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(54) **ELECTRONICALLY CONTROLLED CUT-OFF VALVE SYSTEM WITH PARTICULAR APPLICATION AS AN ANTI-FLOODING DEVICE**

ELEKTRONISCH GESTEUERTES VENTILSYSTEM MIT SPEZIELLER ANWENDUNG ALS VORRICHTUNG ZUM SCHUTZ VOR UEBERFLUTUNG

SYSTEME DE VANNE DE FERMETURE ELECTRONIQUE S'UTILISANT PARTICULIEREMENT EN TANT QUE DISPOSITIF ANTI-INONDATION

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Description

The invention relates to an electronically controlled cut-off valve system with particular application as an anti-flooding device. It allows the user to set its stand-by state and protects, against flooding, rooms in which washing machines, dish washers or other appliances obtaining their water intake through a bib valve have been installed. In these cases the electronic circuit of a cut-off valve cooperates with an electrode unit which detects any appearance of a liquid conducting an electric current on the surface protected against flooding. Moreover, the electronically controlled cut-off valve system may also be employed in cases where an out-of-control outflow of water or other electrolyte from any open tanks filled through bib valves appears. Furthermore, in cooperation with a suitable emergency state detector, the system may be used to shut off pipe flow in cases of sudden flow pressure drop or due to other detectable quantities that are characteristic of out-of-control emergency states as well as due to changes in the level of quantities characteristic of controlled dynamic states.

Polish patent file No.89749 describes an electromagnetic water valve that is mounted on a water pipe and is designed for the protection of rooms against flooding by water. The electromagnetic valve unit cooperates with a water level float detector. A drive unit of that valve consists of a handwheel, a rotary spindle with a return spring installed on it, and a disk with recesses which catch on a rotation limiter and a protrusion on the armature of an electromagnet operated through contacts associated with the water level detector float. The valve is equipped with a housing mounted above the water pipe. Inside the housing is a rotary spindle with a disk having recesses on its circumference which, during rotation, catch on a rotation limiter and a protrusion on the armature of an electromagnet. The water level detector is comprised of a body inside of which there is a sliding float with a mandrel at whose end is a contact. Another contact is on the water-tight cover of the detector's body. If the water level rises, the float is lifted up until both contacts are connected. At that point, an electric circuit is closed and a relay is operated. The relay, through its protrusion on the armature, unlocks the disk which, under the action of a return spring, rotates together with the rotary spindle until the disk catches on the rotation limiter. In this position, water inflow is cut-off. In order to open the valve again, it is necessary to rotate the disk, by means of the external handwheel of the spindle, until the disk catches on the protrusion on the armature of the electromagnet again.

An electronically controlled cut-off valve system according to the preamble of claim 1 is also known. It is designed for the protection against flooding of rooms in which automatic washing machines or other appliances deriving water through a bib valve are used. This system is produced by SIEMENS AG, Germany under the name WASSERWACHTER - SET type 5WA 3000. In this sys-

tem a solenoid valve cooperates through an electronic circuit with an electrode unit mounted permanently to the floor of the room being protected against flooding. An emergency condition is signalled through a cable to the input of an electronic circuit when the electrodes of this unit are connected by a thin layer of water acting as a conductive liquid. This emergency condition signal triggers the system which, in turn, causes the valve to be shut off.

A supply unit is equipped with a separate housing, which contains the electronic section of the control system. This unit is mounted on a wall near an outlet socket to which the unit is connected.

The electromagnetic cut-off valve is equipped with a separate housing and is connected to the supply unit by means of a cable. The body of the valve is equipped with an inlet and outlet socket ferrule that connects the flow duct of the valve and is mounted to the outlet of bib valve. A length of hose connecting the water supply to the washing machine is screwed onto the outlet of the cut-off valve.

The above mentioned electrode unit of the resistive detector for the appearance of conductive liquids cooperates with the previously described valve. It has an insulating moulding resembling a type of flat electrical outlet plug. Two conductive electrodes are installed close to each other on the front face of this body. The signal cable of the unit containing wires connected to the electrodes extends out the narrowing end of the curved body. The insulating moulding is mounted flat on the surface protected and in this position there remains a through clearance between the lowest point of the given conductive electrode and the protected surface for the purpose of preventing reaction to slight dampness unrelated to any real flooding.

The designs described above have a number of faults and drawbacks. The first is rather primitive in its operation although it possesses a complicated structure. It requires a precise tooling of the rotary component of the spindle and its mounting and sealing in the valve body so as to eliminate the danger of any locking of the rotary part due to the settlement of mineral deposits inside the body of the valve during the long periods between emergency operations. Effective operation of the valve requires considerable force to rotate the spindle and, consequently, a considerable attractive force from the electromagnet's armature. This effect may be achieved by using an electromagnet with a large activating current obtained, most often, from the mains. The float detector cannot be used to protect rooms against surface flooding.

The second design also requires an electrical supply from the mains. In the stand-by state, energy is consumed continuously and lost in the winding of the valve's electromagnet. Individual sub-assemblies of the valve are mounted in separate housings and connected with cables which results in an enlargement of the unit's size and a reduction of the level of its reliability. Supplying

electricity from the mains creates the danger of electric shock and requires the proper installation of a separate, well insulated, outlet socket.

The construction of the above described electrode unit and its cooperation with the valve necessitates that it be mounted according to precisely defined and stable service positions imposed by the manufacturer as only such will allow for its effective operation. In cases of unintentional moistening from above of the front face with the conductive electrodes, even a small amount of liquid will create an uninterrupted water film connecting these electrodes and cause a reaction resulting in the closing of the valve. Furthermore, the signal cable leading out from the insulating body of the unit is hardly suitable for the task of locating the electrodes in relation to the protected surface without mounting the body to it. The stiffness and thickness of this cable aggravate the stability of the unit positioned without mounting it to the protected surface as specified by the manufacturer. On the other hand, many users will be reluctant to perform this mounting, not wanting to disturb the material covering the protected surface in such rooms as a kitchen or a bathroom.

The purpose of the present invention is an electronically controlled cut-off valve system with particular application as an anti-flooding device that cooperates with an electrode unit detecting an emergency state signalled by the appearance of a liquid conducting an electric current on the surface protected against flooding, a unit where the mechanical parts of the cut-off valve, the electronic circuit and the executive member it controls, as well as the power supply would be of compact design. At the same time, the invention tends towards making the system independent of an external power supply in order to achieve full independence, on the one hand, while, on the other hand, a level of supply voltage that is safe for the user. Furthermore, the proposed design attempts to incorporate an external element that is accessible to the user for setting the state of the valve after each emergency operation. Another aim is to retain minimal dimensions of the device while obtaining the optimum forces of operation for its executive elements that would be efficient for both cutting off water and in holding the valve at the stand-by condition. Another essential aim is to obtain energy consumption only during the emergency reaction of the valve which would lead to the possibility of using a battery as an exchangeable power supply, one that would, under such conditions, give many years of service life.

As regards the unit's sensitivity, the aim of the invention is such a design of the executive member and the electrode unit which ensures immediate reaction to the genuine appearance of an emergency state and, simultaneously, is resistant to dampness or a slight unintentional splashing of water on the surface protected against flooding.

Another aim of the invention is an electrode unit for the purpose of detecting liquids conducting an electric current whose design features would, on the one hand,

ensure the proper operation of the unit in any service position, and, on the other hand, limit or eliminate the possibility of activating the unit in cases of dampness or unintentional splashing with water which do not constitute a real emergency.

An essential aim is also the requirement that the electrode unit be self-righting by virtue of its permanent design features even after attempts have been made to dislocate it to a non-service position on the surface protected against flooding.

The electronically controlled cut-off valve system with particular application as an anti-flooding device contains a sealed electronic circuit triggered by means of a signal from a unit detecting an emergency condition, a mechanical membrane cut-off valve with an elastic driving element that is compressed in the open-position of the valve by means of an external element which sets the state of the valve, and a holding/releasing member of this external element which sets the state of the valve that is controlled by the said electronic circuit and is located outside the body of the mechanical membrane cut-off valve which is also equipped with a flow duct with an inlet and outlet. The essence of the design is that the body of the membrane cut-off valve is part of a compact unit which contains an electronic circuit that is connected by means of a signal cable to the external unit detecting the emergency condition, the holding/releasing member of the external element setting the state of the valve controlled by this electronic circuit, and a separate and independent d.c. power supply unit. At the same time, the independent d.c. supply unit is separated from the body of the membrane cut-off valve by the part of the housing containing the electronic circuit and the holding/releasing member of the external element setting the state of the valve controlled by this electronic circuit. Furthermore, the housing contains a separate chamber for the independent power d.c. supply unit that is sealed off from the part, of the housing that contains the electronic circuit and the holding/releasing member of the external element setting the state of the valve which is controlled by this electronic circuit.

Moreover, the independent d.c. power supply unit has contacts for a replaceable power supply element placed in this chamber and galvanically connected to proper connecting terminals of the electronic circuit controlling the holding/releasing member of the external element which sets the state of the valve.

The holding/releasing member is the magnetic-electromagnetic member while the external element setting the state of the valve is a double-arm lever which, when the valve is open, compresses an elastic driving element located in the body of the valve acting on an axial pressing down element of the valve's membrane. The lever is connected by a universal joint to the external tip of the axial pressing down element of the membrane and cooperates through its working surfaces which are in the form of rollers with the surface of the valve body in which the said axial pressing down element has been located

in a more or less perpendicular position.

The magnetic-electromagnetic member, being the part that holds and releases the lever, contains an electromagnet activated by an electronic circuit that is triggered by an external signal from the unit detecting an emergency condition. The core of the electromagnet is linked with a permanent magnet with polarization that is opposite to that of the field of the electromagnetic coil so that in the open position of the membrane valve, when there is no signal of an emergency condition, the magnetic field of the permanent magnet, acting through the pole shoes of the electromagnet's magnetic core, exerts a force sufficient to hold the lever down.

Advantageously, inside its motive arm, the lever contains a small magnetic armature, coupled with the pole shoes of the electromagnet's core which are polarized by the permanent magnet. At the same time, there is a return spring between the motive arm of the lever and the opposite wall of the housing.

The ends of the pole shoes of the magnetic core of the electromagnet's coil are polarized by the permanent magnet, and couple the magnetic armature of the lever, and are located visibly in the aforementioned wall of the housing opposite the inside of the motive lever arm.

The magnetic core of the electromagnet's coil consists of the previously mentioned permanent magnet and two separate, longitudinal, magnetic strip elements associated in such a way that their ends are located inside the housing and adhere from each side to this permanent magnet thus forming the magnetic channel core of an electromagnet while their opposite free ends form pole shoes of this magnetic core that are located, as previously mentioned, visibly in the wall of the housing opposite the lever.

The coil of the electromagnet is located on one arm of the magnetic core above the permanent magnet and is also associated with a contact switch located within the influence of its electromagnetic field. This is preferably a reed contact and is the element that applies full supply voltage to this coil of the electromagnet during detection of an emergency condition.

It is also favourable if the lever has an element located at the end of the side wall of its motive arm that indirectly disconnects one contact of one pole of the replaceable d.c. supply unit from one end of the electromagnet's coil immediately after the magnetic armature of the lever is released from the field of the previously mentioned permanent magnet during its motion forced by its return spring and the elastic driving element of the membrane valve compressed by the lever when the valve is open.

In such a case, it is favourable that this element which indirectly disconnects the coil and the power supply is an additional permanent magnet whose magnetic field is associated with an auxiliary contact switch when the valve is open. This is preferably a reed contact located inside the housing in such a way that this additional permanent magnet that is located on one of the side

walls of the motive arm of the lever which surrounds the housing from outside when the valve is open holds the auxiliary contact switch in a shorted state by means of its magnetic field. The emergency motion of the motive arm of the lever together with this additional permanent magnet that is initiated by the field of the electromagnet actuated by the emergency activated electronic circuit and forced by the return spring, results in the disconnection of this auxiliary switch.

If the system described above is the anti-flooding cut-off valve system, then the unit detecting an emergency condition is the electrode unit and contains two conductive electrodes located visibly in its insulating body and separated by the shaped part of this insulating body. The length of the surface of this shaped part in an expanded view in any axial plane of the electrode unit is greater than the distance between the conductive electrodes themselves.

This shaped part of electrode unit uniformly separating the conductive electrodes is united entirely through these electrodes with the shaped supporting elements of the insulating body which in any service position of the unit in profile give an approximately even through-clearance between the surface protected against flooding and the lower profile of the segment of the electrode unit located between the shaped supporting elements. The shaped supporting elements of the insulating body of the electrode unit together with the shaped part and the conductive electrodes form a solid of revolution whose longitudinal axis is approximately parallel to the flat surface protected against flooding in any service position of the unit. Furthermore, the shaped part of the insulating body of the electrode unit separating the conductive electrodes contains within itself the connecting wires of these electrodes which are inserted into a common insulating guard exiting the protective element as a flexible cable. This signal cable together with the protective element forces the transition of the unit from an unstable position to a service-resting position on the surface protected against flooding. This protective element is located on the mid-point of the shaped part of the insulating body between the conductive electrodes of the unit.

It is favourable that the protective element is permanently joined with the shaped part of the insulating body of the electrode unit thus forming an integrated element.

The design of the present invention embodies a compact construction which contains, in one common housing, a mechanical membrane cut-off valve, an electronic circuit, a holding/releasing member of the external element setting the state of the valve, and a separate and independent d.c. supply unit with an exchangeable d.c. supplying member. The external element setting the state of the valve is a user accessible double-arm lever. Due to such features, the valve is small and suitable for the standard dimensions of water pipes and the standard pressures inside them. Use of the double-arm lever in the design of the valve system makes it possible to op-

timize the force necessary for holding the valve in the open state by means of a permanent magnet that is part of the magnetic core of the electromagnet of the holding/releasing member. The d.c. supply unit makes the valve system independent of any external conditions. Use of the additional permanent magnet in association with the auxiliary contact switch of the supply circuit ensures consumption of current from the exchangeable d.c. supplying member only for a fraction of second during an emergency reaction of the valve which results in several years of service life for the exchangeable d.c. supplying member under such conditions. The use of the driving unit with the double-arm lever, the electronic circuit, and the member holding/releasing the lever make it possible to use a 1.5V LR6 Mignon type cell as the supplying member and make the valve absolutely safe for the user. The lever is the element setting the state of the valve and is directly accessible after the appearance of an emergency state which is indicated by its position. The simplicity of the valve's design ensures the required compactness of the water unit and its effective separation from the other sub-assemblies of this construction.

Thanks to the incorporation of the electrode unit, the valve system of this invention ensures effective protection against flooding and is characterized by immediate reaction to an uncontrolled outflow of water.

The design, due to the described shapes and location of individual insulating elements of the body of the electrode unit and the conductive electrodes ensures suitable and effective operation of the unit in any position on the surface protected against flooding. This is guaranteed by the above mentioned structural features. The fact that, in any position, the shaped supporting elements of the insulating body adjoin to the protected surface through the small segments of their circular profiles, ensures effective reaction of the unit during emergency inflow of liquid from any side. As well, the developed surface of the shaped part separating the conductive electrodes prevents any undue reaction particularly when the detector is only dampened or some unintentional non-damaging splashing from above occurs. In such cases, the side surface profile of this shaped part effectively precludes the creation of an uninterrupted film of conductive liquid between the electrodes. In case of flooding from below, the side surface profile of the shaped part of the insulating body does not impede the creation of such an uninterrupted film due to the fact that the film is created on a flat and, as a rule, protected surface. In this case only the thickness of this uninterrupted film of conductive liquid is essential. It should be noted that each of the conductive electrodes are located in the insulating body between an extreme shaped supporting element and one end of the shaped body part. This is an unessential design feature of the present invention. It is also possible to imagine a solution with equivalent features where the conductive electrodes are located at the edges of the insulating body. The present construction, however, is more advantageous, both as regards its op-

eration and the technology of production. The slightly bowed, radially shaped side surfaces of the shaped supporting elements of the insulating body together with their described edge location cause the unit to shift automatically to a suitable service position even from an unintentional vertical location of the unit on the protected surface. This occurs due to the shapes of the sides of these supporting elements and the protecting element with the signal cable.

The present invention will now be described by means of examples with reference to the attached drawings in which: Fig. 1 presents the local view and a partial section of the valve system housing in the axis of the water duct. Fig. 2 presents the end view of the narrow back wall of the valve system housing from the inlet side together with the outlet of the signal cable to the unit detecting the emergency condition. Fig. 3 presents the axial view of the electrode unit detecting the emergency condition of water flooding the surface protected by the cut-off valve system according to the anti-flooding version of the invention. Fig. 4 presents a cross-section, A-A, of the electrode unit marked in Fig. 3. Fig. 5 presents a circuit diagram of the electronic circuit and elements of the lever holding/releasing member of the valve connected to the electronic circuit. In the design presented in Figs. 1 and 2, the electronically controlled cut-off valve system has housing 1, being a compact construction containing the body 2 of the mechanical membrane cut-off valve, the electronic circuit 3 that controls member 4 holding/releasing the external element 5 setting the state of the membrane valve, and the separate independent d.c. supply unit 6. From the housing 1, from the electronic circuit 3, a cable is led out to the external unit detecting an emergency condition. The independent d.c. supply unit 6 is separated from the body 2 of the membrane cut-off valve by part 7 of the housing 1 that contains the electronic circuit 3 and the member 4 holding/releasing the external element 5 setting the state of the valve. The housing 1 below part 7 has a separate chamber 8 of the independent d.c. supply unit 6 tightly separated from part 7 of the housing 1 by a wall 9. The independent d.c. supply unit 6 has connecting contacts, not shown in the drawing, located on the narrow walls of the chamber 8 and assigned to the exchangeable d.c. supplying member in the form of a 1.5V LR6 Mignon type cell. These connecting contacts are connected to suitable connecting terminals in the electronic circuit 3. The body 2 of the valve contains the flow duct 10 with an inlet 11 and an outlet 12, the inlet being equipped with the joining nut 13. The holding/releasing member 4 is a magnetic-electromagnetic member. The external element 5 setting the state of the valve and held and released by this magnetic electromagnetic member is the double-arm lever 14. This double-arm lever 14, when the valve is open, compresses the elastic driving element 15 settled in the body 1 acting upon the axial pressing down element 16 of the membrane 17 of the valve. The lever 14 is joined by a universal joint with an external tip of the

axial pressing down element 16 and cooperates with the external surface 18 of the body 2 in which the axial pressing down element 16 is settled, more or less perpendicularly, by means of the radial parts of its working surfaces in the form of rollers 19. The magnetic-electromagnetic member 4 holding/releasing the lever 14 contains the electromagnet actuated by the electronic circuit 3 which is triggered by the signal of the emergency condition. The channel core of the electromagnet contains the permanent magnet 20 whose magnetic field is of opposite polarization to the polarization of the magnetic field of the electromagnet's coil 21 which is actuated in the emergency state. In the open position of the membrane valve, when there is no signal of an emergency condition, the magnetic field of the permanent magnet, acting through the pole shoes 22 of the magnetic core of the electromagnet, creates a force holding the lever 14 which contains inside its motive arm 23 a small magnetic armature 24 coupled with the pole shoes 22 of the magnetic core of the coil 21 of the electromagnet. Between the motive arm 23 of the lever 14 and the opposite wall 25 of the housing 1 there is a return spring 26 one end of which is fastened to that wall 25 of the housing 1 in which the ends of the pole shoes 22 of the electromagnet are visibly located. The magnetic core of the coil 21 of the electromagnet consists of the permanent magnet 20 mentioned before and two separate longitudinal magnetic strip elements 27 associated in such a way that the ends of the strip elements 27 which are located inside the housing 1 in its part 7 each adhere to one side of the permanent magnet 20 thus forming a magnetic channel core of the electromagnet. The coil 21 of the electromagnet is located on one of the strip elements 22 in an insulating bobbin above the permanent magnet 20. Through an internal hole in the bobbin of the coil 21, an additional thin magnetic strip element is led. The magnetic strip element is bent at its ends and equipped with clamp half-rings 28 mounting the contact switch 29 in the form of a reed contact which is associated with the coil 21 within the limits of influence of its electromagnetic field. The contact switch 29 is the element cooperating with the electronic circuit 3 and is connected electrically to this circuit. The contact switch 29 is fastened from one side to one contact of the chamber 8 of the exchangeable d.c. supplying unit and from the other side to one end of the coil 21 of the electromagnet and during the detection of an emergency condition is the element applying full supply voltage to the coil 21 of the electromagnet. The lever 14 has settled on the end of the bottom side wall of its motive arm 23 an additional permanent magnet 30 which is the element that indirectly disconnects the second contact of the chamber 8 of the said supplying member from the second end of the coil 21 of the electromagnet. This occurs immediately after the releasing of the magnetic armature 24 of the lever 14 from the field of the permanent magnet 20 during its motion forced by its return spring 26 and the elastic driving element 15 of the membrane valve which is compressed by the lever 14

when the valve is open. The magnetic field of the additional permanent magnet 30 is associated, when the valve is open, with the auxiliary contact switch 31 which is in the form of the reed contact located inside part 7 of the body 1 next to the wall 9. When the valve is open the walls of the motive arm 23 of the lever 14 surround the housing 1 from each side while the additional permanent magnet 30 which is located in one of the walls holds the auxiliary contact switch 31 in the shorted state. Emergency motion of the motive arm 23 of the lever 14 along with the additional permanent magnet 30 results in disconnection of the auxiliary contact switch 31 and, in effect, disconnection of the supply source. It is obvious from the described method of cooperation between the elements of the holding/releasing member and the use of magnetic fields that the construction of the part 7 of the housing 1 must not interfere with their cooperation.

In the anti-flooding version of the cut-off valve system, the signal cable 32, led out from the side of the housing 1 from the electronic circuit 3, is connected to the electrode unit which responds to an undesired outflow of liquid onto the surface protected against flooding.

The electrode unit consists of the insulating body 33 and two conductive electrodes 34 settled in this body which are connected galvanically to separate insulated wires 35 of the signal cable 32 which leads out from the insulating body 33. The insulating body 33 has shaped supporting elements 36 with a circular axial profile and a side profile that has a somewhat bowl shaped radial part at the external side of the unit. The conductive electrodes 34 are settled in the insulating body 33 behind the supporting elements 36 and are separated by the shaped part 37 of the insulating body 33. The unit rests upon the surface 38 protected against flooding, leaning on small segments of the circular perimeters of the supporting elements 36. The conductive electrodes 34 are in the shape of disks with diameters somewhat smaller than the diameters of the supporting elements 36. Accordingly, there exists a safe through-clearance 39 between the lowest points of the edges of the conductive electrodes 34 and the surface protected against flooding 38. The shaped part 37 of the insulating body 33 separating the conductive electrodes 34 has a cylindrical shank 40 fitted with circular fins 41 which form the grooves 42 between them. It is due to such a construction that the length of the side surface of this shaped part in an expanded view in any axial plane of the unit is considerably greater than the distance between the conductive electrodes 34 which prevents any unintentional reaction of the unit when it is dampened or splashed from above since the fins 41 and the grooves 42 impede the creation of an uninterrupted film of conductive liquid between the conductive electrodes 34. Looking from below, in any service position of the unit, the profile of the shaped part 37 forms a through-clearance 43 between the surface 38 protected against flooding and the lower profile of a segment of the unit located between the shaped supporting elements 36 of the insulating body 33

The unit is a solid of revolution with its longitudinal axis approximately parallel to the flat surface 38 protected against flooding in any of its working positions. The shaped part 37 of the insulating body 33 contains the wires 35 of the conductive electrodes 34 which are inserted into one common insulating guard in the protective element 44 forming the signal cable 32 at its exit. This, together with the protective element 44 is the member that forces transition of the unit from an unstable position to the rest-service position on the surface 38 protected against flooding. The protective element 44 is permanently joined with the shaped part 37 of the insulating body 33 forming a unified element. The element 44 is located on the shaped part of 37 and joined with its fins 41 in the mid-point between the conductive electrodes 34 separated by the shaped part 37. The conductive electrodes 34 have central holes, not shown in the drawing, through which a plastic material joins the shaped supporting elements 36 and the shaped part 37 of the insulating body 33 into one uniform element which contains the conductive electrodes 34 and their connecting wires 35. The protective element 44 has the profile of a finned frustum of a cone.

Fig.5 presents the diagram of the electronic circuit 3 and its electrical connections with the cooperating elements of the holding/releasing member 4 and the conductive electrodes 34. The active element of the electronic circuit 3 is the thyristor TY which is triggered by the gate current appearing when a liquid conducting an electric current connects the conductive electrodes 34.

Passive elements R1, R2, C1 and C2 set the optimum working conditions for the thyristor TY. The contact switch 31 is shown in the closed state forced by the magnetic field of the additional permanent magnet 30, this magnet being translocated together with the motive arm 23 of the lever 14.

When the valve is open, the axial pressing down element 16 is pulled out by the lever 14 to the highest position of its external tip. Simultaneously, inside the body 2 it compresses the elastic driving element 15 in the form of a coil spring. By means of the rollers, 19 the lever (14) leans against the external surface 18 of the body 2 in such a way that the support points and the axis of the lever's rotation lie on one plane with the longitudinal axis of the axial pressing down element 16. The value of the force necessary for keeping the lever 14 in this position which is applied to the end of the motive arm 23 of the lever 14 by the holding/releasing member 4 is minimal and depends only on the value of the force exerted on the lever 14 by the return spring. When the valve is open, the lever 14 is held by the magnetic field of the permanent magnet 20. This polarizes the pole shoes 22 of the magnetic core of the coil 21 of the electromagnet and couples the magnetic armature 24 of the lever 14. The coil 21 of the electromagnet is not supplied with voltage and the contact switch 29 associated with the electromagnetic field of this coil is open. The auxiliary contact switch 31 is closed by the magnetic field of the additional

permanent magnet 30 which together with the motive arm 23 of the lever 14 touches the side wall of the housing acting upon the contact switch 31.

In the case of an emergency which results in out-of-control outflow of water or a liquid conducting an electric current onto the surface 38 protected against flooding, operation of the electrode unit is dependant upon the thickness of the liquid layer which will appear between its conductive electrodes 34. A small accidental outflow will not create an uninterrupted film of liquid which would connect the conductive electrodes 34. Similarly, dampening or splashing of the insulating body 33 of the electrode unit from above will not connect these electrodes due to the fact that the surface of the shaped part 37 of the insulating body 33 is developed by the fins 41 and grooves 42.

These electrodes 34 become connected in the case of a real emergency that results in an outflow which quickly forms an uninterrupted film between them. The resistance between the electrodes actuates the electronic circuit 3 which applies a part of the supply voltage to the coil 21 of the electromagnet. The coil 21 generates an electromagnetic field with polarization opposite to the polarization of the magnetic field of the permanent magnet 20 which is a part of its channel magnetic core. The influence of the electromagnetic field of the coil on the field of the permanent magnet 20 is now not strong enough to enable release of the magnetic armature 24 of the lever 14 under the action of the return spring's 26 force since the current flowing through the circuit of the coil 21 due to the electronic circuit 3 is not sufficient to accomplish this task. The field of the coil 21, however, is sufficient to close the associated contact switch 29 which applies the full voltage of the exchangeable d.c. supplying member through its closed contacts to coil 21 which results in the current in the coil 21 being high enough to overcome the field of the permanent magnet 20. The magnetic armature 24 of the lever 14 is released. The lever 14 is pushed away from the housing 1 by the return spring 26 and makes a rotation on a pin joining this lever to the axial pressing down element 16 and is pulled together with the axial pressing down element 16 by the expanding elastic driving element 15 inside the body 2 of the valve. The axial pressing down element 16 which shifts together with the elastic driving element 15 presses, by means of its stop flange, the membrane 17 of the valve. The membrane, pressed against the internal outlet of the pipe settled in the inlet 11 of the valve cuts off the flow of liquid through the valve. Simultaneously, during the motion of the motive arm 23 of the lever 14 from the housing 1 the additional permanent magnet 30 settled on the end of the arm 23 moves away from the auxiliary contact switch 31 closed, until now, by the field of the magnet 30. As a consequence, the switch 31 is opened and results in cutting off the electromagnet coil's 21 supply. In fact, the reaction of the valve to the external emergency signal lasts only for a fraction of second. Accordingly, power consumption by the electronic circuit 3

and the coil 21 is momentary. As a result, it is possible to use a single 1.5V cell to supply the valve system for several years. In the case of some modern alkaline batteries, for instance, the battery may be replaced after its four year warranty period.

Claims

1. An electronically controlled cut-off valve system with particular application as an anti-flooding device containing an encased electronic circuit (3) triggered by a signal from a unit detecting an emergency condition, characterized in that it comprises a mechanical membrane cut-off valve (2) with an elastic driving element (15), compressed in the open state of the valve by means of an external element (5) setting the state of the valve, and a holding/releasing member (4) of this external element setting the state of the valve controlled by the said electronic circuit and located outside the body (2) of the mechanical membrane cut-off valve, where the said body is also equipped with a flow duct with an inlet and an outlet, wherein the body (2) of the membrane cut-off valve is a part of housing (1) being a compact construction containing, simultaneously, an electronic circuit (3) connected by means of a signal cable with an external unit detecting an emergency condition, a member (4) holding/releasing an external element (5) setting the state of the membrane valve, the said member (4) being controlled by the electronic circuit (3), and a separate independent d.c. supply unit (6).
2. A cut-off valve system as claimed in claim 1, in which the independent d.c. supply unit (6) is separated from the body (2) of the membrane cut-off valve by a part (7) of the housing (1) containing the electronic circuit (3) and the member (4) holding/releasing the external element (5) setting the state of the valve.
3. A cut-off valve system as claimed in claim 2, in which the housing (1) has a separate chamber (8) of the independent d.c. supply unit (6) sealed from the part of the housing (1) containing the electronic circuit (3) and the member (4) holding/releasing the external element (5) setting the state of the valve, the said member being controlled by the electronic circuit (3).
4. A cut-off valve system as claimed in claim 1 or 2 or 3, in which the independent d.c. supply unit (6) has connecting contacts assigned for the exchangeable d.c. supplying member which are located in the chamber (8) and connected galvanically to suitable connecting terminals of the electronic circuit (3) controlling the member (4) holding/releasing the external element (5) setting the state of the valve.
5. A cut-off valve system as claimed in claim 4, in which

the holding/releasing member (4) is a magnetic-electromagnetic member and the external element (5) setting the state of the valve is a double-arm lever (14) compressing, in the open state of the valve, an elastic driving element (15) settled in the body (2) and acting upon an axial pressing down element (16) of a membrane (17), the said lever (14) being joined by a universal joint with the external tip of the axial pressing down element (16) and cooperating, by means of its working surfaces containing radial parts in the form of rollers (19), with the external surface (18) of the body (2) in which the axial pressing down element (16) is settled more or less perpendicularly.

6. A cut-off valve system as claimed in claim 5, in which the magnetic electromagnetic member (4) holding/releasing the lever (14), contains an electromagnet activated by the electronic circuit (3) triggered by an external signal from a unit detecting an emergency condition, associated with a permanent magnet (20) with magnetic polarization opposite to the polarization of the electromagnetic field of the coil (21) of the electromagnet, so that in the open position of the membrane valve, in the absence of a signal indicating the presence of an emergency condition, the magnetic field of the permanent magnet (20), acting through pole shoes (22) of a magnetic core of the electromagnet, creates a force holding down the lever (14).
7. A cut-off valve system as claimed in claim 6, in which the lever (14) contains, inside its motive arm (23), a small magnetic armature (24) which serves to couple the pole shoes (22) of the magnetic core of the electromagnet's coil (21) with the lever (14), the said pole shoes (22) being polarized by the permanent magnet (20), and where there is a return spring (26) between the motive arm (23) of the lever (14) and the opposite wall (25) of the housing (1).
8. A cut-off valve system as claimed in claim 7, in which the ends of the pole shoes (22) of the magnetic core of the coil (21) of the electromagnet, polarized by the permanent magnet (20), coupling the magnetic armature (24) of the lever (14) are located visibly in the wall (25) of the housing (1) which is opposite to the inside of the motive arm (23) of the lever (14).
9. A cut-off valve system as claimed in claim 8, in which the magnetic core of the coil (21) of the electromagnet consists of a permanent magnet (20) and two separate magnetic longitudinal strip elements (27) associated in such a way that their ends are (27) located inside the housing (1) and adhere, each to one side of the permanent magnet (20), thus forming the magnetic channel core of the electromagnet.

10. A cut-off valve system as claimed in claim 5 or 6 or 7 or 8 or 9, in which the coil (21) of the electromagnet is located on one arm of the magnetic core above the permanent magnet (20) and is associated with the contact switch (29), preferably a reed contact, located within the limits of influence of the coil's magnetic field, the said contact switch (29) being the element applying full supply voltage to the coil (21) of the electromagnet during the detection of an emergency condition.

11. A cut-off valve system as claimed in claim 10, in which the lever (14) has settled on the end of the side wall of its motive arm (23) an element indirectly disconnecting one pole of an exchangeable d.c. supplying member from one end of the coil (21) of the electromagnet immediately after releasing the magnetic armature (24) of the lever (14) from the field of the permanent magnet (20) during the motion forced by its return spring (26) and the elastic driving element (15) of the membrane valve that is compressed by the lever (14) when the valve is open.

12. A cut-off valve system as claimed in claim 11, in which the element indirectly disconnecting the coil (21) and cutting off the supply voltage is an additional permanent magnet (30) whose magnetic field is associated, in the open state of the valve, with an auxiliary contact switch (31), preferably a reed contact, located inside the housing (1) in such a way that an additional permanent magnet (30), located in one of the side walls of the motive arm (23) of the lever (14) surrounding the housing (1) from each side, holds the auxiliary contact switch (31) in the closed state by means of its magnetic field, while the emergency motion of the motive arm (23) of the lever (14) together with its additional permanent magnet (30), initiated by the field of the coil (21) of the electromagnet, actuated by the electronic circuit (3), triggered by an external signal from a unit detecting an emergency condition and forced by the return spring (26), results in the transition of the auxiliary switch (31) to the open state.

13. A cut-off valve system as claimed in claim 12, in which the unit detecting an emergency condition is an electrode unit which contains two conductive electrodes (34), located visibly in its insulating body (33), separated by a shaped part (37) of the insulating body (33), the length of the surface of the part (37) in an expanded view in any axial plane of the unit being greater than the distance between the conductive electrodes (34).

14. A cut-off valve system as claimed in claim 13, in which the shaped part (37) of the electrode unit separating the conductive electrodes (34) is united

through these electrodes with shaped supporting elements (36) of the insulating body (33) forming, in any service position of the unit, through-clearance (43) between the surface (38) protected against flooding and the lower profile of the segment of the unit located between these shaped supporting elements (36).

15. A cut-off valve system as claimed in claim 14, in which the the shaped supporting elements (36) of the insulating body (33) of the electrode unit, it shaped part (37) and the conductive electrodes (34) separated by the shaped part (37), form a solid of revolution whose longitudinal axis is parallel to the flat surface (38) protected against flooding in any service position of the unit.

16. A cut-off valve system as claimed in claim 15, in which the shaped part (37) of the insulating body (33) of the electrode unit separating the conductive electrodes (34) contains the connecting wires (35) of these electrodes within itself.

17. A cut-off valve system as claimed in claim 16, in which the connecting wires (35) of the conductive electrodes (34) of the electrode unit are inserted into one common insulating guard in a protective element (44) forming, at its exit, a signal cable (32) which, together with the protective element (44), is a member that forces transition of the unit from an unstable position to a rest service position on the protected surface (38).

18. A cut-off valve system as claimed in claim 17, in which the protective element (44) of the electrode unit is located on the shaped part (37) of the insulating body (33), preferably in a central part of the distance between the conductive electrodes (34) separated by the shaped part.

19. A cut-off valve system as claimed in claim 18, in which the protective element (44) is permanently joined with the shaped part (37) of the insulating body (33) of the electrode unit, thus forming a uniform element.

Patentansprüche

1. Elektronisch gesteuertes Absperrventilsystem mit spezieller Anwendung als Vorrichtung zum Schutz vor Überflutung, das eine umgebaute elektronische Schaltung /3/ beinhaltet, das mit einem Signal aus der Baugruppe zur Erkennung des Havariezustandes ausgelöst wird, dadurch gekennzeichnet, daß ein mechanisches Membransperrventil /2/ mit elastischem Antriebsbauteil /15/, das in der geöffneten Stellung des Ventils mit Hilfe des äußeren, die Stel-

- lung des Ventils feststellender, Bauteiles /5/ zusammengedrückt wird, und das Halte-Auslöseglied /4/ von diesem äußeren, die Stellung des Ventils feststellender, Bauteil, das mit der genannten elektronischen Schaltung gesteuert wird und außerhalb des Grundkörpers /2/ des mechanischen Membransperrventils, das außerdem mit einem Durchflußkanal mit Einlauf- und Auslaufstutzen versehen ist, angeordnet ist, enthält, und daß der Grundkörper /2/ des Membransperrventils einen Teil des eine kompakte Konstruktion bildenden Gehäuses /1/, das zugleich eine mit Hilfe einer Signalleitung mit äußerer Baugruppe zur Erkennung des Havariezustandes gekoppelte elektronische Schaltung /3/, mit ihrer Hilfe gesteuertes Halte-Auslöseglied /4/ des äußeren, die Stellung des Ventils feststellender, Bauteiles /5/ und eine separate unabhängige Energieversorgungseinheit /6/ enthält.
2. Absperrventilsystem nach Anspruch 1, dadurch gekennzeichnet, daß die unabhängige Energieversorgungseinheit /6/ von dem Grundkörper /2/ des Membransperrventils mit dem Teil /7/ des Gehäuses /1/, das die elektronische Schaltung /3/ und mit ihrer Hilfe gesteuertes Halte-Auslöseglied /4/ des äußeren, die Stellung des Ventils feststellender, Bauteiles /5/, enthält, abgetrennt ist.
3. Absperrventilsystem nach Anspruch 2, dadurch gekennzeichnet, daß das Gehäuse /1/ eine separate Kammer /8/ der unabhängigen Energieversorgungseinheit /6/ besitzt, die dicht von dem die elektronische Schaltung /3/ und mit ihrer Hilfe gesteuertes Halte-Auslöseglied /4/ des äußeren, die Stellung des Ventils feststellender, Bauteiles /5/, enthaltenen Teiles des Gehäuses /1/ abgetrennt ist.
4. Absperrventilsystem nach Anspruch 1 oder 2 oder 3, dadurch gekennzeichnet, daß die unabhängige Energieversorgungseinheit /6/ Verbindungskontakte für die genannte Energieversorgungseinheit enthält, die in der Kammer /8/ angeordnet sind und mit der entsprechenden Verbindungsanschlüssen der elektronischen Schaltung /3/, die mit dem Halte-Auslöseglied /4/ des äußeren, die Stellung des Ventils feststellender, Bauteiles /5/ steuert, galvanisch gekoppelt sind.
5. Absperrventilsystem nach Anspruch 4, dadurch gekennzeichnet, daß das Halte-Auslöseglied /4/ ein elektromagnetisches Glied bildet, dagegen aber das äußere, die Stellung des Ventils feststellende, Bauteil /5/ einen zweiarmigen Hebel /14/ bildet, der in der geöffneten Stellung des Ventils den auf dem Grundkörper /2/ angeordneten, auf das achsiale Druckstück /16/ des Verschlusstückes /17/ wirkenden, elastischen Antriebsteiles /15/ zusammendrückt, der auf dem äußeren Endstück von diesem Druckstück /16/ schwenkbar angeordnet ist, und der mit seinen Arbeitsflächen, die radialen Teile als drehbare Rollen /19/ enthalten, mit der äußeren Fläche /18/ des Grundkörpers /2/, in welcher das Druckstück /16/ ungefähr senkrecht angeordnet ist, zusammenarbeitet.
6. Absperrventilsystem nach Anspruch 5, dadurch gekennzeichnet, daß das elektromagnetische Glied, das das Halte-Auslöseglied /4/ des Hebels /14/ bildet, einen Elektromagneten enthält, der von der elektronischen, mit dem äußeren Signal von der Baugruppe zur Erkennung des Havariezustandes ausgelösten, Schaltung /3/ angeregt wird, der mit einem Permanentmagneten /20/ mit einer dem elektromagnetischen Feld der Spule /21/ des Elektromagneten entgegengesetzten Polarisation verknüpft ist, so, daß das durch die Polschuhe /22/ der Flußführung des Elektromagneten wirkende Magnetfeld des Permanentmagneten /20/, in der geöffneten Stellung des Membranventils, beim Fehlen des Signals des Havariezustandes, eine den Hebel /14/ haltende Kraft bildet.
7. Absperrventilsystem nach Anspruch 6, dadurch gekennzeichnet, daß den Hebel /14/ innerhalb seines mobilen Armes /23/ einen kleinen, mit der Polschuhen /22/ der Flußführung der Spule /21/ des Elektromagneten, die mit dem Permanentmagneten /20/ polarisiert sind, verknüpften magnetischen Anker /24/ enthält, im Gegensatz dazu befindet sich zwischen dem mobilen Arm /23/ des Hebels /14/ und der gegenüber zu diesem liegenden Wandung /25/ des Gehäuses /1/ eine Rückholfeder /26/.
8. Absperrventilsystem nach Anspruch 7, dadurch gekennzeichnet, daß die mit dem Permanentmagneten /20/ polarisierten Enden der Polschuhe /22/ der Flußführung der Spule /21/, die den magnetischen Anker /24/ des Hebels /14/ einkuppeln, sichtbar in der gegenüber zu dem Inneren des mobilen Armes /23/ des Hebels /14/ liegenden Wandung /25/ des Gehäuses /1/ angeordnet sind.
9. Absperrventilsystem nach Anspruch 8, dadurch gekennzeichnet, daß die Flußführung der Spule /21/ aus einem Permanentmagneten /20/ und zwei separaten Längsstreifenbauteilen /27/ besteht, die so miteinander verkuppelt sind, daß die im Inneren des Gehäuses /1/ angeordneten Enden der Streifenbauteile /27/ jeweils an einer der Seiten des Permanentmagneten /20/ anliegen und damit eine C-förmige Flußführung des Elektromagneten bilden.
10. Absperrventilsystem nach Anspruch 5 oder 6 oder 7 oder 8 oder 9, dadurch gekennzeichnet, daß die Spule /21/ des Elektromagneten auf einem der

Schenkel der Flußführung oberhalb des Permanentmagneten /20/, der indirekt den magnetischen Anker /24/ des Hebels /14/ einkuppelt, angeordnet und mit einem im Bereich der Wirkung ihres Magnetfeldes liegenden Kontaktschalter /29/, günstig Schutzrohrkontaktrelais, das während der Erkennung des Havariezustandes einen Bauteil zur Einschaltung voller Einspeisung auf die Spule /21/ bildet, eingekuppelt ist.

11. Absperrventilsystem nach Anspruch 10, dadurch gekennzeichnet, daß der Hebel /14/ ein auf dem Endstück der seitlichen Wandung seines mobilen Armes /23/ angeordneter Bauteil besitzt, das einen Pol des genannten Energieversorgungsgliedes mit einem Ende der Spule /21/ des Elektromagneten sofort nach dem Auslösen des magnetischen Ankers /24/ des Hebels /14/ aus dem Feld des Permanentmagneten /20/ während seiner Bewegung, die mit seiner Rückholfeder /26/ und mit dem elastischen Antriebsteil /15/ des mit dem Hebel /14/ während der geöffneten Stellung zusammengedrückten Membranventils erzwungenen wird, indirekt abschaltet.

12. Absperrventilsystem nach Anspruch 11, dadurch gekennzeichnet, daß das indirekt die Spule /21/ und die Einspeisung abschaltende Bauteil einen zusätzlichen Permanentmagneten /30/ bildet, dessen Magnetfeld in der geöffneten Stellung des Ventils mit einem im Inneren des Gehäuses /1/ angeordneten Hilfskontaktschalter /31/, günstig Schutzrohrkontaktrelais, gekuppelt ist, so daß der zusätzliche Permanentmagnet /30/, der in einer der das Gehäuse /1/ von den Seiten in geöffneter Stellung des Ventils umschließenden seitlichen Wandungen des mobilen Armes /23/ des Hebels /14/ angeordnet ist, den Hilfskontaktschalter /31/ mit seinem magnetischen Feld im geschlossenen Zustand hält, dagegen aber die angeregte und mit dem Feld der Spule /21/ des Elektromagneten, der von der elektronischen mit dem äußeren Signal von der Baugruppe zur Erkennung im Fall des Havariezustandes ausgelösten Schaltung /3/ erregt wird, und mit der Rückholfeder /26/ erzwungene Havarieverlagerung des mobilen Armes /23/ des Hebels /14/ zusammen mit dem zusätzlichen Permanentmagneten /30/ das Öffnen von diesem verursacht.

13. Absperrventilsystem nach Anspruch 12, dadurch gekennzeichnet, daß die Baugruppe zur Erkennung des Havariezustandes eine Elektrodenbaugruppe bildet, die zwei in einem Isoliergrundkörper /33/ sichtbar angeordnete, mit einem Formteil /37/, dessen Länge der Fläche nach ihrer Entwicklung in beliebiger Achsenebene größer als der Abstand zwischen den stromführenden Elektroden /34/ ist, von diesem Isoliergrundkörper /33/ abgetrennte

stromführende Elektroden /34/ enthält.

14. Absperrventilsystem nach Anspruch 13, dadurch gekennzeichnet, daß das Formteil /37/ der Elektrodenbaugruppe, der die stromführenden Elektroden /34/ abtrennt, durch diese Elektroden mit den Stützformteilen /36/ des Isoliergrundkörpers /33/, die in beliebiger Arbeitslage der Baugruppe in der Kontur einen angenähert gleichen Durchgangslichtspalt /43/ zwischen der vor der Überflutung geschützten Fläche /38/ und der unteren Kontur des zwischen den Stützformteilen /36/ angeordneten Fragmentes der Baugruppe bilden, verbunden ist.

15. Absperrventilsystem nach Anspruch 14, dadurch gekennzeichnet, daß die Stützformteile /36/ des Isoliergrundkörpers /33/ der Elektrodenbaugruppe, ihrer Formteil /37/ und die mit diesem abgetrennten stromführenden Elektroden /34/ einen Rotationskörper der Baugruppe mit einer Längsachse bilden, die angenähert parallel zu der ebenen vor der Überflutung geschützten Fläche /38/ in beliebiger Arbeitslage der Baugruppe ist.

16. Absperrventilsystem nach Anspruch 15, dadurch gekennzeichnet, daß das Formteil /37/ des Isoliergrundkörpers /33/ der Elektrodenbaugruppe, der die stromführenden Elektroden /34/ abtrennt, im Inneren der Verbindungsader /35/ von diesen Elektroden enthält.

17. Absperrventilsystem nach Anspruch 16, dadurch gekennzeichnet, daß die Verbindungsader /35/ der stromführenden Elektroden /34/ der Elektrodenbaugruppe sich in einem gemeinsamen Gehäuseisolator in dem Schutzbauteil /44/ befinden, indem sie an dem Ausgang von diesem eine Signalleitung /32/ bilden, die zusammen mit dem Schutzbauteil /44/ ein Glied zur Erzwingung des Überganges der Baugruppe in der labilen Lage in die Ruhearbeitslage auf der geschützten Fläche /38/ bildet.

18. Absperrventilsystem nach Anspruch 17, dadurch gekennzeichnet, daß das Schutzbauteil /44/ der Elektrodenbaugruppe auf dem Formteil /37/ des Isoliergrundkörpers /33/ angeordnet ist, günstig in dem mittleren Teil des Abstandes zwischen den mit dem Formteil /37/ abgetrennten stromführenden Elektroden /34/.

19. Absperrventilsystem nach Anspruch 18, dadurch gekennzeichnet, daß den Schutzbauteil /44/ fest mit dem Formteil /37/ des Isoliergrundkörpers /33/ der Elektrodenbaugruppe verbunden ist, indem er mit diesem einen einheitlichen Bauteil bildet.

Revendications

1. Le système de vanne de fermeture électronique, s'utilisant particulièrement en tant que dispositif anti-inondation, contenant un système électronique (3) en boîtier, déclenché par un signal de l'unité détectant la condition d'émergence, caractérisé par ce qu'il comprend une vanne (2) mécanique de fermeture à membrane, avec un élément moteur élastique (15), compressé dans l'état ouvert de la vanne à l'aide de un élément extérieur établissant l'état de la vanne, et un membre retenant - déclenchant de cet élément extérieur établissant l'état de la vanne, contrôlé par le circuit électronique antérieurement mentionné et situé en dehors du corps de la vanne mécanique de fermeture, ledit corps étant équipé en plus d'un canal de flux avec une tubulure d'entré et de sortie, caractérisé en ce que le corps (2) de la vanne de fermeture à membrane est une partie du boîtier (1) étant une construction compacte contenant en même temps un circuit électronique (3) connecté par un câble de signal avec l'unité extérieure détectant la condition d'émergence, un élément retenant-déclenchant (4) un élément extérieur (5) stabilisant l'état de la vanne à membrane, ledit élément (4) étant contrôlé par le circuit électronique (3), et l'unité séparée indépendante d'alimentation (6) du courant continu.

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2. Le système de vanne de fermeture suivant la revendication no. 1, est caractérisé en ce que l'unité séparée indépendante d'alimentation (6) du courant continu est séparé du corps (2) de la vanne de fermeture à membrane par un élément (7) du boîtier (1) comprenant un circuit électronique (3) et un membre retenant - déclenchant (4) un élément extérieur (5) stabilisant l'état de la vanne, ledit membre contrôlé par le circuit électronique (3).

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3. Le système de vanne de fermeture suivant la revendication no. 2, caractérisé en ce que le boîtier (1) possède une chambre (8) séparée de l'unité indépendante d'alimentation (6) hermétiquement séparée du partie du boîtier (1) comprenant un circuit électronique (3) et un membre retenant - déclenchant (4) un élément extérieur (5) stabilisant l'état de la vanne, ledit membre contrôlé par le circuit électronique (3).

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4. Le système de vanne de fermeture suivant la revendication no. 1 ou no. 2 ou no. 3, caractérisé en ce que l'unité séparée indépendante d'alimentation (6) a les contacts de jonction avec le mentionné élément d'alimentation, situé dans la chambre (8) et joints galvaniquement avec les terminales de connexion respectives du circuit électronique (3) contrôlant le membre retenant - déclenchant (4) d'un élément extérieur (5) stabilisant l'état de la vanne.

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5. Le système de vanne de fermeture suivant la revendication no. 4, caractérisé en ce que le membre retenant - déclenchant (4) est constitué d'un élément électromagnétique et un élément extérieur (5) stabilisant l'état de la vanne est constitué d'un levier à double bras (14), compressant, dans la position d'ouverture de la vanne un élément moteur élastique (15) situé dans le corps (2), et agissant sur un élément axiale de pression (16) de la membrane (17), ledit levier inclinable fixé sur l'extrémité extérieure de cet élément de pression (16) et coopérant, à l'aide de ses surfaces de travail, comprenant les éléments radiales en formes des rouleaux rotatifs (19), avec la surface extérieure (18) du corps (2), dans lequel l'élément de pression (16) est encastré à peu près verticalement.

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6. Le système de vanne de fermeture suivant la revendication no. 5, caractérisé en ce que l'élément électromagnétique, constituant le membre retenant - déclenchant (4) le levier (14), comprend l'aimant électromagnétique, activé par le circuit électronique (3) déclenché par un signal extérieur de l'unité de détection de la condition d'émergence, associé avec un aimant permanent (20) ayant la polarisation magnétique contraire à la polarisation du champs électromagnétique de la bobine (21) de l'électroaimant, de la manière que dans la position de l'ouverture de la vanne à membrane, en défaut du signal de la condition d'émergence, le champs magnétique de l'aimant permanent (20) agissant par des pièces polaires (22) du noyau de l'électroaimant constitue la force retenant le levier (14).

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7. Le système de vanne de fermeture suivant la revendication no. 6, caractérisé en ce que le levier (14), comprend à l'intérieur de son bras mobile (23) une petite armature magnétique (24), accouplée avec des pièces polaires (22) du noyau de la bobine (21) de l'électroaimant, lesdites pièces polaires étant polarisées par un aimant permanent (20), et où entre le bras mobile (23) du levier (14) et le paroi opposé (25) du boîtier (1) se trouve un ressort de retour (26).

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8. Le système de vanne de fermeture suivant la revendication no. 7, caractérisé en ce que les extrémités des pièces polaires (22) du noyau de la bobine (21) de l'électroaimant polarisées par un aimant permanent (20), accouplant l'armature magnétique (24) du levier (14) sont situées visiblement sur le paroi (25) du boîtier (1) opposé à l'intérieur du bras mobile (23) du levier (14).

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9. Le système de vanne de fermeture suivant la revendication no. 8, caractérisé en ce que le noyau de la bobine (21) de l'électroaimant polarisé est constitué de l'aimant permanent (20), et de deux éléments de

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bande (27) allongés séparés associés de la manière que les extrémités des éléments de bande (27) situés à l'intérieur du boîtier (1) adhèrent chacun à un côté de l'aimant permanent (20) constituant avec lui le noyau profilé en U de l'électroaimant.

10. Le système de vanne de fermeture suivant les revendications no. 5, ou 6, ou 7, ou 8, ou 9, caractérisé en ce que la bobine (21) de l'électroaimant est située sur un des bras du noyau au dessus de l'aimant permanent (20), et en plus elle est associée avec un joint de contact (29), préférablement interrupteur à lame souple, situé dans les limites du champs électromagnétique de la bobine, constituant lors de la détection de la condition d'émergence, l'élément déclenchant l'alimentation complète sur la bobine (20) de l'électroaimant.

11. Le système de vanne de fermeture suivant la revendication no. 10, caractérisé en ce que le levier (14) possède sur l'extrémité du paroi latéral de son bras mobile (23) un élément indirectement déconnectant un pôle du membre d'alimentation échangeable de l'une des extrémités de la bobine (21) de l'électroaimant, immédiatement après le déclenchement de l'armature magnétique (24) du levier (14) du champs de l'aimant permanent (20), durant son mouvement forcé par son ressort de retour (26) et l'élément élastique moteur (15) de la vanne à membrane qui est compressé par le levier (14) quand la vanne est ouverte.

12. Le système de vanne de fermeture suivant la revendication no. 11, caractérisé en ce que l'élément indirectement déconnectant la bobine (21) et coupant l'alimentation est constitué d'un aimant permanent additionnel (30) dont le pôle magnétique est associé dans l'état ouvert de la vanne avec un joint auxiliaire de contact (31), préférablement interrupteur à lame souple, situé dans le boîtier (1), de la manière que l'aimant permanent auxiliaire additionnel situé sur une des parois latérales du bras mobile (23) du levier (14) embrassant le boîtier (1) des cotés dans l'état ouvert de la vanne, maintient le joint auxiliaire de contact (31) dans l'état fermé par son champs magnétique, cependant le déplacement d'émergence du bras mobile (23) du levier (14) avec l'aimant permanent additionnel (30) initié et forcé par le champs de la bobine (21) de l'électroaimant incité par le circuit électronique (3) déclenché par un signal extérieur de l'unité de la détection de la condition d'émergence et le ressort de retour provoque son ouverture.

13. Le système de vanne de fermeture suivant la revendication no. 12, caractérisé en ce que l'unité de la détection de la condition d'émergence est constitué d'une unité d'électrodes, comprenant deux électro-

des conductrices (34) encadrées visiblement dans le corps d'isolation (33), séparées par une partie formatrice (37) de ce corps isolateur (33) dont la longueur de la superficie en développement dans n'importe quel plan axiale de l'unité est supérieure à la distance entre les électrodes conductrices (34)

14. Le système de vanne de fermeture suivant la revendication no. 13, caractérisé en ce que la partie formatrice (37) de l'unité électrodes, séparant deux électrodes conductrices (34) est uni, par ces électrodes avec les éléments formatrices de support (36) du corps isolateur (33) formant dans n'importe quelle position de travail ajour intermédiaire (43) entre la superficie (38) protégée contre inondation, et le bord du fragment de l'unité situé entre ces éléments formateurs de support (36).

15. Le système de vanne de fermeture suivant la revendication no. 14, caractérisé en ce que les éléments formateurs de support (36) du corps isolateur (33) de l'unité électrodes, sa partie formatrice (37) et électrodes conductrices (34) divisé par ladite partie, forment un solide rotatif de l'unité à l'axe longitudinal approximativement parallèles à la superficie plane (38), protégé contre l'inondation, dans n'importe quelle position de travail.

16. Le système de vanne de fermeture suivant la revendication no. 15, caractérisé en ce que la partie formatrice (37) du corps isolateur (33) de l'unité électrodes, séparant les électrodes conductrices (34) comporte en son intérieur les fils de jonction (35) de ces électrodes.

17. Le système de vanne de fermeture suivant la revendication no. 16, caractérisé en ce que les fils de jonction (35) des électrodes conductrices (34) de l'unité électrodes, entre dans la protection isolant commune dans l'élément de protection (44) constituant à sa sortie un conduit de signal (32) qui ensemble avec l'élément de protection (44) constitue un membre forçant le passage de l'unité de la position instable à la position du travail de repos sur la surface (38) protégée.

18. Le système de vanne de fermeture suivant la revendication no. 17, caractérisé en ce que l'élément de protection (44) de l'unité d'électrodes est situé sur la partie formatrice (37) du corps d'isolation (33), préférablement en partie centrale de la distance entre les électrodes conductrices (34), séparées par la partie formatrice.

19. Le système de vanne de fermeture suivant la revendication no. 18, caractérisé en ce que l'élément de protection (44) est fixé d'une manière permanente avec la partie formatrice (37) du corps d'isolation

(33), de l'unité d'électrodes, en formant avec elle un élément homogène.

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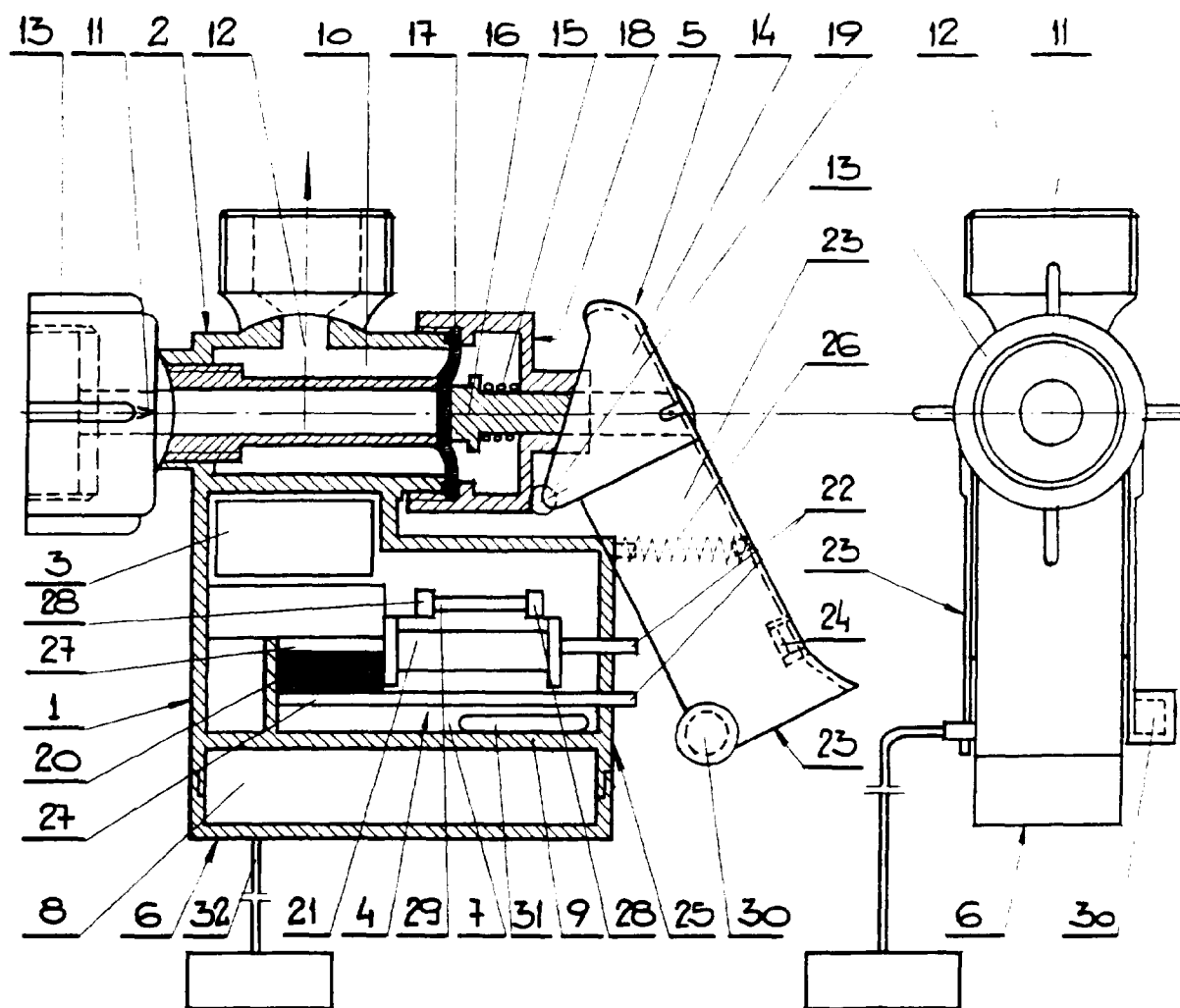


Fig.1

Fig.2

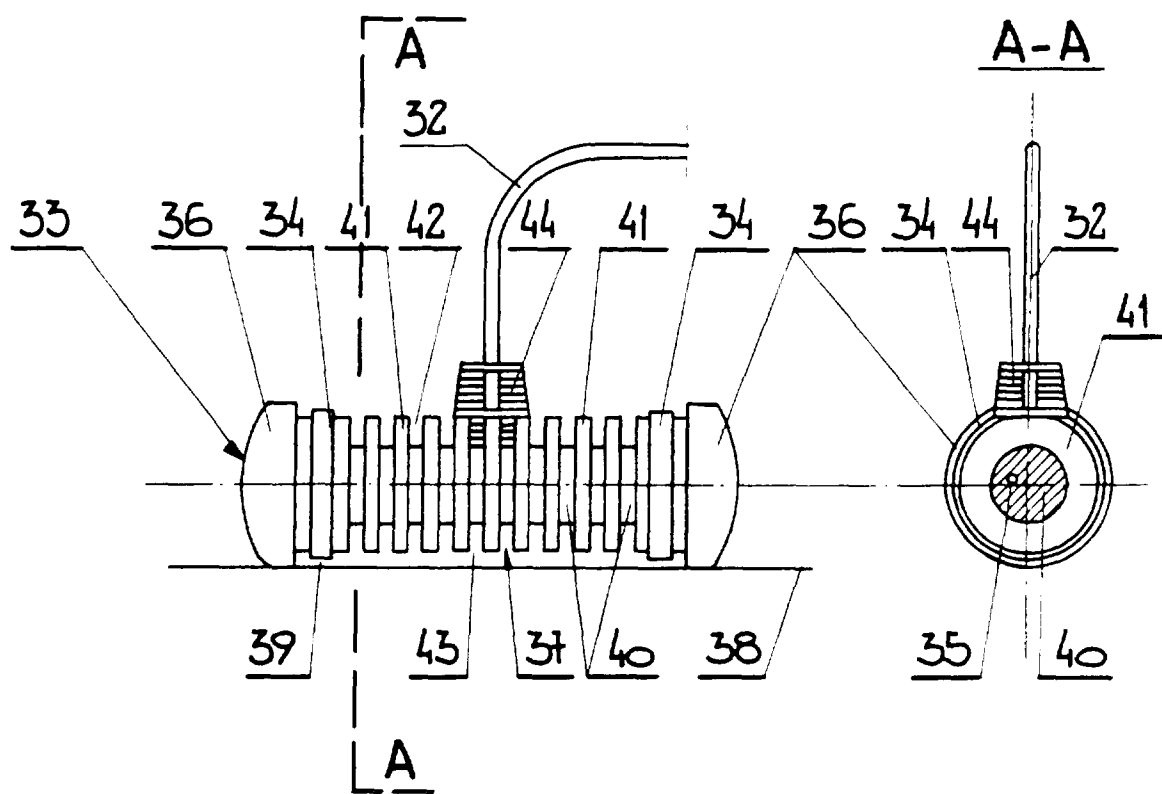


Fig. 3

Fig. 4

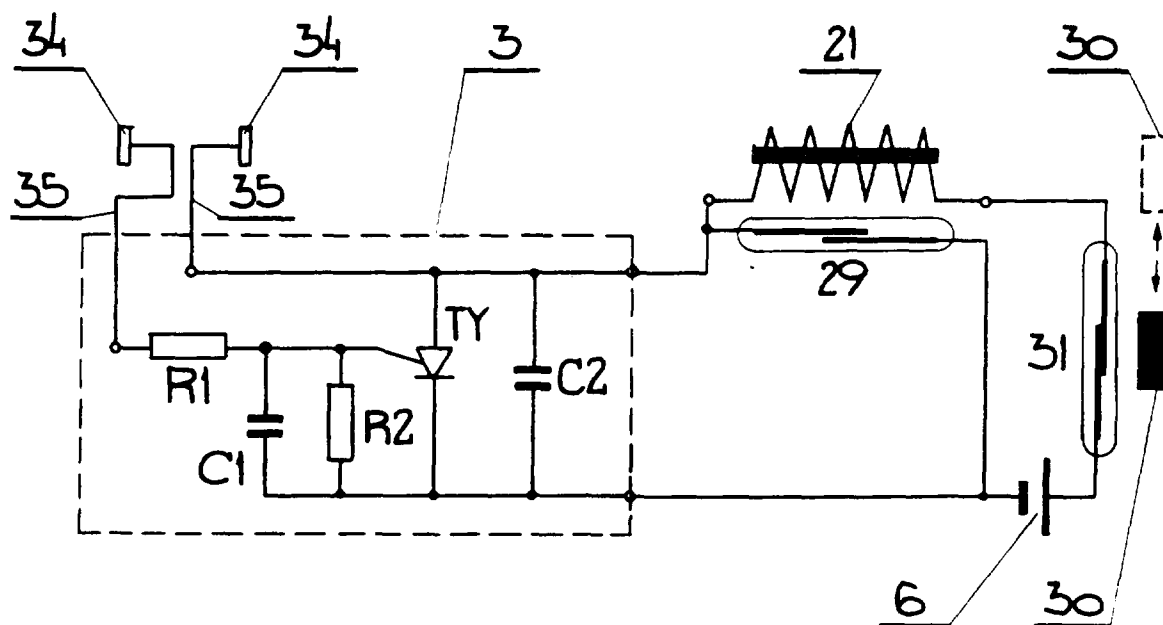


Fig. 5