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(54) Vertically-moving roller curtain for windows in general and particularly for rail passenger-car windows

(57) Electromechanical or manual vertically-moving roller curtain for windows in general consisting of a curtain (1) made of thin and flexible material, wrapped around a self-winding upper roller (2) and having its lower edge fastened to a rigid horizontal crossbar (4) connected, in its turn, by links (5), to sliders (6) equipped with matching internal thread, consisting of vertical worm screws (7) provided with matching thread meshing with the internal threads of the sliders (6), a geared motor (8) or a crank driving the worm screws (7) through the driven shaft (9) and through bevel gear pairs (10), and including a surrounding frame (11, 17) consisting of vertical and horizontal section bars connected by linkage (14, 15, 16) so that when the motor (8) or the crank is driven, a rotation is imparted to the worm screws (7) which, through sliders (6), vertically move the lower edge of the curtain (1) which is moved upwards and downwards thus winding and unwinding on the upper roller (2).

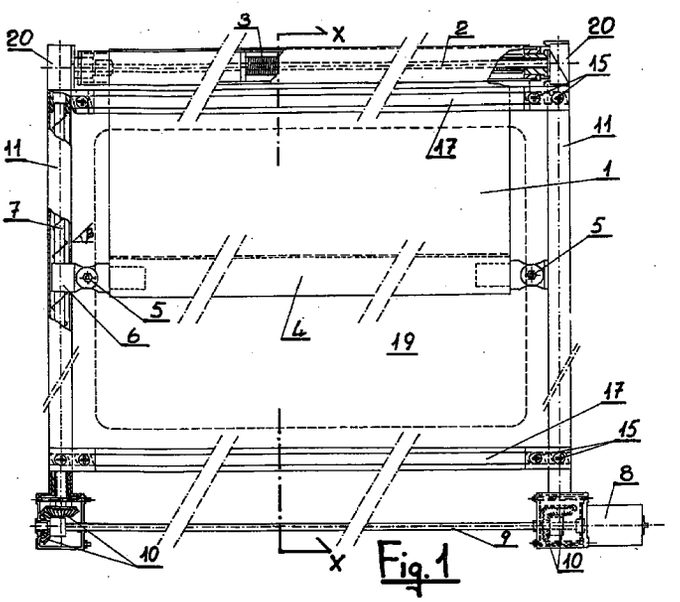


Fig. 1

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Description

Roller curtains fitted with vertical motion so as to cover partially or totally the inside of a window or door-window pane are commonly known.

Such roller curtains are used for house windows or windows of rail passenger-cars, coaches, industrial vehicles, watercraft and boats, etc. and generally feature a panel of thin flexible material, such as fabric, plastic or other suitable material, which, by sliding, partially or totally covers the windowpane. Such panel is at present operated by hand and features at its lower edge sliders, guided by grooves located in the opposite internal sides of the door or window frame.

Such arrangement has some drawbacks. A first drawback is that these hand-operated roller curtains usually do not take and maintain a stable position and autonomously vary their coverage, especially in train passenger-cars and vehicles subject to strong vibrations. A second drawback is due to the fact that during the operation, sometimes carried out without great delicacy, the side guide sliders may get stuck thus blocking the movement of the curtain or slip out of their ways thus making the curtain useless, and making the user uncomfortable and dissatisfied.

These well-known vertically-moving curtains may also be electromechanically controlled, but in case of failure or malfunctioning of this electromechanic drive, the curtain cannot be operated manually and again becomes useless.

It should be mentioned that there are also blinds consisting of horizontal interconnected strips, with side guides and electromechanic drive, these strips being stacked in the upper area when the blind is open while they are distributed on the window surface when the blind is closed. These strip blinds have the drawback that the failure of even one only of the strip links blocks the blind and makes it useless.

It may also be observed that there are horizontally-moving curtains with vertical folds but their great drawback is that, particularly in rail passenger-cars, they tend to flap and become tattered when used with open windows.

The invention in question presents a panel-type roller curtain in thin and flexible material with electromechanical or manual vertical movement, capable of eliminating the drawbacks of the above mentioned known curtains.

In the invention in question the curtain is operated at both lower ends by a system of sliders and corresponding worm screws, both worm screws being controlled by one single electric geared motor through driving gears. At its upper end the curtain is wrapped around a self-winding roller, which automatically rewinds the curtain and applies a pulling force which prevents flapping and tattering.

The worm screws and corresponding sliders show threads with high lead angle to the horizontal plane, so that the curtain may be manually operated in case of failure of the electromechanic driving mechanism, which in such case is dragged by hand.

The invention in question is illustrated in one exemplifying implementation in the enclosed drawings, in which:

Fig. 1 shows a front view and partial section of the curtain subject matter of this invention and relevant frame,
Fig. 2 shows the cross section according to the X-X axis of the curtain in Fig. 1,
Fig. 3 shows a magnified front view of the junction of the section bars forming the curtain frame,
Fig. 4 shows the longitudinal section of the frame according to the Y-Y axis in Fig. 3,
Fig. 5 shows a cross section of the frame according to the Z-Z axis in Fig. 3.

With reference to the above drawings, the thin panel-like curtain 1 in flexible material such as fabric, plastic or other suitable material is wrapped around a rotating roller 2 fitted with axial spring 3 for self-winding. The upper edge of the above mentioned curtain 1 is fixed to the self-winding roller 2, while the lower edge is fastened, by means of stiches or seams, to a horizontal crossbar 4 of any suitable shape, such as strip or rod, etc., in rigid material, such as metal or hard plastic.

At each end of the above crossbar 4 are detachable links 5 connected to the sliders 6, with internal matching thread, meshing with vertical worm screws 7 with matching threads. A geared motor 8 simultaneously drives the worm screws 7 by means of a driven shaft 9 and bevel gear pairs 10 which may reduce the gear ratio.

Basically, by operating the geared motor 8 in either direction, the worm screws 7 will rotate in one direction or in the opposite one and cause raising or lowering of the threaded sliders 6 which, connected to the lower crossbar 4, will push the lower edge of the curtain 1 up or down.

When curtain 1 is pulled down to cover the window 19, it will unwind from the upper roller 2 overcoming the opposing action of spring 3, while when it is pulled upwards it will automatically wind on the roller 2 under the action of the winding spring 3.

The matching threads of the worm screws 7 and of sliders 6 have a wide lead angle β with respect to the transverse horizontal plane, so that, in case of failure or missing of the electromechanic drive, the curtain may be operated manually with reversible driven motion.

By such hand-operation, the elctromechanic system is dragged and its inertial resistance keeps the curtain in the chosen position.

It follows that, in accordance with the aims of this invention, the sliding curtain gently opens and closes with balanced control without the possibility of getting stuck and with stable positioning.

In the exemplifying solution described and illustrated in the drawings the electromechanic control sys-

tem is located in the lower part of the window, but it is also possible, according to this invention, to locate this control system in the upper part of the window by placing the driven shaft 9 of the geared motor 8 inside the shaft of the self-winding roller 2 and by locating the bevel gear pairs 10 in the upper boxes 20 acting as supports for the self-winding roller 2.

The curtain as described above features a surrounding frame which makes it particularly functional and well structured. The side posts will preferably consist of box-type sections 11 featuring a slot 12 facing inwards. Inside each of the mentioned box-type sections 11 are placed a worm screw 7 and relevant slider 6, while the slot 12 allows passage and sliding of the link 5 connecting the crossbar 4 of the curtain 1. The box-type section 11 has the shape 13 of a channel section on one side, normally on the inner side of the window, with inward facing flanges, suitable to house one or more small plates 14 fitted with set screws 15 of the external junction plate 16. The above fastening system with plate 16 connects the posts 11 to the crossbars 17.

To secure the frames in site, the lower crossbar 17 may have the shape of a double channel section, as shown by way of example in Fig. 2.

The vertical 11 and horizontal framing sections 17 may of course have different shapes, and also their connecting system may be different.

The invention in question may also be used as an independent mosquito-net or in combination with the curtain where such mosquito-net in thin and flexible net is wound on the self-winding roller 2 and operated by the described elctromechanic system.

Obviously the geared motor 8 can be substituted by a crank so that the curtain is operated by hand.

Claims

1. Electromechanical or manual vertically-moving roller curtain for windows in general and particularly for rail passenger-car windows and transport means in general characterized in that it includes:

   - a thin curtain (1) in flexible material, wound onto an upper rotatin roller (2) provided with self-winding axial spring (3),
   - a horizontal crossbar (4) in rigid material fixed in any way to the lower edge of curtain (1),
   - sliders (6) with internal matching thread connected to both ends of the crossbar (4) by means of links (5),
   - vertical worm screws (7) with matching thread meshing with the internal threads of the above sliders (6),
   - a geared motor (8) or a manual crank operating the worm screws (7) by means of the driven shaft (9) and of bevel gear pairs (10),
   - a frame (11, 17) consisting of vertical and horizontal section bars connected by links (14, 15,16),

   so that by operating the motor (8) or the manual crank, a rotating movement is imparted to the worm screws (7) which, by means of sliders (6), vertically move the lower edge of the curtain (1) which is moved downwards thus covering the window (19) or upwards thus uncovering the window and rewinding on the upper roller (2).

2. Vertically-moving roller curtain as described in claim 1, characterized in that the lead angle (β) to the horizontal plane of the worm screw (7) and of sliders (6) is such as to allow, in case of failure of the electromechanic system, for easy and stable hand operation of the curtain (1).

3. Vertically-moving roller curtain as described in claim 1, ***characterized*** in that the ratio of the bevel gears (10) is such as to reduce the rotating speed impressed by the motor (8) to worm screws (7).

4. Vertically-moving roller curtain as described in claim 1, ***characterized*** in that the geared motor (8), the driven shaft (9), and bevel gear pairs (10) are placed lower than the worm screws (7).

5. Vertically-moving roller curtain as described in claim 1, ***characterized*** in that the geared motor (8), driven shaft (9), and bevel gear pairs (10) are placed higher than the worm screws (7) the driven shaft (9) being lodged in the shaft of the rewinding roller (2) and the bevel gear pairs (10) being placed in the upper boxes (20) supporting the roller (2).

6. Vertically-moving roller curtain as described in claim 1, ***characterized*** in that its frame features vertical side posts consisting, for example, of box-type section bars (11) housing the worm screws (7) with relevant sliders (6), these box-type sections (11) having a longitudinal slot (12) for passage of the links (5) to the curtain (1) crossbar (4) while these box-type sections (11) feature a channel section (13) on their inwards facing side, with flanges bent inwards for assembly of the frame.

7. Vertically-moving roller curtain as described in claim 1, characterized in that its frame features horizontal crossbars consisting, for example, of single or double channel sections (17) with flanges bent inwards for assembly of the frame.

8. Vertically-moving roller curtain as described in claims 4 and 5, characterized in that the links consist, for example, by small plates (14) inserted in channel sections (13, 17), provided with set screw (15) of a plate (16) on the flanges of the channel section, thus connecting the posts and crossbars of the frame.

9. Vertically-moving roller curtain as described in claim 1, characterized in that the geared motor (8) is substituted by a manual crank.

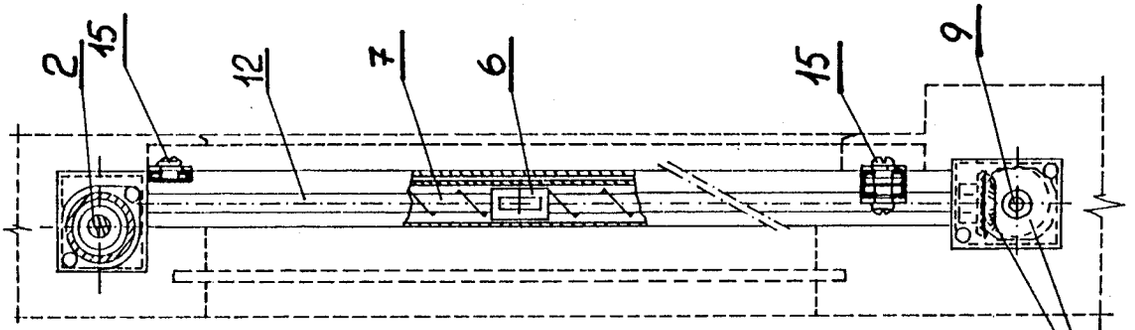


Fig.2

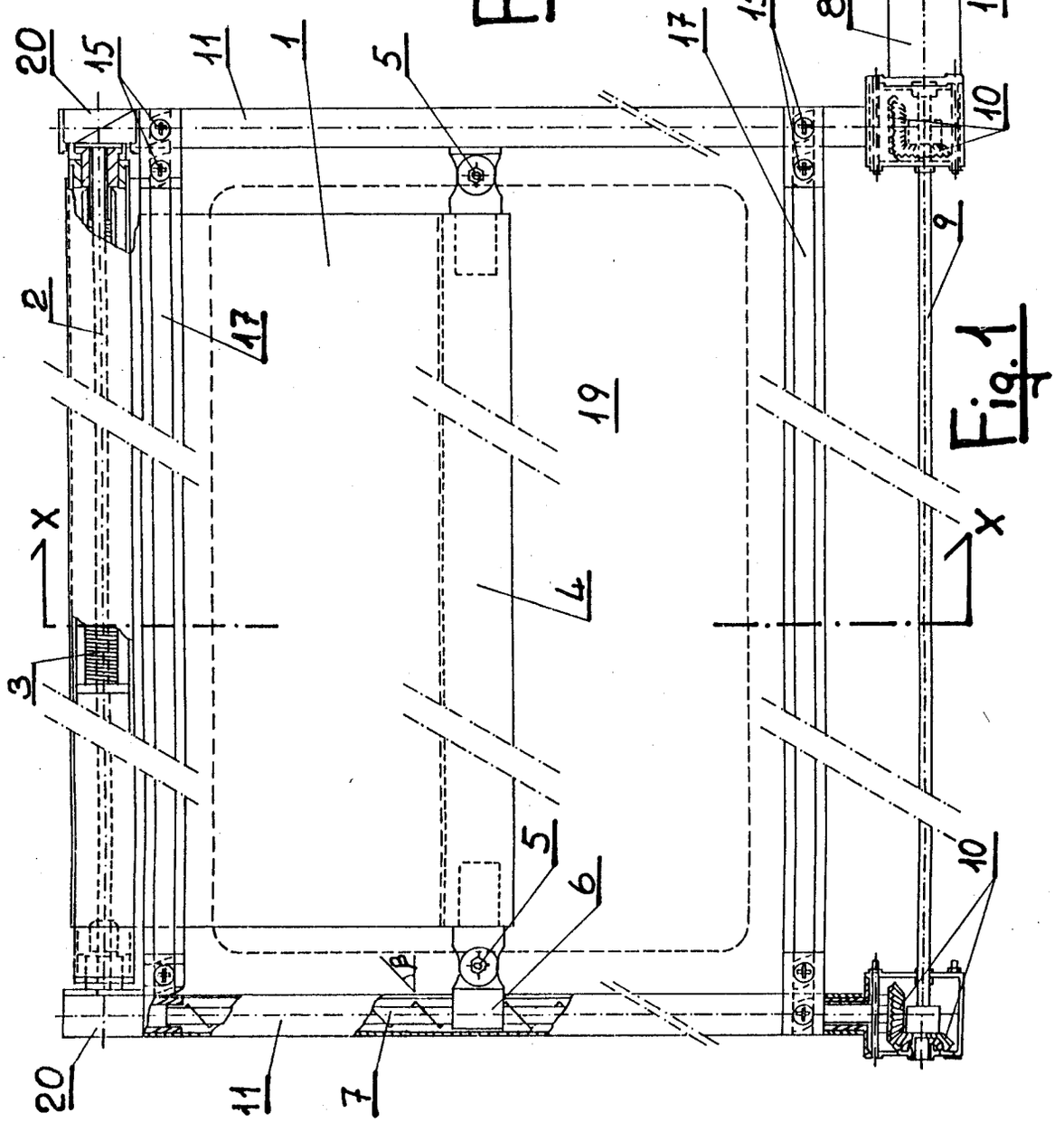


Fig.1

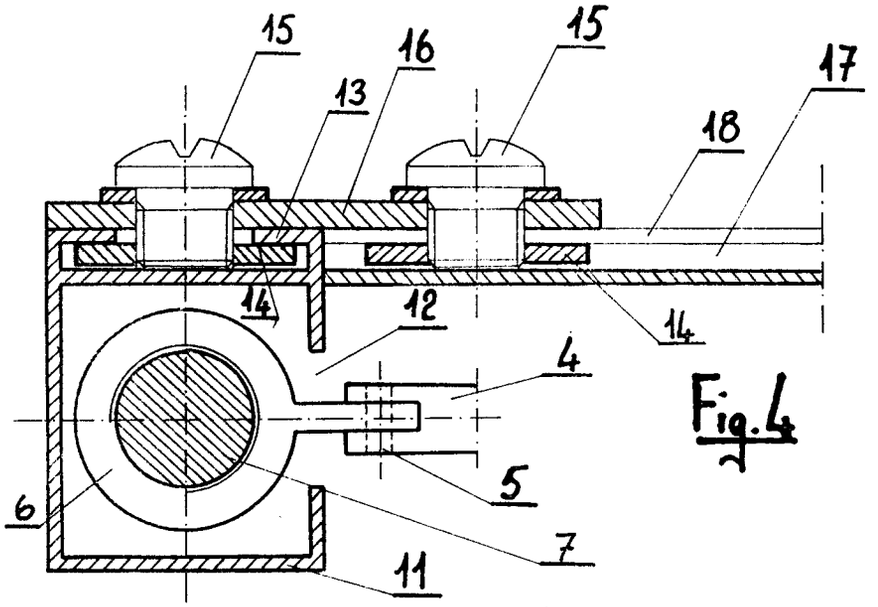


Fig.4

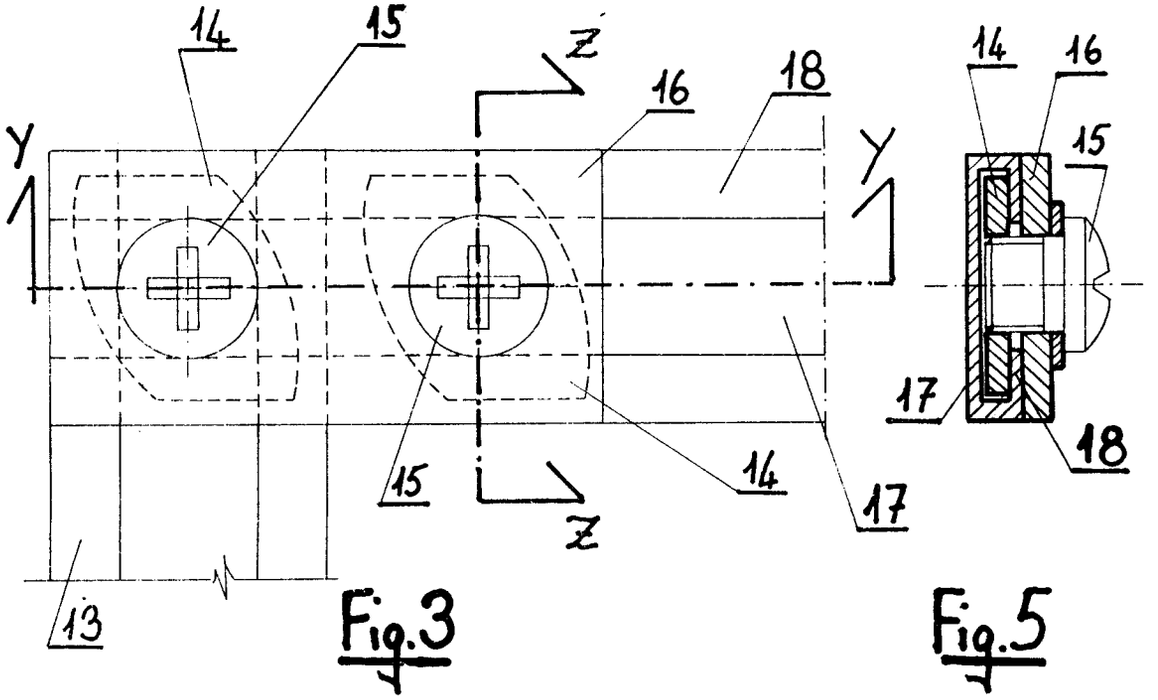


Fig.3

Fig.5