter of the invention. The system is at rest, waiting for a user to select a washing programme.

Figure 2 - Shows a similar view to that shown in the previous figure, in which the pressurised water is in circulation due to a drive pump and flowing through an outlet nozzle of a gun connected to the water circuit.

Figure 3 - Shows a schematic view like the previous ones, in which the gun is closed and the water is circulating internally through part of the circuit.

Figure 4 - Shows a similar view to that shown in the previous figure in which the drive pump is deactivated.

DESCRIPTION OF AN EXAMPLE EMBODIMENT OF THE INVENTION

[0020] Taking into account the numbering used in the figures, the device for supplying water in a pressurised water system for use at washing facilities comprises a water circuit (4) which includes a first pressure switch (1) and a second pressure switch (2) together with a discharge valve (3), said circuit (4) including, in addition to the abovementioned components, a drive pump (5) and a non-return valve (6), said circuit (4) feeding a washing spray gun (7) with an outlet nozzle (7a) through which the water flows when said washing spray gun (7) is activated by means of a trigger (7b), in such a way that when the trigger (7b) of the gun (7) is in an actuated

position the volume of water flows through the outlet nozzle (7a) of the gun (7), whereas when the trigger (7b) is in a released position the water does not flow from the nozzle (7a) of the gun (7), at which point the drive pump (5) stops rotating after a time delay, as a result of the deactivation of a motor (8) that transmits its movement to the drive pump (5).

[0021] The discharge valve (3) is a three-way two-position valve with a hydraulic pilot (3a). Said discharge valve (3) adopts a first position through the action of the hydraulic pilot (3a) against the resistance of a spring (3b); and a second position through the action of the spring (3b) which is achieved when the hydraulic pilot (3a) is deactivated, said hydraulic pilot being connected to an outflow section (4b) of the circuit (4) at a point located between the discharge valve (3) and the non-return valve (6). Said outflow section (4b) is arranged at the outlet of the drive pump (5).

[0022] The pressure switches (1), (2) include a contactor with two terminals: a first terminal (1a), (2a), which sends an electrical signal communicating that there is pressure in the part of the circuit (4) where the respective pressure switch is connected, and a second terminal (1b), (2b), which sends an electrical signal communicating that there is not pressure in this part of the circuit (4).

[0023] In this situation, when the trigger (7b) of the gun (7) is newly actuated to make the volume of water flow once again through its outlet nozzle (7a), the motor (8) that transmits its movement to the drive pump (5) is activated again.

[0024] Thus, when the water flows through the outlet nozzle (7a) of the gun (7), the two pressure switches, first (1) and second (2), are receiving pressure signals and in this situation the motor (8) that transmits its rotational movement to the drive pump (5) remains activated.

[0025] In order to ensure the device of the invention performs as described, the circuit (4) of the pressurised water system comprises an inflow section (4a) which feeds the drive pump (5), the outflow section (4b) including the discharge valve (3) and the non-return valve (6), which in turn is connected to a terminal pipe (4c) for feeding the gun (7).

[0026] The drive pump (5) is inserted between the inflow section (4a) and the outflow section (4b) of the circuit (4), while the inflow section (4a) is connected to the outflow section (4b) through a parallel lateral diversion (4d) of the circuit (4), the discharge valve (3) being interposed in such a way that the said lateral diversion (4d) leads into the discharge valve (3).

[0027] In turn, the first pressure switch (1) is connected to the outflow pipe section (4b) by means of a first diversion (9), while the second pressure switch (2) is connected to the terminal pipe (4c) by means of a second diversion (10).

[0028] With this described arrangement, once a washing programme has been selected, the gun (7) is activated by actuating its trigger (7b), at which point the drive pump (5) begins to rotate by means of the motor (8),

generating a stream of water at the outlet of the nozzle (7a) of the gun (7), as shown in Figure 2. In this situation, the fluid flows under pressure through the inside of the circuit (4) of the system, passing through the non-return valve (6), in such a way that the pressure inside the circuit (4) is kept the same at every point, as can be checked using pressure gauges (11), (12) connected to the two pressure switches respectively: first (1) and second (2). In this situation, the water flows through the discharge valve (3) reaching the terminal pipe (4c) and gun (7), in such a way that said discharge valve (3) remains in its first position by means of the hydraulic pilot (3a) acting against the resistance of the spring (3b).

[0029] In contrast, when the flow of water from the nozzle (7a) of the gun (7) is interrupted when the trigger (7b) thereof is released (Figure 3), the pressure in the circuit (4) is maintained in the terminal pipe (4c) as shown by the pressure gauge (12) connected to the second pressure switch (2).

[0030] In this situation, the non-return valve (6) stops the fluid from passing, generating a water seal as a result of the gun closing (7), while in the outflow section (4b) the pressure drops, causing the discharge valve (3) to adopt its second position when its hydraulic pilot (3a) is deactivated as a result of the pressure drop as shown by the pressure gauge (11) connected to the first pressure switch (1) (Figure 3), which will send an electrical signal communicating that there is no pressure, this electrical signal activating a time delay before the rotation of the motor (8) of the drive pump (5) is stopped, in anticipation of the drive pump (5) being actuated again. In this situation, the discharge valve (3) remains in its second position through the action of its spring (3b).

[0031] To follow on from the previous paragraph, in a short space of time a volume of water makes a closed-loop journey through the inflow (4a) and outflow (4b) pipe sections, the front (4e) pipe section, the front pipe section (4d) and the discharge valve (3) in its second position.

[0032] In addition, when the gun (7) is newly activated by means of its trigger (7b) to release the water flow, the pressure in the terminal pipe (4c) momentarily drops, at which point the second terminal (2b) of the second pressure switch (2) will send a signal to the motor (8) to activate it so that it transmits its rotation to the drive pump (5), at which point the system circuit (4) will become pressurised once again, the two pressure gauges (11), (12) displaying the pressure received by the two pressure switches (1), (2).

Claims

1. A device for supplying water in a pressurised water system for use at washing facilities, wherein the pressurised water system comprises a circuit (4) which includes at least one water drive pump (5) that rotates by means of a motor (8), and a washing spray gun (7) with an outlet nozzle (7a) from which a stream

of water flows when said gun (7) is activated due to the action of a trigger (7b) built into the gun (7); **characterised in that:**

- it comprises a first pressure switch (1) and a second pressure switch (2) together with a non-return valve (6) and a three-way two-position discharge valve (3) having a hydraulic pilot (3a) acting against the resistance of a spring (3b), these two valves (3), (6) being inserted between the drive pump (5) and the gun (7), while at the outlet of the drive pump (5) is located an outflow section (4b) of the circuit where the discharge valve (3) is mounted first followed by the non-return valve (6);
- the discharge valve (3) is also connected to one end of a lateral diversion (4d), while the other end of this lateral diversion (4d) is connected to an inflow section (4a) which is coupled to the outflow section (4b) of the circuit (4), the drive pump (5) being located between these two sections (4a), (4b);

whereby as the water flows from the outlet nozzle (7a) of the gun (7), the two pressure switches (1), (2) detect pressure in the circuit (4) and said pressure switches generate electrical signals which keep the motor (8) rotating, whereas when the flow of water from the nozzle (7a) of the gun (7) stops, the first pressure switch (1) does not detect pressure and generates another electrical signal which stops the rotation of the motor (8).

2. The device for supplying water in a pressurised water system for use at washing facilities, according to claim 1, **characterised in that:**

- the first pressure switch (1) is connected to the outflow section (4b) of the circuit (4) at the outlet of the drive pump (5), before the discharge valve (3); whereby a pressure drop in the water in said outflow section (4b) of the circuit (4) is detected by the first pressure switch (1), the latter generating an electrical signal which stops the rotation of the motor (8) that actuates the drive pump (5) when the trigger (7b) of the gun (7) is released;
- the second pressure switch (2) is connected to a terminal section (4c) of the circuit (4) where the gun (7) is connected, the terminal section (4c) starting from the non-return valve (6); the gun (7) and the second pressure switch (2) being connected to the terminal section (4c) of the circuit (4), whereby a pressure drop in the water in said terminal section (4c) is detected by the second pressure switch (2).

3. The device for supplying water in a pressurised water system for use at washing facilities, ac-

according to claim 1, **characterised in that** the hydraulic pilot (3a) of the discharge valve (3) is connected to the outflow section (4b) of the circuit (4) at a point located between the discharge valve (3) and the non-return valve (6).

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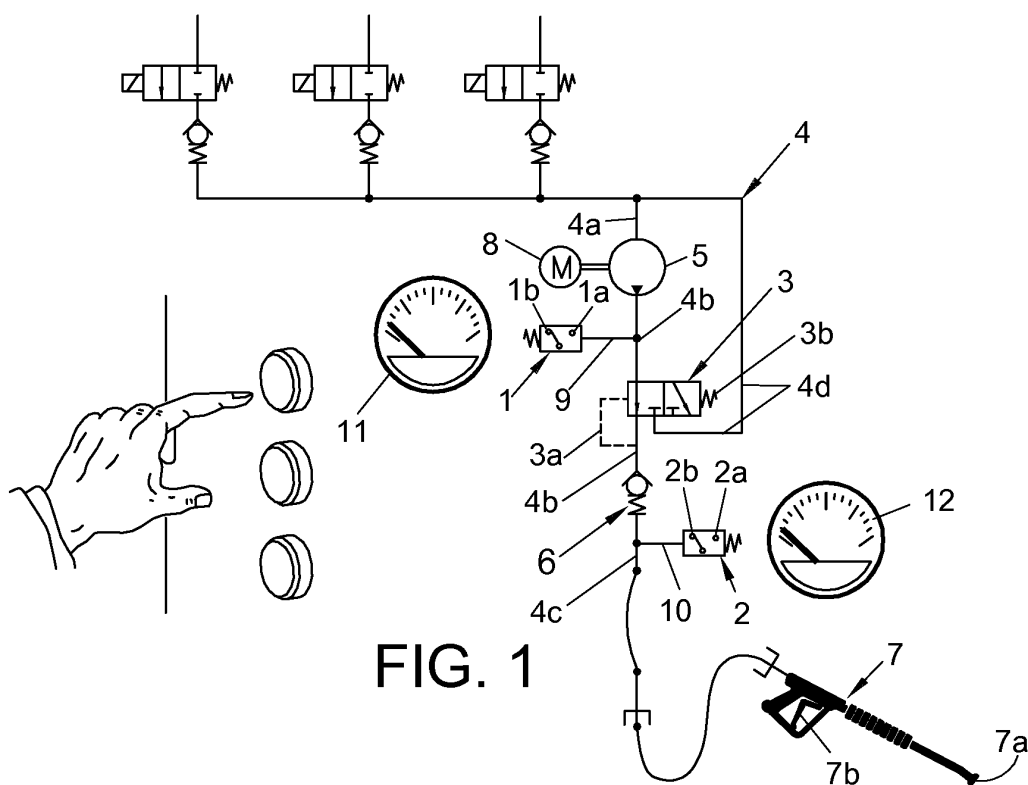


FIG. 1

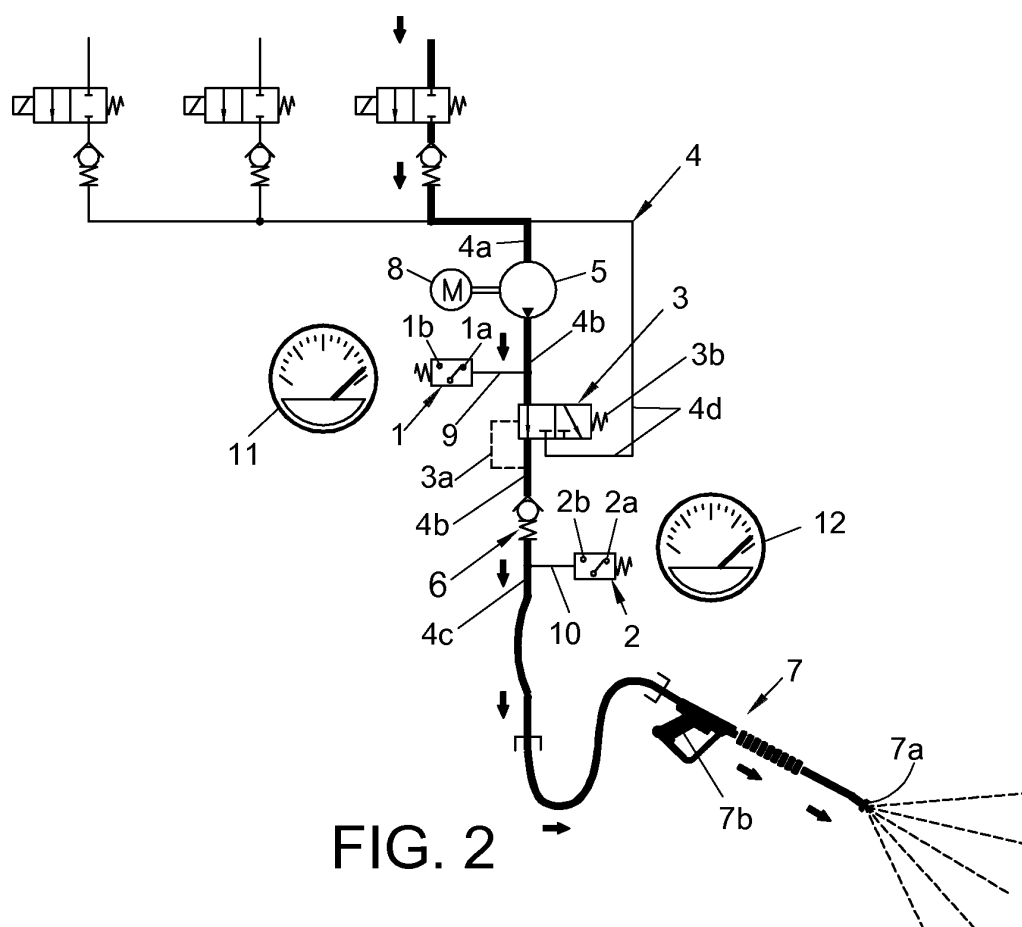


FIG. 2

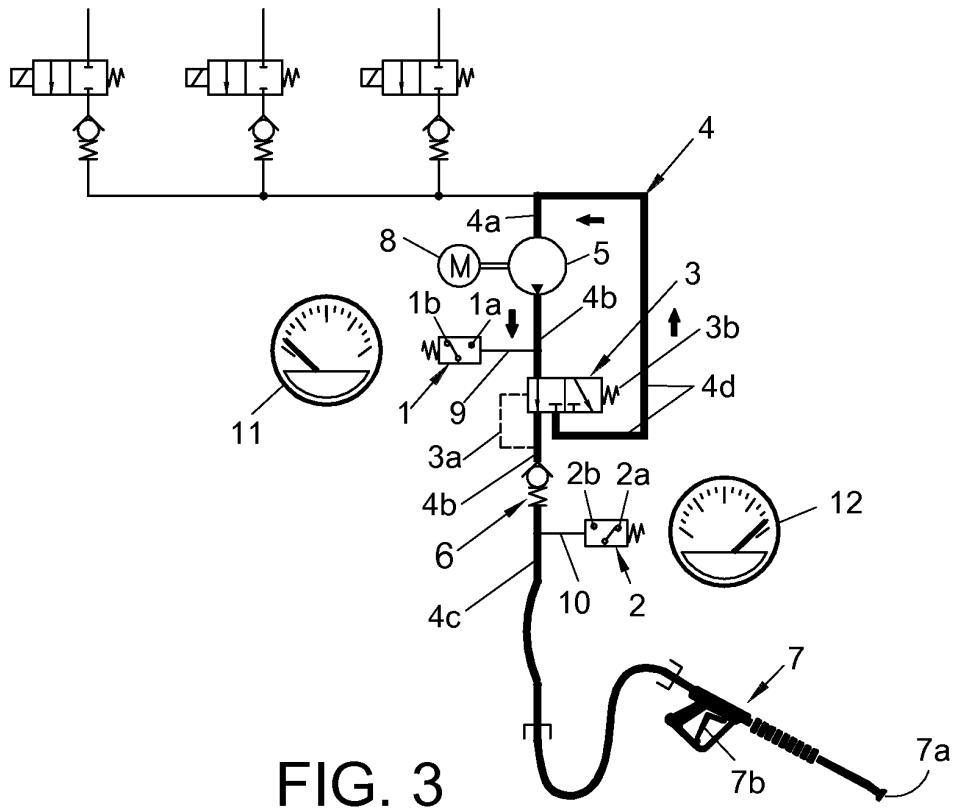


FIG. 3

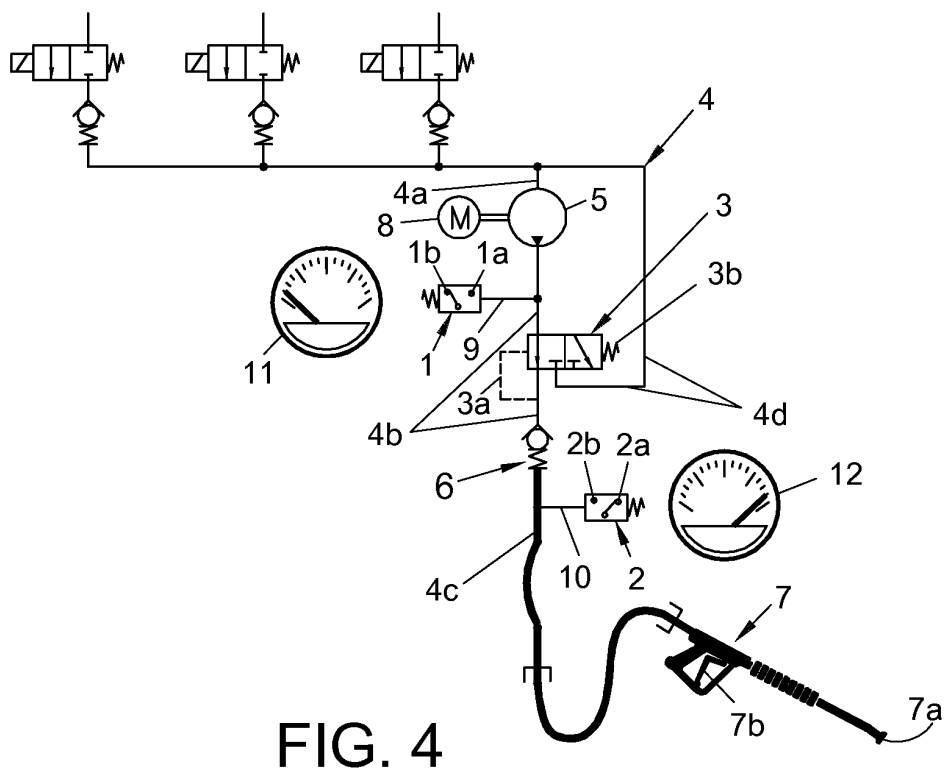


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2016/070098

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B05B, B08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

B60S, F04B

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 3630362 A1 (OERTZEN ARNDT H GMBH & CO) 10/03/1988, description; figure 3.	1
A	DE 3724386 A1 (KAERCHER GMBH & CO ALFRED) 09/02/1989, abstract; figures.	1
A	GB 1555003 A (FRANK SCHE EISENWERKE AG) 07/11/1979, abstract; figures.	1
A	US 3140049 A (NORSTRUD IVEN R ET AL.) 07/07/1964, figures.	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search
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Form PCT/ISA/210 (second sheet) (January 2015)

EP 3 305 414 A1

INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

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Form PCT/ISA/210 (patent family annex) (January 2015)

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CLASSIFICATION OF SUBJECT MATTER

B05B12/02 (2006.01)

B05B9/04 (2006.01)

B08B3/02 (2006.01)

REFERENCES CITED IN THE DESCRIPTION

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- US 2014203102 A [0008]