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

(57) Safety device (10) for a frame having a plurality of panels which have cursor means (12) that slides, along a sliding axis (X), in guide means (13), which frame is moved by drive means (20), in which the cursor means (12) comprises a pair of rolling elements (14), lying along the sliding axis (X), a pair of support elements (15, 16) on each of which a rolling element (14) is pivoted, and which are pivoted with respect to each another on a first pivoting axis (P), displaced with respect to the sliding axis (X), and substantially perpendicular to the plane on which the rolling elements (14) lie. The pair of support elements (15, 16) oscillates between a first position where the rolling elements (14) are close to one another, and a second position where the rolling elements (14) are far from each other. The passage from the first to the second position is caused by the breaking of the drive means (20). Elastic means (24) is also provided, which cooperates with the support elements (15, 16), in order to thrust the latter towards the second position, and a clamping means (22), associated with one of the support elements (15, 16), which acts against an internal surface (27) of the guide means (13) when said support elements (15, 16) are in said second position, in order to block the displacement of the sectional frame (26), and which is disposed in a position substantially opposite said first pivoting axis (P), with respect to said sliding axis (X).

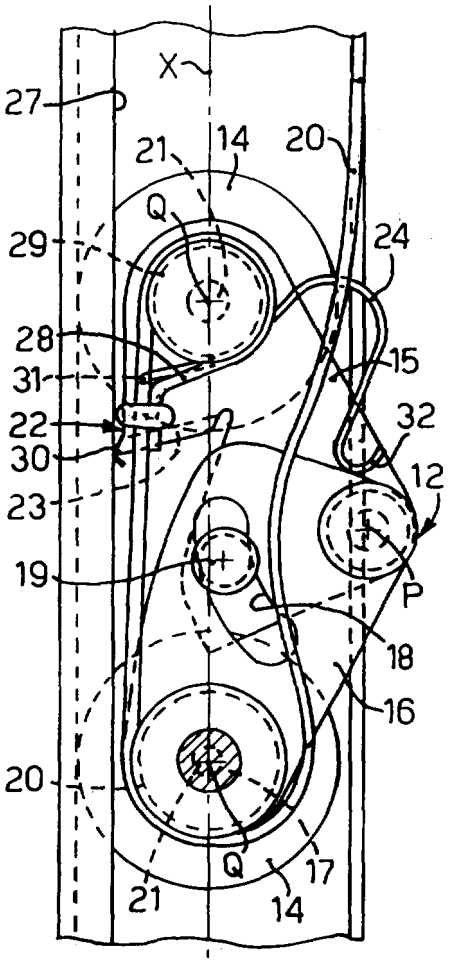

fig. 3

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Description

FIELD OF THE INVENTION

[0001] The present invention refers to a safety device for a sectional frame such as a door, main door, gate or suchlike, that is, a frame consisting of various 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. The invention automatically intervenes in order to block said sectional frame in any position, in the event that breakages occur to its drive means.

BACKGROUND OF THE INVENTION

[0002] Safety devices associated with sectional frames, such as doors, main doors, gates or suchlike, with longitudinal sections, or panels, hinged to each other by means of hinges disposed on the internal side, are known. Said safety devices are known, for example, from the patent application UD 2002 A 00218, filed by the present Applicant.

[0003] In such frames, each panel has a cursor means at its ends, able to slide in suitable sliding guides in order to pass from a closed position of the frame, which is normally substantially vertical and impedes passage, to an open position of the frame, which permits passage, and vice versa.

[0004] One of the main disadvantages of said sectional frames occurs when the metal cable breaks during movement, thus causing the whole frame to fall due to gravity, with the consequent risk of causing serious damage to users and/or structures.

[0005] Known safety devices are disposed in determinate positions on the panels so that, if the cable breaks, the travel of the frame is stopped by stopping elements of the safety devices.

[0006] These known safety devices consist of two support elements, pivoted to one another on a pivoting axis, and are associated with rolling elements, disposed along a sliding axis, which slide along sliding guides.

[0007] The support elements are able to oscillate between two positions in which there is, respectively, minimum and maximum distance between the central pivoting axis and the sliding axis of the rolling elements. The change between the two positions is determined by the breaking of the drive means.

[0008] The safety device also comprises clamping means, coaxial with the pivoting axis. The clamping means is external and protruding from the guide means, and acts against an external surface of the guide means, while the support elements move from the position of maximum distance to the position of minimum distance between the pivoting axis and the sliding axis, in order to act as a lock, blocking the displacement of the sectional frame.

[0009] These known solutions do not guarantee a complete safety of the frame since, in certain operating conditions, they are not able to intervene.

[0010] For example, these known safety devices do not function correctly in the curved area of the guides, where the frame passes from its closed position to its open position, since in this section the safety device moves away from the guides and is unable to have any grip on them, thus leaving an area where the sectional frame cannot be controlled if the metal cable breaks.

[0011] Furthermore, these known devices excessively protrude from the guide in which they are inserted and may, in this way, be hindered by further supplementary guides or accessory devices of said sectional frames.

[0012] Purpose of the present invention is to achieve a safety device for a sectional frame that, in the event of breakage of the drive means of the sectional frame, is able to immediately block said frame and prevent it from moving, whatever position it may be in.

[0013] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0014] The present invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0015] In accordance with the above purpose, the present invention is applied to a sectional frame comprising a plurality of sections, or panels, cooperating longitudinally with one another. The sectional frame is moved by drive means, of a substantially known type, to selectively allow passage.

[0016] In accordance with the above purpose, the safety device comprises cursor means, associated with at least one of said panels and able to slide in mating guide means, along a sliding axis. The cursor means comprises at least a pair of rolling elements lying on the sliding axis and a pair of support elements, on each of which a corresponding rolling element is pivoted. The support elements are in turn pivoted to one another on a first pivoting axis, displaced with respect to the sliding axis of the rolling elements and substantially perpendicular to the plane on which said rolling elements lie.

[0017] The support elements can thus oscillate between a first position, in which said rolling elements are close to one another, and a second position, in which the rolling elements are far from each other. The passage from the first to the second position is caused by the breaking of the drive means.

[0018] The safety device according to the present invention also comprises elastic means cooperating with said support elements in order to elastically push them, against the action of the drive means, towards said second position.

[0019] Furthermore, the safety device according to the

present invention comprises clamping means associated with at least one of the two support elements, and able to act against the guide means, while the support elements move towards the second position, in order to act as a lock clamping the movement of the sectional frame.

[0020] According to a characteristic feature of the present invention, the clamping means is disposed in a position opposite said central pivoting axis, with respect to said sliding axis. The clamping means is thus internal to the guide means and projects from the pivoting axis of the rolling elements, towards an internal surface of the guide means, on which it acts in order to clamp the frame.

[0021] Advantageously, therefore, the distance between the clamping means and the internal surface of the guide means is always less than the distance between the external surface of the guide means and the central pivoting axis. Furthermore, another advantage of the device according to the present invention is that the clamping means effectively cooperates with the guide means both in the vertical segments, the curvilinear segments, and in the horizontal segments of the latter, even when double guide rails are provided, precisely because the clamping means is internal to the guide means.

[0022] The cooperation of the drive means with the safety device is such that the two support elements are normally kept in the first position.

[0023] In the event that the drive means breaks, it no longer keeps the support elements in their first position, thus allowing the elastic means to distance them from each other by driving the clamping means against the guide means.

[0024] In this way, with the safety device according to the present invention, in the event of a sudden breaking of the drive means, the sectional frame is immediately clamped, whatever its position with respect to the guides may be.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] These and other characteristics of the present invention will become 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 shows a three-dimensional view of a safety device according to the present invention associated with a sectional frame;
- fig. 2 is a schematic view of an enlarged detail of the safety device in fig. 1, in a first operating condition;
- fig. 3 is a schematic view of an enlarged detail of the safety device in fig. 1, in a second operating condition; and
- fig. 4 is a schematic view of another enlarged detail of the safety device in fig. 1, in a second operating condition.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0026] with reference to fig. 1, a safety device 10 for a sectional frame according to the present invention, in this specific case, is applied to a door 26, for example of the type able to close a garage, a warehouse or suchlike.

[0027] The door 26 comprises a plurality of modular elements, or panels 11, coupled longitudinally two by two by means of respective hinges, of a known type and not shown in the drawings. The hinges allow a reciprocal rotation of the panels 11, in order to move the door 26 from a closed position, substantially vertical, to an open position, substantially horizontal (fig. 1).

[0028] The device 10 comprises cursor means, or sliders 12, disposed on opposite sides with respect to the panels 11, and sliding inside respective mating guides 13, so as to allow the door 26 to pass from the closed position to the open position, and vice versa.

[0029] In accordance with the present invention, the guides 13 have a substantially "C" shaped section and comprise a bent portion 35, substantially at 90 degrees with respect to the peripheral pivoting axis Q, which cooperates with the safety device, as will be explained hereafter in the description (fig. 4).

[0030] Each slider 12 comprises two wheels 14 (fig. 2), disposed, when installed, along a same sliding axis "X", substantially parallel to the guides 13 and defining a common lying plane. Each wheel 14 is pivoted, by means of pins 21, to a respective support element 15 and 16, on peripheral pivoting axes "Q" (figs. 2 and 3), intersecting the sliding axis "X" and orthogonal thereto. The two support elements 15 and 16 are pivoted to each other on a central pivoting axis "P", normally misaligned or displaced with respect to the sliding axis "X", that is, not coplanar with respect to the sliding axis "X" (figs. 2 and 3) and substantially perpendicular to the plane on which the rolling elements 14 lie. In this way, the support elements 15, 16 can oscillate between a first position (fig. 2) in which the rolling elements 14 are close to each other and the central pivoting axis P is at maximum distance from the sliding axis X, and a second position (fig. 3), in which the rolling elements 14 are far from each other and the central pivoting axis P is at minimum distance from the sliding axis X.

[0031] Axially to one of the two wheels 14 a rod 17 is fixed, to which the panels 11 (fig. 1) are rotatably connected in a known manner.

[0032] The support element 15 is provided with at least a hard metal clamping element 22 which extends from the peripheral pivoting axis "Q" (figs. 2, 3 and 4), and which has a contact portion 23, with a high coefficient of friction, which extends substantially parallel to the peripheral pivoting axis Q (fig. 4), therefore substantially bent at a right angle with respect to the sliding axis X.

[0033] Normally, the clamping element 22 is disposed with its contact portion 23 in proximity to an internal surface 27 of the guide 13. The internal surface 27 is ad-

vantageously disposed on the bent portion 35 (fig. 4). Therefore, as shown in fig. 4, the clamping element 22 projects from the peripheral pivoting axis Q, in a direction opposite the first pivoting axis P, towards the internal surface 27, in order to be able to act thereon.

[0034] At least a cutting element 30 is applied to the contact portion 23, which cuts into the internal surface 27 of the respective guide 13, until it blocks. In this way, as will be explained hereafter, if the steel cable 20 breaks, the door 26 is guaranteed to stop.

[0035] According to a variant, the clamping element 22 is disposed in proximity to any external or internal surface of the guides 13.

[0036] According to another variant, two or more clamping elements 22 cooperating with respective surfaces of the guide 13 can be provided.

[0037] The support element 16 comprises an eyelet 18 that cooperates with a stopping pin 19 of the support element 15, which is able to define the limit closed position of the support elements 15 and 16, and to keep them adjacent while still allowing them to move with respect to each other.

[0038] The slider 12 to which the terminal lower panel 11 (that is, the panel which in the closed position is closest to the ground) is fixed, is connected with the end of a steel cable 20 (fig. 1).

[0039] The cable 20 has one end bent back on itself, so as to define an annular part 28, by means of which it is fixed to a circular seating 29 coaxial to the pin 21 of the support element 15. The cable 20 is also wrapped, as shown in figs. 2 and 3, around a circular seating 29 disposed coaxially to pin 21 of the support element 16. In this way, by drawing the cable 20 the two wheels 14 tend to move closer to each other, thus distancing the central pivoting axis P from the sliding axis X, and consequently the clamping element 22 from the internal surface 27 of the guide 13.

[0040] A spring 24 is positioned between the two support elements 15 and 16, provided with two arms 31 and 32 which act on respective thrust portions of the two support elements 15 and 16. The action of the spring 24 tends to maintain the wheels 14 separate from each other.

[0041] In particular, the first arm 31 of the spring 24 has one end hooked onto the support element 15 and a segment that acts elastically on the pin 21 of the latter. The position of the spring 24 is not essential for the purposes of the present invention. The spring 24 can in fact be positioned between the two support elements 15 and 16 in any position, provided it tends to keep the wheels 14 normally separate. A lever system or a rack system can be used as an alternative to the spring 24.

[0042] The other end of the cable 20 is connected to a drum 33, moved by a helical spring 34 which functions as a counterweight, recovering the cable 20 during the passage of the door 26 from the closed position to the open position. This movement of the door 26 occurs with any known means, for example by means of an electric motor 25, which draws the panels 11 in order to determine the downward or upward movement thereof.

[0043] The security device 10 described heretofore functions as follows.

[0044] In normal conditions of use, when the door 26 is closed, the electric engine 25 is switched on, in order to recover the cable 20 and determine the upward movement of the panels 11. In this way, the traction of the cable 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 to come closer to each other.

[0045] This reciprocal bringing closer of the wheels 14 leads to a reciprocal rotation of the two support elements 15 and 16 (fig. 3), which causes a distancing of their central pivoting axis P from the sliding axis X, and consequently the displacement of the clamping element 22 from the internal surface 27. If there is no traction of the cable 20, for example due to the breaking of the cable 20, the action of the spring 24 causes the two wheels 14 to move away from each other. This reciprocal distancing of the two wheels 14 causes a rotation of the two support elements 15 and 16 in a direction opposite to the previous one.

[0046] In this way we have a sudden movement of the central pivoting axis P closer towards the sliding axis X, until the clamping element 22 is progressively made to cooperate with the internal surface 27 of said guide 13. The cooperation between the clamping element 22 and the internal surface 27 determines the immediate stoppage of the door 26 in whatever position it may be.

[0047] Advantageously, the safety device 10 thus achieved allows in any case to position the central pivoting axis P of the two support elements 15 and 16 not too protruding from the guides 13, since the clamping action of the clamping means 22 takes place on the internal surface 27 of the bent portion 35 (fig. 4). In this way the need to provide extra space between the central pivoting axis P and the guides 13 is avoided, with considerable economy of space (fig. 4).

[0048] It is clear 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.

[0049] According to another variant, the contact portion 23 can be made of rubber, of asbestos fibers and brass fibers, like ferodo®, or other, provided it guarantees that the door 26 will stop if the cable 20 breaks.

[0050] It is also clear that, although the present invention has been described with reference to specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of security device, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Safety device for a sectional frame (26) of the type having a plurality of sections, or panels (11) cooperating longitudinally with each other and moved by drive means (20), comprising cursor means (12) associated with at least one of said panels (11) and able to slide, along a sliding axis (X), in mating guide means (13), wherein said cursor means (12) comprises:

   - a pair of rolling elements (14), lying along said sliding axis (X);
   - a pair of support elements (15, 16), on each of which a corresponding rolling element (14) is pivoted, said support elements (15, 16) being pivoted to each other on a first pivoting axis (P) displaced with respect to said sliding axis (X), and substantially perpendicular to the plane on which said rolling elements (14) lie, and able to oscillate between a first position in which said rolling elements (14) are close to each other, and a second position in which said rolling elements (14) are far from each other, said passage from the first position to the second position being caused by the breaking of said drive means (20);
   - elastic means (24) cooperating with said support elements (15, 16) in order to thrust them, against the action of said drive means (20), towards said second position;
   - clamping means (22), associated with at least one of said support elements (15, 16) and able to act against an internal surface (27) of said guide means (13) when said support elements (15, 16) are in said second position, in order to block the displacement of the sectional frame (26);

   characterized in that said clamping means (22) is disposed in a position substantially opposite said first pivoting axis (P), with respect to said sliding axis (X).

2. Safety device as in claim 1, **characterized in that** said clamping means (22) projects from a second pivoting axis (Q) of one of said rolling elements (14), orthogonal to said sliding axis (X), in an opposite direction with respect to said first pivoting axis (P), towards said internal surface (27) of said guide means (13), so as to act on said internal surface (27) when said support elements (15, 16) are in said second position.

3. Safety device as in any claim hereinbefore, **characterized in that** in said second position, said pivoting axis (P) is at a minimum distance from said sliding axis (X).

4. Safety device as in claim 2, **characterized in that** said clamping means (22) is substantially coaxial to said second pivoting axis (Q).

5. Safety device as in claim 2 or 4, **characterized in that** said clamping means (22) is disposed in proximity to second pivoting axis (Q).

6. Safety device as in claim 2 or 4 or 5, **characterized in that** said clamping means (22) comprises a contact portion (23) that extends substantially in a parallel direction to said second pivoting axis (Q), towards the inside of said guide means (13).

7. Safety device as in claim 6, **characterized in that** said contact portion (23) also comprises cutting means (30) able to cut into said internal surface (27) of said guide means (13) when said support elements (15, 16) are in said second position.

8. Safety device as in claim 6 or 7, **characterized in that** in said first position said contact portion (23) is disposed in proximity to said internal surface (27).

9. Safety device as in any claim from 6 to 8, **characterized in that** said contact portion (23) is made of a material with a high coefficient of friction.

10. Safety device as in any claim from 6 to 9, **characterized in that** said contact portion (23) comprises at least one knurled portion made of hard metal.

11. Safety device as in any claim from 6 to 9, **characterized in that** said contact portion (23) is made of polymeric material.

12. Safety device as in any claim from 6 to 9, **characterized in that** said contact portion (23) is made of a material consisting of asbestos fibers and brass fibers, like ferodo®.

13. Safety device as in any claim hereinbefore, **characterized in that** in said first position, said first pivoting axis (P) is at a maximum distance from said sliding axis (X).

14. Safety device as in any claim hereinbefore, **characterized in that** it is associated with a terminal panel (11).

15. Safety device as in any claim hereinbefore, wherein said drive means (20) is of a flexible type, **characterized in that** said drive means (20) is associated with said rolling elements (14), the action of said drive means (20) normally keeping said support elements (15, 16) in said first position.

16. Safety device as in any claim hereinbefore, **characterized in that** said drive means (20) has a first end wrapped around circular seatings (29) coaxial to said rolling elements (14), so that the traction causes said rolling elements (14) to be brought reciprocally closer to each other.

17. Safety device as in any claim from 2 to 16, **characterized in that** said elastic means comprises at least a spring (24) provided with a first arm (31) which cooperates with a pin (21) disposed along said second pivoting axis (Q) of said support elements (15), a second arm (32) which presses on said support elements (16), in such a manner as to tendentially distance said rolling elements (14) from each other.

18. Sectional frame such as a door, a main door, a gate or suchlike, comprising a safety device as in any claim hereinbefore.

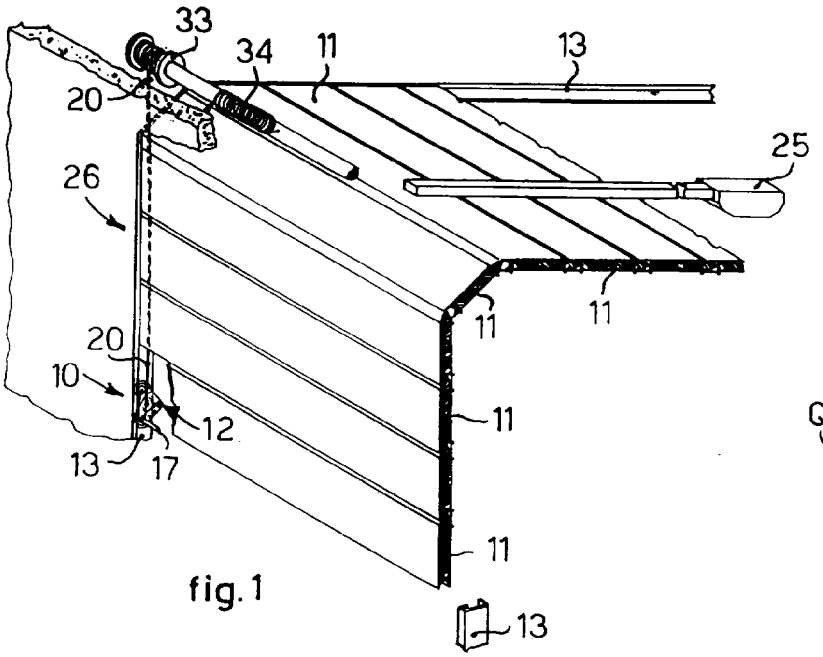

fig. 1

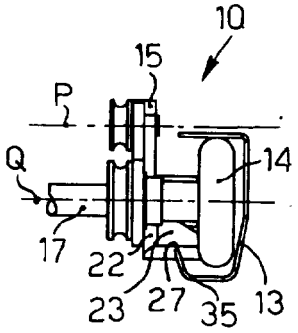

fig. 4

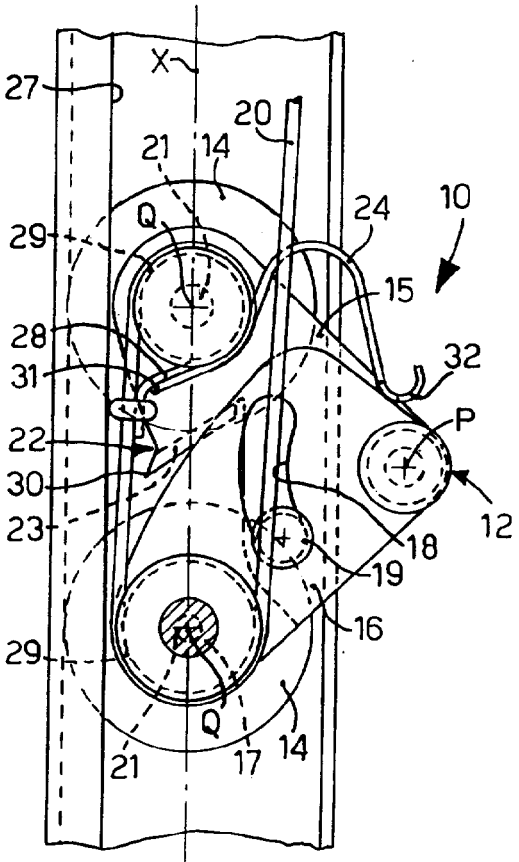

fig. 2

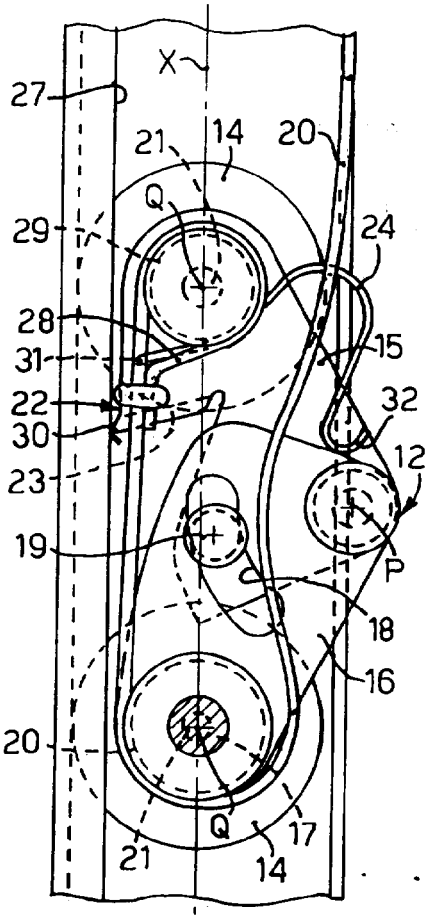

fig. 3