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(54) **SECURITY DEVICE**

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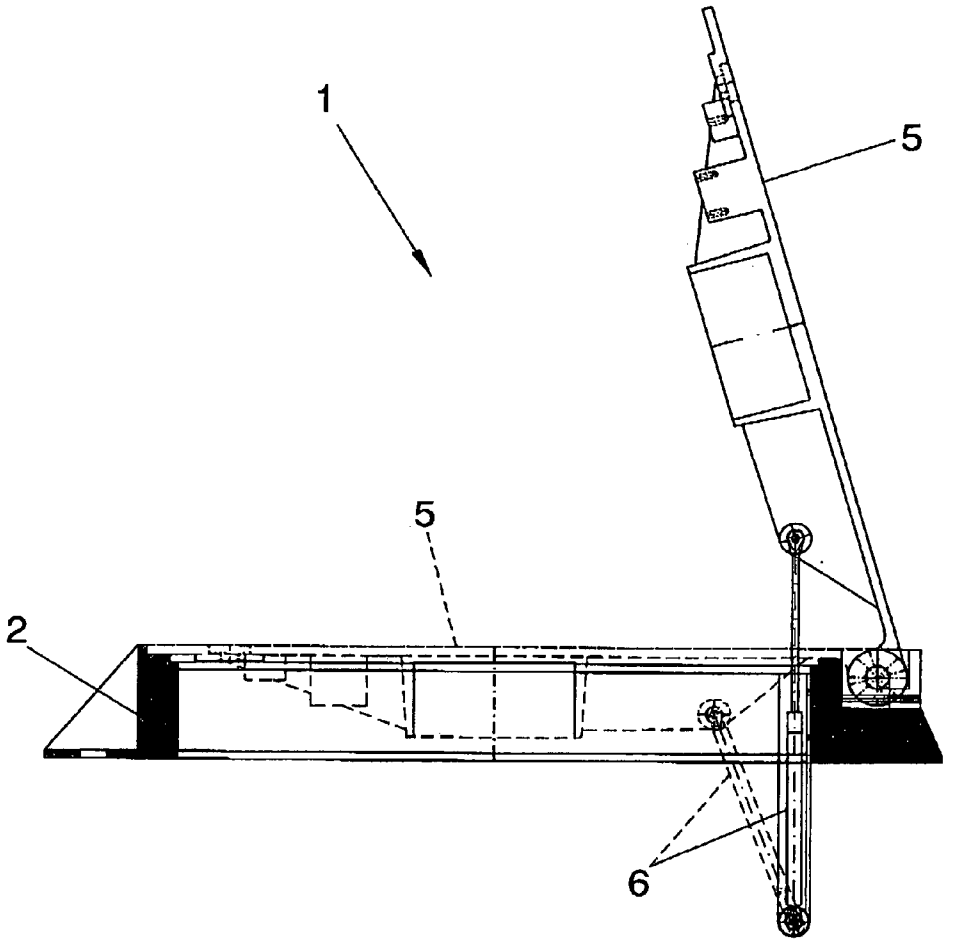
(57) **ABSTRACT**

The invention relates to a security manhole that is secured to the mouth of an underground pipe (**4**) including an edge (**2**) and a hinged cover (**5**) having rising cylinders (**6**), a peripheral sealing gasket (**30**) being provided for. The cover (**5**) includes an opening provided with a screw fixed lid (**8**), one of the screws compresses a first electrical contact (**9**) sending a warning signal to a control centre. Underneath the lid is provided a turning part (**10**) pulling in an angular fashion a closing handle (**14**) provided onto the edge. In the closed position, said handle (**14**) is located on top of the plate (**18**) integral with said edge (**5**), both having an access ramp providing automatic pre-closing. The closing position is provided through a second electrical contact (**19**). In the opening position, the closing handle (**14**) is retained by retention pawl (**15**) hinged to the edge (**2**). Release is provided through a screw (**21**) fixed to the cover (**5**) upon contact with said retention pawl (**15**).



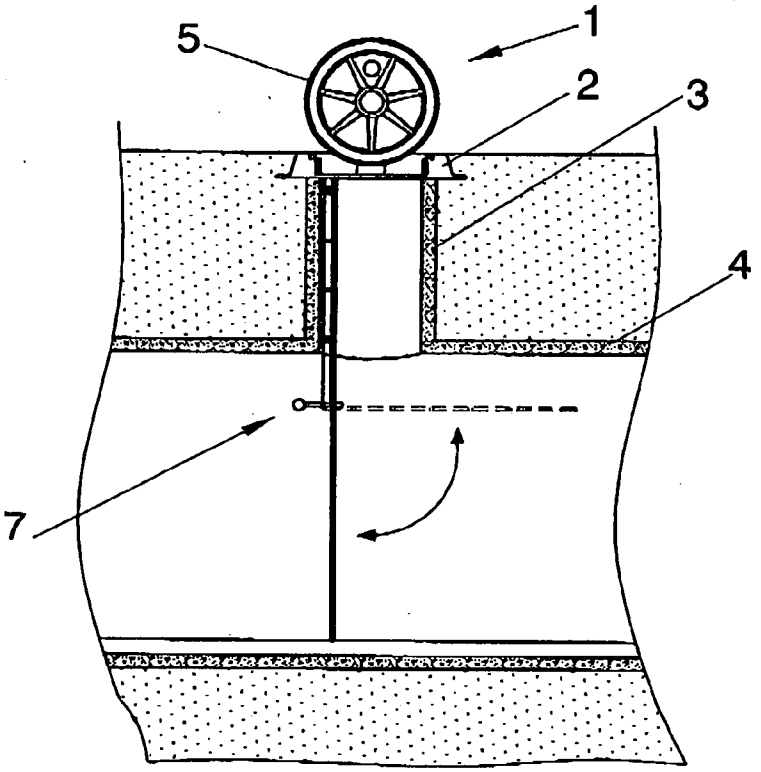


FIG. 1a

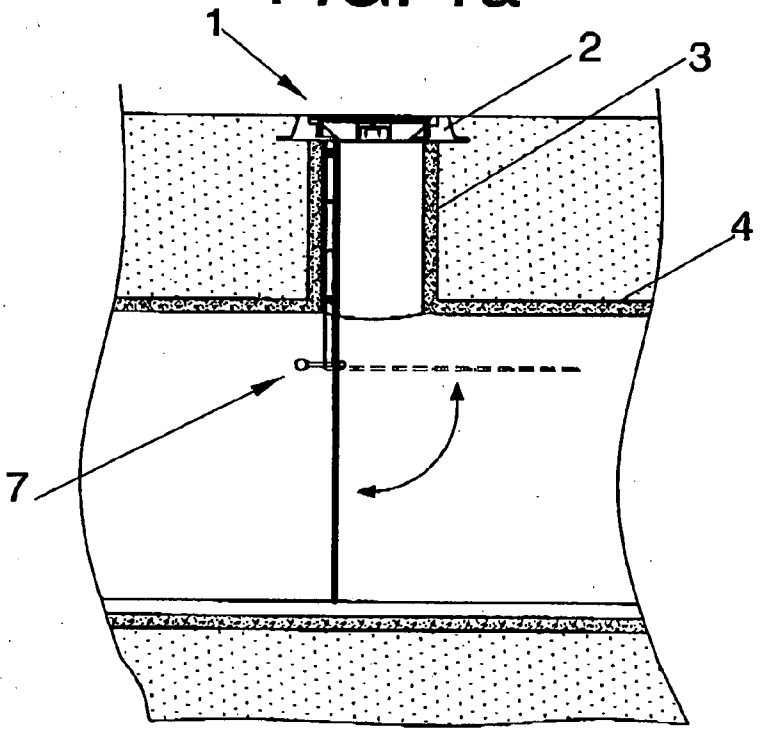


FIG. 1b

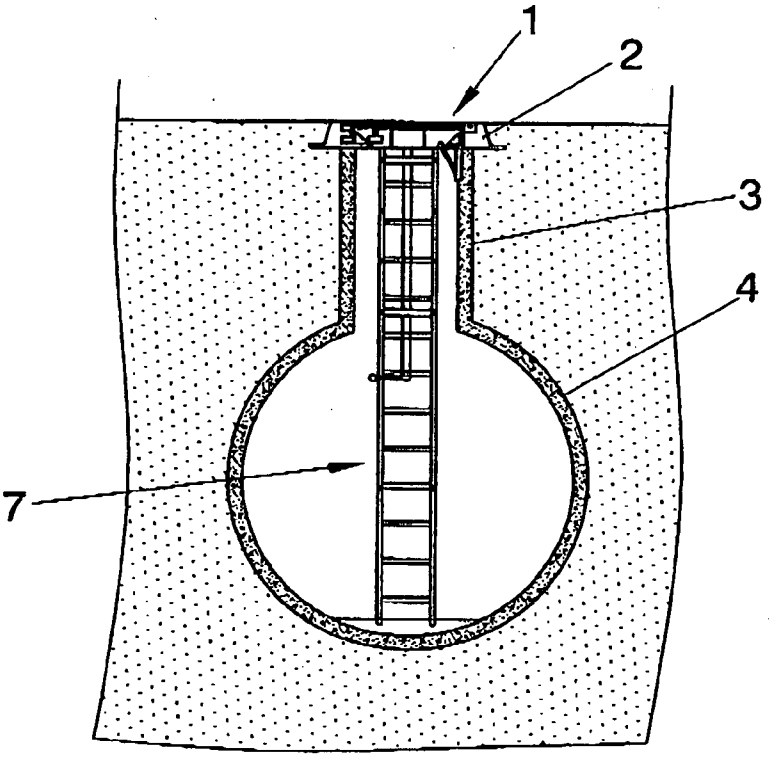


FIG. 2a

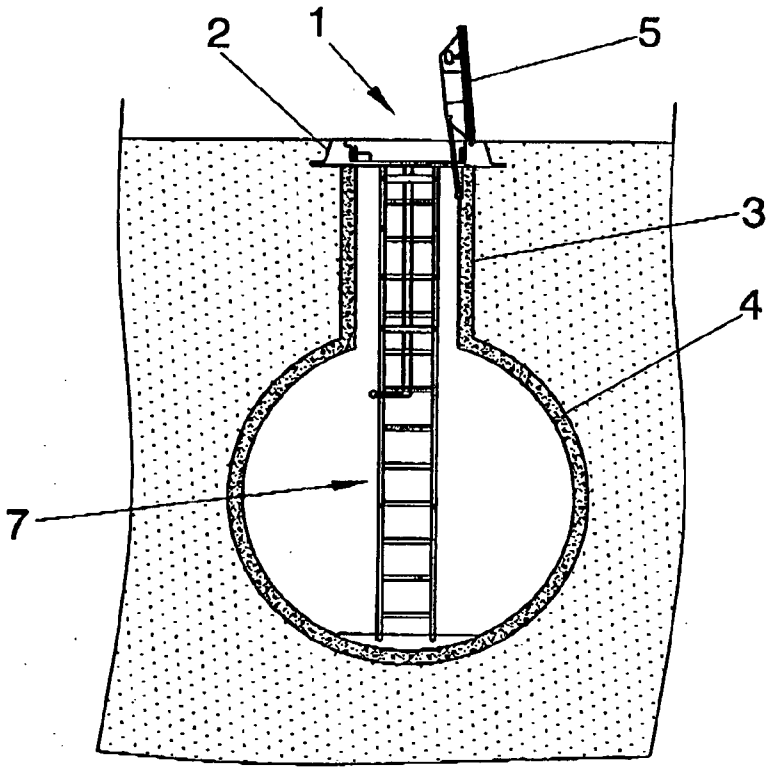


FIG. 2b

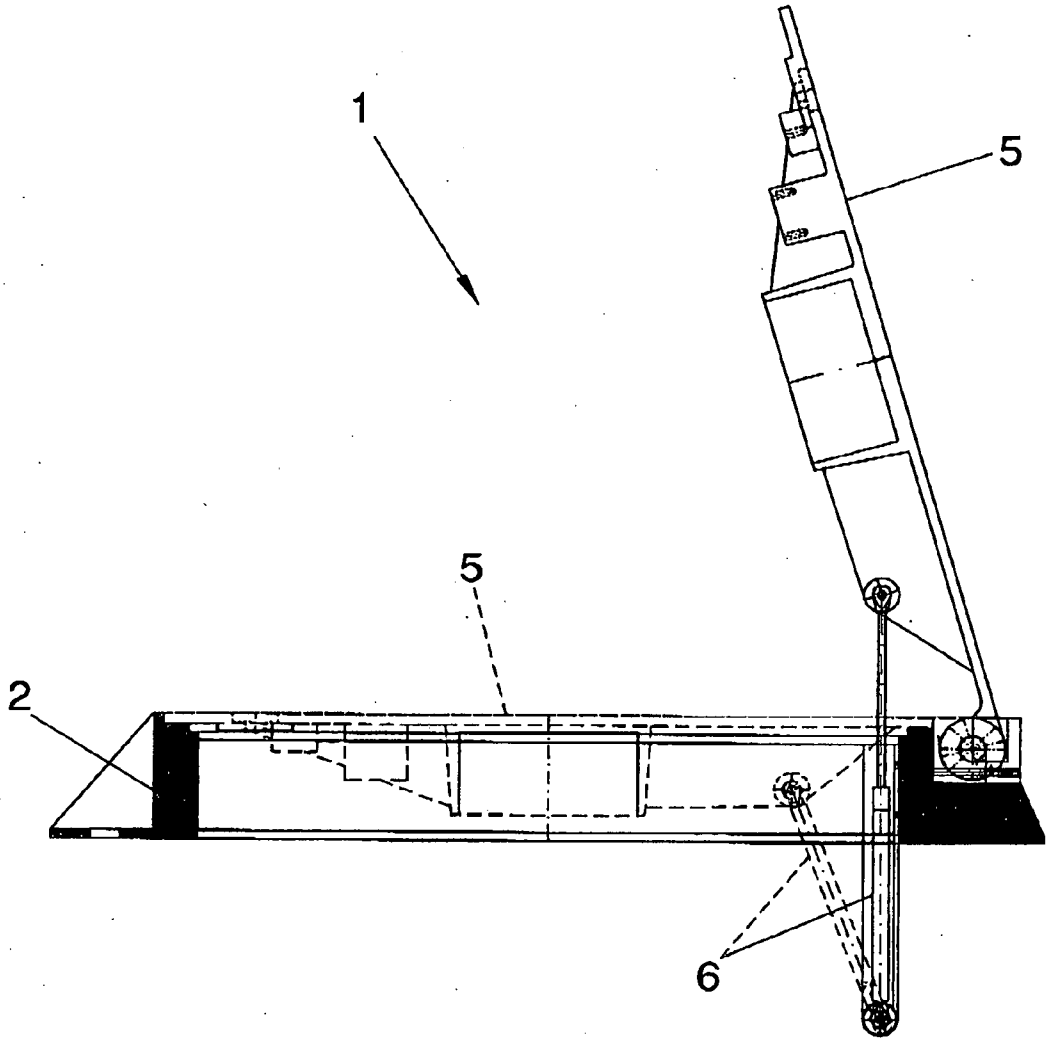


FIG. 3

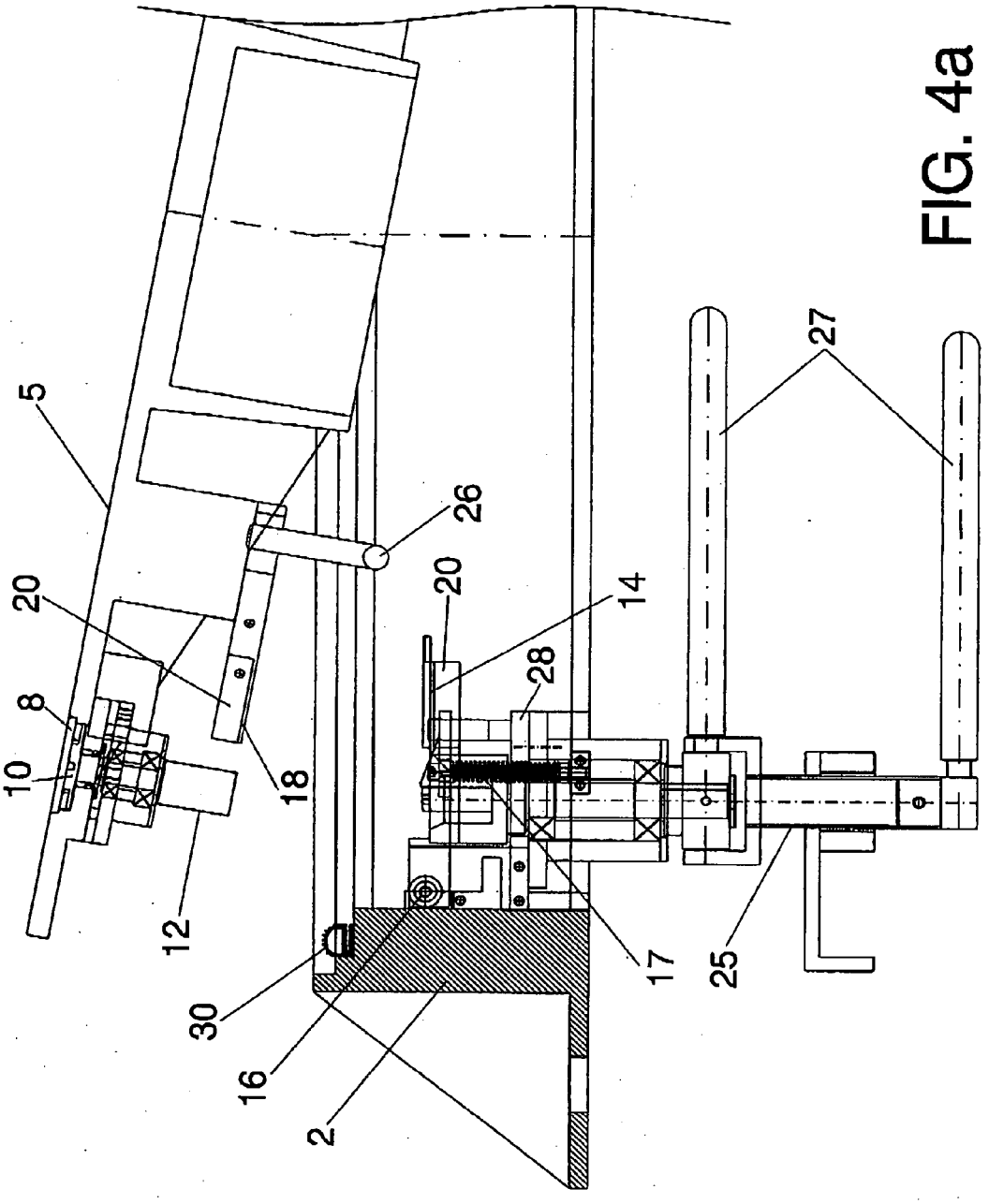


FIG. 4a

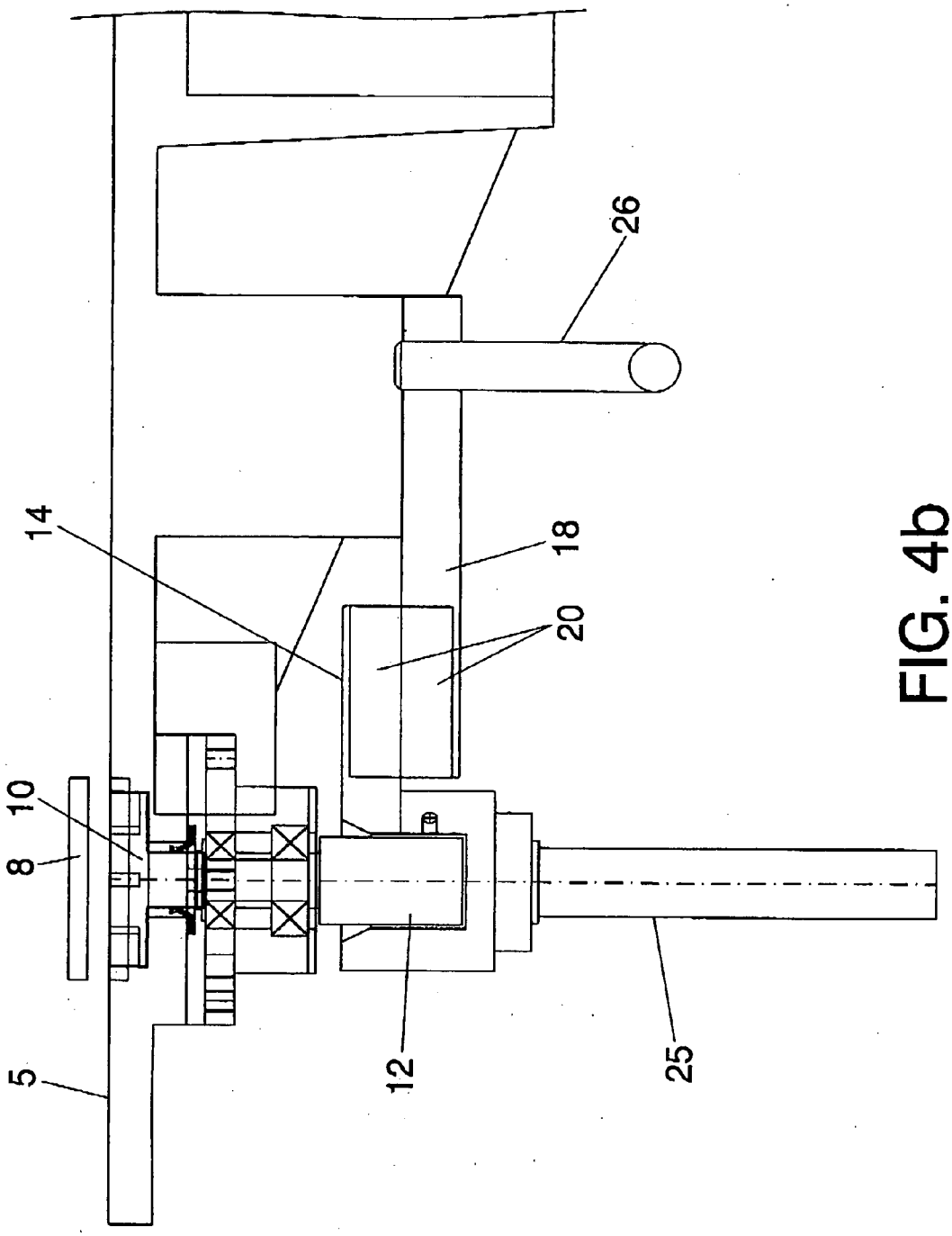


FIG. 4b

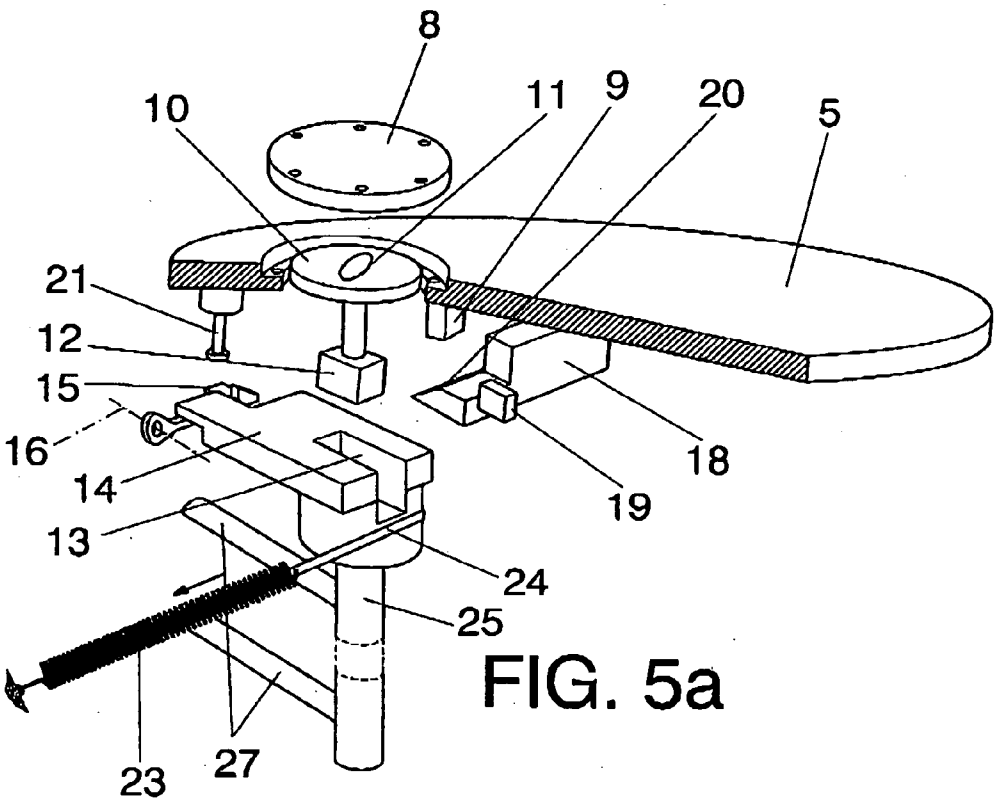

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FIG. 5a

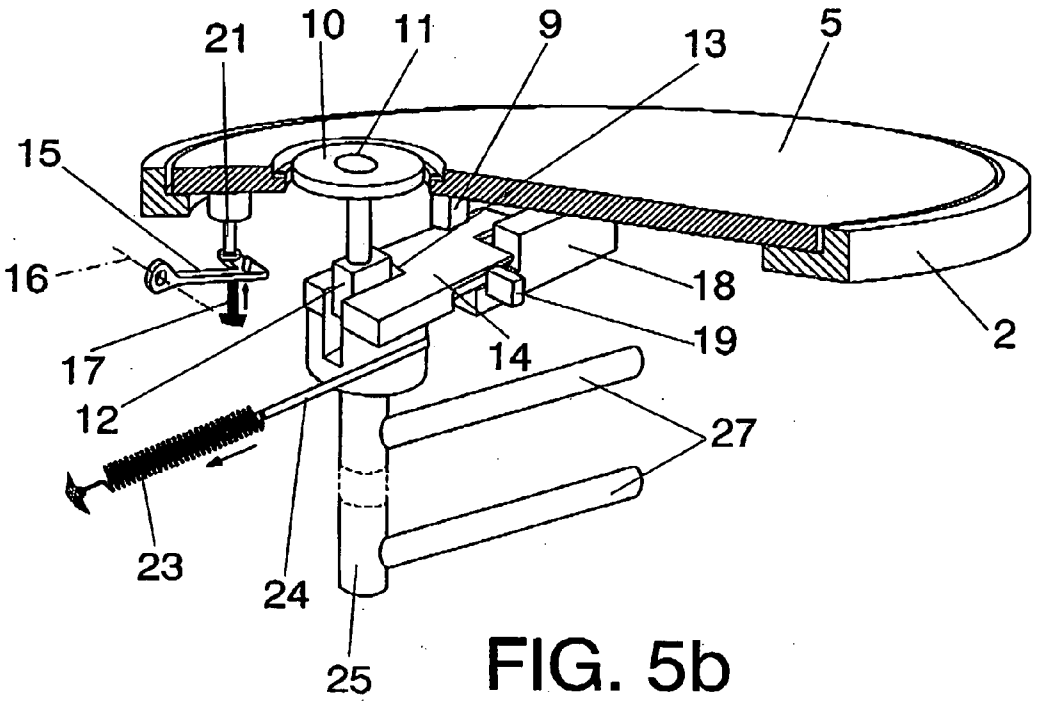
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FIG. 5b

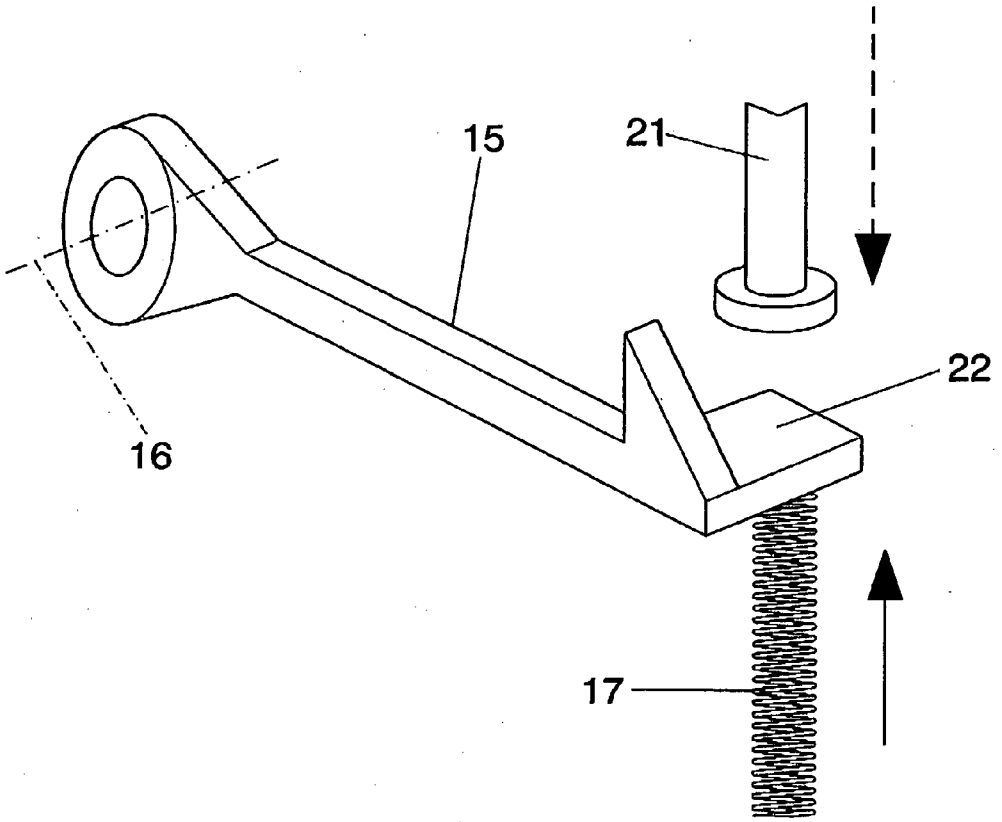

FIG. 6

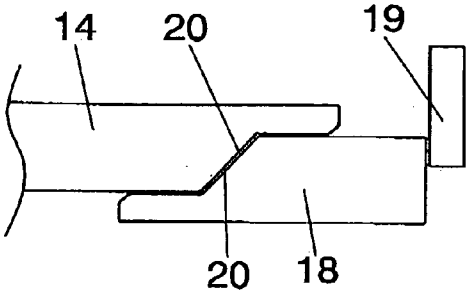

FIG. 7A

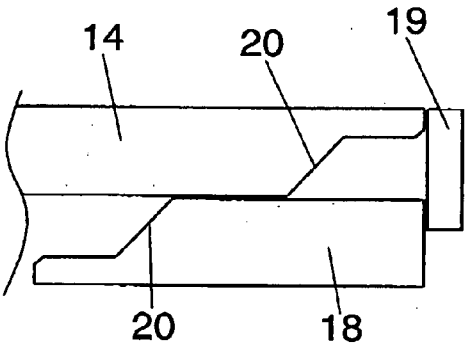

FIG. 7B

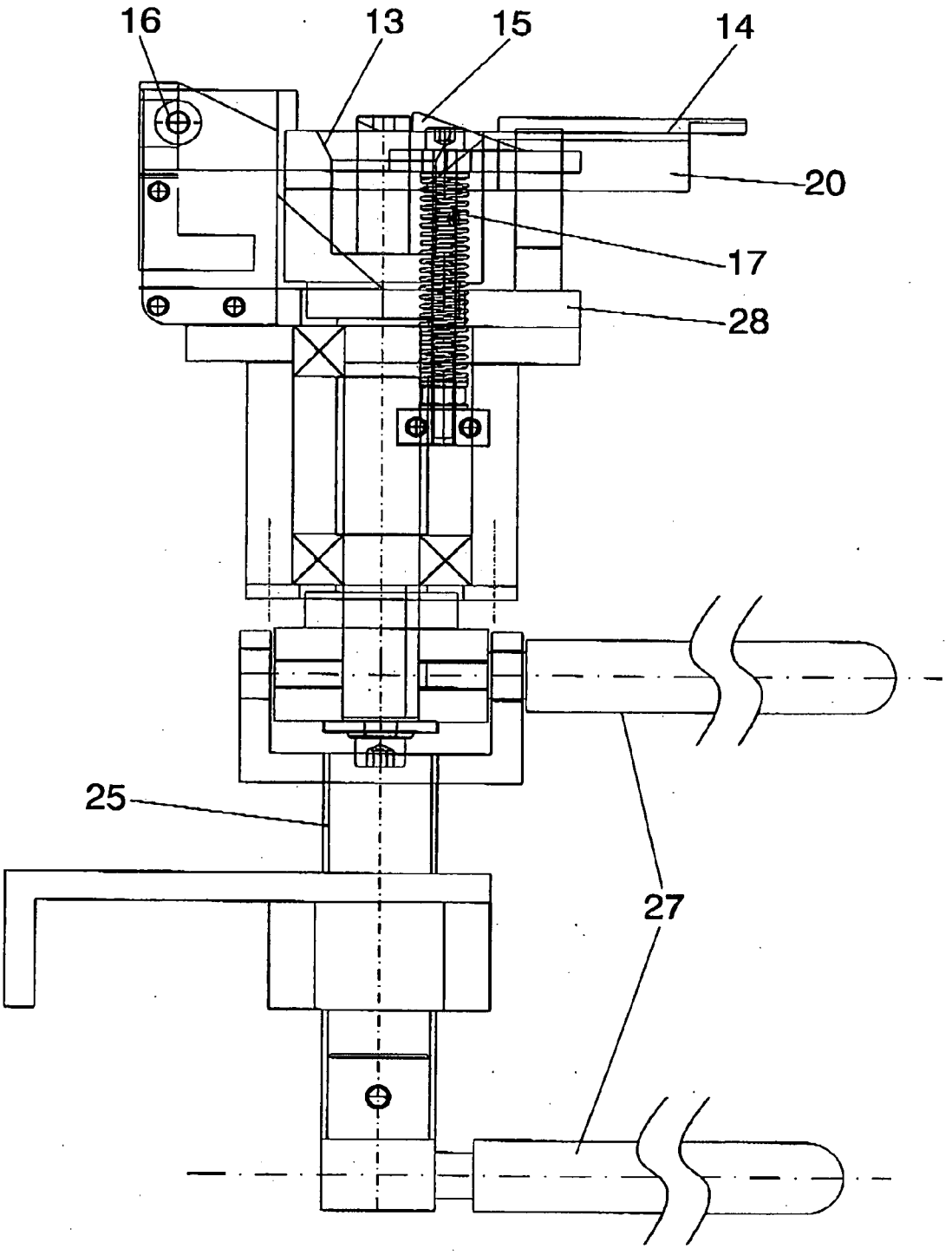

FIG. 8

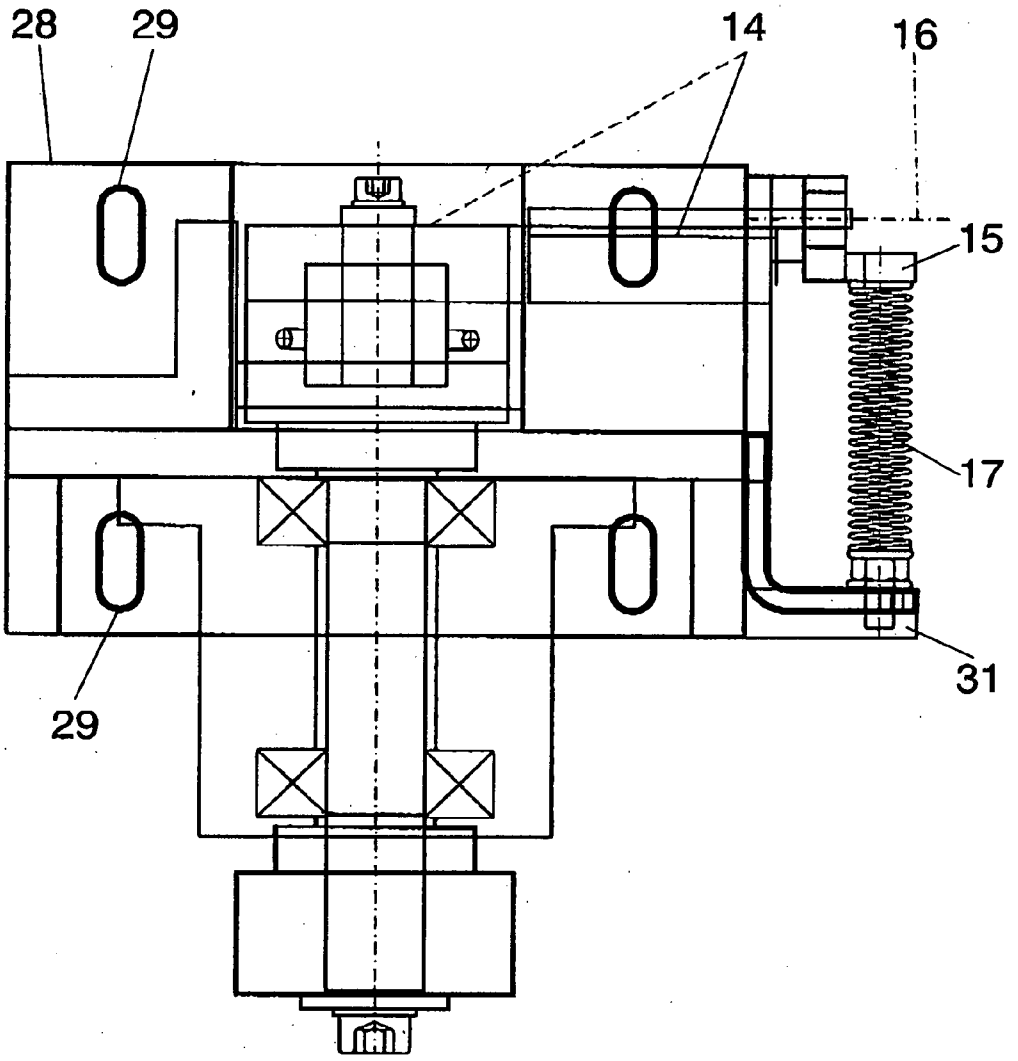

FIG. 9

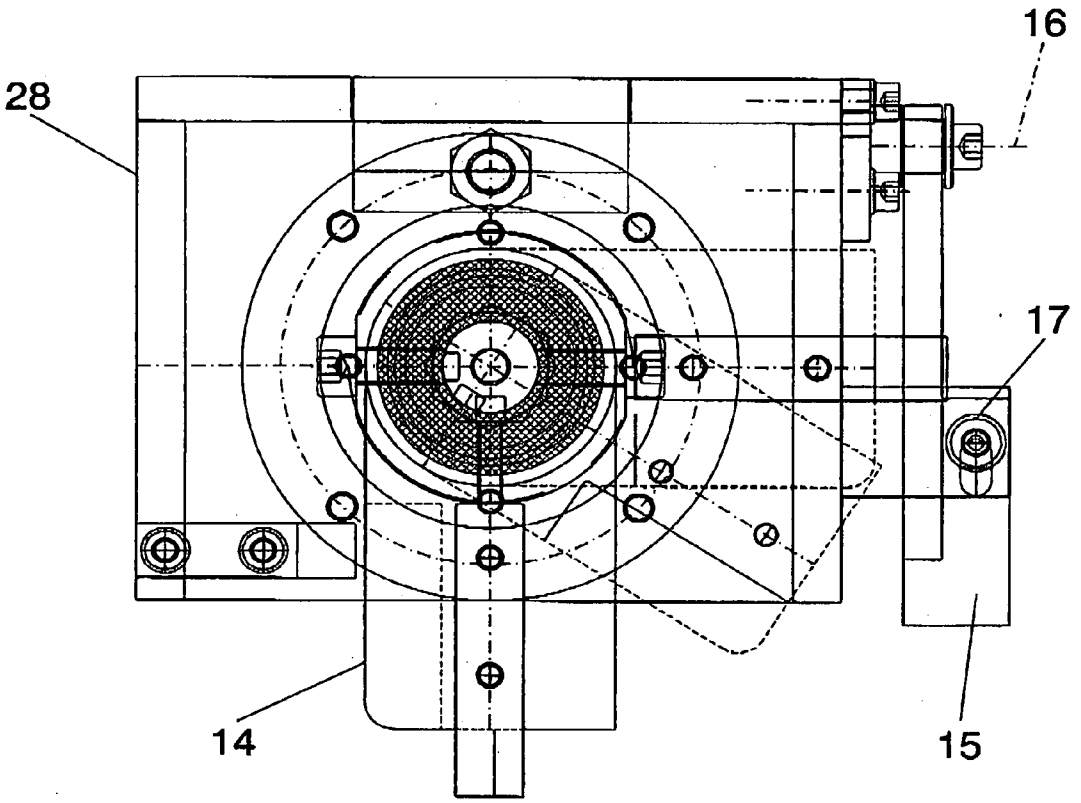

FIG. 10

SECURITY DEVICE

OBJECT OF THE INVENTION

[0001] As stated in the title of this descriptive specification, the present invention relates to a security device, contributing notable advantageous characteristics compared to conventional closing systems, being a mechanical and manual security closure, offering an initial pre-closing stage and another stage of complete and sealed closure. It is a security closure at ground level and consists of a fixed edge and a hinged cover aided by means of elevation which facilitate its opening, there existing a peripheral sealing gasket.

[0002] Currently, in major infrastructures such as ports, airports, etc. their electrical, fibre-optic and other installations are laid out in underground pipes of great length, linked to the outside by means of access mouths with their corresponding closing covers which are located at a certain distance from each other. The covers of those access mouths are flush with the level of the ground.

[0003] Access to the underground pipes is done by means of opening the cover on top of the access mouth by simply undoing their fastening screws. This operation is simple and easy to perform by means of a conventional tool.

[0004] Once the cover has been opened, the operator introduces himself into the underground pipe in order to carry out his tasks, whether these concern repair, inspection, maintenance, etc., and he is obliged to exit via the same mouth through which he entered since, from the inside, the covers cannot be either opened or closed. So, once the operator has entered the pipe in order to carry out his task, the access mouth will be kept open which means that unauthorised persons are able to enter inside the pipe.

[0005] Another drawback shown by these covers which are easily manipulable from the outside consists of the fact that the operator will be obliged to exit via the same mouth as the one he entered, with the consequent problem that might be implied for him by an emergency such as a possible fire, in which he could find himself trapped due to having only one exit route.

[0006] Moreover, it is important that the closure of the access mouth by means of its corresponding cover should be sealed in order to completely isolate the underground pipes from the outside, thus preventing water from leaking inside, the entrance of insects, etc., and thereby keep those installations in an ideal condition.

[0007] It is therefore the object of the present invention to create a new security device which, as a result of the growing increase in insecurity on account of terrorist actions that have been carried out recently at the international level, will solve the possibility of incursion into underground pipes by terrorists or other outside persons who could manipulate those underground pipes with malicious intent and cause serious material damage and harm to persons.

[0008] In this regard, the security device forming the object of the invention permits the opening and closing from both the outside and the inside, thereby solving the drawbacks that have presented themselves so far given that the operator can move around inside the underground pipe without having to retrace his steps in order to access the outside via the same mouth as the one he entered, and can instead exit through whichever mouth is nearest. He is also released from the risk of finding himself trapped inside the pipe in the event of a possible incident since he will be able to gain access to the outside via any other access mouth. Another major advantage presented by the invention consists of the fact that the same operator can close the cover from inside the pipe when he has entered it, thereby preventing access by unauthorised persons.

STATE OF THE ART

[0009] According to their current structure, in present closing systems of the kind that we are concerned with, the degree to which the cover is hermetically sealed to the outside depends on the pressure exerted by the threading of the fastening screws thereof.

[0010] Conventional closing covers lack any anti-vandal and warning means, and are therefore very vulnerable to access to the inside of underground pipes.

[0011] In current installations, it is only possible to open them from the outside, which means as a consequence that when an operator gains access to the inside of the underground pipe he has to exit via the same mouth that he leaves open, and he cannot exit through a different one in the line.

DESCRIPTION OF THE INVENTION

[0012] In general terms, the security device forming the inventive object permits the hinged cover to be closed in two phases: an initial pre-closing phase and a final phase of complete sealed closure, an action which can be performed from the inside or from the outside of the underground pipe, its use being selective to authorised personnel.

[0013] The most characteristic functions of the invention are as follows:

[0014] Completely sealed closure against water.

[0015] Remote control of the state of the closure.

[0016] Manhole open, closed or pre-closed.

[0017] Automatic anti-panic opening from the inside.

[0018] Automatic anti-vandal opening from the outside.

[0019] Semi-automatic closing from the inside.

[0020] Semi-automatic closing from the outside.

[0021] The automatic opening from the inside can be effected from any depth at which the operator is located, or beneath the manhole itself, therefore complying with the anti-panic function.

[0022] The semi-automatic closing from the inside can be done by the operator with a single hand since, when closing the manhole it automatically enters the pre-closed position, and with the same hand he can perform complete closure, as we will see later on.

[0023] In a similar way, semi-automatic closure can be performed from the outside since, when closing the manhole automatically, it also remains in the pre-closed position permitting easy closure from the outside. This closure is effected with a special anti-vandal tool which is the same as that used for performing the opening.

[0024] Remote control over the closure controls both the opening or closing position of the manhole and the perfect closure of the system. It sends a remote signal when the opening commences and the remote control can receive the signal from the manhole system by means of cabled circuit, or by means of a switching system for the signal by GPS, radio, etc.

[0025] All the manoeuvres of the system are mechanically effected in the absence of an outside power source.

[0026] The hinged cover includes a circular opening provided with a peripheral stagger in which seats a plate which is fastened with screws. One of these screws presses on an electrical contact which sends a warning signal to the control centre. Once this plate has been removed, a rotating piece is encountered provided with a descending shaft with a stub for pulling on a closing handle, which is also rotating and is

connected to the edge of the manhole. This handle includes a pawl which is able to mesh with another piece integral with the cover, these pieces having separate recesses defining access ramps. In a fully rotated position, complete closure is obtained, this position being secured when contact is made with an electrical detector which transmits another signal to the control centre. There exists a prior or pre-closed position and a position of actuation from inside and from the outside. This position of partial closure in which the electrical contact is not acted upon is achieved when closing the hinged cover, since it is provided with an adjustable screw which pushes a retention pawl from the rotated position of the closing handle, causing the latter to jump in order to occupy the pre-closing position with the aid of a spring which assists it.

[0027] The closing handle is linked to the edge by means of a support which can be adjusted in height in order to thereby permit the sealing gasket on which the hinged cover sits to be compressed gradually and efficiently since the tightening pressure can be regulated.

[0028] In accordance with the invention, a ladder is also provided fixed to the walls of the underground pipe, in the initial vertical section thereof, with a final folding section that can be arranged in the longitudinal direction close to the roof of the horizontal underground pipe, including means of retention in the folded and unfolded positions.

[0029] In order to aid an understanding of the characteristics of the invention and forming an integral part of this specification, some sheets of drawings are enclosed in which, on an illustrative rather than limiting basis, the following has been represented:

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] FIG. **1***a*.—Is a schematic view in elevation of the security device forming the inventive object with the hinged cover in the open position, being coupled to the mouth of the underground pipe and where the descent ladder can be seen.

[0031] FIG. **1***b*.—Is a view similar to FIG. **1***a*, with the hinged cover closed.

[0032] FIG. **2***a*.—Is a lateral view of that shown in FIG. **1***b*.

[0033] FIG. **2***b*.—Is a lateral view of that shown in FIG. **1***a*.

[0034] FIG. **3**.—Is a view of the security device forming the inventive object on a greater scale, with the cover open.

[0035] FIG. **4***a*.—Is a partial view of that represented in FIG. **3**, in a position of the hinged cover very close to that of closure, with the inclusion of the devices attached to the cover and to the edge in order to achieve the closure system according to the invention.

[0036] FIG. **4***b*.—Is a view similar to that of FIG. **4***a*, in the closed position and without including the edge and elements integral with it, including the closing handle.

[0037] FIG. **5***a*.—Is a schematic view in perspective of the closing system in the open position.

[0038] FIG. **5***b*.—Is a schematic view in perspective similar to FIG. **5***a*, in the locked position.

[0039] FIG. **6**.—Is a schematic view of the retention pawl of the closing handle when the hinged cover is in the open position and is able to be actuated by the adjustable screw integral with said cover.

[0040] FIG. **7**.—Is a schematic view of the closing system by means of staggered ramps of the closing handle linked to the edge and the pawl or fixed lower plate integral with the hinged cover.

[0041] FIG. **8**.—Is a view in side elevation of the mechanisms attached to the closing handle and therefore linked to the edge of the manhole, without including said edge.

[0042] FIG. **9**.—Is a view in front elevation of the closing device linked to the edge.

[0043] FIG. **10**.—Is a plan view of that shown in FIG. **9**.

DESCRIPTION OF THE PREFERRED FORM OF EMBODIMENT

[0044] Making reference to the numbering adopted in the figures, we can see how the security device, proposed by the invention, is referenced in general with the number **1** and formed by the edge **2** provided in the mouth of the vertical section **3** for access to the horizontal underground pipe **4**. The hinged cover is referenced with number **5** and is assisted by a pneumatic spring **6** as can be seen more clearly in FIG. **3**.

[0045] Access to the underground pipe **4** takes placed via the folding ladder **7**.

[0046] In FIGS. **5***a* and **5***b*, wherein is shown in schematic form the opening and closing positions of the security mechanism, we can see that the cover **5** incorporates a security plate **8** secured with peripheral screws, one of which presses on an electrical contact **9** sending a warning signal to the control centre when said screw making contact with it is manipulated. Said signal can sent by means of cabled circuit, or by means of a switching system for the signal by GPS, radio, etc.

[0047] Once the security plate **8** has been removed, the lock **10** of the cover **5** becomes free and accessible. This lock **10** presents a depression **11** which can only be manipulated with a special key in order to cause it to turn. The perfect fitting of the opening tool and the depression **11** permits the locking mechanism to be turned by means of the stub **12** which fits in the housing **13**, the upper plate **14** determining the closing handle being displaced in an angular fashion. FIG. **5***a* shows the open position and FIG. **5***b* the closed position, the latter being achieved by means of rotation through a quarter of a turn.

[0048] The open position (FIG. **5***a*) is maintained due to the fact that the closing handle **14** becomes trapped in the retention pawl **15** which oscillates around the shaft **16** and is aided by a spring **17**. In this position, the cover **5** can be raised with the help of the pneumatic cylinders **6**.

[0049] FIG. **5***b* shows the position of the closing handle **8** when it is located on a lateral zone of the lower plate **18** which is integral with the lower face of the cover **5**. In this position, pressure is also exerted on the end-of-travel electrical contact **19** controlling the closing position of the cover, sending the corresponding closing signal when the upper plate or closing handle **14** has reached its end of rotation position, becoming completely superimposed on the lower plate **18**, the cover **5** remaining in a position of complete sealed closure of the access mouth to the underground pipe. The operation of overlapping of the plates **14** and **18** is facilitated by having some respective surfaces in the form of a ramp **20**, which facilitates the pre-closing position as we will see further below. FIG. **7** shows the arrangement of these ramps **20** in schematic form.

[0050] From the outside, a pre-closure and a complete sealed closure can be performed. In order to proceed to the pre-closure of the cover **5**, it suffices to exert pressure on it in the downwards direction and, when the stub **12** is introduced in the housing **13** of the upper plate **14** which has been turned as shown in FIG. **5***a* and retained by the claw of the retention pawl **15**, it also happens that the screw **21**, adjustable in height and which is integral with the lower face of said cover **5**, will make contact with the widening **22** of the latter, causing it to turn around the shaft **16** and against the spring **17**, due to which the upper plate **14** is released and turns in the clockwise

direction according to FIG. **5***a*, aided by the spring **23** which pulls the belt **24** wound around the cylindrical periphery of the vertical shaft **25**, with respect to which said upper plate **14** is radially arranged. So, the raising of the cover **5** becomes blocked by the superposition of the plates **14** and **20** in the recessed section having the form of a ramp **20**.

[0051] Once the cover has been successfully secured in the pre-closed position, it suffices to act with the special opening key by introducing it in the depression **11** and completing the closure until the complete superposition of both plates **14**, **18** is achieved, at which moment pressure is also exerted on the electrical contact **19**, and a closed signal is received in the control centre. Once fully sealed, the security plate **8** is then placed in position.

[0052] When the manhole is open, in other words, the cover **5** is raised, and once the operator has introduced himself into the access mouth, he can then proceed to carry out the pre-closing of the cover **5** by pulling on a handle **26** integral with the lower face of the cover **5** (see FIG. **4***a*) and pulling it in the downwards direction until triggering the pre-closure.

[0053] Once the plate **5** is in the pre-closed state, the operator will act on either of the two radial handles **27** integral with the vertical shaft **25**, exerting a short and gentle angular displacement which will be displaced to the upper plate **14**, completing the closure under the security conditions mentioned above.

[0054] The anti-panic opening from the inside, when the operator has to exit through another access hatch that is nearer to him, is done by operating the handle **27** from any depth since the shaft **12** is sufficiently long, turning it in the anti-clockwise direction according to FIG. **5***b* against the spring **23**, until the upper plate **14** or closing handle becomes retained by the retention pawl **15**.

[0055] In FIG. **4***a* can be seen the assembly of the closing system linked to the edge **2**. FIGS. **9** to **11** show all the elements on a larger scale, according to a real configuration and which functionally are equal to those described in FIG. **5***a* and **5***b* where they were shown schematically.

[0056] In FIG. **9** we can see referenced with number **28** the support for securing the closure mechanism to the edge **2**, consisting of some openings **29** cast for the passage of the fastening screws, thereby being able to be installed at the desired height in order to regulate the pressure which the upper plate **14** will exert with respect to the lower plate **18** and the pressure exerted on the sealing gasket **30** (see FIG. **4***a*) located in a staggered seating of the edge **2**, on which the hinged cover **5** seats.

[0057] In FIG. **9**, referenced with number **31** is the support on which the spring **17** rests which aide the retention pawl **15**.

[0058] Again making reference to FIGS. **1** and **2**, where the ladder **7** is shown which the operator will have to use for gaining access to the lower part of the pipe **4** and for accessing the outside, it presents a section fixed to the wall of the vertical pipe **3**, having a folding section hinged around an axis. The ladder will thus be folded in the form of an "L" so that, in order to lower it, the operator will have to exert a downwards pressure with his foot until the mobile part of the ladder reaches the vertical position, at which moment a retaining catch or similar will secure it to the fixed part. When the operator wishes to leave the pipe via the same mouth as which he entered it, once he is on the fixed part of the ladder **7**, he will have to operate the retention catch in order to release the mobile part of the ladder, with a counterweight having been provided at the height of the hinging axis so that the ladder can easily reach the horizontal position. In the event of wishing to gain access to the outside of the pipe via another mouth, the operator will find the ladder in the folded position, and in order to unfold it he will have to pull on it via a cable or similar pulling on its free end, thus causing the ladder to descend and then engaging the fastening catch so that the ladder can be used.

1. SECURITY MANHOLE, with cover hinged to the edge fixed to the mouth of the underground pipe, assisted by means of raising and there existing a sealing joint for closure of the cover, wherein the cover comprises an opening with a peripheral stagger in which seats a plate fastened with screws, one of which exerts pressure on an electrical contact sending a warning signal, there existing beneath the plate a rotating piece provided with a coaxial shaft ending in a stub which fits into a housing of the closing handle linked to the edge and having a rotating pulling movement, able to adopt a position in which it is located above another plate integral with the cover, both of which are provided with a ramp for facilitating access, being able to adopt another angular position for release in which it is retained by a retention pawl; with provision being made for another electrical contact which transmits the corresponding signal to the control centre securing this closure position, there existing means which force that closure position along with means of opening from the inside in an anti-panic action from the underground pipe via radial handles to a lower extension of the actual rotating axis of the closing handle.

2. SECURITY MANHOLE, according to claim **1**, wherein a pre-closure is provided for the cover both from the outside and from the inside, consisting of a screw that is adjustable in height and fixed to the cover, which makes contact with the retention pawl which maintained the closing handle in the rotated open position, causing it to descend in order to release said closing handle so that, aided by a recovery spring, it can occupy the partially closed position, without reaching the point of acting on said electrical contact, the cover comprising a handle for pulling from the inside.

3. SECURITY MANHOLE, according to claim **1**, wherein the means which force the pre-closed or locking position of the closing handle are determined by a belt wound around a widened cylindrical segment of the shaft for rotation of said handle and whose free end is secured to a pulling spring fixed to the wall of the edge.

4. SECURITY MANHOLE, according to claim **1**, wherein the closing handle is linked to the edge by means of a support that is adjustable in height in order to control the tightening pressure of the cover on the peripheral sealing gasket.

5. SECURITY MANHOLE, according to claim **1**, wherein the vertical section of the underground pipe to which the edge is secured incorporates an access ladder consisting of a fixed section backed onto the walls of the vertical pipe and another end section that is hinged for folding onto the roof of the horizontal pipe, there existing means of retention for the folded position, along with a counterweight connected to the mobile section.

* * * * *