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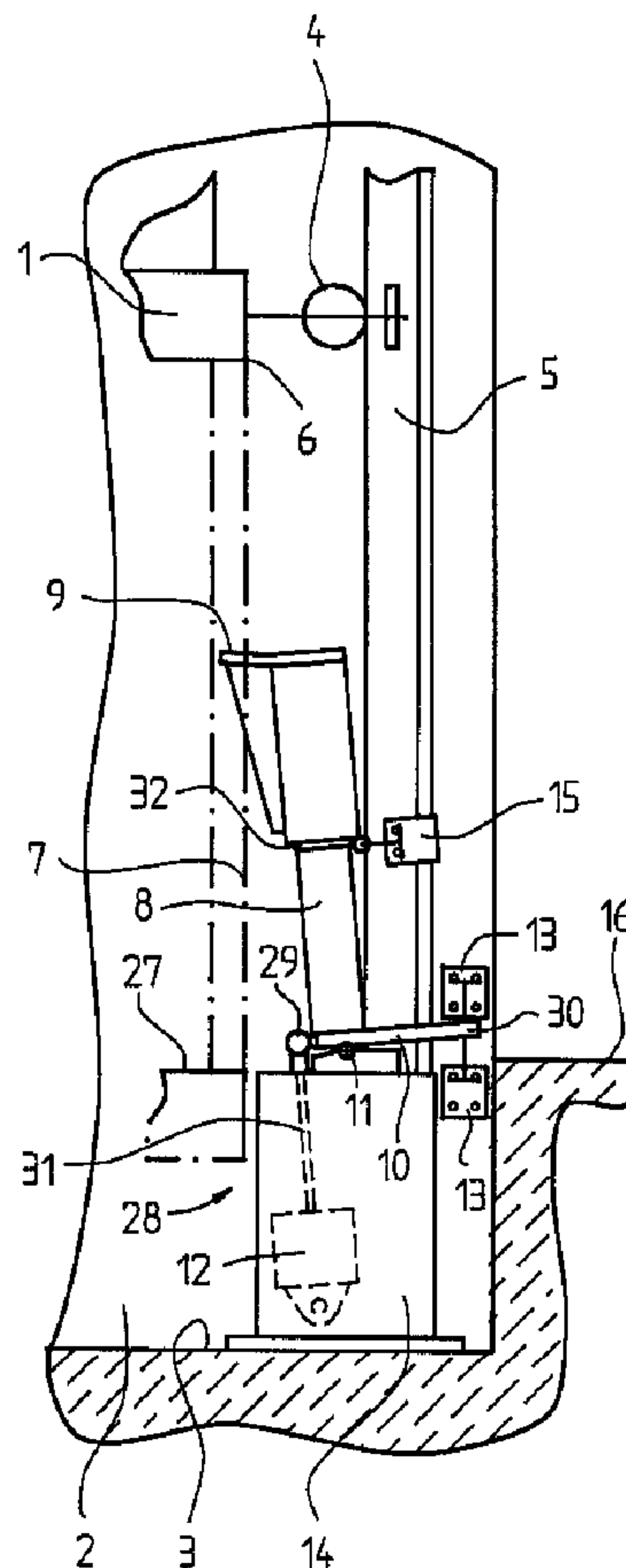
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(54) Titre : MATERIEL SERVANT A PROTEGER TEMPORAIREMENT UN ESPACE DE TRAVAIL

(54) Title: TEMPORARY WORKING SPACE PROTECTION



(57) Abrégé/Abstract:

Equipment for the protection of persons against the danger of being crushed by the ingress of a transport equipment into a temporary working space such as for example a shaft pit 3 of a lift. Shaft pits 3 of reduced depth display swivel buffers 8, which



(57) Abrégé(suite)/Abstract(continued):

before entering the shaft pit 3 are pivoted into the travel range of a cage 1. After leaving the shaft pit 3 and during each travel, the swivel buffers 8 are retracted and pivoted out again by their own weight on each stop of the lift. These movements are registered by means of safety switches 13 and the functional capability of the equipment is checked continuously in this manner. By means of the unlatching and release equipment arranged in the shaft door front, a memory circuit is actuated in addition, the resetting of which must take place by a key switch in the machine room.

ABSTRACT:Summary

Equipment for the protection of persons against the danger of being crushed by the ingress of a transport equipment into a temporary working space such as for example a shaft pit 3 of a lift. Shaft pits 3 of reduced depth display swivel buffers 8, which before entering the shaft pit 3 are pivoted into the travel range of a cage 1. After leaving the shaft pit 3 and during each travel, the swivel buffers 8 are retracted and pivoted out again by their own weight on each stop of the lift. These movements are registered by means of safety switches 13 and the functional capability of the equipment is checked continuously in this manner. By means of the unlatching and release equipment arranged in the shaft door front, a memory circuit is actuated in addition, the resetting of which must take place by a key switch in the machine room.

(Fig. 1)

Translation of legend in Fig. 8 of the drawings

"Automatic securing of protective space"

Description

The invention concerns an equipment for the protection of persons against the danger of being crushed by the ingress of a transport equipment into the working space occupied temporarily by one or more persons. Working spaces of this kind are for example shaft pits and shaft heads in travel shafts of lift plants. Their temporary occupation by persons is caused by the periodic maintenance and checking operations according to regulations at the technical equipment present in these spaces. Relevant regulations, for example the EN81, propose for the protection of the persons temporarily staying there that these spaces are to display appropriate dimensions which in consideration of the full travel path into the end positions of the transport equipment still guarantee adequate safety height for the personnel working therein. This is however not possible in all cases, in particular on the refurbishing of lift plants in existing buildings.

An equipment of that kind, which displays at least one abutment which is adjustable over the entire travel path length and also called travel path limiter, is known from the DGM 75 18 439.3 of 20.11.75. The travel path limiter is constructed as abutment plate with a fastening hook which is hooked into elongate holes at the guide rails where the travel of a transport equipment must be limited for the protection of persons.

The effectiveness of this equipment presupposes that the personnel is informed of its presence, that the abutment plates are available at any time and that they are also actually put into operation under pressure of time and for a presence expected to be only brief in the danger space. Therefore, a reliable protection of persons can not be guaranteed.

The patent specification CH 667 638 describes a protective equipment, which is mounted in the shaft pit, in the shape of a setting-down device which is borne to be pivotable and in which, on the opening of the lowermost shaft door in the absence of a cage, an abutment stay automatically pivots into the clear space profile of the transport equipment. Thereby, the shaft pit space is secured against the ingress of the transport equipment and the demanded

protection of persons is given in principle. After leaving the shaft pit, the setting-down device is brought manually into the initial position.

Equipments of this kind consist of mechanical and electrical components which must maintain their full functional capability during the entire operating life of a transport equipment. This functional capability must therefore be checked periodically in order to guarantee a permanently reliable function of the protective equipment. The manual resetting from the interior of the shaft involves a certain risk of being locked in on the closing of the shaft door by a second person from outside and furthermore means an appreciable loss of convenience in the application.

It is therefore the object of the present invention to create a protective equipment of the initially described kind, the function of which guarantees a certain protection for a fitter and namely also in the case of inattention or faulty operation caused by negligence, the possible functional incapability of which is noticed at once and which is comfortable in the application.

This problem is solved according to the invention which is described in the following and displays the features recited in the claims.

The advantages achieved by this invention consist substantially in that the functional reliability of the equipment is assured by a continuous functional check or that an occurring fault is noticed at once and that the equipment fully automatically assumes both possible settings.

Further advantages are to be seen in that, with simultaneous fulfillment of the regulations for the personnel protection, appreciable building costs can be saved in that the reduced depth and height of a travel shaft free additional space volumes for other purposes.

An example of embodiment of the invention is illustrated in the drawings and there show

Fig. 1 the setting-down equipment in the passive state,

Fig. 2 the setting-down equipment in the active state,

Fig. 3 a shaft door front,

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In one aspect, the present invention resides in equipment for the protection of persons against the danger of being crushed by the ingress of a transport equipment into the working space within a lift shaft, which space is accessible through a shaft door and temporarily occupied by one or more persons and which equipment displays a setting-down equipment with at least one swivel buffer, which is transferable automatically from a retracted setting into a safety setting which limits the travel path of a cage, and which equipment displays an unlatching and release mechanism, wherein the swivel buffer is tiltable automatically into the safety setting, and fetchable into the retracted setting by an actuator, that the safety setting of the swivel buffer is signalled by a safety switch actuated by the actuator and that the actuator is deactivated when the shaft door is opened in the absence of the cage, for which a memory circuit is activated.

In another aspect, the present invention resides in a safety apparatus for preventing movement of an elevator cage into the working space of an elevator shaft, the working space being accessible through a shaft door when the elevator cage is moved to an upper position spaced thereabove, the apparatus comprising,

a swivel lever which is pivotal about a pivot point between a retracted position wherein the lever is moved out of the path of elevator movement, and a safety position, wherein the lever is pivoted into the path of elevator movement to abut and prevent movement of the elevator cage therepast,

buffer means for dissipating abutment forces between the elevator and swivel lever,

an actuator which when activated maintains the swivel lever to the retracted position, and

- Fig. 4 the unlatching and release equipment when not actuated,
Fig. 5 the unlatching and release equipment when actuated,
Fig. 6 the unlatching and release equipment after the actuation,
Fig. 7 the disposition of the unlatching and release equipment at a shaft door front,
Fig. 8 a front elevation of the protected unlatching and release equipment,
Fig. 9 the protected unlatching and release equipment when not actuated and
Fig. 10 the protected unlatching and release equipment when actuated.

A cage 1, which travels in upward and downward direction by way of roller guides 4 at guide rails 5, in a shaft 2 is illustrated in the Fig. 1. The lowermost cage position, which the cage assumes when it travels to the lowermost storey level 16, is indicated by 27. An automatic setting-down equipment 28 is installed in a shaft pit 3. A low-friction pivot bearing 11, on which a swivel buffer 8 is arranged vertically, is disposed on a buffer pedestal 14. The low-friction pivot bearing 11 can be constructed as knife bearing as finds application in the mechanical weighing technique. The upper termination of the swivel buffer 8 consists in the shape of a buffer plate 9, which juts out laterally and serves as bearing surface for an impact edge 6 and the cage 1. The foot of the swivel buffer 8 is constructed as buffer level 10, which to the left opens into a joint 19 and the right-hand horizontal prolongation of which is shaped as actuating finger 30 for two redundant safety switches 13. An actuator 12, which is fastened at the buffer pedestal 14, is connected by way of its plunger 31 with the joint 29 of the buffer lever 10. An increase in the diameter of the swivel buffer 8 at about half the height is constructed as switching flank 32 for a position switch 15.

In the drawn state, the swivel buffer 8 is illustrated in the initial position pushed back by the actuator 12 and the buffer plate 9 is situated outside a movement path 7. In this setting of the swivel buffer 8, the cage 1 can travel without obstruction to the lowermost storey 16. In order that the swivel buffer remains in this

setting, the actuator 12 must be extended in order to exert a continuous thrust force on the joint 29 and thus keep the swivel buffer 8 in the swivelled-back setting.

In the Fig. 2, the actuator 12 is not activated and the swivel buffer 8 is tilted into the illustrated setting by the own weight due to the asymmetrical mass distribution over the pivot bearing 11. Thereby, the safety switches 13 have been turned over by means of the actuating finger 30, which is appropriately registered and evaluated in a not illustrated lift control.

The Fig. 3 shows the customary picture of a shaft door front with a shaft door 17 and a lock-actuating element formed as triangular bolt 18, for example arranged in a buckle 19, and serving for the unlatching of the shaft door 17 by means of the known triangular key.

In the case of the equipment according to the invention, not only a mechanical unlatching of the shaft door is undertaken with the triangular bolt, but a so-called memory circuit is also actuated, as illustrated in the Figs. 4, 5 and 6. This memory circuit consists of a latching switch 21 and a resetting element 20 bringing this into the initial setting.

The actuation of the memory circuit takes place by way of a switching cam 22 shaped on at the triangular bolt 18. When the triangular bolt is turned for example through 90° , the latching switch 21 is brought into the detent setting according to Fig. 5 and remains in this setting after the release of the triangular bolt 18, which then as is generally usual turns back by spring force into the position according to Fig. 6. For a resetting of the latching switch, an activation of the resetting element 20 is required. The resetting element 20 can for example be executed as electromagnet.

The front elevation of the two-stage arrangement of an unlatching and release equipment 26 is illustrated in the Figs. 7 and 8.

The mechanism and the function of this two-stage unlatching and release equipment is evident from the Figs. 9 and 10. On its actuation, a pawl 33 is lifted by a first triangular bolt 18 over a lug 34 of a switching slide cam 24. In the raised state of the pawl 33, a slide 33 can then be pushed manually to the right, whereby a

second lock-actuating element or a triangular bolt 25 is made accessible and the latching switch 21 is brought into the memory setting at the same time. The final unlatching of the shaft door takes place only by the actuation of the second triangular bolt 25. The resetting of the latching switch 21 takes place in the same manner as already described in the preceding. The slide 23 is after its actuation preferably retracted again into its initial position by a not illustrated spring. The latching switch 21 then also remains kept in the actuated setting and must be neutralised again by the resetting element 20, as already described.

The equipment according to the invention operates as following: In order to be able to climb into the shaft pit 3, the cage 1 is sent into a higher storey. The lowermost shaft door 17 can be unlatched and opened by means of the unlatching and release equipment 18, 25 and 26 and the standardised triangular key. The triangular bolt 18 or 25 is according to execution of the memory circuit openly accessible thereto or covered by a screw lid or by a slide 23. The actuation of the triangular bolt 18 and, in the construction according to Figs. 7 to 10, additionally of the second triangular bolt 25 after the pushing-back of the slide 23 sets the latching switch 21 into the detent setting, whereby the safety loop of the lift control is interrupted. The shaft door 17 can now be opened manually and be arrested in the open setting. After the cage 1 during driving away has moved away from the lowermost storey, the one or preferably both the mutually opposite swivel buffers 8 are tilted automatically within the movement path 7 and thus into the movement range of the cage 1 by the switching-off of the actuator 12. After climbing into the shaft pit 3, the control off-switch present there according to regulations is actuated in addition so that a multiple interruption of the safety loop is present. The maintenance and checking work to be undertaken can now be performed without risk.

After completion of the operations in the shaft pit 3, the switching-on again of the control off-switch in the shaft pit 3 as well as the closing and latching of the shaft door 17 take place in reverse sequence. The lift is now however still not yet ready for operation because the latching switch of the memory circuit always still interrupts the safety loop. Now, the resetting element 20 must

still be activated, which occurs by a key contact in the machine room at the lift control by an expert person. The lift is again fully ready for operation only now.

The continuous checking of the functional reliability, which was mentioned in the set object and for the advantages, is achieved by the swivel buffers 8, with the exception of a travel into the lowermost storey, by switching-off of the actuator 12 after a travel and by switching-on of the actuator before a travel the orderly operation of the swivel buffers 8 during a travel can be checked by means of the safety switches 13 and the evaluation of their respective settings. This functional test can take place during each travel or however, according to the local conditions, at programmed time intervals, for example daily or weekly or after a predetermined number of travels. Thereby, a faulty function is noticed at once on the one hand and it is prevented on the other hand that a sticking of the setting-down equipment in the vertical setting can occur after longer non-use of the equipment.

Should it happen for any reason that the cage lowers with the doubly switched-off safety loop, then the cage 1 will set down by its abutment edges 6 on the buffer plate 9, press the swivel buffer 8 in somewhat and be stopped. The pressing-in of the swivel buffer 8 however causes an actuation of the position switch 15, which is appropriately evaluated or stored in the lift control.

For the monitoring and the operation of the setting-down device, the following variants of operational sequences can be performed:

- For lifts with small numbers of travels, the actuator 12 is isolated from the energy supply after each travel of the lift, whereby the swivel buffer 8, with exception for a cage position in the lowermost storey 16, tilts each time into the setting-down position and the safety switches 13 are actuated. The reported-back setting is AND-interlinked logically together with further safety signals in the lift control and, in the case of correct function of the setting-down device, enables the release of a further travel of the lift. An absent reporting-back signal of the safety switches 13 permits the deduction of a defect at the setting-down device, which has the consequence of a blocking of the lift and calls the maintenance service to the scene.

- In buildings with much passenger traffic, correspondingly great numbers of travels are also reached by a lift. According to the aforescribed functional pattern, this also results in a correspondingly large number of changes in setting of the setting-down equipment, which can mean premature wear for the equipment. For this case, the release of the swivel buffer 8 is executed for example once daily or once weekly for checking purposes, which is realised by appropriate control programs. Should the shaft pit 3 be entered with the swivel buffer 8 retracted, the actuator 12 is isolated from the energy supply by the actuation of the triangular bolt 18 and 25 and the swivel buffer 8 tilts into the setting-down position.

- In the case of greater checking intervals, energy is also fed for a correspondingly long time to the actuator 12 for the holding-back of the swivel buffer 8, which has the consequence of greater heating or greater dimension of the actuator 12 as well as greater energy consumption. In order to avoid this and nevertheless to gain from the advantage of a greater checking interval, the swivel buffer 8 is retracted only before the entry into the lowermost stopping place 16 and again released after the stopping of the cage 1. The swivel buffer 8 now lying against the cage wall then tilts automatically back into the setting-down position on the cage 1 travelling away. A simple sliding surface at the cage side wall prevents a hooking of the swivel buffer 8 into the cage structure. With this mode of operation, there results a short switching-on duration of the actuator and a smaller overall size as well as also a smaller number of changes in setting of the setting-down equipment and thus less wear.

The basically similar equipment can also be used for limited shaft head height. In this case, two constructions are possible:

- Arrangement of the swivel buffers 8 below the counterweight similar in system as Fig. 1 and
- Arrangement of the swivel buffers 8 below the shaft ceiling.

The swivel buffers 8 or their buffer stops 14 are then fastened at the shaft ceiling and the mass distribution of the swivel buffer 8 is so disposed that a pivoting-in into the travel range of the cage 1 takes place again only by means of the own weight. All remaining functions and operations are exactly the same as described in the

preceding. For the application for the protection of the protective space above the cage, all shaft doors, with the exception of the lowermost one, are equipped with an unlatching and release equipment according to Figs. 7 to 10.

The equipment according to the invention can be used in principle for any desired conveying equipments which at the end positions display maintenance spaces, which are limited in the depth or height, with danger to persons.

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What is claimed is:

1. Equipment for the protection of persons against the danger of being crushed by the ingress of a transport equipment into the working space within a lift shaft, which space is accessible through a shaft door and temporarily occupied by one or more persons and which equipment displays a setting-down equipment with at least one swivel buffer, which is transferable automatically from a retracted setting into a safety setting which limits the travel path of a cage, and which equipment displays an unlatching and release mechanism, wherein the swivel buffer is tiltable automatically into the safety setting, and fetchable into the retracted setting by an actuator, that the safety setting of the swivel buffer is signalled by a safety switch actuated by the actuator and that the actuator is deactivated when the shaft door is opened in the absence of the cage, for which a memory circuit is activated.

2. Equipment for the protection of persons according to claim 1, wherein the memory circuit displays a latching switch, which is provided with a safety loop contact, and a resetting element to be activated by a key switch.

3. Equipment for the protection of persons according to claim 1, wherein apart from the case of the setting-down equipment for the protection of persons, a periodic functional test of the swivel buffer and the actuator takes place, for which a stopping of the cage takes place in the case of a faulty function signalled by the safety switch.

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4. Equipment for the protection of persons according to claim 2, wherein the key switch activating the resetting element is arranged outside the shaft.

5. Equipment for the protection of persons according to claim 2, wherein the key switch activating the resetting element is arranged in a machine room.

6. Equipment for the protection of persons according to claim 1, wherein the unlatching and release mechanism displays a first lock-actuating element having a pawl, which engages a lug of a switching slide cam for actuating a latching switch, and wherein a second lock-actuating element, which is firmly connected with the switching slide cam and selectively covered by a slide, is actuatable for unlatching the shaft door.

7. Equipment for the protection of persons according to claim 6, wherein the first lock-actuating element displays a switching cam.

8. Equipment for the protection of persons according to claim 6 or claim 7, wherein the switching slide cam is connected with a retraction spring.

9. A safety apparatus for preventing movement of an elevator cage into the working space of an elevator shaft, the working space being accessible through a shaft door when the elevator cage is moved to an upper position spaced thereabove, the apparatus comprising,

a swivel lever which is pivotal about a pivot point between a retracted position wherein the lever is moved out of the path of elevator movement, and a safety position,

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wherein the lever is pivoted into the path of elevator movement to abut and prevent movement of the elevator cage therepast,

buffer means for dissipating abutment forces between the elevator and swivel lever,

an actuator which when activated maintains the swivel lever to the retracted position, and

safety switch means for deactivating the actuator when the shaft door is opened when the elevator is moved to the upper position.

10. A safety apparatus as claimed in claim 9 wherein said swivel lever has an inherent tendency to move from the retracted position to the safety position under the force of gravity.

11. A safety apparatus as claimed in claim 9 or claim 10 wherein said buffer means is provided as an integral part of said swivel lever.

12. Equipment for the protection of persons according to any one of claims 1 to 8, wherein the swivel buffer is tiltable automatically to the safety setting by gravity.

Fig. 2

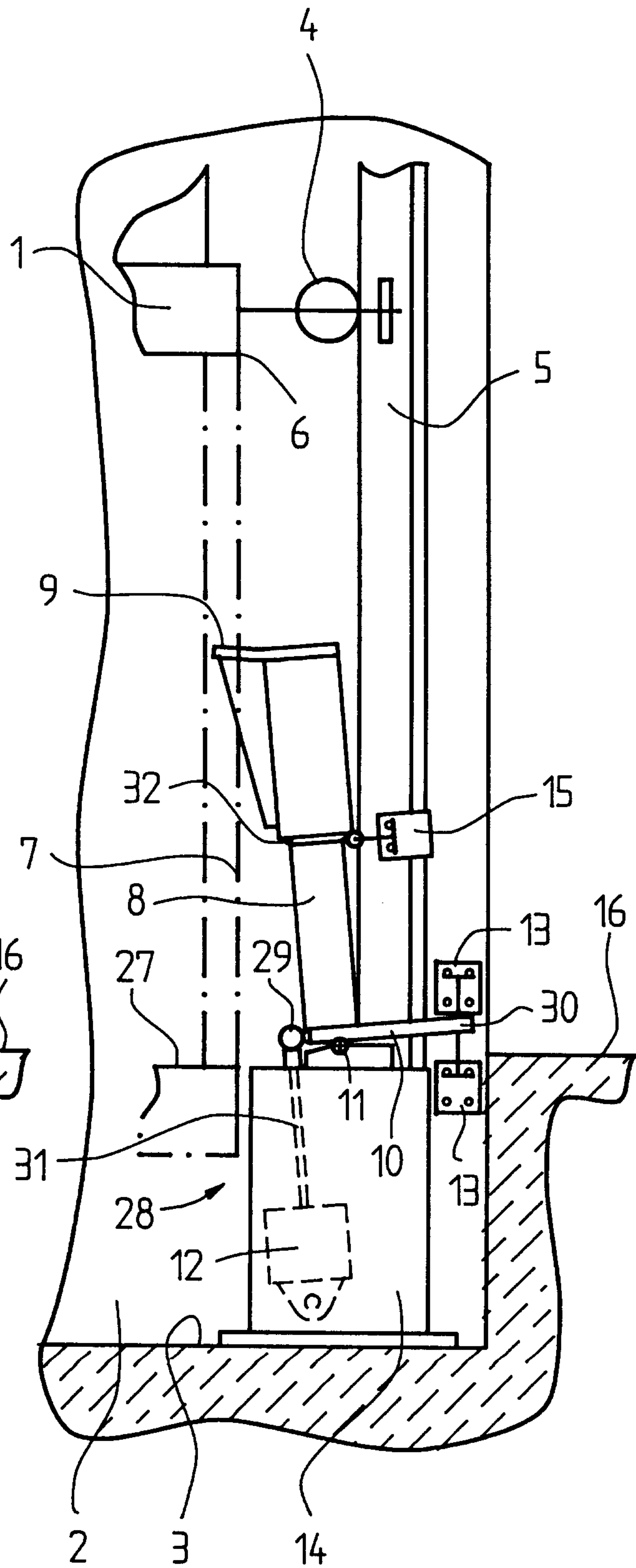


Fig. 3

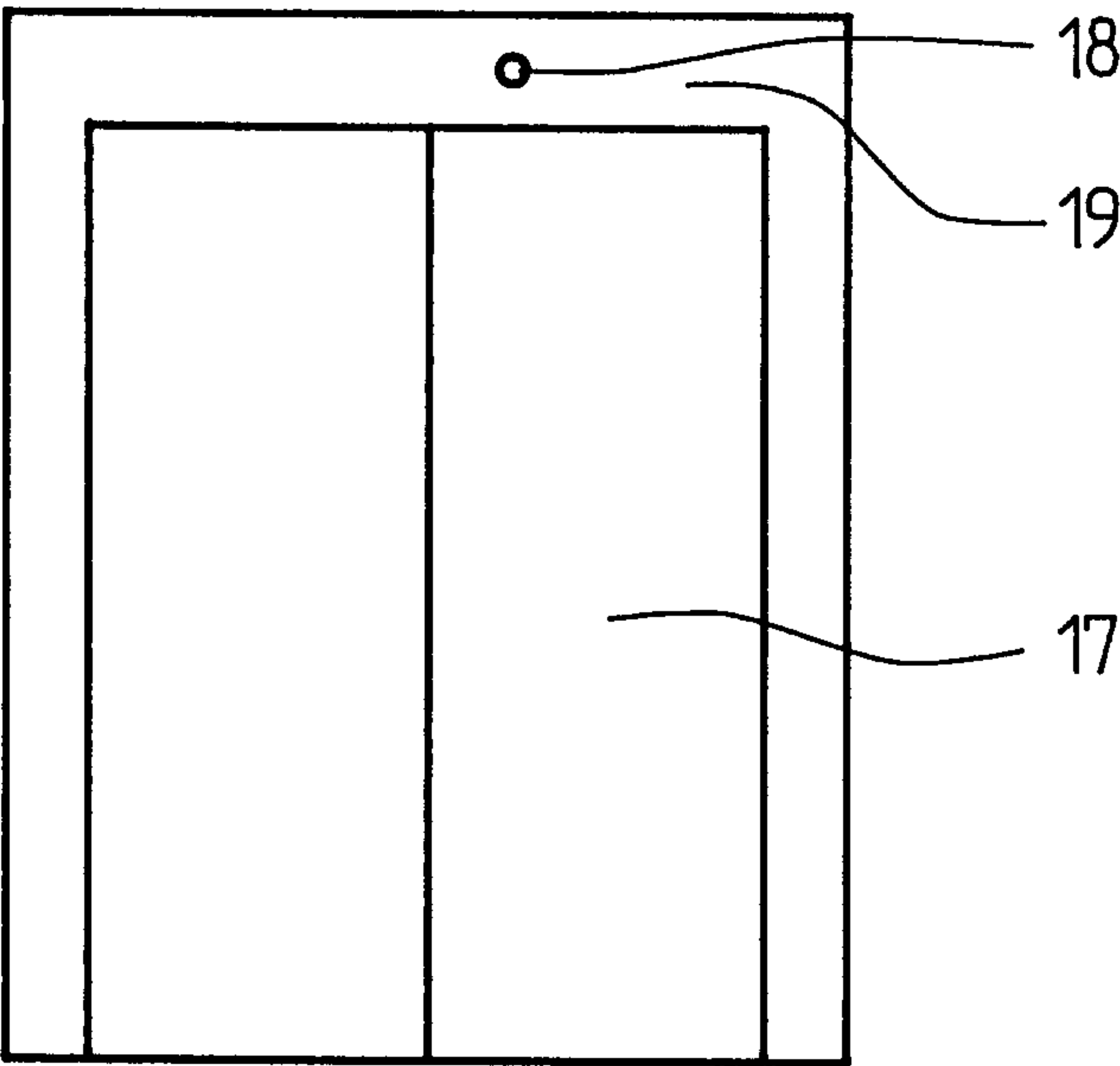


Fig. 4

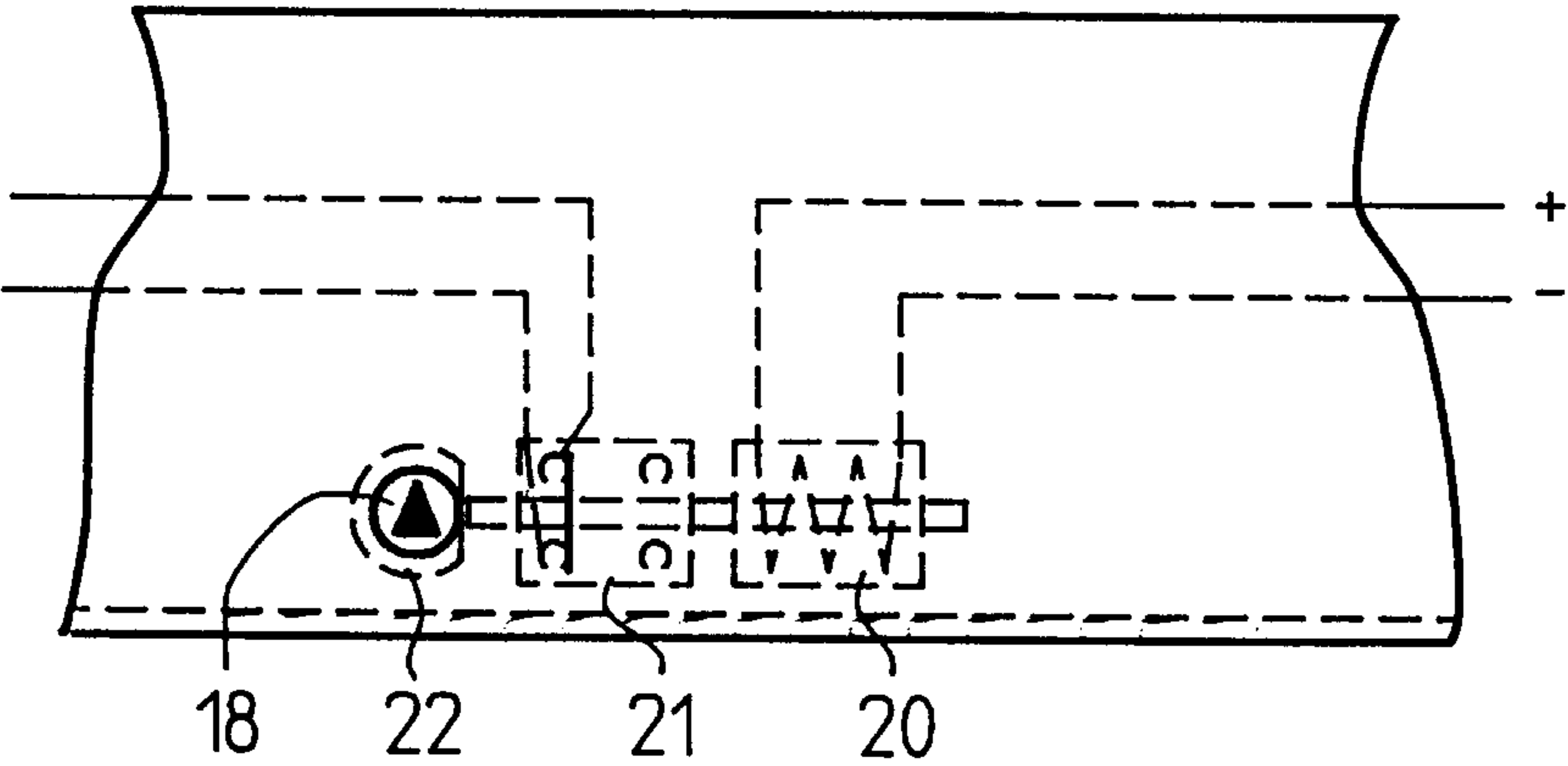


Fig. 5

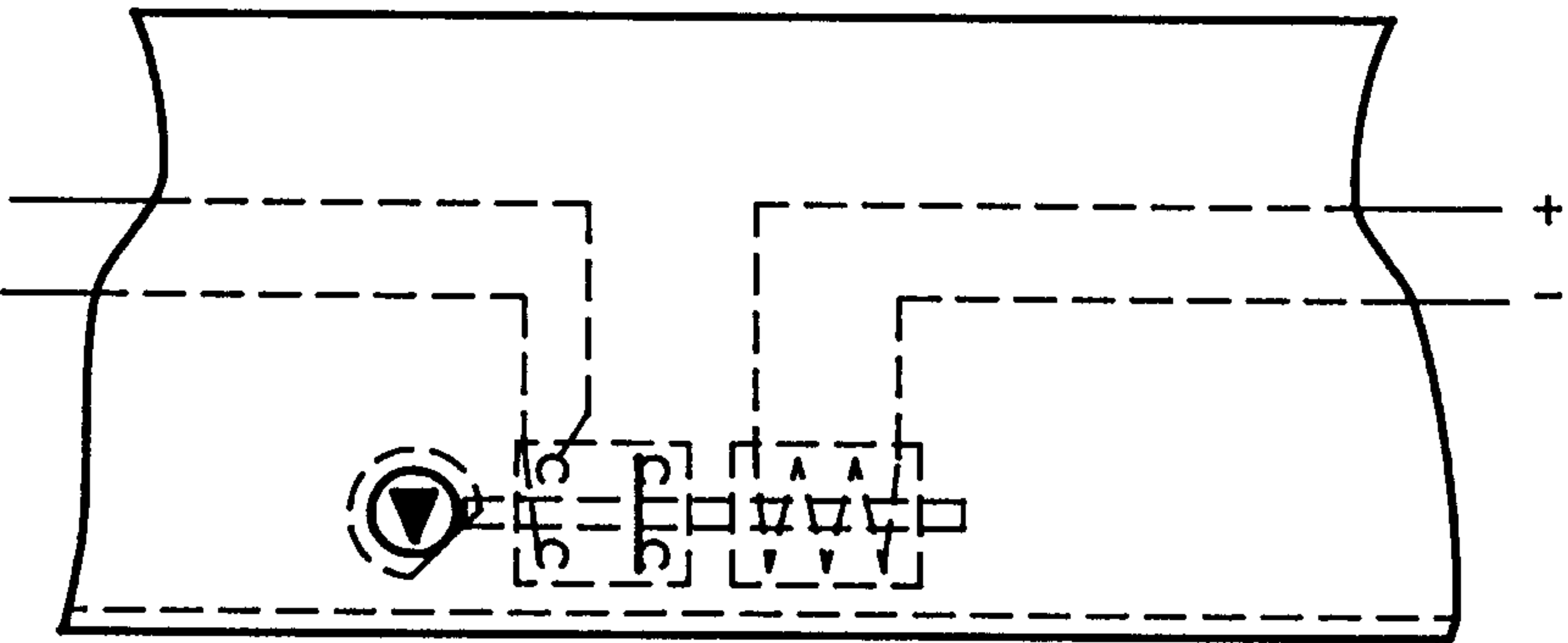


Fig. 6

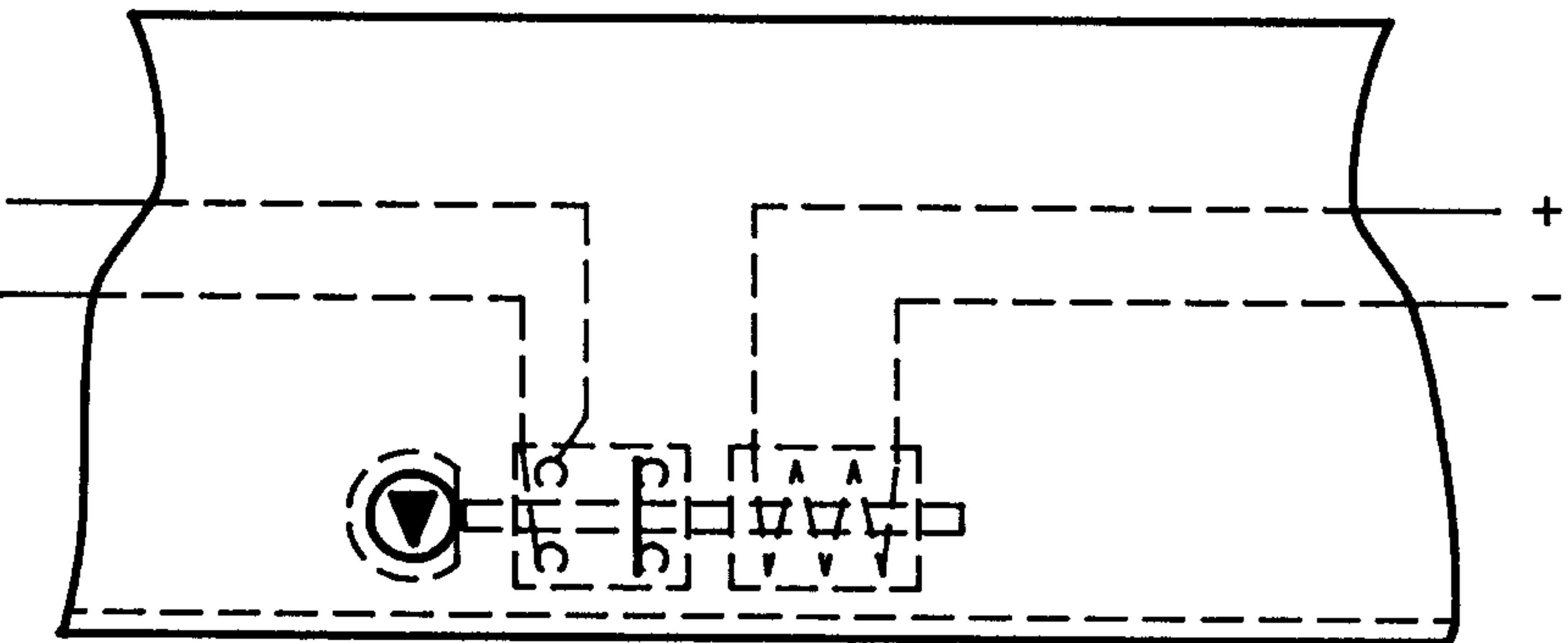


Fig. 7

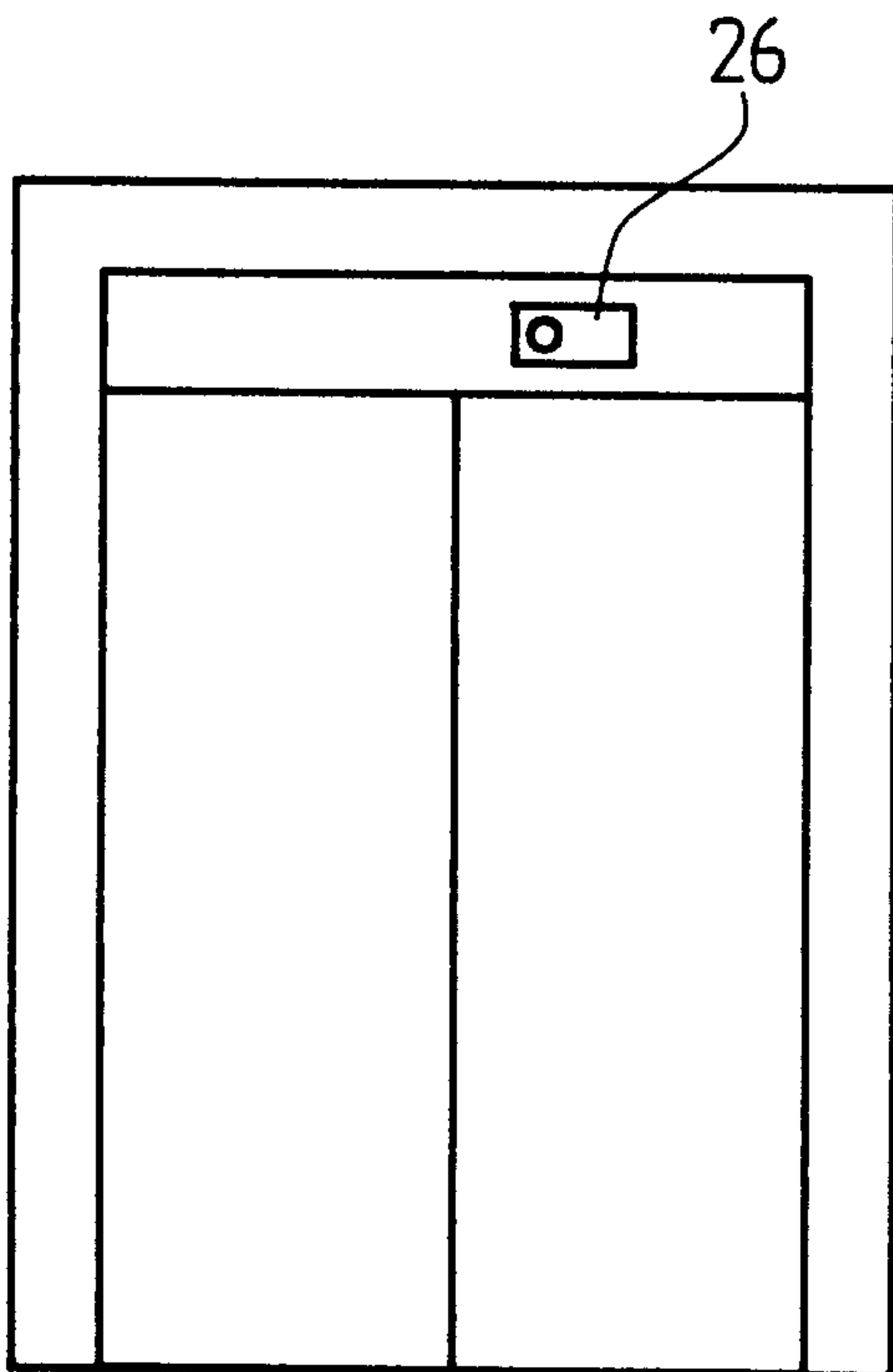


Fig. 8

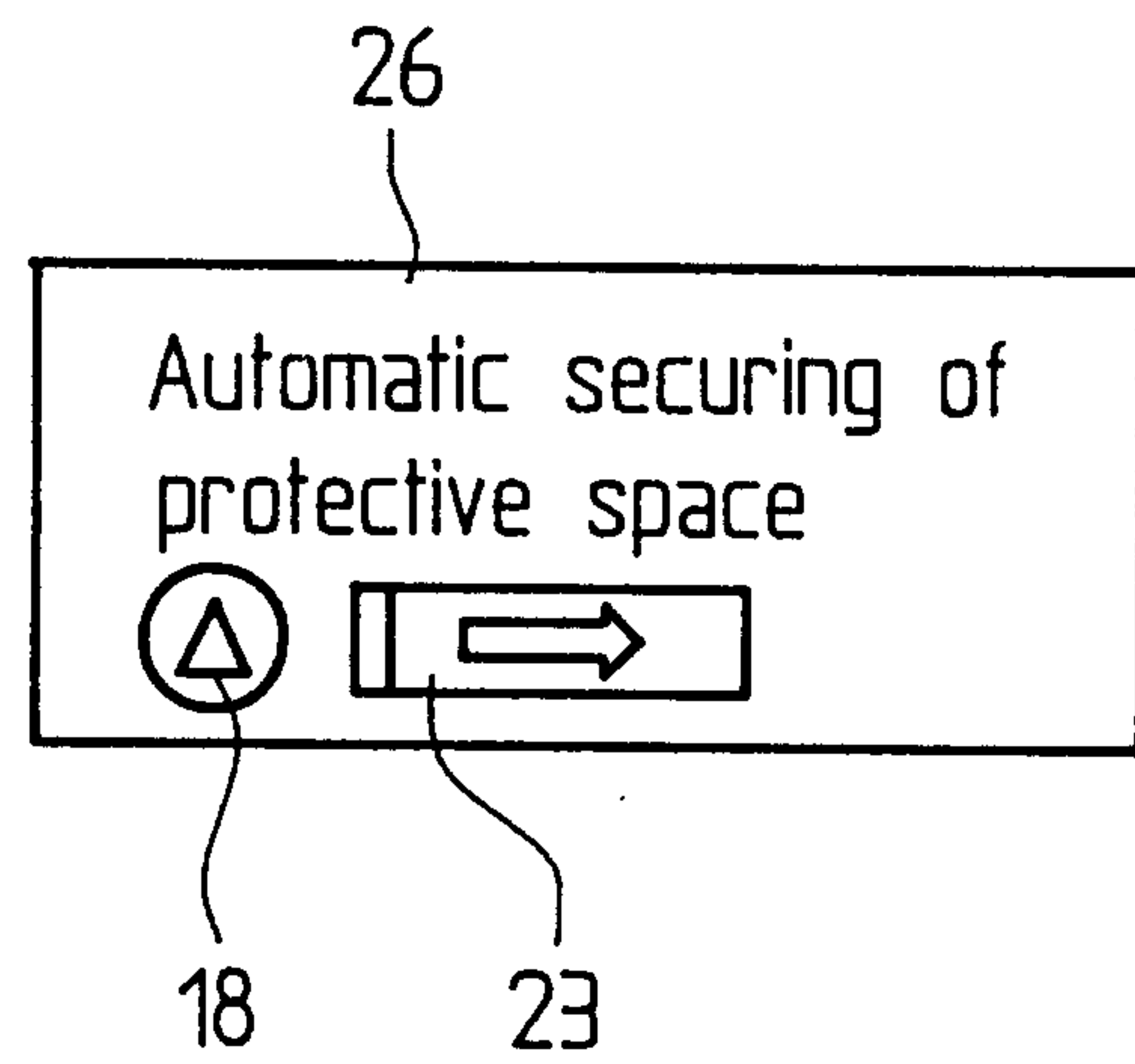


Fig. 9

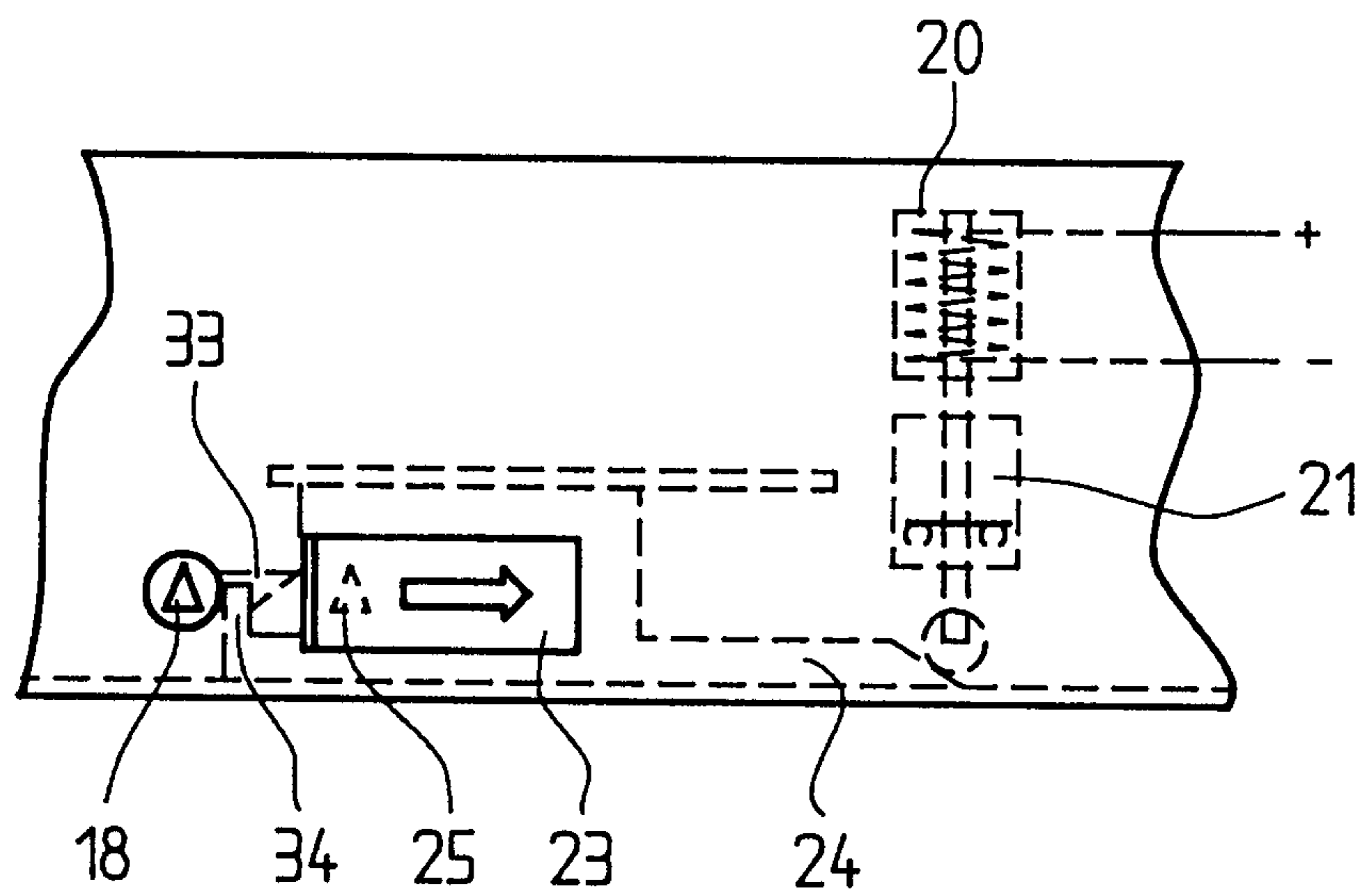


Fig. 10

