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(54) **Safety device for a sectional closing element, such as a door, a main door, a gate or suchlike**

(57) Safety device (10) for a sectional closing element (26) comprising a plurality of sections or panels (11) that cooperate longitudinally with each other. Each panel (11) includes slider elements (12) that slide along a sliding axis (X) in mating guides (13). The device (10) includes a pair of rolling members (14) that lie on the sliding axis (X) and are associated with respective frames (15, 16) pivoted together at a central pivoting point (P) normally offset with respect to the sliding axis (X). The frames (15, 16) can oscillate from a first position wherein the rolling members (14) are near each other, and a second position wherein the rolling members (14) are distant from each other. The passage from the first position to the second position is activated by the breaking of the drive elements (20). A stop element (22) associated with a frame (15, 16) acts against the guides (13) when the frames (15, 16) move towards the second position, in order to block the displacement of the closing element (26). An elastic member (24) is provided to take the frames (15, 16) into the second position.

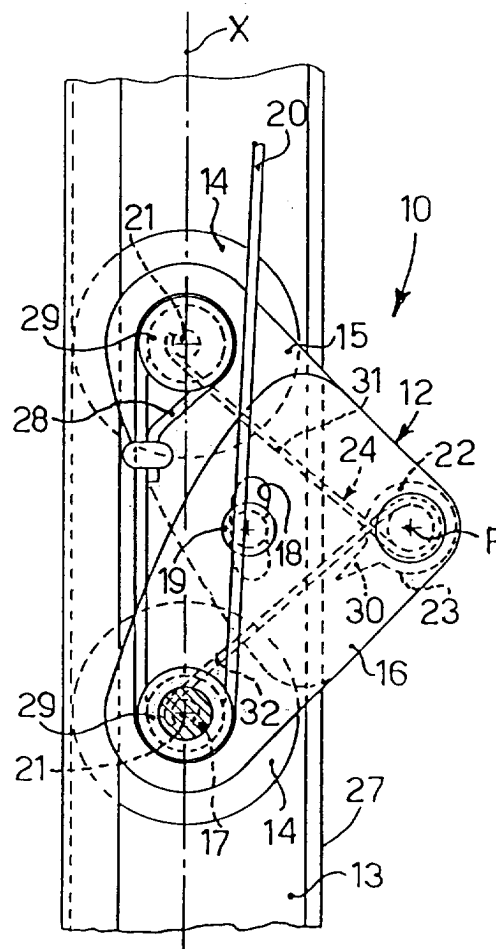


fig. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a safety device for a sectional closing element such as a door, a main door, a gate or suchlike, that is, a closing element consisting of several longitudinal sections or panels, parallel to each other, hinged to each other and movable along guide means between a closed position and an open position.

[0002] To be more exact, the invention concerns a safety device able to intervene automatically to block said sectional closing element in any position whatsoever in the event that breakages occur in its drive means.

BACKGROUND OF THE INVENTION

[0003] Sectional closing elements are known, such as doors, main doors, gates or suchlike, with longitudinal sections or panels, hinged to each other by means of hinges situated on the inner side, wherein each panel includes at the ends slider means able to slide in appropriate guides in order to pass from a closed position of the closing element, which is normally substantially vertical and prevents any passage, to an open position of the closing element, where passage is allowed.

[0004] Such panels can be made of solid wood, of box-like profiled metal sheet with expanded polyurethane inside, or a mixture of box-like profiled metal sheet with heads made of extruded aluminum. They can also be made entirely of extruded aluminum.

[0005] The movement from the closed position to the open position of the panels can be effected in any known manner, for example either manually or automatically.

[0006] The manual movement of such panels is achieved not only by lifting the closing element manually but also by means of an element that functions as a counter-weight connected to the closing element by means of a metal cable associated with the slider means of the base panel, that is, the panel which in the closed position rests on the ground.

[0007] The automatic movement is effected by a drive member that draws or thrusts the various panels in order to determine the open position or the closed position of the closing element, aided by the action of the element that functions as a counter-weight.

[0008] One of the main shortcomings of such known solutions is that the metal cable can break during the movement steps, thus causing the whole closing element to fall due to gravity, with the consequent risk of causing serious damage to the users and/or structures.

[0009] It is known that this shortcoming can be obviated by means of stop elements arranged in determinate positions on the panels, so that, in the event that the cable breaks, the travel of the closing element is stopped by said stop elements.

[0010] However, these known solutions do not guarantee optimum safety of the closing element, since such elements are not able to intervene under certain operating conditions.

[0011] For example, such elements do not function correctly in the curved zone of the guides wherein the closing element passes from its closed position to its open position, since in this segment the stop element is distanced from the guides and is not able to have any type of grip on the guides, thus leaving a zone wherein the sectional closing element cannot be controlled if the metal cable breaks.

[0012] Applicant has devised and embodied the present invention to overcome these shortcomings of the state of the art and to obtain other advantages.

SUMMARY OF THE INVENTION

[0013] The present invention is set forth and characterized in the main claim, while the dependent claims describe other innovative characteristics of the invention.

[0014] The purpose of the invention is to achieve a safety device for a sectional closing element consisting of a safety brake which, in the event of a breakage in the drive means, is able to immediately block said closing element, preventing the travel thereof, in whatsoever position it might be.

[0015] The present invention is applied to a sectional closing element comprising a plurality of sections or panels cooperating longitudinally with each other, each of which includes slider means that slide along a sliding axis in mating guide means. The sectional closing element is moved by drive means.

[0016] In accordance with the aforesaid purposes, the safety device provides at least a pair of rolling means lying on the sliding axis and associated with respective frames pivoted together at a central pivoting point normally located offset with respect to the sliding axis of the rolling means.

[0017] In this way, the frames can oscillate from a first position, wherein the rolling means are near each other and the pivoting point is at maximum distance from the sliding axis, and a second position, wherein the rolling means are distant from each other and the pivoting point is at minimum distance from the sliding axis.

[0018] Passage from the first to the second position is activated by a breakage in the drive means.

[0019] The safety device according to the present invention also comprises stop means associated with one of the two frames and able to act progressively against the guide means while the frames move towards the second position, so as to act as a stop element blocking the movement of the sectional closing element.

[0020] Elastic means are also provided, which tend to take the frames to their second position when the drawing action of the drive means fails.

[0021] The drive means are normally of the flexible

type, for example a metal cable, and the device according to the invention is normally located in cooperation with the terminal panel.

[0022] The cooperation of the drive means with the safety device is such as to keep the two frames normally in the first position.

[0023] In the event that the drive means break, they do not keep the two frames in their first position, thus allowing the elastic means to distance them from each other, making the stop means act against the guide means.

[0024] In this way, according to the present invention, in the event that the drive means suddenly break, the closing element is immediately blocked, whatever its position with respect to the guides.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] These and other characteristics of the present invention will be apparent from the following description of a preferential form of embodiment, given as a non-restrictive example, with reference to the attached drawings wherein:

- fig. 1 is a three-dimensional view of a sectional door according to the present invention;
- fig. 2 is a schematic view of an enlarged detail of fig. 1, in a first operating condition;
- fig. 3 is a schematic view of an enlarged detail of fig. 2, in a second operating condition.

DETAILED DESCRIPTION OF THE DRAWINGS

[0026] With reference to fig. 1, a safety device 10 for a sectional closing element according to the present invention is in this case applied to a door 26, for example of the type able to close a garage, a warehouse or such-like.

[0027] The door 26 comprises a plurality of modular elements or panels 11, coupled longitudinally in pairs by means of respective hinges, of a known type and not shown in the drawings.

[0028] The hinges allow a reciprocal rotation of the panels 11 in order to make the door 26 pass in this case from a substantially vertical closed position to a substantially horizontal open position.

[0029] The device 10 comprises slider means or sliders 12, arranged on opposite sides with respect to the panels 11 and able to slide inside respective guides 13, so as to allow the door 26 to pass from the closed to the open position.

[0030] Each slider 12 comprises two wheels 14 (fig. 2), each one pinned by means of pins 21 to a respective frame 15 and 16. Both the wheels 14 are arranged on the same sliding axis "X", substantially parallel to the guides 13.

[0031] The two frames 15 and 16 are pivoted together at a pivoting point "P", normally offset with respect to the

sliding axis "X".

[0032] Axially to one of the two wheels 14 a rod 17 is fixed, to which the panels 11 are rotatably connected in a known manner.

[0033] The frame 16 is provided with a stop element 22 made of hard metal, substantially cylindrical in shape and coaxial with the pivoting point "P", having a circular contact surface 23 with a high friction coefficient.

[0034] Normally, the stop element 22 is arranged with its contact surface 23 in proximity with an outer surface 27 of the guide 13.

[0035] At least a pointed element 30 is applied on the contact surface 23 and knocks against the outer surface 27 of the respective guide 13 until it jams. In this way, as will be explained hereafter, the device according to the invention guarantees to stop the door 26 in the event of a breakage of the steel cable 20.

[0036] According to a variant, the stop element 22 is arranged in proximity with any outer or inner surface of the guides 13.

[0037] According to another variant, the contact surface 23 can be for example knurled, shaped or otherwise.

[0038] According to another variant, not shown here, the stop element 22 is shaped substantially like a pad and is arranged in proximity with the pivoting point "P".

[0039] Furthermore, two or more stop elements 22 can be provided, cooperating with respective surfaces of the guide 13.

[0040] Each frame 15 and 16 comprises respective eyelets 18 coinciding with each other, inside which a block 19 is arranged, able to define the limit closed position of the frames 15 and 16 and to keep the latter adjacent while still allowing them to move with respect to each other.

[0041] The slider 12 to which the lower terminal panel 11 is fixed, that is to say, the panel that in the closed position is nearest the ground, is connected to one end of a steel cable 20.

[0042] The cable 20 has one end folded back on itself, so as to define an annular part 28, by means of which it is fixed to a circular seating 29 coaxial with the pin 21 of the frame 15. The cable 20 is also wound, as shown in figs. 2 and 3, around a circular seating 29 arranged coaxial with the pin 21 of the frame 16. In this way, by drawing the cable 20 the two wheels 14 tend to draw closer to each other, thus distancing the pivoting point "P" from the sliding axis "X", and consequently the stop element 22 from the surface 27 of the guide 13.

[0043] In correspondence with the pivoting point "P" there is also a spring 24 provided with two arms 31 and 32 which act on the pins 21. The action of the spring 24 tends to keep the wheels 14 normally separate from each other.

[0044] The position of the spring 24 is not essential for the purposes of the present invention. In fact, the spring 24 can be positioned between the two frames 15 and 16 in any position, provided that it tends to keep the

wheels 14 normally separate from each other.

[0045] The other end of the cable 20 is connected to a drum 33, moved by a helical spring 34 functioning as a counter-weight, which recovers the cable 20 during the passage of the door 26 from the closed position to the open position. This movement of the door 26 is effected by any known means, for example by means of an electric motor 25, which draws the panels 11 in order to determine the upwards or downwards movement thereof.

[0046] The safety device 10 as described heretofore functions as follows.

[0047] Under normal conditions of use, wherein the door 26 is in its closed position, the electric motor 25 is started so as to recover the cable 20 and cause the upward movement of the panels 11. In this way the traction of the cable 20 exerted on the slider 12 takes the two wheels 14 to overcome the force of the arms 31 and 32 of the spring 24 and draw them close together.

[0048] This reciprocal drawing together of the wheels 14 leads to a reciprocal rotation of the two frames 15 and 16 (fig. 3) which entails a distancing of their pivoting point "P" from the sliding axis "X", and consequently the slight displacement of the stop element 22 from the outer surface 27 of the guide 13.

[0049] In the event that the traction of the cable 20 should be lacking, for example due to a breakage of the cable 20 itself, the action of the spring 24 leads the two wheels 14 to move apart from each other. This reciprocal distancing of the two wheels 14 entails a rotation of the two frames 15 and 16 in a direction opposite to the previous one.

[0050] In this way, the pivoting point "P" rapidly approaches the sliding axis "X" until the stop element 22 is put progressively into cooperation with the outer surface 27 of the guide 13.

[0051] The cooperation between the stop element 22 and the outer surface 27 causes the door 26 to stop immediately in whatever position it might be.

[0052] It is clear, however, that modifications and/or additions of parts may be made to the safety device 10 as described heretofore, without departing from the field and scope of the present invention.

[0053] According to another variant, the contact surface 23 can be made of rubber, asbestos fibers and brass fibers, such as Ferode®, or otherwise, provided that it guarantees that the door 26 is stopped in the event of breakage of the cable 20.

[0054] It is also clear that, although the present invention has been described with reference to specific examples, a skilled person in the art shall certainly be able to achieve many other equivalent forms of sectional closing element such as a door, a main door, a gate or suchlike, all of which shall come within the field and scope of the present invention.

Claims

1. Safety device for a sectional closing element (26) of the type comprising a plurality of sections or panels (11) cooperating longitudinally with each other, each of said panels (11) including slider means (12) able to slide along a sliding axis (X) in mating guide means (13), said closing element being moved by drive means (20), **characterized in that** it includes at least a pair of rolling means (14) lying on said sliding axis (X) and associated with respective frames (15, 16) pivoted together at a central pivoting point (P) normally offset with respect to said sliding axis (X), said frames (15, 16) being able to oscillate from a first position, wherein said rolling means (14) are near each other, and a second position, wherein said rolling means (14) are distant from each other, the passage from the first position to the second position being activated by the breaking of the drive means (20), stop means (22) being associated with one of said frames (15, 16) and able to act against said guide means (13) when said frames (15, 16) move towards said second position, in order to block the displacement of the sectional closing element (26), elastic means (24) being provided to tend to take said frames (15, 16) into said second position.
2. Safety device as in claim 1, **characterized in that** in said first position said pivoting point (P) is at maximum distance from said sliding axis (X).
3. Safety device as in claim 1, **characterized in that** in said second position said pivoting point (P) is at minimum distance from said sliding axis (X).
4. Safety device as in claim 1, **characterized in that** said stop means (22) are arranged in proximity with said pivoting point (P).
5. Safety device as in claim 1, **characterized in that** said stop means (22) are substantially coaxial with said pivoting point (P).
6. Safety device as in claim 1, **characterized in that** it is associated with a terminal panel (11).
7. Safety device as in claim 1, wherein said drive means (20) are of the flexible type, **characterized in that** said drive means (20) are associated with said rolling means (14), the action of said drive means (20) keeping said frames (15, 16) normally in said first position.
8. Safety device as in claim 1, **characterized in that** said stop means (22) comprise a contact surface (23), or resting surface, said contact surface (23) comprising at least pointed means (30) able to

knock against an outer surface (27) of said guide means (13) when said frames (15, 16) are in said second position.

9. Safety device as in claim 8, **characterized in that** 5
said contact surface (23) is made of a material with
a high friction coefficient.
10. Safety device as in claim 8, **characterized in that**
in said first position said contact surface (23) is ar- 10
ranged in proximity with said outer surface (27).
11. Safety device as in claim 10, **characterized in that**
said contact surface (23) comprises at least a 15
knurled segment made of hard metal.
12. Safety device as in claim 10, **characterized in that**
said contact surface (23) is made of rubber material.
13. Safety device as in claim 10, **characterized in that** 20
said contact surface (23) is made of a material con-
sisting of asbestos fibers and brass fibers, such as
Ferade®.
14. Safety device as in claim 1, **characterized in that** 25
said drive means (20) have a first end wrapped
around circular seatings (29) coaxial with said roll-
ing means (14), so that the traction causes the re-
ciprocal approach of said rolling means (14). 30
15. Safety device as in claim 1, **characterized in that**
said elastic means comprise at least a spring (24)
arranged coaxial with said pivoting point (P) and
provided with two arms (31, 32) able to distance 35
said rolling means (14) from each other.

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