

[54] DOORS WITH ELECTRO-MECHANICAL OPERATING MEANS

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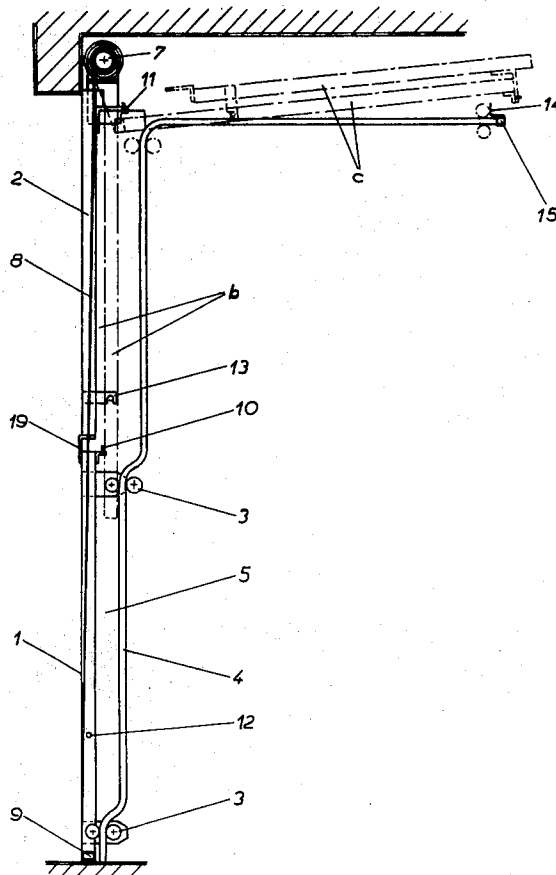
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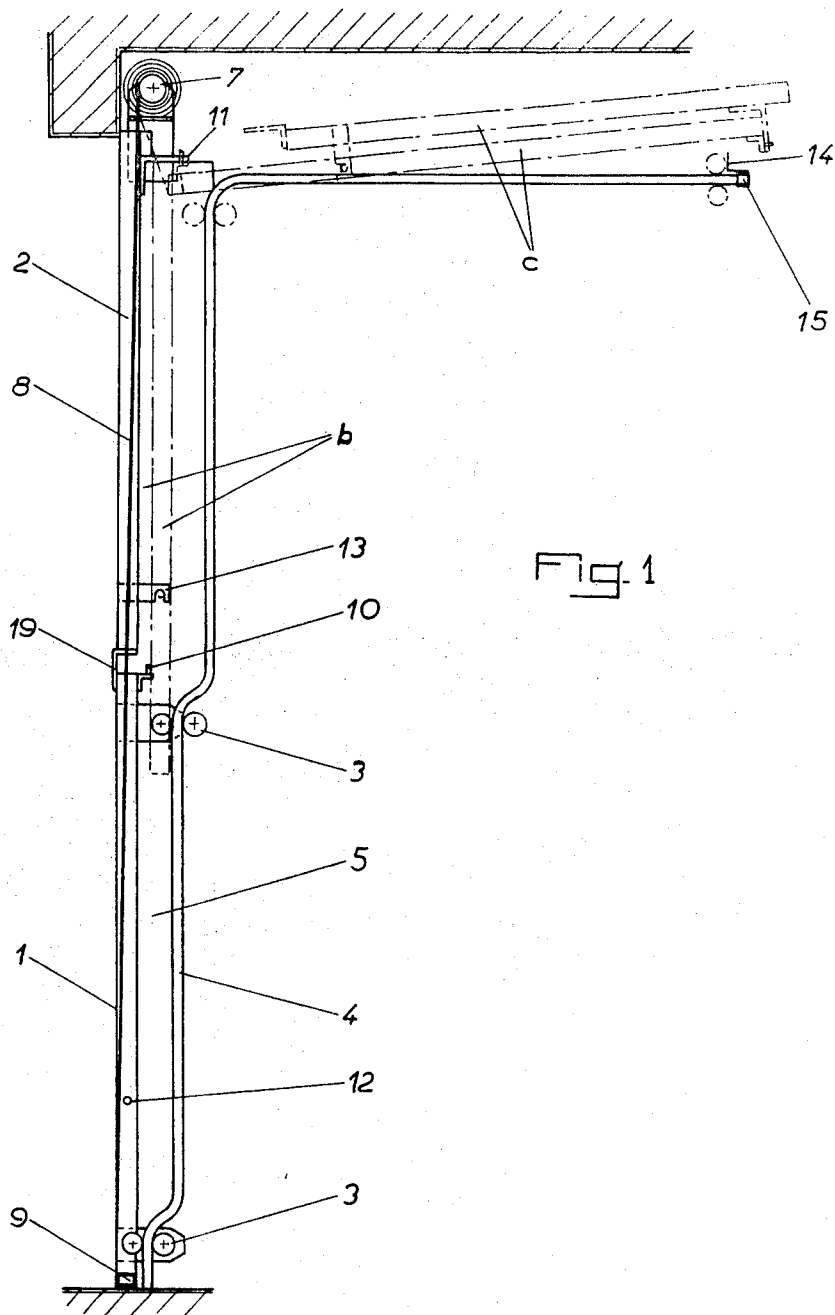
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[57] ABSTRACT

A door with electro-mechanical operating means has a height substantially equal to half the height of the opening to be closed. Two elbowed guide rails are situated on either side of the opening and made fast with the door frame, and two pairs of guide devices are provided on either side and quite close to the lower and upper extremities of the lower panel. A winding device constituted by a winding drum is driven by a motor and reduction gearing or a hydraulic or pneumatic element, and a strap or linkage connects the lower extremity of the lower panel, on each side of the opening, to the winding element. A device for couples the two panels of the door, and the operating means are controlled by a tumbler change-over switch.

6 Claims, 3 Drawing Figures





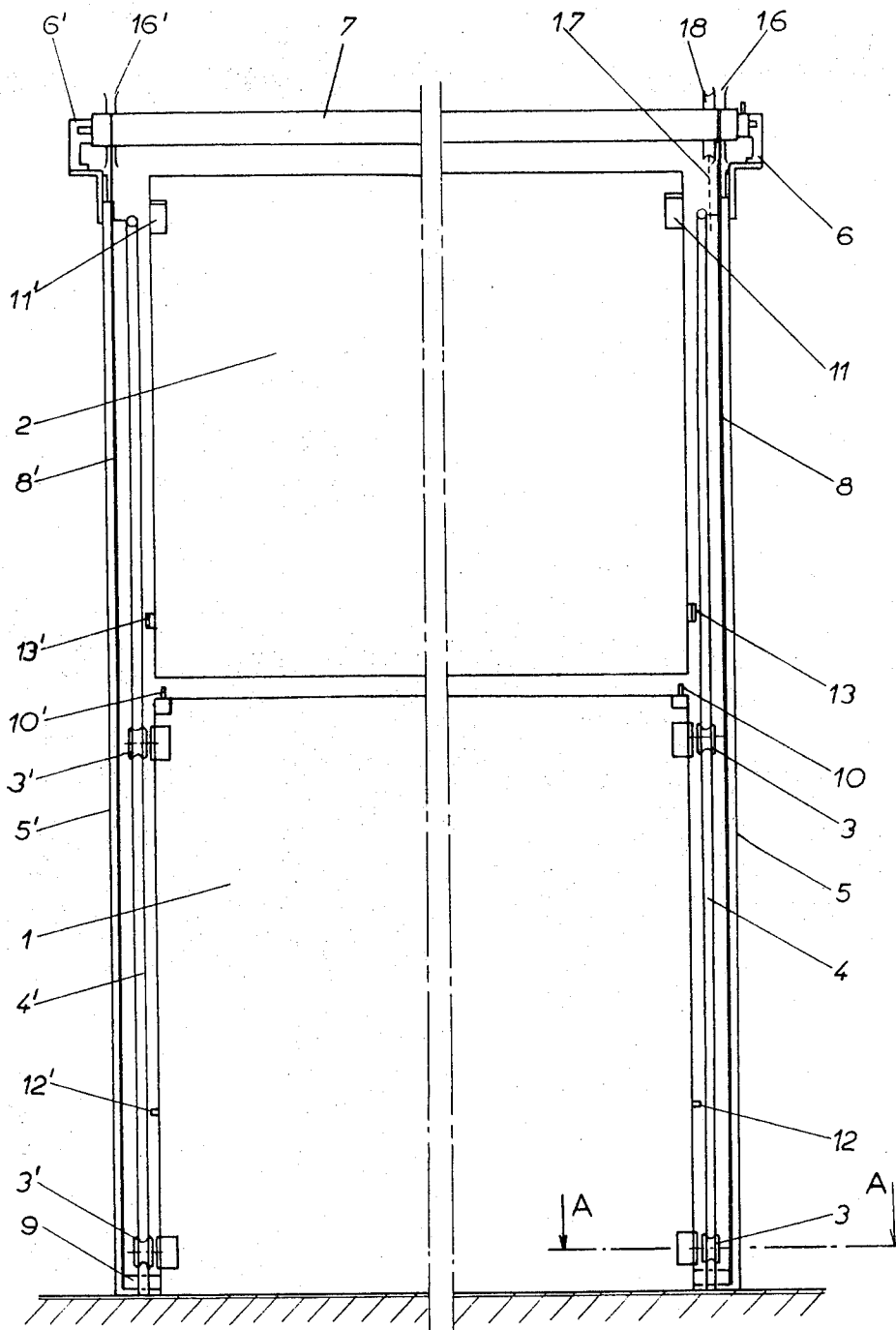


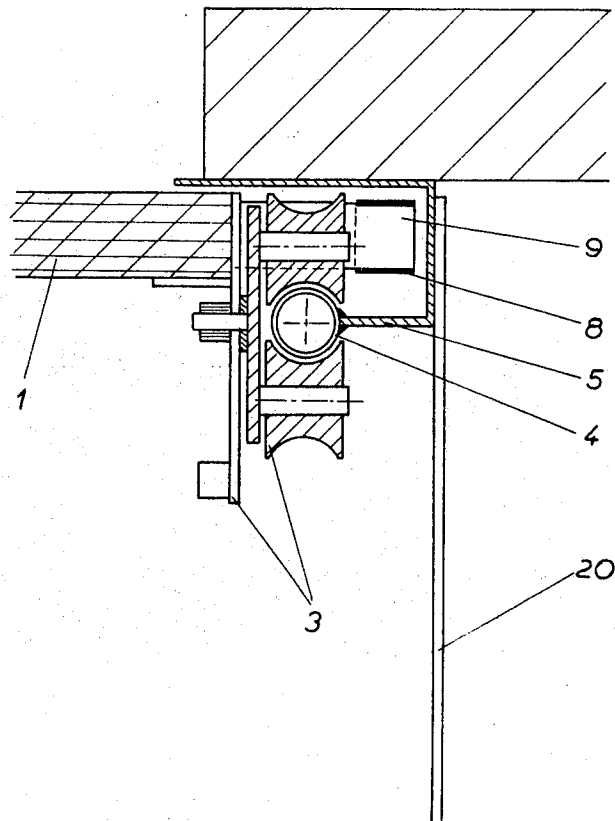
Fig 2

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Fig. 3



DOORS WITH ELECTRO-MECHANICAL OPERATING MEANS

INTRODUCTION AND BACKGROUND OF THE INVENTION

The present invention concerns the closure of openings by panels, and has more especially for its object the provision of a garage door closed by two horizontal panels which on opening retract to behind the lintel, and electro-mechanical means for guidance and operation.

The electro-mechanically operated doors and closures known hitherto, and especially roller shutters, are quite noisy in operation and their elements are subject to friction causing excessively rapid wear. Other operating means also exist, but are of complex design, especially those operated by hydroelectric and jack assemblies or by worms or even by racks along which the motor travels with the door, or even doors balanced by springs or counter-weights which are operated by reduction gearings operating an apparatus comprising chain and pinions (toothed wheels) fixed to the ceiling, which frequently cause the lower extremity of the door to protrude during operation outside the building, or even to encumber the lateral walls.

Mechanisms are likewise known which entrain sectional doors, but these doors necessitate a major springing of the lintel, moreover they necessitate horizontal rails of a length almost equal to the height of the door, the positioning of which requires special precautions so that precise adjustment may be achieved.

The present invention has the purpose of remedying these drawbacks by proposing a manner of realisation of closures and principally of garage doors or workshop main doors which can have quite a great height or width, which is simple in conception but robust and above all silent in operation, the operation being manual or automatic, while the door during operation does not protrude from the external facade of the building, nor does it excessively encumber the interior of the premises, even in the absence of major overhead accommodation areas.

The door with the operating means according to the present invention is noteworthy in that it is simple in construction, and easy to realise at a relatively moderate cost. This invention should ensure the popularisation of the electro-mechanically operated garage door.

BRIEF SUMMARY OF THE INVENTION

The door is constituted by two horizontal panels together having the dimensions of the opening, that is to say each panel being of approximately half the height of the opening, the panels being placed one above the other in the same plane.

FURTHER DESCRIPTION AND ADVANTAGES OF THE INVENTION

The opening action is commenced with the lower panel, to the lower part of which two straps (of nylon or steel according to the weight of the door) are attached, one at each lateral end. The straps are connected at their other ends to a winding drum which is fixed on the upper part of the door frame and in which there is incorporated a stepped-down motor with limit switch. As the drum winds up the straps, the lower panel slides along the guide, which is formed by an elbowed rail on each side, to which the panel is con-

nected by two grooved-roller fittings. A coupling device is provided on the upper panel, and as soon as the lower panel arrives at this level it entrains the former so as to retract to behind the lintel together, beneath the ceiling, in a horizontal position.

To close the door it will be sufficient to rotate the winding drum in the other direction, and the two panels slide afresh each into its initial position. An electro-magnet is provided in the appropriate position for locking the door.

Inside the winding drum a clutch is also provided which permits of operating the door manually in the case of absence of electric current, this being effected through a chain wheel mounted on the winding drum, and it is sufficient to place a small chain over this wheel and pull so that the drum rotates and winds up the straps. The mechanical drive is provided only for the cases of absence or breakdown of current, but either of the drive means, electric or mechanical, can be utilised at any moment by simple engagement or disengagement of the stepped-down motor or lever provided on the winding drum.

The manual operation of the door can also be effected by a torsion spring incorporated in the winding drum, in replacement of the reduction gearing provided for the electric drive.

The winding drum with incorporated motor can of course equally be replaced by a hydraulic or pneumatic element which simultaneously actuates two strap-winding pulleys.

The particular features which appear either from the accompanying drawings or from the present text, these being given by way of non-limitative example, will make it clearly understood how the invention can be realised.

BRIEF DESCRIPTION OF THE VIEWS IN THE DRAWINGS

FIG. 1 is a lateral elevational view of the guide apparatus and of the motor element with partial section of the door panels, in different positions :

- b. at the moment of coupling,
- c. when the door is opened;

FIG. 2 is a front elevational view from the interior of the garage;

FIG. 3 is a cross-sectional view, on a larger scale, through A — A in FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The example of embodiment of an electrically operated garage door as represented in FIGS. 1 and 2 is composed of two panels 1 and 2 of substantially the same size, namely about half the height of the opening to be closed. On each side of the opening a door frame 5 and 5', which supports the door assembly, is the only element which has to be fixed to the building. The elbowed guide rails 4 and 4' are welded to the door frame. The pivoting fittings with two grooved rollers 3 and 3', which slide along the elbowed rails 4 and 4' are fixed by their support plates on each lateral side of the panel 1 and preferably quite close to the lower and upper extremities. This guidance could equally be realised by rollers mounted on spindles and sliding along a profiled rail, rollway or slideway which is elbowed as shown in FIG. 1.

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The motor mechanism 7 is comprised by a known winding drum in which there are housed the planetary reduction gearing, the motor, the capacitor, the drive disc with clutch and the limit regulation contactor cage. This apparatus is controlled by a tumbler change-over switch. The assembly is mounted by a support 6 for the fixed end piece of the winding drum and a swivel support 6' on the door frame 5. On each side a strap 8 of material appropriate to the weight of the door (nylon or steel cable) is fixed to the lower part of the lower panel 9 and associated at the other end with the winding element 16, 16'. The coupling device represented by the points 10 and 10' is associated during operation with the supports 11 and 11' at the same time as the tenons 12, 12' couple with the supports 13, 13'. For the regulation of the position of the door in the open state a stop 14 is provided for each guide end. Parallelism between the guide rails is realised by a preferably tubular strut 15 on which there are also fixed the stiffeners 20 which bear with their other ends on the door frame.

For emergency operation in the case of absence of electric current a chain disc 18 is provided over which it is sufficient to pass a small chain and to pull so that the straps wind up. Locking is effected by an electromagnet fixed at the appropriate point, preferably to the upper part of the lower panel so as to lock the two panels at the same time.

The upper panel rests on four stops specially provided on the door frame so as to form a clearance between the two panels which is necessary for good operation, which clearance is concealed from the exterior by a decorative strip 19.

Opening of the door is effected by winding of the straps onto the winder, closure is effected by rotation of the winder in the opposite direction, permitting the panels to return to their initial position.

What is claimed is :

1. A sectional door comprising a pair of panels each having a height substantially equal to half the height of

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the opening to be closed, two elbowed guide rails disposed one on either side of the opening, two pairs of guide devices disposed on either side of and adjacent the upper and lower extremities of the lower panel and engaging said guide rails, drive means for raising and lower said panels comprising a winding drum and flexible means interconnecting the winding drum and the lower portion of the lower panel, and means connecting the two panels when the lower panel is raised so that the lower panel raises and lowers the upper panel, the elbows on the guide rails being so located that when the lower panel is in the upper portion of the doorway, the lower panel moves behind the upper panel, but when the lower panel moves downwardly into the lower portion of the doorway, the lower panel moves forwardly beneath the upper panel.

2. A door as claimed in claim 1, the upper panel being supported by and free to move with the lower panel when the lower panel is in the upper portion of the doorway.

3. A door as claimed in claim 1, and power means to drive said winding drum, and a tumbler changeover switch to reverse the operation of said power means.

4. A door as claimed in claim 1, said guide rails having elbows therein vertically spaced apart a distance equal to the distance between said guide devices so that the lower panel moves into and out of the upper portion of the doorway in parallelism to the position of the lower panel when the door is closed.

5. A door as claimed in claim 1, said guide rails having a substantially horizontal upper portion which supports both of said panels in the open position of the door.

6. A door as claimed in claim 1, said drum being parallel to and above the upper edge of said upper panel, said flexible means comprising two flexible members wound on opposite ends of the drum and extending down to opposite sides of the lower portion of the lower panel.

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