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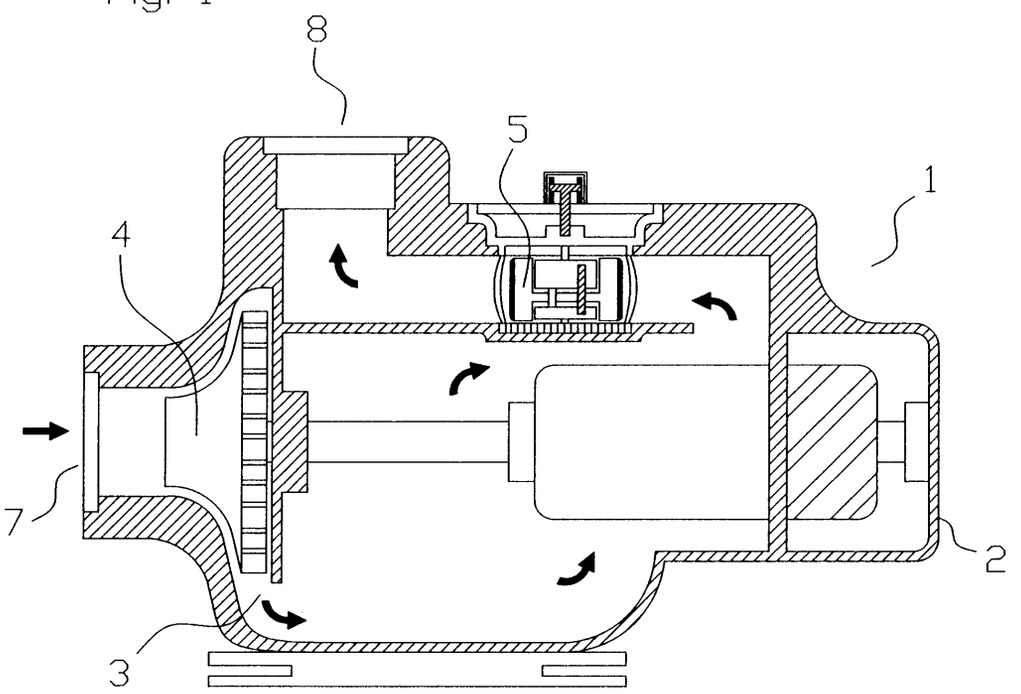
(54) Hydraulic machine with automatic control device attached

(57) The invention relates a hydraulic machine, specifically a pump (2), with automatic control devices attached to its internal water conduits. Said devices register the presence of pressure and flow of the liquid, automatically providing for the activation of the machine when they register a certain pressure and/or flow, and its deactivation when they register a certain pressure and/or in the absence of flow. Such functions are carried out thanks to the data provided by a delivery indicator (5) and a pressure switch (6) attached to the internal water conduits (3) and connected to a control electronic circuit which regulates the machine functioning.

The fluid circulates around the external surfaces of the electric tight motor, cooling it. This allows the pump to be very silent.

Fig. 1



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Description

Technical Field

[0001] The invention relates the technical sector of the construction of pumps for fluids and particularly for the distribution of water in external or internal areas.

Background art

[0002] At present experts of this field know pumps of different kind through which fluids are moved.

[0003] It's not the aim of this patent application to describe the types of pumps nowadays on sale, since all technicians of this field already know how they work, as they constitute known art. Especially, what is already known are hydraulic working machine, alternative pumps, as well as centrifugal, axial or others, able to lift or push a liquid.

[0004] Pumps that are known at present are switched on when the user wish to move a fluid, and work till they are switched off without any control on the pressure or the delivery of the fluid. Thus implying not only inconvenience for the user compelled to act on the pump for activate or deactivate it, but also risks relative to the possibility that the machine dry-works.

[0005] In order to eliminate these drawbacks, control and protective devices against dry-working are known, as well as mechanical or electromechanical apparatus which improves the pump's working avoiding damages to the machine.

[0006] Said devices are generally constituted by a casing containing inside it the following elements:

1- a system for measuring the pressure of the fluid, specifically a pressure switch;
2- a system for measuring the delivery of the fluid, specifically a flow switch either a rotating, axial or weighing one;
3- possibly, a protective system for the pump against dry-working;
4- a control panel.

[0007] Said devices are applied out of the pump through thread or specific clutches located on the delivery point, therefore out of the casing of the same pump.

[0008] For these characteristics they are better qualified as separated completing accessories of the pump.

[0009] Specifically, a known patent is the WO 96/23936 "Device for regulating a water supply plant", concerning a device designed in order to be applied out of the pump and equipped with one or two pressure switches and a turbine aiming at controlling the pressure and the flow of water, as well as avoiding the machine dry-works.

[0010] Nevertheless, even such device is an external accessory of the pump and is very unwieldy, it raises the output costs and limits the use of the pump which is not compact and easy to use and transport.

[0011] Furthermore these devices, which are external accessories of the pump, have the drawback of producing a high output cost because of the need of join the components in a distinct body which can work with the pump once applied to it.

[0012] This invention aims at eliminating these and other drawbacks, supplying a compact pump, integrated with electromechanical devices that improve its functioning by controlling the pressure and the flow of the liquid and protecting the pump from dry-working.

Disclosure of invention

[0013] These and other aims are achieved by a hydraulic machine integrated with electromechanical devices, providing for the automatic working of the machine itself, regardless of the variations of delivery, as well as with a pump's protective system from dry-working.

[0014] A hydraulic machine, according to the present invention, is characterised by the fact that it comprises:

- means to measure the pressure of the fluid, with a pressure indicator (6) attached to the internal water ducts of the machine;
- means to register the presence of flow of water inside the pump, with a delivery indicator (5) attached to the internal water ducts of the machine;
- means to activate the machine when a certain pressure and/or flow of water is registered, and to deactivate it when a certain pressure is registered and/or in the absence of flow of water, with an electronic circuit, specifically programmed, which reads the data coming from the pressure and the delivery indicator, and consequently regulates the machine functioning.

[0015] The machine has the advantage of being equipped with a cooling system for the electric motor, which operates through the passage of the pumped flow that skims the external surface of the electric tight motor. This allows the machine to be very silent and effective while working.

[0016] Conveniently, the hydraulic machine is a pump with at least a delivery indicator and a pressure switch attached to its internal ducts and connected with a control electronic circuit.

[0017] Conveniently, the delivery indicator (5) is a flow switch attached to the water suction or delivery conduit (3) inside the pump (2).

[0018] Conveniently, the pressure indicator (6) is a pressure switch attached to the water delivery conduit (3) inside the pump (2).

[0019] Conveniently, both the delivery indicator (5) and the pressure indicator (6) are easy to be reached from the outside, for possible inspections and cleaning or maintenance operations.

[0020] Conveniently, the electronic control card analyses the data coming from the pressure switch (6) and/or the flow switch (5) and activate automatically the pump when some water is required, for example when a tap has been turned on, when it measures a certain flow and/or a prefixed pressure, which is then kept constant.

[0021] Conveniently, the electronic control card analyses the data coming from the pressure switch (6) and from the flow switch (5) and deactivate automatically the pump when it measures a prefixed pressure and/or the absence of flow of the liquid.

[0022] The electronic card and the control panel have the advantage of being accessible from the outside of the pump, as they can be directly attached to the body of the pump, to its top or to a completely separated support, possibly far from the pump, such as an electric board.

[0023] Another advantage is that the electronic card is programmed so as to allow the pump to work automatically, providing for activating it when the tap is turned on and deactivating it when it's turned off. Furthermore, the card stops automatically the pump in the absence of water to be sucked, thus avoiding possible damages to the machine.

[0024] Conveniently, the card can be programmed in order to carry out further functions according to the producer's or user's needs, always starting from the analysis of the data provided by the pressure switch and the delivery indicator.

[0025] Conveniently, the circuit is programmed so that it deactivates the pump automatically when the pump itself turns on and off more than once in short regular periods of time, because of a loss from the pipes of the hydraulic plant.

[0026] Conveniently, the pumping group, with the pressure-flow switch device attached, is incorporated in a compact block that comprises a control panel.

[0027] This control panel has the advantage of being inserted on the top (12) and is connected to an electronic card for the programmed operation of the device.

[0028] Another advantage of this top is that it works as further acoustic insulator reducing even more the sound emission from the invention, thus permitting it being used also in internal domestic environments.

[0029] Conveniently, the pumping group is fixed to a base and protected by a top at its turn fixed to this base.

[0030] Conveniently, the invention is furnished ready to be installed and it doesn't need any particular procedures, being facilitated by flexible pipes that come out from the suction and the delivery.

Advantageous effects of the invention

[0031] The invention offers a lot of advantages.

[0032] First of all. it allows the user to have at his disposal a hydraulic machine, specifically a pump, which is activated and deactivated automatically following the opening and closing of the water tap, with no need he acts directly on it. In addition, such pump is equipped with a control system against dry-working, which is integrated in the internal conduits of the pump.

[0033] This allows the user to get a pump that externally is completely similar to traditional pumps, with the same dimensions, but internally it has this further functionality.

[0034] Particularly, rather than attaching control devices out of the machine, this pump is compact and less unwieldy, since externally is like a traditional pump, even if it contains the integrated control devices. Therefore, it results handy, lighter and easier to use and transport.

[0035] Furthermore, the cooling system of the electric motor permits the pump to be very silent.

[0036] Another advantage is that the user gets a saving in the output costs, since it's not necessary to design and build an independent container with all the relative links for the connection of the pump.

Description of one way of carrying out the invention by reference to the drawing

[0037] In an ideal practical form, the invention is constituted by a pump (2) inside which a delivery indicator (5) and a pressure switch (6) are attached to the water suction conduits (3). These conduits (3) cross the pump so that the fluid skims the external surface of the motor, that is tight. This allows the machine to have a very silent and effective cooling system.

[0038] On the contrary, the control panel is attached to the external body of the pump, and is connected to the electronic card which receives and analyses the information provided by the pressure switch (6) and the flow switch (5), proceeding with the activation or deactivation of the pump according to the needs.

[0039] In a different practical form, the invention is constituted by a pumping group (Fig. 3, n. 1) inside which a delivery indicator (5) and a pressure indicator (6) are attached to the water delivery conduit (3), and above which a top (12) is placed. In this practical solution, the control panel is located on the top of the pump, rather than on its body.

Brief description of drawings

[0040] Further characteristics and advantages will be more evident looking to a favourite but not restrictive form of realization depicted as an example in the attached drawings where:

- Fig. 1 shows a vertical section drawing of the machine (1) constituted by a pump (2) for liquids of any kind, equipped, in this case, with impeller (4), entrance hole (7) for water, water suction conduit (3) and exit hole (8). A delivery indicator, or flow switch, (5) and a pressure indicator, or pressure switch (which is not depicted in this table) are attached to

the conduit (3);

- Fig. 2 shows a horizontal section drawing of the machine where the section of the pump (2), the flow switch (5) and the pressure switch (6) are highlighted;
- Fig. 3 shows a schematic possible conformation of the machine constituted by a base (10) equipped with supports (11) where the machine (1) is located, isolated from sounds and vibrations with silentblocks and/or gaskets (9) which are placed on the base of the top (12) as well.

[0041] Details of execution can vary, also in accordance with types of materials used and realization techniques, without however straying from the principle of the solution adopted and therefore remaining inside the boundaries of protection granted by this patent.

Claims

1. Hydraulic machine characterized by the fact that it comprises:

   - means to measure the pressure of the fluid, with a pressure indicator (6) attached to the internal water ducts of the machine;
   - means to register the presence of flow of water inside the pump, with a delivery indicator (5) attached to the internal water ducts of the machine;
   - means to activate the machine when a certain pressure and/or flow is registered, and to deactivate it when a certain pressure is registered and/or in the absence of flow of the fluid, with an electronic circuit, specifically programmed, which reads the data coming from the pressure and the delivery indicator, and consequently regulates the machine functioning.

2. Machine according to claim 1 characterized by the fact that it's equipped with a cooling system of the electric motor, which operates through the passage of the pumped flow around the external surface of the electric tight motor, which, being skimmed by the fluid, cools. This allows the machine to be very silent and effective while working.

3. Machine according to claim 1 or 2 characterized by the fact that it's a pump with at least a delivery indicator and a pressure indicator attached to its internal ducts and connected with a control electronic circuit.

4. Machine according to claim 1, 2 or 3 characterized by the fact that the delivery indicator (5) is a flow switch attached to the water suction or delivery conduit (3) inside the pump (2).

5. Machine according to claim 1, 2 or 3 characterized by the fact that the pressure indicator (6) is a pressure switch attached to the water delivery conduit (3) inside the pump (2).

6. Machine according to claim 1, 2 or 3 characterized by the fact that both the delivery indicator (5) and the pressure indicator (6) are easy to be reached from the outside, for possible inspections and cleaning or maintenance operations.

7. Machine according to claim 1, 2 or 3 characterized by the fact that the electronic control card analyses the data coming from the pressure switch (6) and/or the flow switch (5) and activate automatically the pump when some water is required, when it measures a certain flow and/or a prefixed pressure, which is then kept constant.

8. Machine according to claim 1, 2 or 3 characterized by the fact that the electronic control card analyses the data coming from the pressure switch (6) and from the flow switch (5) and deactivate automatically the pump when it measures a certain pressure and/or the absence of flow of the liquid.

9. Machine according to claim 1, 2 or 3 characterized by the fact that the electronic card and the control panel are accessible from the outside of the pump. as they can be directly attached to the body of the pump, to its top or to a completely separated support, possibly far from the pump.

10. Machine according to claim 1, 2 or 3 characterized by the fact that the electronic card is programmed so as to allow the pump to work automatically, providing for activating it when the tap is turned on and deactivating it when it's turned off and/or in the absence of water to be sucked, thus avoiding possible damages to the machine.

11. Machine according to claim 1, 2 or 3 characterized by the fact that the card can be programmed in order to carry out further functions according to the producer's or user's needs, always starting from the analysis of the data provided by the pressure switch and the delivery indicator.

12. Machine according to claim 11 characterized by the fact that the circuit is programmed so that it deactivates the pump automatically when the pump itself turns on and off more than once in short regular periods of time, because of a loss from the pipes of the hydraulic plant.

13. Machine according to claim 1, 2 or 3 characterized by the fact that the pumping group, with the pressure-flow switch device attached, is incorporated in

a compact block that comprises a control panel.

14. Machine according to claim 13 characterized by the fact that the control panel is inserted on the top (12), that works as further acoustic insulator, and is connected to an electronic card for the programmed operation of the device.

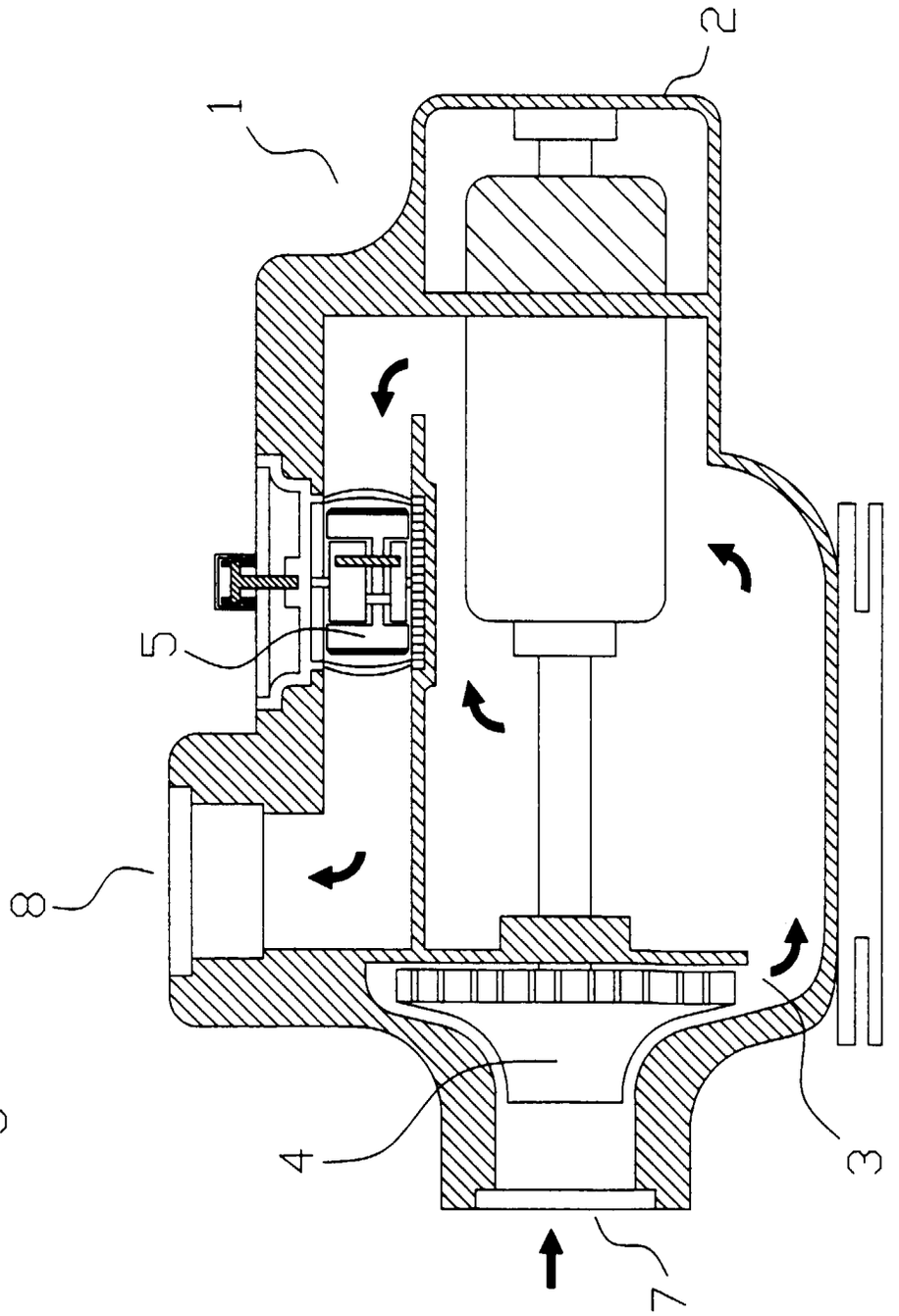


Fig. 1

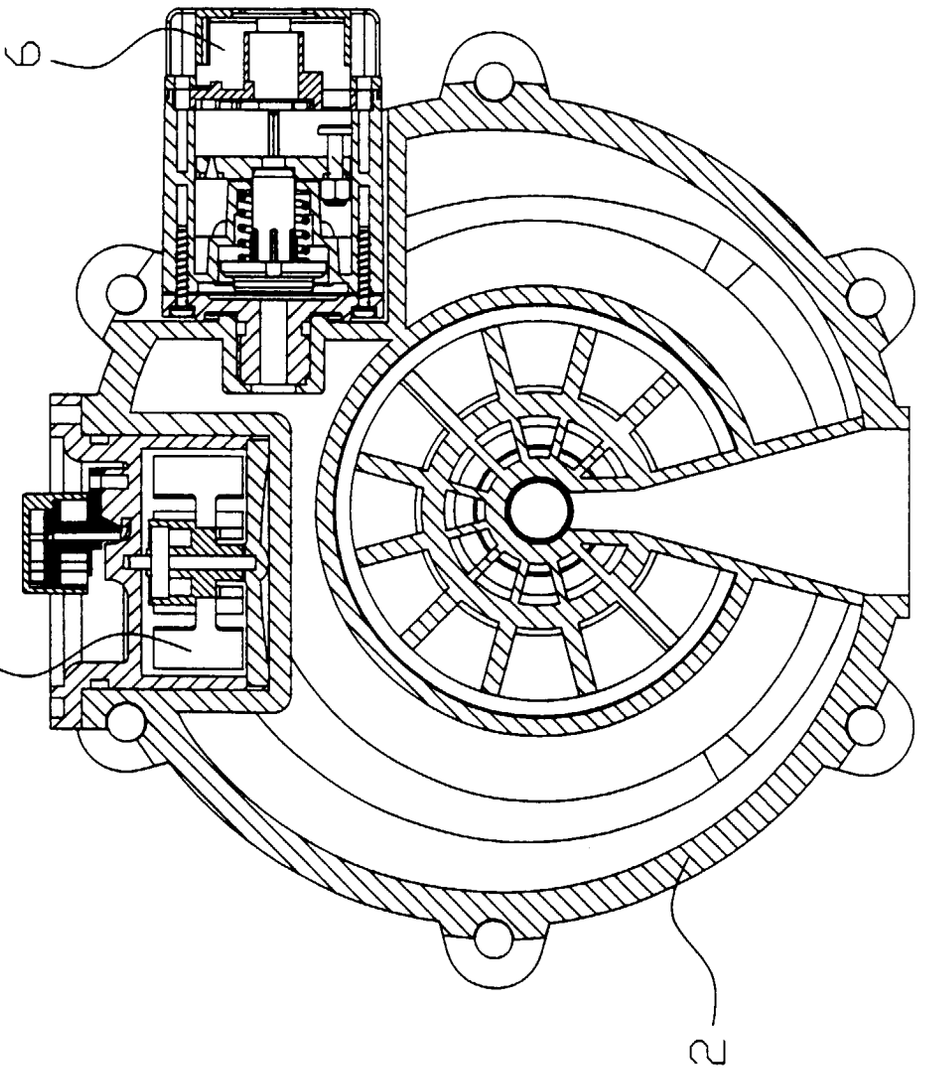
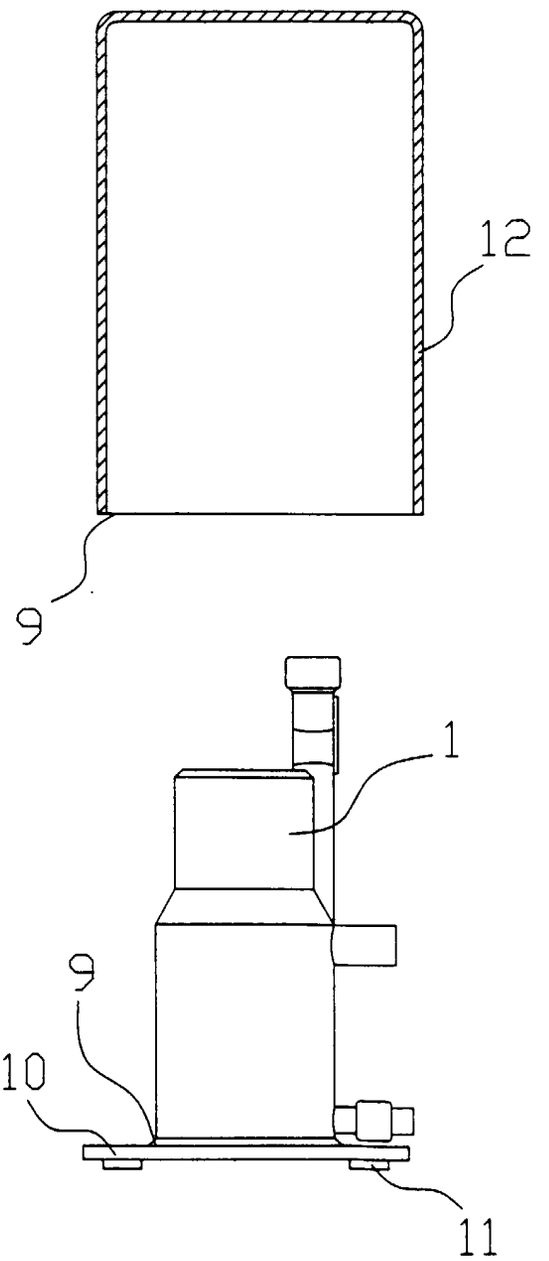


Fig. 2

Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 3319

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	5 October 2000	Fistas, N

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X : particularly relevant if taken alone
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