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(54) **Device for the control of elevating pumps in a drainage installation or similar**

Vorrichtung zur Steuerung von Pumpen in Entwässerungsanlagen

Dispositif pour le contrôle des pompes dans une installation de drainage ou similaire

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Description

The invention relates to a device for controlling the starting and stopping of the elevating pumps in a drainage installation, according to the preamble of claim 1.

Dynamic drainage installations have collecting wells for waste water or sewage, in which one or more pipes converge, and from which the sewage is elevated by means of submerged pumps and sent to a higher section of the drainage installation. In installations of this type it is necessary to have a system which controls the starting and stopping of the submerged pumps to ensure, on one hand, that the pumps always remain submerged, and, on the other hand, that a safe level of the sewage is not exceeded. Normally, two pumps of equal capacity are disposed in a single well and are provided with a system of floats which control their starting and stopping. In particular, three floats are provided at three different levels, corresponding respectively to a minimum level of the liquid below which it must not fall if the pump is not to be uncovered, a second intermediate level at which at least one pump must be started, and a third higher level at which the second elevating pump must be started.

The floats contain mercury switches and are always supplied with electrical power. Each float is suitably counterweighted so that, when the liquid reaches the level of the float, the float is rotated in such a way as to cause the mercury switch to close.

These floats have considerable disadvantages, in the first place their high cost and the necessity of having a number of floats equal to the number of control levels of the liquid. In the second place, the electrical potential, although low, constitutes a hazard because of the presence of water in the installation area. Moreover, in the specific application to drainage installations, the presence of floating substances and froth generated by soaps poured into the drains leads to the formation of encrustations on the floats which alter their floating characteristics, so that in certain cases the necessary rotation of the float at the moment when the liquid reaches it does not take place.

A device according to the preamble of claim 1 is known, for example, from US-A-3.637.326. This known device has a pressure-sensitive switch arranged inside the flexible chamber and arranged at the same level as the pump which the swtich is intended to control.

All the electric control circuits are, therefore, submerged. Moreover, this known device is unsuitable for the control of more than one pump in response to the level of the liquid.

The object of the invention is to provide a device for the objects specified above which overcomes the disadvantages of the conventional devices which use floats with mercury switches.

This is obtained with a device according to claim 1.

The chamber is connected by a pressure transmission pipe to a pressure-operated switch which is disposed in the control panel outside the well in which the chamber and elevating pumps are disposed. In this way, the presence of any type of electrical power supply inside the drainage installation for driving the pump control device is avoided.

If a pressure-operated switch with three trigger levels is fitted, it is possible to control with a single chamber the switching on and off of two elevating pumps at three different levels of the liquid or sewage accumulated in the well in which the pumps are located. The pressure-operated switch may also be provided with a bistable device, of a type known in itself and previously used in this type of application, which enables the pumps to be used alternately so that the number of operating cycles of each pump is decreased.

It will be seen from the above summary that, by using the flexible sealed chamber according to the invention, it is possible to produce a two-pump elevating installation while reducing substantially the cost of the control devices for the pumps, and that it is also possible to eliminate all the disadvantages inherent in floats. In particular, since the chamber has to remain constantly submerged, and is therefore located at a depth approximately equal to the depth of the pumps, no encrustations caused by floating detritus will be formed on it, and therefore its efficiency is not diminished over a period of time, whereas this does occur with the mercury switch floats of the conventional type.

The pressure line connecting the flexible chamber to the pressure-operated switch may be provided with a pressure gauge installed, for example, in the control panel of the installation, which makes it possible to check the level reached by the sewage without opening the manhole of the well in which the pumps are installed.

Further advantageous characteristics of the device according to the invention are indicated in the attached dependent claims.

The invention will be more clearly understood from an examination of the description and the attached drawing, which shows a non-restrictive practical example of the invention. In the drawing,

Fig. 1 is a highly schematic view of a well with the submerged elevating pumps and the control device according to the invention;
Fig. 2 is a side view and partial section of the flexible sealed chamber which forms the fundamental component of the device;
Figs. 3A and 3B are simplified electrical circuit diagrams to illustrate the operation of the device according to the invention; and
Figs. 4A and 4B show a modified electrical circuit diagram of an improved embodiment.

With reference to Fig. 1 initially, P indicates a well into which flow one or more sewage discharge pipes C. In the well P there are disposed two submerged pumps 1 and 3 for the elevation of the sewage from the well P

to a higher section of the drainage installation which is not shown. L1, L2 and L3 indicate three control levels of the sewage. More specifically, L1 is the minimum level of the sewage below which it must not fall if the submerged pumps 1 and 3 are not to be uncovered. L2 is the level at which one of the pumps 1 and 3 must be started to initiate the emptying of the well P. If the capacity of the pump which has been started is greater than the capacity of the pipes C which discharge into the well, the level of the sewage is lowered until it again reaches the level L1, at which point the pump is switched off. Conversely, if the capacity of the started pump is lower than the capacity of the sewage entering from the pipes C, the level of the sewage in the well continues to rise even after the starting of the first pump until it reaches the level L3, at which level the second of the two pumps 1 and 3 is also started to provide a capacity greater than the total capacity of the pipes C which discharge into the well, and consequently a reduction of the level of the sewage to the minimum level L1 at which both pumps are switched off.

To control the pumps, a chamber 5, made from a flexible material, for example rubber or similar, with high strength and good sealing properties, is disposed inside the well P and is connected to a pipe 7 which represents a pressure transmission line leading from the interior of the chamber 5 to a pressure-operated switch, as will be described in greater detail in the following text. The chamber 5 is illustrated in particular in Fig. 2. It has an annular rim 7 which surrounds an aperture 9 and which is gripped between a first flange 11 and a second flange 13 by means of screw members 15 and 17. One or more of the screw members 15, 17 may have a ring 19 to enable the chamber to be anchored at a predetermined level in the well P. The flange 13 has a tubular joint 21 for connection to the flexible tube which connects the interior 5A of the chamber 5 to the pressure-operated switch.

In the embodiment illustrated in the attached drawing, the flange 11 has a mechanical system for protecting the chamber 5 consisting of a single pair of intersecting metal strips 23 and 25 which form a kind of cage. The structure formed by the strips 23 and 25 is sufficiently open not to be blocked by any detritus which may be present in the sewage, which might adversely affect the operation of the chamber. A further ring 27 is welded at the area of intersection of the strips 23 and 25 and is used, together with the upper ring 19, to maintain the chamber at a predetermined position inside the well P.

The system consisting of the tube 7 and the flexible chamber 5 is a closed system which contains a fluid, for example air, whose pressure is directly proportional to the head of liquid above the chamber 5, and therefore to the level which the sewage reaches in the well P. The pressure inside the chamber 5 and in the pipe 7 is detected by a pressure-operated switch indicated schematically by 30 in Fig. 3A. This pressure-operated switch has three trigger levels indicated schematically by 30A, 30B, and 30C. The three trigger levels may be set so that the first contact is closed when the pressure inside the chamber 5 reaches the value corresponding to a level L1 of the sewage in the well P. The next levels 30B and 30C are set so that they correspond to the higher pressure when the head of liquid in the well P reaches levels L2 and L3 respectively.

As shown in Fig. 3A, the pipe 7 is also connected to a pressure gauge 31 which permits direct reading of the pressure and consequently reading of the level of the sewage in the well P. The electrical instruments comprising the pressure gauge 31 and the pressure-operated switch 30 are housed, for example, inside an electrical control panel 33 disposed outside the well in an area easily accessible to the maintenance and control personnel of the installation.

Fig. 3B shows the electrical circuit of the bistable starting and stopping device for the pumps 1 and 3, controlled by the three trigger levels 30A, 30B and 30C of the pressure-operated switch 30. The circuit in Fig. 3B is of a type known in itself. The circuit in Fig. 3B will therefore be described only very briefly since it is known to experts in the field. B1 and B3 indicate the coils of relays controlling the starting of the pumps 1 and 3 respectively. R1 and R3 are lamps indicating the operating condition of pumps 1 and 3 respectively, while V1 and V3 are lamps indicating the idle condition of the pumps.

35 and 37 indicate manual switches which enable each of the two pumps to be switched to a manual starting position (position shown by M), to a stop position (shown by the letter S), and to an automatic operation position indicated by A, in which the command for starting and stopping the pumps is obtained through the pressure-operated switch 30 and a bistable control device indicated by 39. By using the device 39 it is possible, by a method known in itself, each time the pressure-operated switch 30 is triggered, always to start up whichever pump was not started in the preceding cycle, in order to permit alternating operation of first the one and then the other pump, thus reducing the operating cycles of the pumps. 40A, 40B and 40C indicate the three contacts which are opened or closed by the pressure-operated switch 30 and which correspond to the three trigger levels of the pressure-operated switch indicated by 30A, 30B and 30C in Fig. 3A.

BIS indicates the coil of the relay controlling the movable element of the bistable device 39. I1 and I3 indicate various switches whose opening or closing is controlled by the relays connected with the pumps 1 and 3 respectively. The switches I1, I3 of the bistable device 39 and the switches I1, I3 of the lamps R1 and R3 are switches of the normally open type, as shown by the standard symbols used in the diagram, and are closed by the corresponding relays, which in turn are controlled by the pressure-operated switch. The switches I1, I3 of the coil BIS of the relay of the bistable device 39 and the switches of the lamps V1 and V3 are of the normally closed type, and are opened by the corresponding re-

lays.

When the pressure-operated switch 30 detects a pressure in the chamber 5 below that corresponding to the level L1, the contact 40A remains open and the pumps are both switched off. Conversely, when the level of the liquid rises above the level L1, the pressure-operated switch closes the contact 40A, and if the level L2 is also reached the pressure-operated switch 30 also closes the contact 40B. According to the state of the bistable device 39 at that instant, the closing of the contact 40B causes either pump 1 or pump 3 to start. If the starting of the pump leads to a reduction in the level of the liquid, the subsequent reaching of the level L1 causes the contact 40B to open and consequently causes the pump to be switched off and the bistable device to be switched to its second state, so that the next starting command will start the pump which did not operate in the preceding cycle. If the starting of a single pump is insufficient to reduce the level of the sewage, and the latter reaches the level L3, the pressure-operated switch also causes the contact 40C to close and consequently causes the second pump to start.

Figs. 4A and 4B show an improved embodiment of the invention, which enables the following further objects, in particular, to be achieved:

- automatic periodic removal of the detritus formed during operation from the well;
- periodic resetting of the internal pressure level in the flexible chamber, to compensate for possible leaks over a period of time.

Elements identical to or corresponding to those in the solution illustrated in Figs. 3A and 3B are indicated by the same reference numbers.

In this embodiment, the pipe 7 has a branch pipe 7A which leads to a second pressure-operated switch P5, set at a pressure value as required for the fluid (air) inside the chamber 5; through a branch 7B of the pipe 7A and through a solenoid valve EL5, a compressor C5 or any source of pressurised fluid may be put into communication with the closed space 5, 7, for the resetting of the pressure in the chamber 5, where the pressure may gradually decrease as a result of various leaks. GR indicates the resetting unit comprising the components P5, EL5 and C5.

In this embodiment, the trigger level 30A of the pressure-operated switch 30 takes the form of a branching contact 40A for connection to the line LOR of a clock OR; this clock OR makes a contact for a short time (for example 10-20 minutes) once in every twenty-four hours or equivalent period. In the said line LOR, in series with the clock and in parallel with each other, there are disposed a timer T1 (set for a short period), a relay RL1 whose contacts are connected to the device 39, the control unit of the compressor C5 (if this is the source of fluid for 5) and the solenoid valve EL5 of the unit GR; the relay RL1 is in series with a contact of the timer T1 and the components C5 and EL5 are in series with the contact controlled by the pressure-operated switch P5 to open the solenoid valve EL5 and activate the compressor C5 when the pressure in 5 decreases below a predetermined trigger level, with a consequent reduction of the volume of the flexible chamber 5. The contact 40A of the pressure-operated switch 30 is also used to drive the time clock OR which constitutes a time switch.

When the pressure-operated switch 30 detects a pressure in the chamber 5 below that corresponding to the level L1, the branching contact 40A is switched to the line LOR and the pumps are both switched off. Conversely, when the level of the liquid rises above the level L1, the pressure-operated switch 30 closes the contact 40B, and if the level L2 is also reached the pressure-operated switch 30 also closes the contact 40C. According to the state of the bistable 39 at that instant, the closing of the contact 40B causes pump 1 or pump 3 to start. If the starting of the pump leads to a reduction in the level of the liquid, the subsequent reaching of the level L1 causes the contact 40B to open and consequently causes the pump to be switched off and the bistable device to be switched to its second state, so that the next starting command will start whichever pump did not operate in the preceding cycle. If the starting of a single pump is insufficient to reduce the level of the sewage, and the latter reaches the level L3, the pressure-operated switch also causes the contact 40C to close and consequently causes the second pump to start.

Periodically, when the clock OR makes the contact (for example, for a quarter of an hour once every 24 hours) the branching contact 40A switched to the line LOR allows current to the group T1, RL1, C5, EL5, that is the group GR to activate the operation of the pump, or preferably pumps, 1 and 3 to rapidly lower the level of the sewage in the well P to the level L0; in this way the pumps also remove the detritus - mostly floating detritus - which has accumulated in the well during operation, and send it to the section to which the pumps are intended to elevate the whole of the sewage. In this way, periodic, although partial, cleaning is obtained, which at least reduces or even eliminates the necessity of manual maintenance. This operation must be carried out in a short period, namely within the short interval established by T1, to prevent overheating of the pumps which will be uncovered.

At the time of the activation of the pump or pumps for discharge to the minimum emptying level L0, it is possible to reset the pressure in the flexible chamber 5 under the control of the second pressure-operated switch P5 by opening the solenoid valve EL5 to enable sufficient fluid to enter the closed space 5, 7, 7A to reset the pressure in the chamber 5, for the correct operation of the chamber. In this way the necessity of checks which would otherwise be required to ensure the operation of the device is avoided, or at least the frequency of such checks is reduced.

In this embodiment, the period of activation of the

pumps with the sewage below the level L1 is limited by the timer T1. However, a situation may still occur in which the pumps operate for a certain time with the sewage at the level of the intake aperture, with a consequent intake of air. In order to avoid this problem, it is possible to replace the timer T1 with a device which switches off the pumps as soon as they begin to take in air. This may be done, for example, with a microprocessor which checks the power absorbed by the motors driving the pumps 1 and 3. When the sewage level falls sufficiently to uncover the intake apertures, the pumps begin to take in air, with a consequent abrupt decrease in the absorbed power. This decrease, detected by the microprocessor, may be used as the signal for switching off the pumps in time.

Claims

1. Device for the control of elevating pumps in a drainage installation, including a pressure-operated switch (30) which generates a control signal for the elevating pump(s) (1, 3) according to the level of the liquid in the installation, and a sealed flexible chamber (5) containing a fluid and intended to be arranged below the level of the liquid to be elevated, characterized by a pressure transmission pipe (7) connecting said sealed flexible chamber (5) to said pressure-operated switch (30) which is located outside the drainage installation.

2. Device according to Claim 1 characterized in that the pressure-operated switch (30) has three trigger levels (30A, 30B, 30C) to control the starting and stopping of two elevating pumps (1, 3) according to the level (L_1-L_3) reached by the liquid.

3. Device according to Claim 2, characterized in that the pressure-operated switch is provided with a bistable control means (39) which enables the said pumps to be started alternately.

4. Device according to one or more of the preceding claims, characterized in that the said chamber (5) is filled with air.

5. Device according to one or more of the preceding claims, characterized in that the said chamber is provided with fastening means (19, 27) to fix the said chamber at a predetermined depth in the well in which the pumps are installed.

6. Device according to one or more of the preceding claims, characterized in that the said chamber (5) is disposed inside a rigid protecting strcture (23).

7. Device according to one or more of the preceding claims, characterized in that the said chamber is provided with a pressure gauge (31), from a reading of which it is possible to deduce the level of the liquid in the well in which the chamber is installed.

8. Device according to one or more of the preceding claims, characterized in that it also comprises means (OR, LOR) for periodically causing a more complete emptying (to level LO) of the pump well, and thus a periodic removal of the detritus formed in the said well.

9. Device according to Claim 8, characterized in that it also comprises a resetting unit (GR), connected to the interior of the flexible chamber, which is activated to reset the pressure inside the chamber, at the time of one of the periodic emptyings of the well, when such resetting is required.

10. Device according to Claim 8 or 9, characterized in that it comprises a branching contact (40A) moved cyclically by the pressure-operated switch (30) to allow current to a time switch or clock (OR) provided with means for causing the activation of at least one of the pumps (1, 3) for a periodic emptying of the well below a lower normal operating limit.

11. Device according to Claim 10, characterized in that it also comprises, in combination with the said clock, the said resetting unit, the latter comprising a compressor (C5) or equivalent, a further pressure-operated switch (P5) capable of reading the internal pressure of the flexible chamber (5) and a solenoid valve (EL5) for the early resetting of the internal pressure of the said chamber in the event of leaks of fluid from the said chamber, at the time of a cyclical emptying of the well.

12. Device according to claim 10, characterized in that the means which cause the activation of at least one of the pumps (1, 3) for the periodic emptying of the well comprise a relay (RL1) and a timer (T1).

13. Device according to Claim 10, characterized in that the means which cause the activation of at least one of the pumps (1, 3) for the periodic emptying of the well comprise a relay (RL1) and a control system which inactivates the pump (1, 3) when the sewage level reaches the intake apertures of the pumps.

Patentansprüche

1. Vorrichtung zur Steuerung von Hebepumpen in einer Entwässerungsanlage mit einem druckbetätigten Schalter (30), der ein Steuersignal für die Pumpe(n) (1, 3) in Übereinstimmung mit dem Flüssigkeitspegel in der Anlage erzeugt, und einer dichten, flexiblen Kammer (5), die ein Fluid enthält und

die unterhalb des Pegels der anzuhebenden Flüssigkeit angeordnet sein soll, **gekennzeichnet** durch ein Druckübertragungsrohr (7), welches die dichte, flexible Kammer (5) mit dem druckbetätigten Schalter (30) verbindet, der außerhalb der Entwässerungsanlage liegt.

2. Vorrichtung nach Anspruch 1, dadurch **gekennzeichnet**, daß der druckbetätigte Schalter (30) drei Triggerpegel (30A, 30B, 30C) hat, um das Starten und Stoppen von zwei Pumpen (1, 3) gemäß dem von der Flüssigkeit erreichten Pegel (L_1-L_3) zu steuern.

3. Vorrichtung nach Anspruch 2, dadurch **gekennzeichnet**, daß der druckbetätigte Schalter mit bistabilen Steuermitteln (39) versehen ist, die ein abwechselndes Starten der Pumpen ermöglichen.

4. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, dadurch **gekennzeichnet**, daß die Kammer (5) mit Luft gefüllt ist.

5. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, dadurch **gekennzeichnet**, daß die Kammer mit Befestigungsmitteln (19, 27) versehen ist, um die Kammer in einer vorbestimmten Tiefe der Wanne, in welcher die Pumpen installiert sind, zu befestigen.

6. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, dadurch **gekennzeichnet**, daß die Kammer (5) innerhalb eines starren Schutzaufbaus (23) angeordnet ist.

7. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, dadurch **gekennzeichnet**, daß die Kammer mit einem Druckmeßinstrument (31) versehen ist, durch dessen Ablesen es möglich ist, den Pegel der Flüssigkeit in der Wanne, in welcher die Kammer installiert ist, zu bestimmen.

8. Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche, dadurch **gekennzeichnet**, daß weiterhin Mittel (OR, LOR) vorgesehen sind, die periodisch ein vollständigeres Leeren (bis zum Pegel LO) der Pumpenwanne und damit ein periodisches Entfernen der in der Wanne gebildeten Ablagen bewirken.

9. Vorrichtung gemäß Anspruch 8, dadurch **gekennzeichnet**, daß weiterhin eine Rückstelleinheit (GR) vorgesehen ist, die mit dem Inneren der flexiblen Kammer verbunden ist, die aktiviert wird, um den Druck innerhalb der Kammer bei einem der periodischen Leervorgänge der Wanne rückzustellen, wenn ein derartiges Rückstellen erforderlich ist.

10. Vorrichtung nach Anspruch 8 oder 9, dadurch **gekennzeichnet**, daß ein Verzweigungskontakt (40A) vorgesehen ist, der durch den druckbetätigten Schalter (30) zyklisch bewegt wird, um zu erlauben, daß in einem Zeitschalter oder Taktgeber (OR) Strom fließt, der mit Mitteln versehen ist, die die Aktivierung wenigstens einer der Pumpen (1, 3) bewirken, um die Wanne unter eine niedrigere normale Betriebsgrenze zu leeren.

11. Vorrichtung nach Anspruch 10, dadurch **gekennzeichnet**, daß weiterhin in Kombination mit dem Taktgeber die besagte Rückstelleinheit vorgesehen ist, wobei die letztere einen Kompressor (C5) oder ein Äquivalent aufweist, ein weiterer druckbetätigter Schalter (P5), der den Innendruck der flexiblen Kammer (5) lesen kann, und ein Solenoidventil (EL5) zum frühen Rückstellen des Innendrucks der Kammer für den Fall, daß bei einem zyklischen Leeren der Wanne aus der Kammer Fluid leckt.

12. Vorrichtung nach Anspruch 10, dadurch **gekennzeichnet**, daß die Mittel, welche die Aktivierung wenigstens einer der Pumpen (1, 3) zum periodischen Leeren der Wanne bewirken, ein Relais (RL1) und einen Zeitgeber (T1) aufweisen.

13. Vorrichtung nach Anspruch 10, dadurch **gekennzeichnet**, daß die Mittel, welche die Aktivierung wenigstens einer der Pumpen (1, 3) zum periodischen Leeren der Wanne bewirken, ein Relais (RL1) und ein Steuersystem aufweisen, das die Pumpe (1, 3) inaktiviert, wenn der Abwasserpegel die Eingangsöffnungen der Pumpe erreicht.

Revendications

1. Dispositif pour commander des pompes élévatoires dans une installation de drainage, comportant un contacteur manométrique (30) qui produit un signal de commande pour la ou les pompes élévatrices (1, 3) en fonction du niveau du liquide présent dans l'installation, et une chambre souple étanche (5) contenant un fluide et destinée à être placée sous le niveau du liquide à élever, caractérisé par un tuyau (7) de transmission de pression reliant ladite chambre souple étanche (5) audit contacteur manométrique (30) qui est situé à l'extérieur de l'installation de drainage.

2. Dispositif selon la revendication 1, caractérisé en ce que le contacteur manométrique (30) a *trois* niveaux de déclenchement (30A, 30B, 30C) pour commander la mise en marche et l'arrêt de deux pompes élévatrices (1, 3) en fonction du niveau (L_1-L_3) atteint par le liquide.

3. Dispositif selon la revendication 2, caractérisé en ce que le contacteur manométrique est pourvu d'un moyen de commande bistable (39) qui permet auxdites pompes d'être mises en marche en alternance.

4. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite chambre (5) est remplie d'air.

5. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite chambre est pourvue de moyens de fixation (19, 27) pour fixer ladite chambre à une profondeur prédéterminée dans le puits dans lequel les pompes sont installée.

6. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite chambre (5) est disposée à l'intérieur d'une structure de protection rigide (23).

7. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite chambre est munie d'un manomètre (31), à partir d'une lecture duquel il est possible de déduire le niveau du liquide dans le puits dans lequel est installée la chambre.

8. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce qu'il comporte également des moyens (OR, LOR) pour provoquer périodiquement un vidage plus complet (jusqu'au niveau LO) du puits de la pompe, et donc une évacuation périodique des détritus formés dans ledit puits.

9. Dispositif selon la revendication 8, caractérisé en ce qu'il comporte aussi un système de remise à zéro (GR), relié à l'intérieur de la chambre souple, qui est mis en marche pour remettre à zéro la pression à l'intérieur de la chambre, au moment d'un des vidages périodiques du puits, lorsque cette remise à zéro est nécessaire.

10. Dispositif selon la revendication 8 ou 9, caractérisé en ce qu'il comporte un contact de dérivation (40A) pour laisser passer un courant vers une minuterie ou une horloge (OR) pourvue de moyens pour provoquer la mise en marche d'au moins une des pompes (1, 3) pour un vidage périodique du puits jusqu'au-dessous d'une limite inférieure normale de fonctionnement.

11. Dispositif selon la revendication 10, caractérisé en ce qu'il comporte également, en combinaison avec ladite horloge, ledit système de remise à zéro, ce dernier comportant un compresseur (C5) ou équivalent, un autre contacteur manométrique (P5) apte à lire la pression interne de la chambre souple (5) et une électro-vanne (EL5) pour lancer une prompte remise à zéro de la pression interne de ladite chambre en cas de fuites de fluide depuis ladite chambre, au moment d'un vidage cyclique du puits.

12. Dispositif selon la revendication 10, caractérisé en ce que les moyens qui provoquent la mise en marche d'au moins une des pompes (1, 3) pour le vidage périodique du puits comprennent un relais (RL1) et une minuterie (T1).

13. Dispositif selon la revendication 10, caractérisé en ce que les moyens qui provoquent la mise en marche d'au moins une des pompes (1, 3) pour le vidage périodique du puits comprennent un relais (RL1) et un système de commande qui met la pompe (1, 3) à l'arrêt lorsque le niveau de déchets atteint les ouvertures d'admission des pompes.

FIG. 1

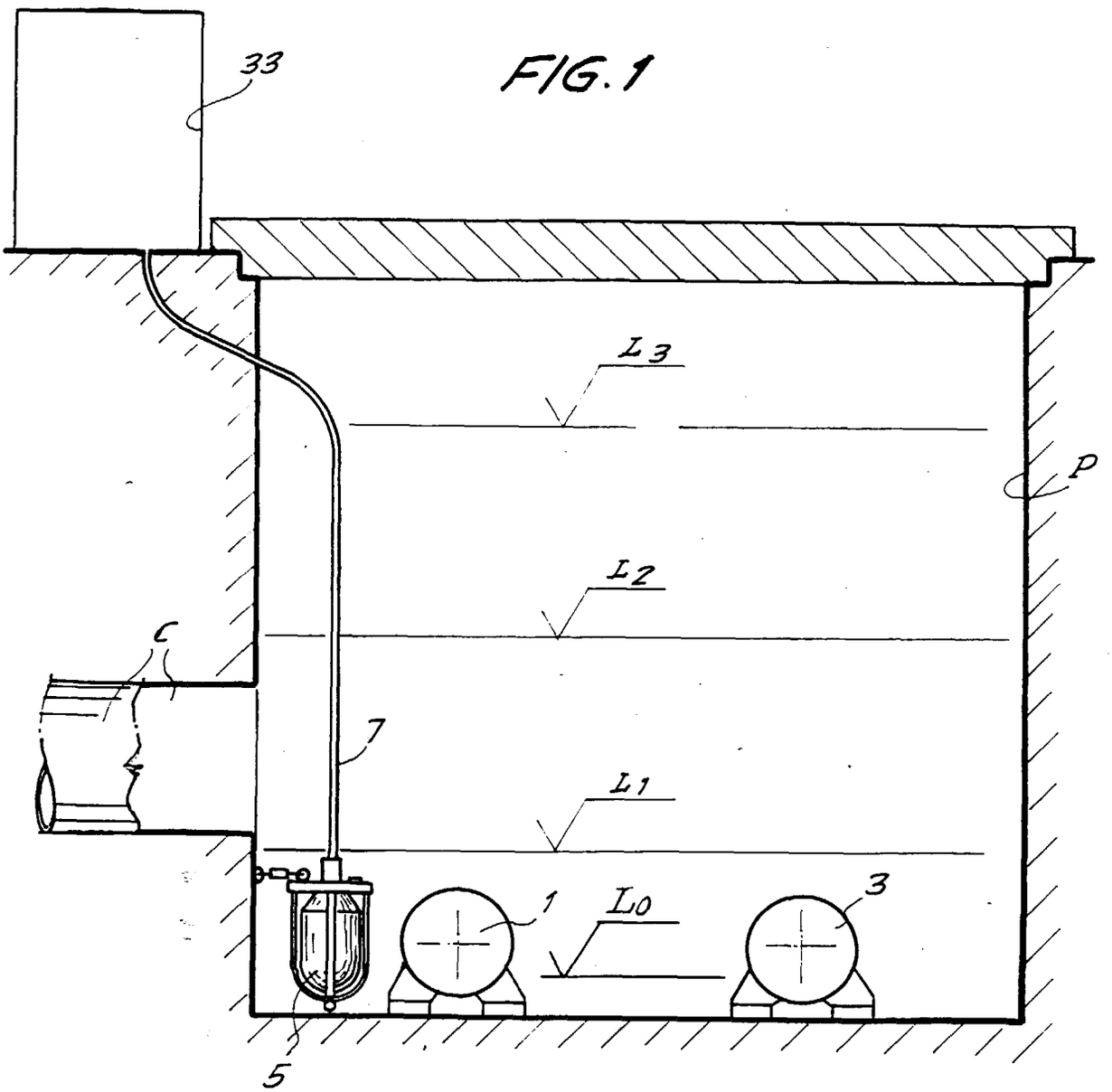
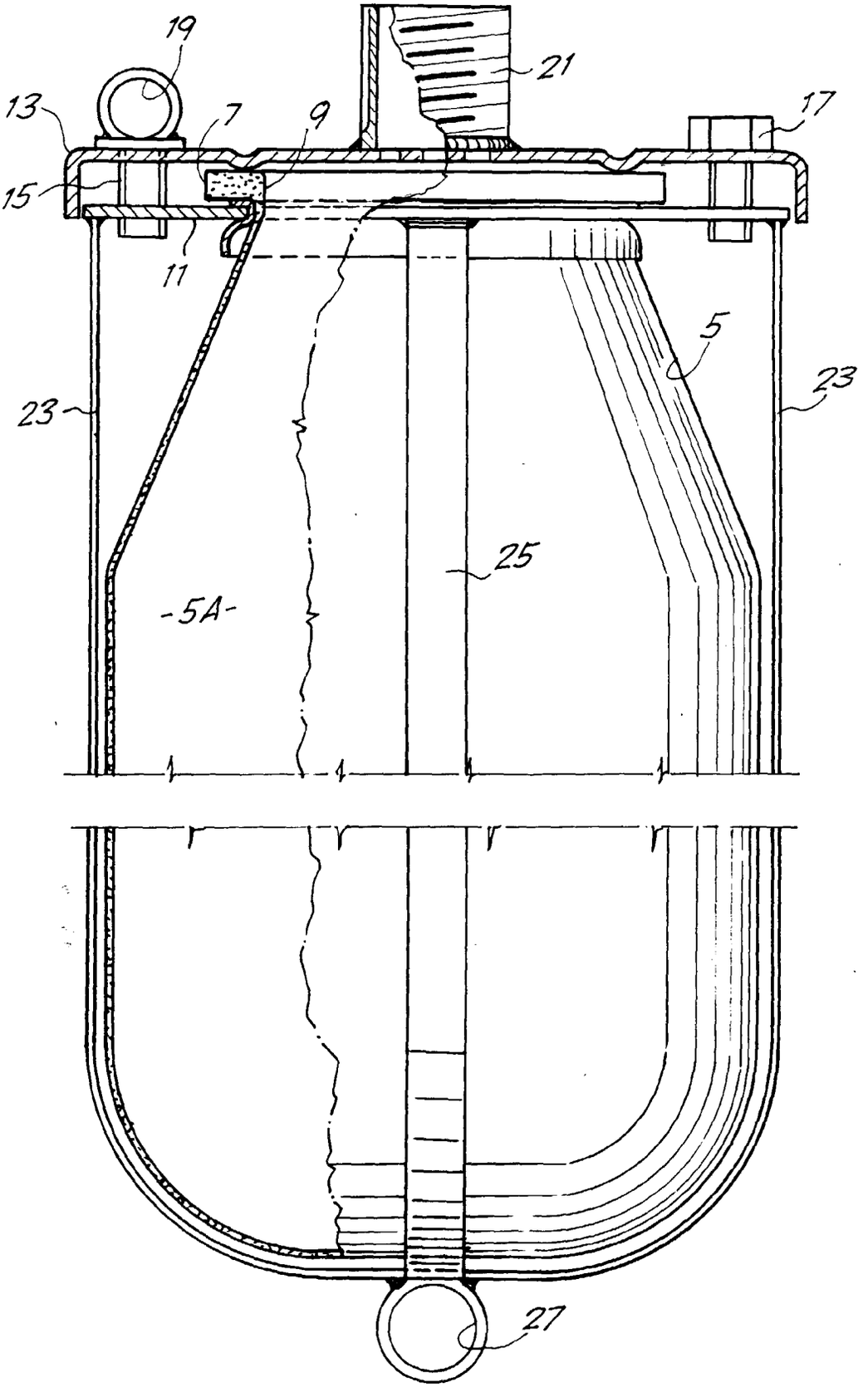


FIG. 2



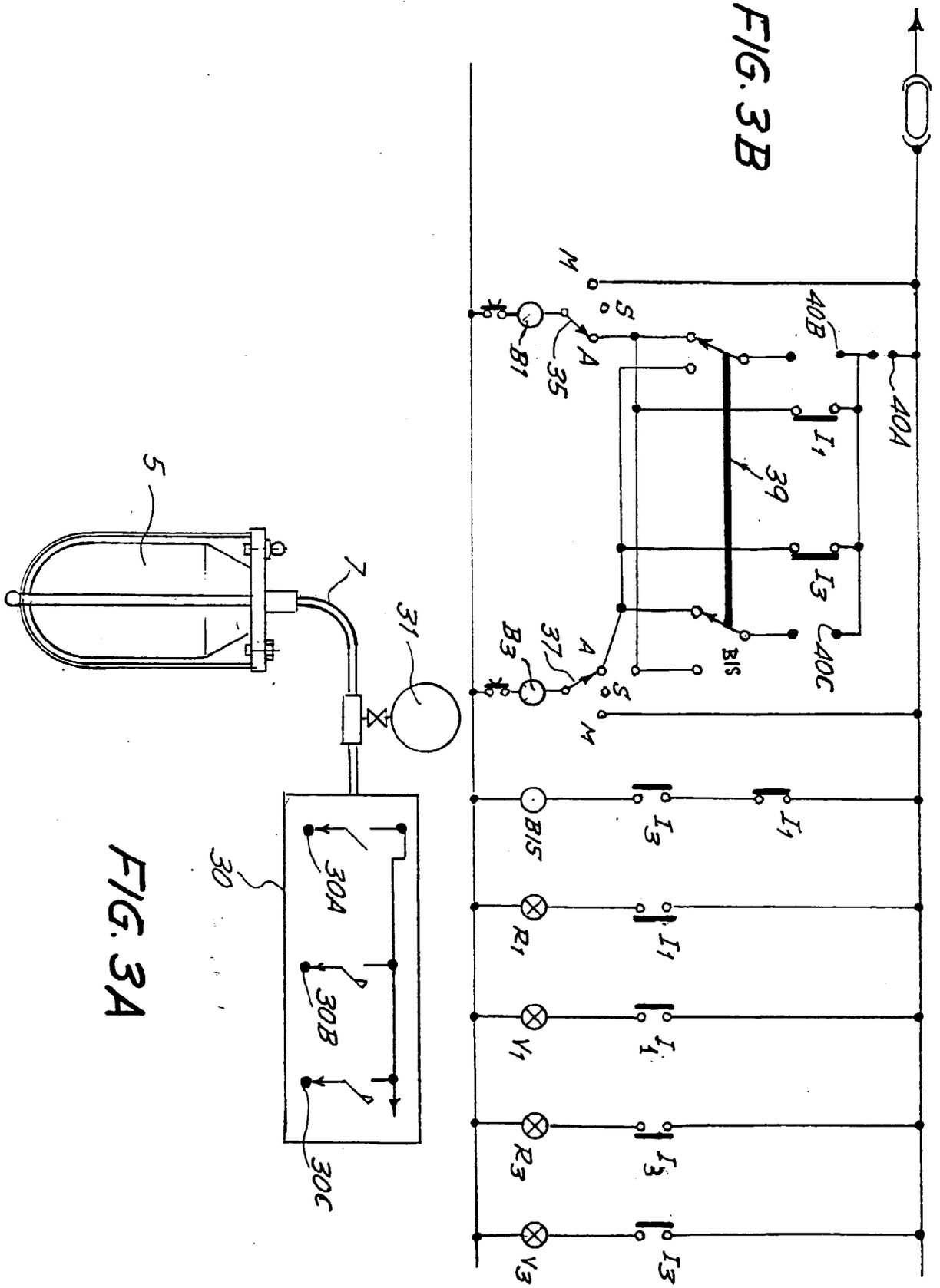

5
7
31
30
30A
30B
30C

FIG. 3A

N
S
B1
A
35
40B
40A
I1
39
I3
40C
B1S
37
B3
A
S
N
B1S
I3
I1
R1
V1
R3
V3

FIG. 3B

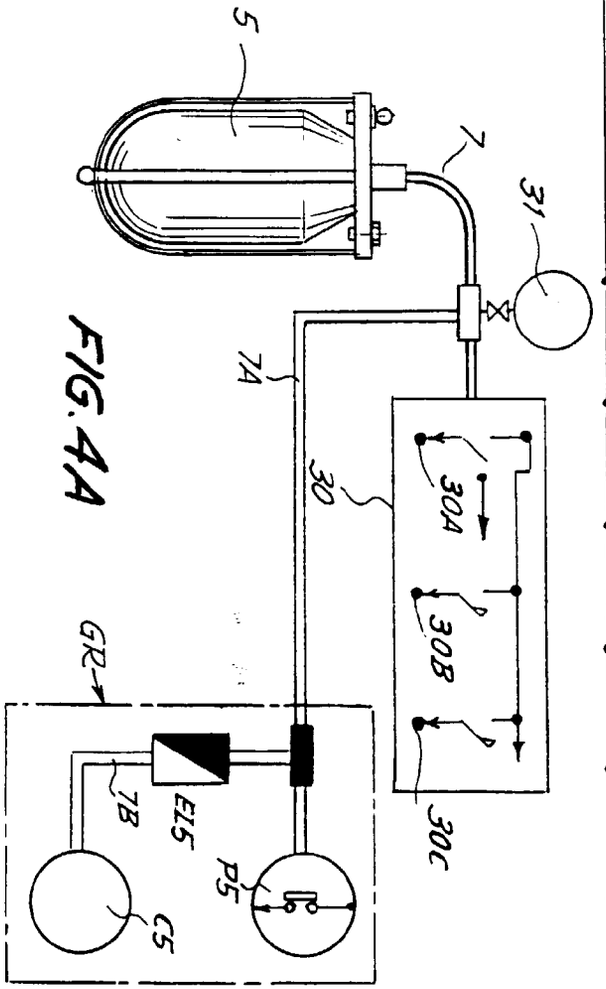

5
7
31
7A
30
30A
30B
30C
GR
7B
ELS
PS
GS

FIG. 4A

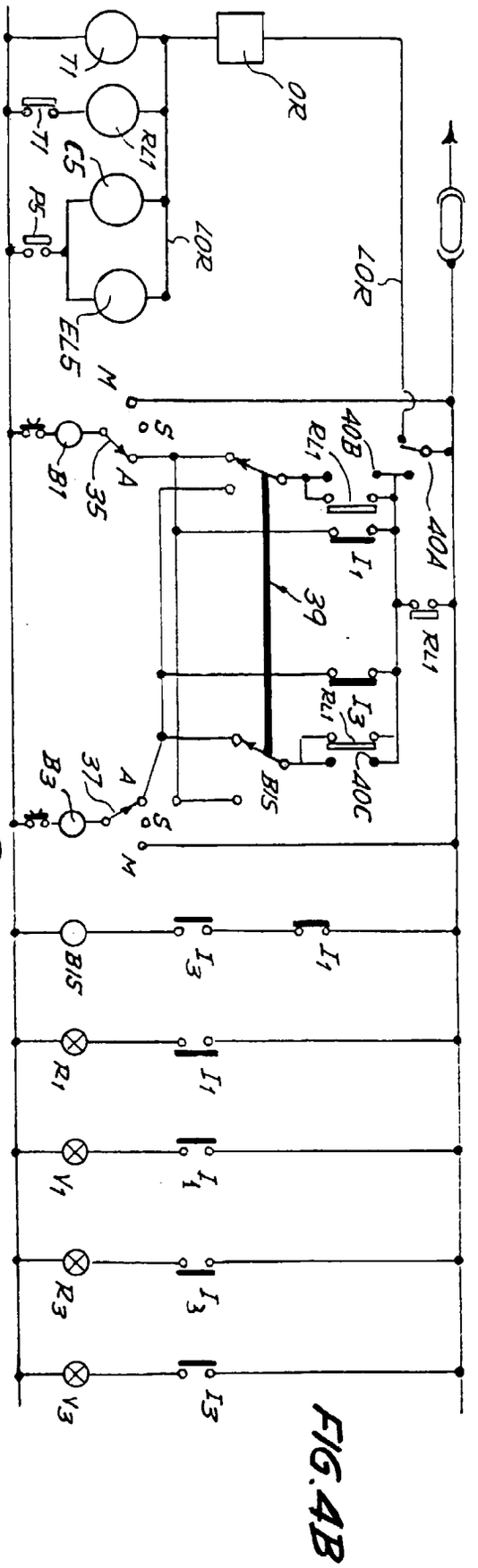

OR
T1
RL1
GS
RS
ELS
10R
N
S
B1
A
35
40B
40A
39
I1
I3
B3
37
B3S
RL1
V1
V3

FIG. 4B