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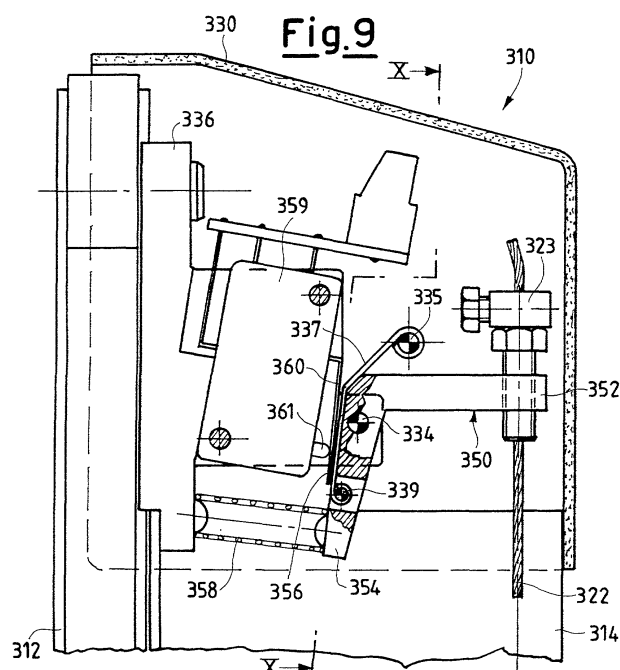
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(54) Improved protection and safety device for automatic sliding gates

(57) Improved protection and safety device for automatic gates, in particular for automatic sliding gates, comprising at least one protection rib (10, 110, 210, 310) which includes a shaped profile (12, 112, 212, 312) connected to a protection element (14, 114, 214, 314), containing inside of it at least one portion of cable (22, 122, 222, 322) attached to a mechanism for shutting off the power supply to the gate, following pressure upon the

protection element (14, 114, 214, 314), as a consequence of a collision of an obstacle; in at least one portion of the profile (12, 112, 212, 312), corresponding to a lower and/or upper zone of the rib (10, 110, 210, 310) and of the surface of the gate, it is foreseen to insert a shell (30, 130, 230, 330), attached to the protection element (14, 114, 214, 314), comprising inside of it a lever member (32; 132, 150; 232; 350) and/or a plate or spring (337) connected to the cable (22, 122, 222, 322).



Description

[0001] The present invention refers to an improved protection and safety device for automatic sliding gates.

[0002] Automatic gates for accessing private property are usually actuated by the users, from fixed posts, through opening or closing buttons or keys or by means of remote controls, which send a radio impulse to an electronic exchange, which takes care of actuating the gate in the desired direction.

[0003] Moreover, generally, in the case of remote radio transmissions, after having commanded the gate to open, the subsequent reclosing of the same gate takes place through sending a new command from the user or else it takes place automatically after a predetermined period of time.

[0004] These types of sliding gates, nevertheless, can become sources of serious drawbacks, from the point of view of user safety since, due to the intrinsic configuration of the structures, they usually comprise moving parts which have sharp edges which are very dangerous to the user's well-being.

[0005] Indeed, since these gates are actuated remotely from fixed installations, the movement of the structure cannot be interrupted automatically at the moment of collision of potential users or of other objects against protruding portions of the aforementioned structures, if not by manually interrupting the power supply of the system after the time of real need.

[0006] Consequently, one can imagine the inevitable and sometimes dramatic consequences linked to the slow speed with which such a type of intervention can be carried out.

[0007] In order to brake or interrupt the travel of an automatic gate in motion, in the case of imminent danger, without needing to intervene manually, safety systems for sliding gates substantially based upon the use of pneumatic ribs have been used.

[0008] Such ribs are positioned in correspondence with the most dangerous edges, they are made out of deformable material and they transmit, by means of pressure switches, an electrical signal to a contact of an electronic transmitter, each time the pressure inside them varies, for example in the case of accidental contacts and collisions caused by vehicles as they pass through.

[0009] Indeed, when the vehicle collides with the rib, the electronic transmitter immediately sends an impulse to a receiver, which can be activated through radio contact, which is displaced near to a fixed point and which immediately takes care of interrupting the electrical power supply to the system; consequently, if the gate is in movement, it instantly locks in the position reached.

[0010] As an alternative to ribs of the pneumatic type, ribs also made out of deformable material, which contain inside of them a rigid steel thin cable which connects, by means of lever members, a contact of an electronic transmitter, each time the tension of the thin cable in-

creases by a predetermined value. The electronic transmitter immediately sends an impulse to a receiver, which can be activated through radio contact, which is displaced near to a fixed point and which immediately takes care of interrupting the power supply to the system.

[0011] In this way, any accidental contact or collision against the rib causes the instant locking of the gate in the position taken up at the moment of contact.

[0012] In the case of automatic sliding gates, the protection rib is mounted, through the application of a shaped aluminium profile, onto the front advancing surface of the gate itself.

[0013] A free space is left at the bottom of the profile so as to be able to fix it to the structure of the gate.

[0014] Such a space, which is usually about 3-5 centimetres from the ground, has no deformable material, of which the protection ribs consist and, therefore, represents a serious danger to the user, especially if it is a child, at any time and, in particular, as the automatic gate is being moved.

[0015] Furthermore, the upper end of the profile also usually has a free space, so as to be able to fix it to the structure of the gate.

[0016] Such a space is generally also used to contain the lever members and the switches of a power shut-off mechanism.

[0017] It has none of the deformable material of which the protection rib consists, and thus represents a further danger to the user.

[0018] The purpose of the present invention is therefore that of avoiding the aforementioned drawbacks and in particular that of realising an improved protection and safety device for automatic sliding gates which allows a fast and safe intervention for every type of collision with an obstacle or malfunction thereof.

[0019] Another purpose of the present invention is that of realising an improved protection and safety device for automatic sliding gates, the operation of which is, in all situations, reliable, precise and correct, even in the case of accidental failures or malfunctions of the electrical control apparatus.

[0020] A further purpose of the present invention is that of realising an improved protection and safety device for automatic sliding gates which is particularly simple, with relatively low manufacturing costs, in virtue of the advantages gained.

[0021] These and other purposes of the present invention are achieved by realising an improved protection and safety device for automatic sliding gates as outlined in claim 1.

[0022] Further characteristics are foreseen in the subsequent claims.

[0023] The characteristics and advantages of an improved protection and safety device for automatic sliding gates according to the present invention shall become clearer from the following description, given as an example and not for limiting purposes, referring to the attached schematic drawings in which:

- figure 1 is a partially exploded axonometric view of a protection rib for automatic sliding gates of the known type;
- figure 2 is an exploded axonometric view of a protection rib for sliding automatic gates, comprising at a lower end a first embodiment of the protection and safety device according to the present invention;
- figure 3 represents a partial section side view of an upper end of a rib for automatic sliding gates, comprising a second embodiment of the protection and safety device according to the present invention;
- figure 4 shows a section view of the upper end of the rib according to figure 3, made according to the line IV-IV;
- figure 5 is a front view of the end of the rib according to figure 3, from which a covering shell of the upper end has been removed;
- figure 6 represents a partial section side view of an end of a rib for automatic sliding gates, comprising a third embodiment of the protection and safety device according to the invention;
- figure 7 shows a section view of the end of the rib according to figure 6, made according to the line VII-VII;
- figure 8 is a front view of the end of the rib according to figure 6, from which a covering shell of the upper end has been removed;
- figure 9 represents a partial section side view of an end of a rib for automatic sliding gates, comprising a fourth embodiment of the protection and safety device according to the present invention;
- figure 10 shows a section view of the end of the rib according to figure 9, made according to the line X-X.

[0024] It should be noted the following description, relative to preferred embodiments, refers to an application of the protection and safety device, according to the invention, on automatic gates of the sliding type, which can be positioned in correspondence with the side posts of the gate.

[0025] Alternatively and just as well, the protection and safety device, object of the present invention, can also be used for automatic gates of a different type, for example tilting doors or double panel doors.

[0026] With reference to the mentioned figures, with 10 a protection rib for automatic sliding gates is generically indicated, comprising a shaped profile 12, suitable for being fixed onto a front advancing surface of the gate and a respective protection 14, substantially shaped as a triangular prism and made out of rubber, plastic or in any case out of deformable material, which is annexed to the profile 12.

[0027] The profile 12 of the rib 10 is usually mounted on the front of the advancing surface of the automatic sliding gate.

[0028] The protection 14 reaches a predetermined level of the rib 10 and, in particular, as shown clearly in

figure 1, is inserted into a terminal 16, which is typically 3-5 centimetres off the ground, such as to leave a pre-determined space, in which the profile 12 remains in view to be able to carry out the mounting thereof onto the surface of the gate, through an attachment screw 18 to be inserted into a through-hole.

[0029] Inside a guide block 20, which is housed in the protection 12, a steel cable 22 slides, connected to a *per se* known intervention mechanism for interrupting the power supply to an actuation device of the sliding gate, in the case of collisions of a user against the rib 10.

[0030] In fact, in the case of a collision of the user against the rib 10, there would be an extremely dangerous situation for the health of the unfortunate person if the actuation device were to continue to move the sliding gate open or closed.

[0031] Moreover, as can be seen in figure 2, in correspondence with a lower portion of the advancing surface of the gate, the insertion of a protective shell 30 is foreseen, preferably made out of rubber, plastic or another deformable material, which encloses inside of it a substantially L-shaped lever member 32 mounted, through the pin 34, in the support 36; the shell 30 is fixed to the lever member 32 through a screw 35.

[0032] Finally, a terminal part or end 23 of the cable 22 is housed in an end attachment 40 of the "L" of the lever member 32, which is opposite the pin 34.

[0033] In the case in which a collision takes place in correspondence with generic points of the moving rib 10, because objects or people are present along the entry area to private property, the power supply to the actuation motor for the sliding gate is immediately switched off, by means of the power shut-off mechanism, so as to automatically stop it from moving, either open or closed, and to thus avoid worse problems.

[0034] Unlike that which can happen using conventional ribs 10, of the type represented in figure 1, also in the case in which the collision takes place near to a lower portion of the advancing surface of the sliding gate, in other words in correspondence with the protection shell 30, the power shut-off mechanism intervenes and, therefore, the gate stops immediately.

[0035] Indeed, a collision which takes place near to the zone indicated with A in figure 2 is transmitted to the attachment 40 of the lever member 32 and from here to the cable 22, since the shell 30, made out of deformable material, is intimately connected to the end portion of such a lever member 32.

[0036] In fact, a collision which takes place on the shell 30 along the zone A causes a rotation of the lever member 32 about a fixed fulcrum (pin 34), whereas a mobile fulcrum (screw 35) moves sideways towards the profile 12.

[0037] Such movements consequently cause a small movement of the cable 22, which is sufficient to actuate the power supply switch-off mechanism situated near to one of the ends of the cable 22 and therefore the interruption of the power supply to the actuation motor of the

sliding gate, which also in this case instantly stops moving.

[0038] In order to obtain a rapid and effective intervention, it is advantageous to arrange the lever member 32 at an angle, with respect to an imaginary vertical axis, which follows the longitudinal progression of the rib 10.

[0039] Figures 3, 4 and 5 illustrate a second possible practical embodiment of the invention, where the components which are the same as and/or equivalent to those illustrated in figures 1 and 2 have the same reference numbers increased by 100.

[0040] In this case the protection and safety device is arranged at the top of the rib 110.

[0041] The intervention mechanism for shutting off the power supply to an actuation device of the sliding gate can be seen in figure 3, and comprises a substantially L-shaped main lever 150 mounted on a fixed fulcrum 134, connected to a support 136, fixed at the top to the profile 112.

[0042] The fulcrum 134 is in a central position of the main lever 150, which carries at one end 152 the termination 123 of the cable 122. An opposite end 154 of the lever 150 has a flat surface 156, and a spring 158 for countering the support 136.

[0043] The flat surface 156 is in contact with a tab 160, which is part of a microswitch or "micro" 159, which is suitable for actuating a button 161 of the "micro" 159 itself.

[0044] When a collision against the protection 114 takes place, the end 152 of the main lever 150, is pulled towards the bottom, by means of the cable 122 ensuring that simultaneously the flat surface 156 acts upon the tab 160, which in turn actuates the micro 159. The intervention of the micro 159 interrupts the power supply to the actuation device of the sliding gate.

[0045] The spring 158 forces the main lever 150 in a standing position, in conditions of normal working of the sliding gate.

[0046] In preferred embodiments of the invention, the protection and safety device of the rib 110 essentially consists of the substantially L-shaped lever member 132 mounted inside the main lever 150 through the fixed fulcrum 134; at an opposite end, the lever member 132 carries a mobile pin or fulcrum 135, integral with the shell 130.

[0047] Like in the case described previously and relative to an intervention device positioned in lower portions of the protection rib, the present mechanism, which can be associated with the aforementioned device inside of the protection rib itself, in order to protect upper portions thereof, operates as follows: when a collision takes place against the shell 130, the pin 135 is displaced integral with the shell 130 itself, actuating a displacement of the lever member 132, so that it presses against the tab 160, in turn responsible for the actuation of the button 161 and consequently of the micro 159, suitable for interrupting the power supply to the electric motor of the sliding gate.

[0048] Figures 6, 7 and 8 illustrate a third possible practical embodiment of the invention, alternative to the one represented in figures 3, 4 and 5, where the components which are the same as and/or equivalent to those illustrated in the aforementioned figures have the same reference numerals increased by 100.

[0049] This embodiment has, in place of the lever member 132 and the main lever 150 fixedly connected to it, a single substantially U-shaped lever member 232.

[0050] It is mounted, in its central position, on the fixed fulcrum 234, connected to a support 236, fixed at the top to the profile 212.

[0051] A first end 252 of the lever member 232 carries a termination 223 of the cable 222, whereas a second end is rotatably fixedly connected to a pin 235, integral with the shell 230.

[0052] When a collision against the protection 214 takes place, the end 252 of the lever member 232 is pulled downwards, ensuring that simultaneously the flat surface 256 acts upon the tab 260, which in turn actuates the button 261 of the micro 259, which interrupts the power supply to the electric motor of the sliding gate.

[0053] According to the invention, in the same way as that which is described above, also when a collision takes place against the shell 230, the pin 235 is displaced integral with the shell 230 itself, actuating a displacement of the lever member 232 which, through the flat surface 256, actuates the tab 260 connected to the micro 259.

[0054] Figures 9 and 10 illustrate a fourth possible practical embodiment of the invention, alternative to the previous ones, where the components which are the same as and/or equivalent to those illustrated in figures 3, 4 and 5 have the same reference numerals increased by 200.

[0055] In this example, the intervention mechanism for switching off the power supply to an actuation device of the sliding gate comprises a substantially L-shaped lever member 350 mounted on a fixed fulcrum 334, connected to a support 336, fixed at the top to the profile 312.

[0056] The fulcrum 334 is in a central position of the lever member 350, which carries at one end 352 the termination 323 of the cable 322. An opposite end 354 of the lever member 350 has a flat surface 356 and a spring 358 for countering the support 336.

[0057] The flat surface 356 is in direct contact with a tab 360, which can be used for actuating the mechanism for shutting of the power supply to the sliding gate.

[0058] As in the previous cases, when a collision takes place against the protection 314, the end 352 of the lever member 350 is pulled downwards, ensuring that simultaneously the flat surface 356 acts upon the tab 360, which in turn actuates the micro 359 through the button 361, so as to shut-off the power supply.

[0059] The spring 358 then takes the lever member 350 back into a rest position, in normal operating conditions of the sliding gate.

[0060] According to the invention, in the same way as that which is foreseen in the case of collisions of an obstacle in correspondence with a central portion of the protection rib, the protection and safety device comprises a spring or plate 337, substantially at an obtuse angle, and fixed at one of its ends onto a pin 339, mounted on the lever member 350 and, at its opposite end, onto a pin 335, integral with the shell 330.

[0061] When a collision takes place against the shell 330, the pin 335 is displaced integral with the shell 330 itself, actuating a displacement of the spring or plate 337, which pushes the tab 360, which actuates the button 361 of the micro 359 to shut off the power supply to the actuation motor of the sliding gate.

[0062] In short, according to the present invention, it is possible to avoid risks of injury, both in the case of collisions which can take place in correspondence with the lower end portion of a protection rib for sliding gates, and in the case of collisions by obstacles which can hit the upper end portion of the rib; moreover, the intervention mechanisms foreseen in the lower and upper portions of the rib and realised according to that which is described can be variously combined on the rib itself and used individually or in combination with each other, according to the user's needs.

[0063] Finally, the realisation according to the invention allows a complete protection to be realised on the entire length of each protection rib which can be realised for conventional sliding gates; furthermore, the fact that it foresees a deformable shell, both on the top and bottom of the rib, allows the use of rigid surfaces, which are particularly dangerous for whoever is in the vicinity, to be avoided.

[0064] From the description which has been made the characteristics of the improved protection and safety device for automatic sliding gates object of the present invention are clear, just as the relative advantages are clear, amongst which we recall:

- simple and reliable use;
- substantial reduction of the risks for the user connected to the movement of the sliding gate;
- low manufacturing costs.

[0065] Finally, it is clear that the improved protection and safety device for automatic sliding gates thus conceived is susceptible to numerous modifications and variants, all covered by the invention; moreover, all of the details can be replaced by technically equivalent elements. In practice, the materials used, as well as the shapes and sizes, can be whatever according to the technical requirements.

[0066] The scope of protection of the invention is therefore outlined by the attached claims.

Claims

1. Improved protection and safety device for automatic gates, in particular for automatic sliding gates, comprising at least one protection rib (10, 110, 210, 310) which includes a shaped profile (12, 112, 212, 312) connected to a protection element (14, 114, 214, 314), containing inside of it at least one portion of cable (22, 122, 222, 322), said cable (22, 122, 222, 322) being attached to a mechanism for shutting off the power supply to said gate, at the moment in which pressure is applied onto said protection element (14, 114, 214, 314), following a collision of an obstacle against said rib (10, 110, 210, 310), **characterised in that** at least in a portion of said profile (12, 112, 212, 312), corresponding to a lower and/or upper zone of said rib (10, 110, 210, 310), the insertion of at least one shell (30, 130, 230, 330) is foreseen, attached to said protection element (14, 114, 214, 314), comprising, inside of it, actuation means (32; 132, 150; 232; 337, 350), connected to said cable (22, 122, 222, 322), of said mechanism for shutting off the power supply.
2. Protection and safety device according to claim 1, **characterised in that** said shell (30, 130, 230, 330) is made out of deformable material, preferably rubber, and **in that** said actuation means (32; 132, 150; 232; 337, 350) comprise at least one shaped lever member (32, 132, 232, 350).
3. Protection and safety device according to claim 2, **characterised in that** said lever member (32, 132, 232, 350) is fixed onto at least one support (36, 136, 236, 336) of said profile (12, 112, 212, 312).
4. Protection and safety device according to claim 1, **characterised in that** said actuation means (32; 132, 150; 232; 337, 350) comprise at least one shaped lever member (32, 132, 232, 350), at least one main lever (150), fixedly connected to said lever member (132), and at least one counteraction spring or plate (337), said lever member (32, 132, 232, 350) being substantially L-shaped (32, 132, 232, 350) and comprise at least one fixed fulcrum (34, 134, 234, 334) and at least one mobile fulcrum (35, 135, 235, 335).
5. Protection and safety device according to claim 1, **characterised in that** said actuation means (32; 132, 150; 232; 337, 350) comprise at least one shaped lever member (32, 132, 232, 350), at least one main lever (150), fixedly connected to said lever member (132), and at least one counteraction spring or plate (337), said lever member (32, 132, 232, 350) being substantially L-shaped (32, 132, 232, 350) and comprising at least one fixed fulcrum (34, 134, 234, 334), said spring or plate (337) com-

prising at least one mobile fulcrum (35, 135, 235, 335).

6. Protection and safety device according to claim 4,
characterised in that said main lever (150) and
said lever member (232, 350) comprise an end
(152, 252, 352), where said cable (122, 222, 322)
is fixed, which is positioned on the opposite side
with respect to a surface (156, 256, 356) in contact
with an actuation device (161, 261, 361) for shutting
off the power supply to said gate, where near to said
surface (156, 256, 356) there is a spring (158, 258,
358) for countering said support (136, 236, 336).
7. Protection and safety device according to claim 4,
characterised in that, in the case of a collision
against at least one portion of said shell (30, 130,
230, 330), said mobile fulcrum (35, 135, 235, 335),
connected to the shell (30, 130, 230, 330), is dis-
placed causing a microswitch device (159, 259,
359) to be actuated.
8. Protection and safety device according to claim 4,
characterised in that said main lever (150) is
mounted on said fixed fulcrum (134), connected to
an attachment support (136), said fixed fulcrum
(134) being positioned in a central portion of said
lever (150) and on said fulcrum (134) being mount-
ed an end of said lever member (132).
9. Protection and safety device according to claim 4,
characterised in that said lever member (232) is
substantially U-shaped and is mounted, in a central
portion thereof, on said fixed fulcrum (234), at least
one first end (252) of said lever member (232) car-
rying a termination (223) of the cable (222), and an
opposite end being rotatably fixedly connected to a
pin (235), integral with the shell (230).
10. Protection and safety device according to claim 4,
characterised in that said lever member (350) is
substantially L-shaped and is mounted on a fixed
fulcrum (334), connected to a support (336), fixed
at the top to the profile (312), where said fulcrum
(334) is positioned in a central portion of the lever
member (350), on said lever member (350) being
fixed, by means of a pin (339), a spring or plate
(337), substantially at an obtuse angle.

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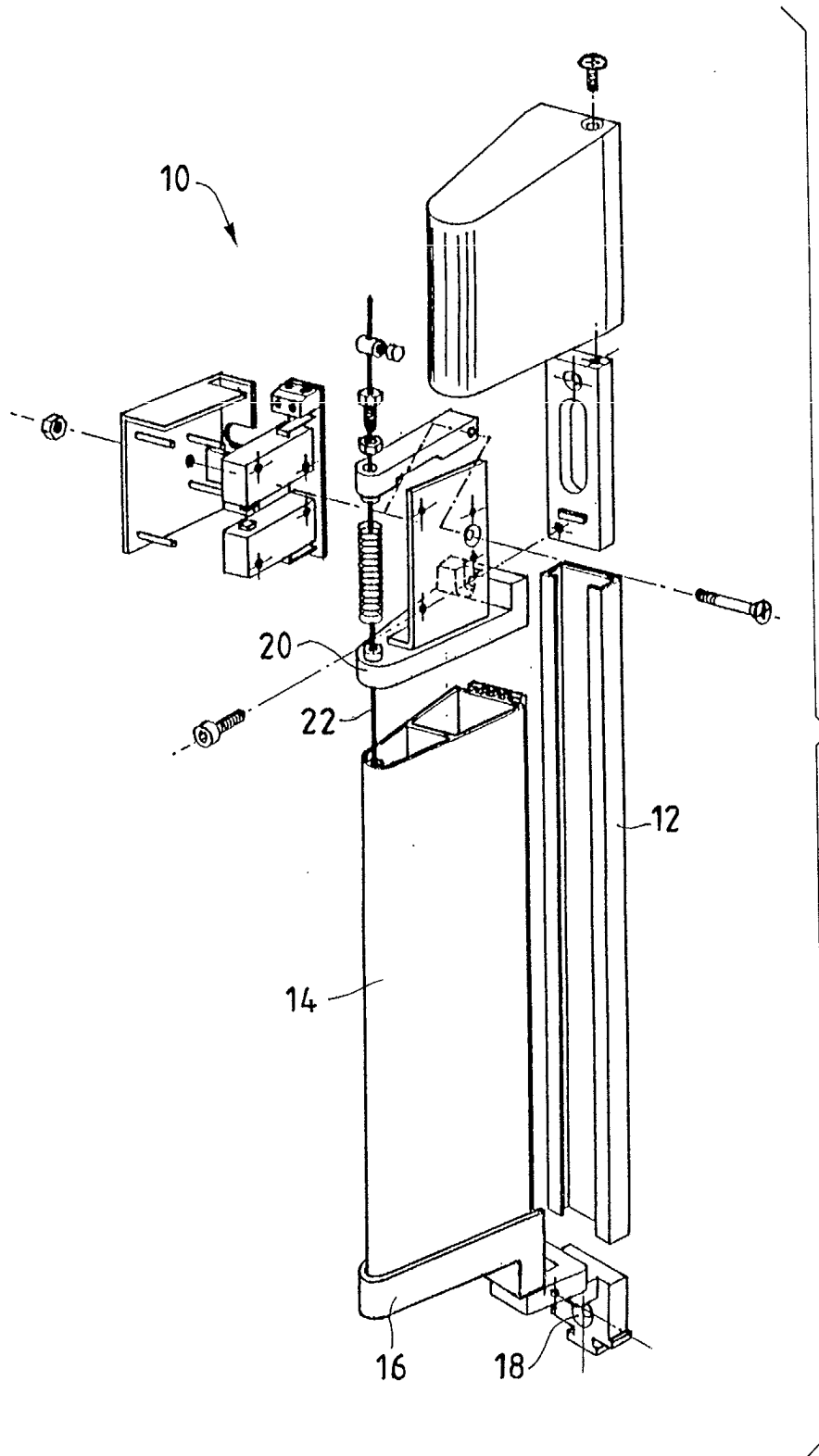


Fig.1
PRIOR ART

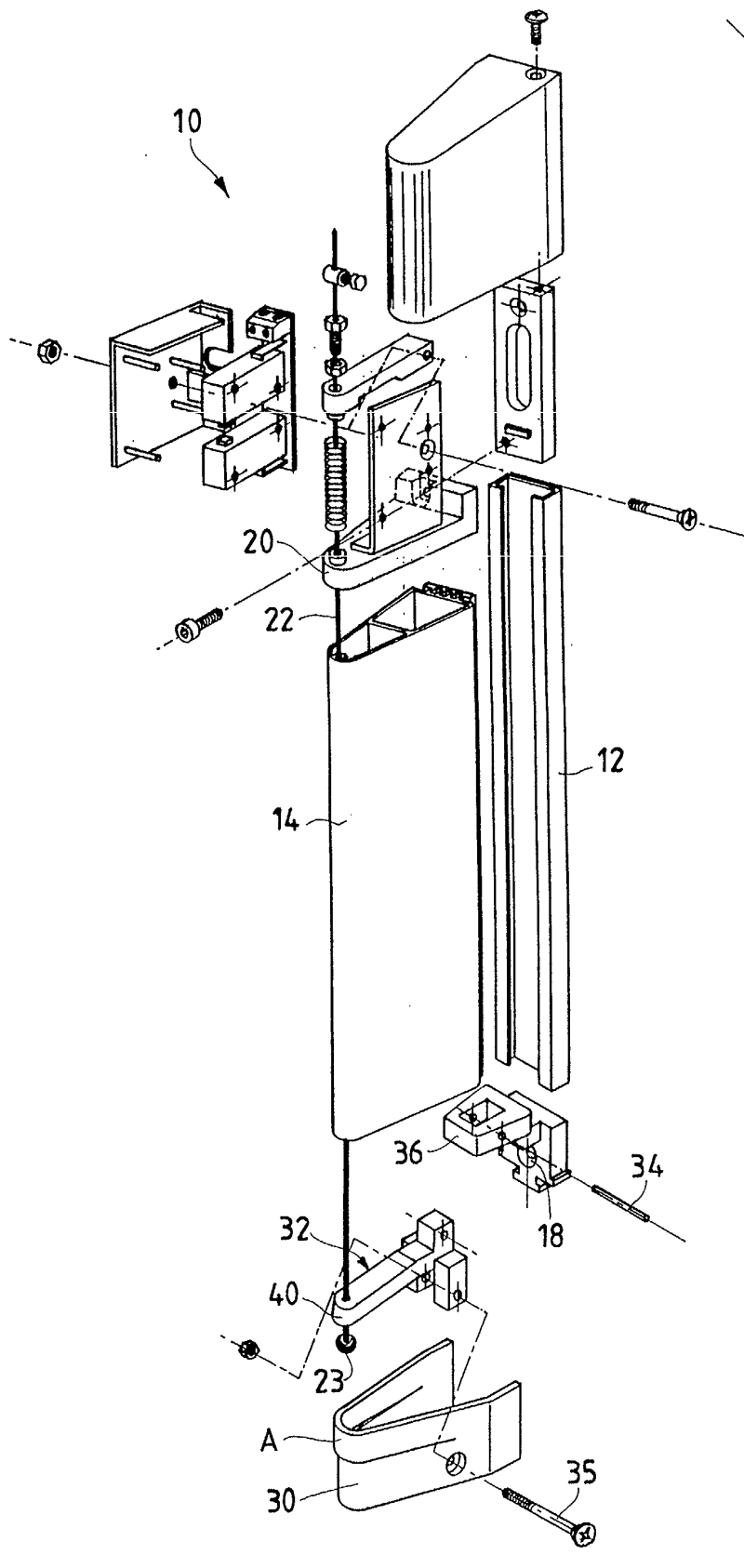


Fig.2

Fig.3

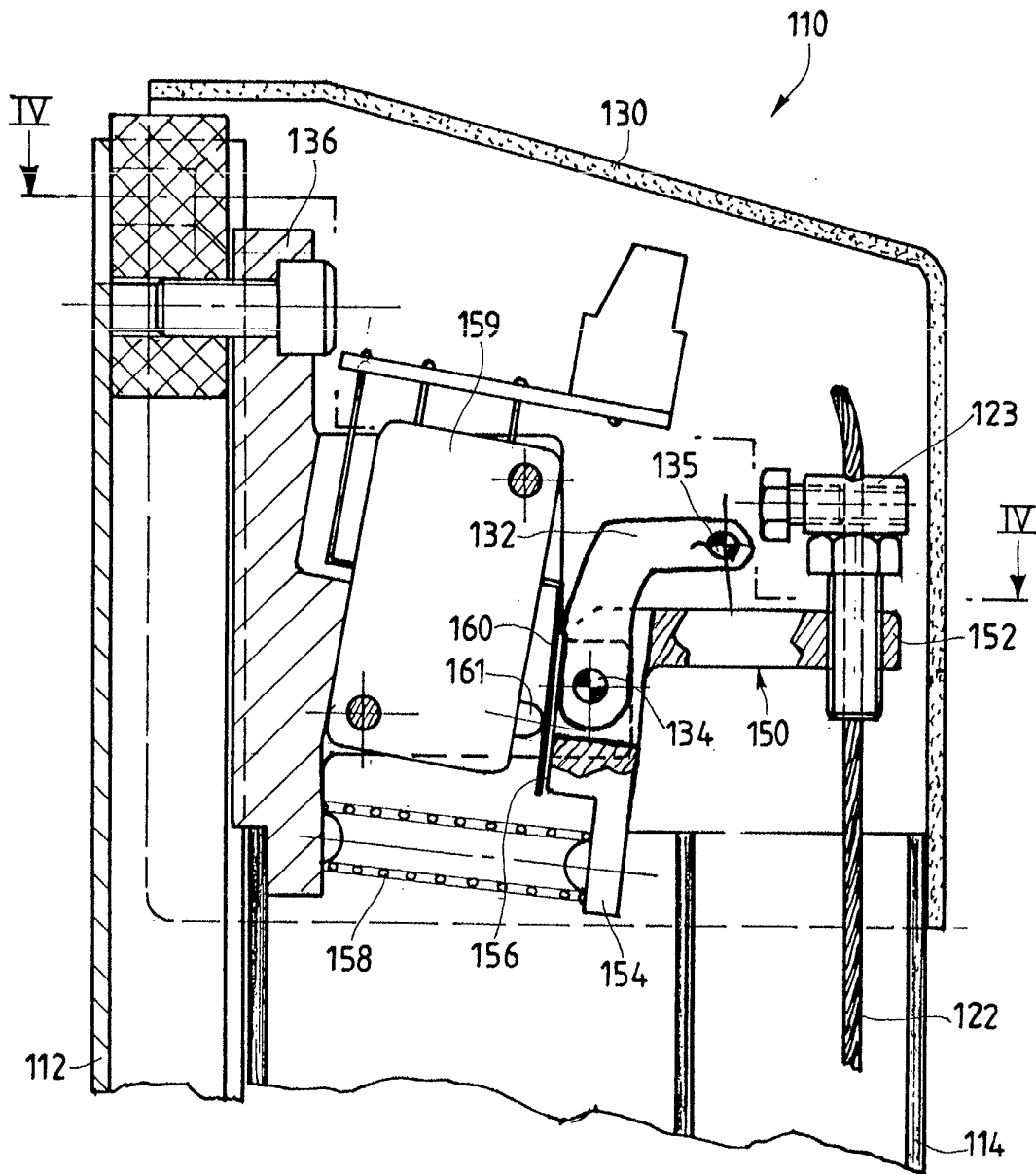


Fig.4

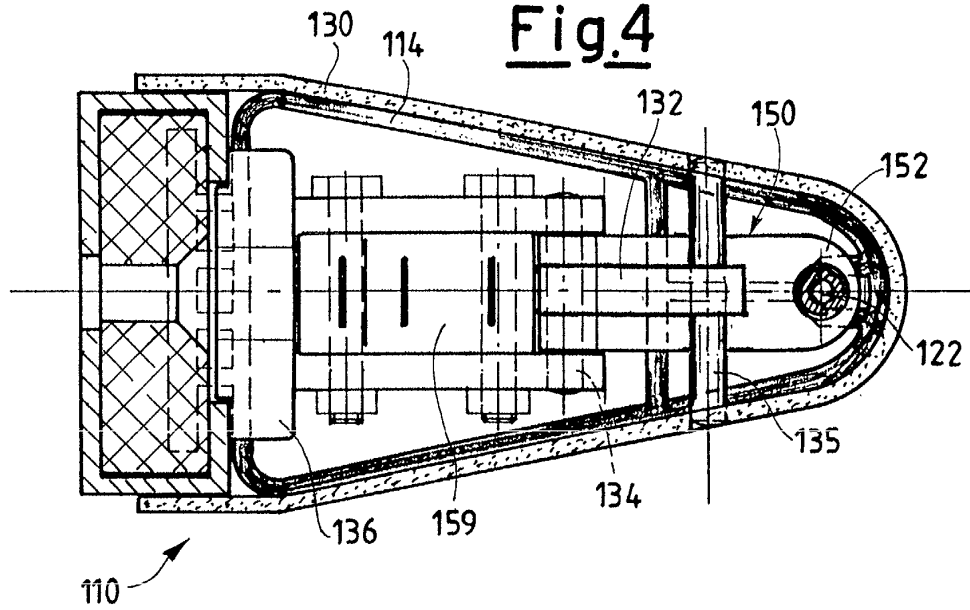


Fig.5

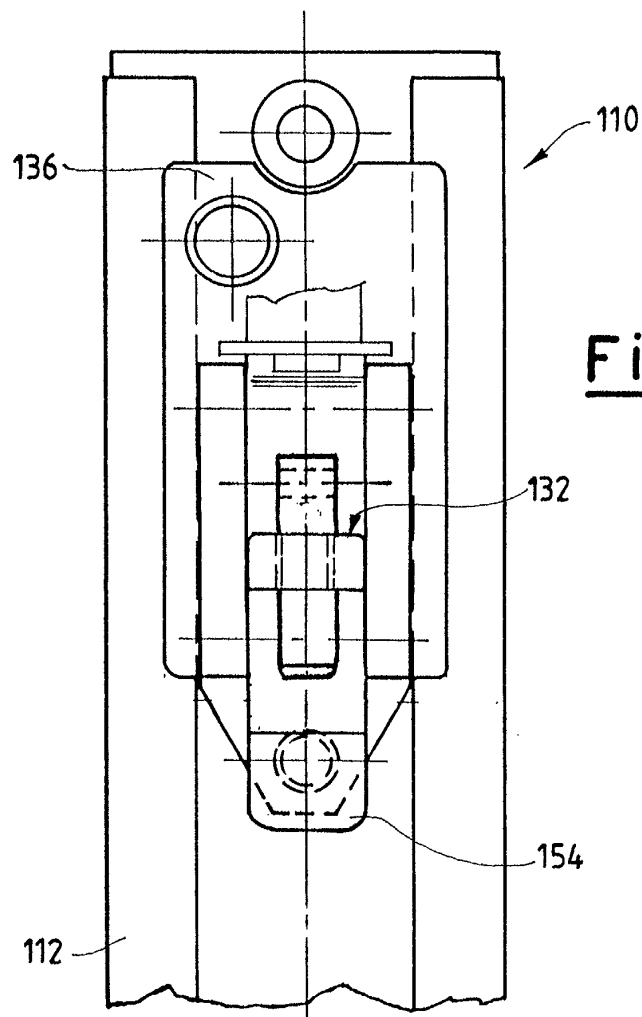


Fig.6

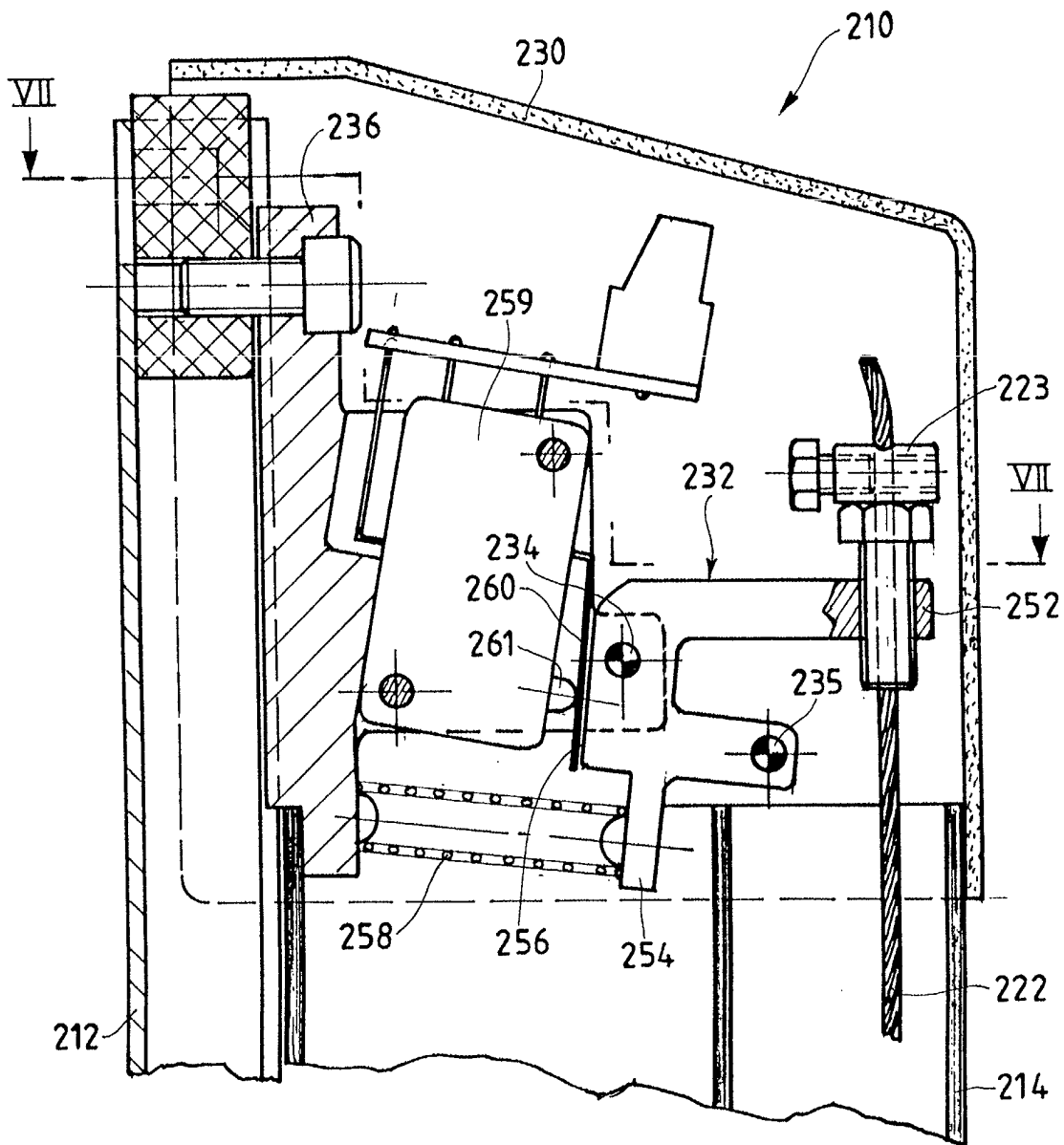


Fig.7

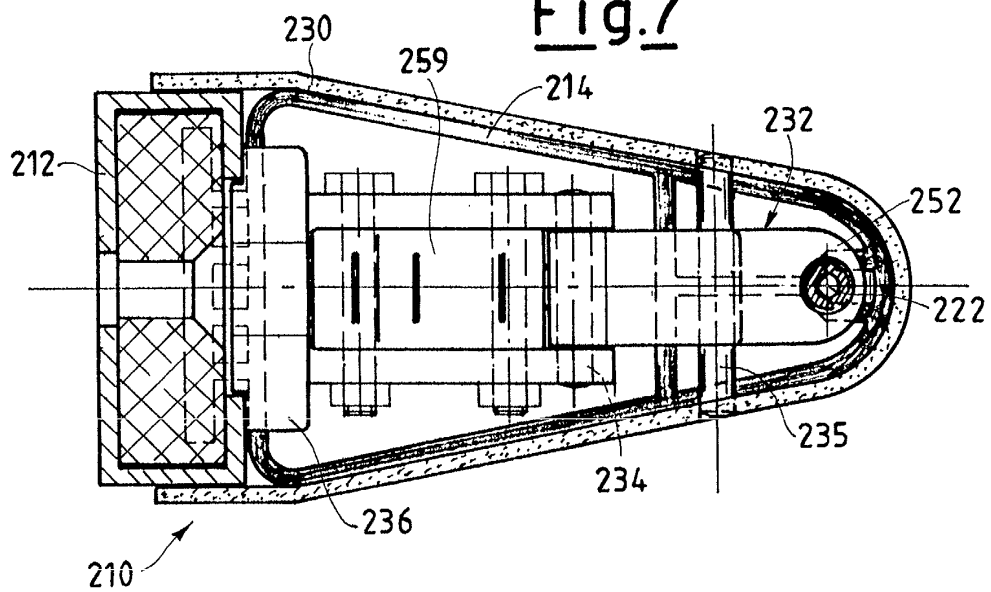


Fig.8

