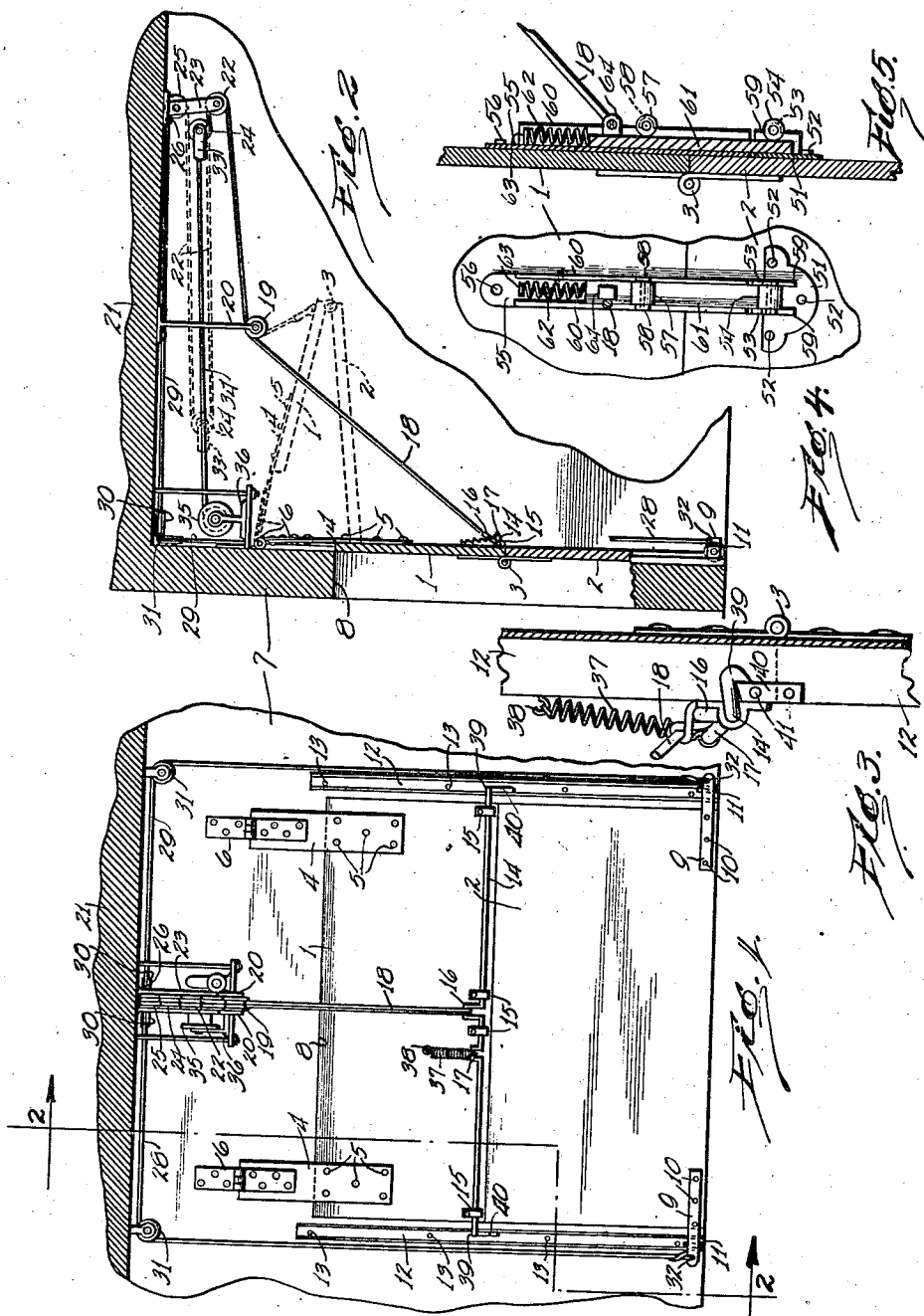


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J. E. W. FOGAL
DOOR OPERATING DEVICE
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DOOR-OPERATING DEVICE.

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To all whom it may concern:

Be it known that I, JOHN E. W. FOGAL, a citizen of the United States, and a resident of Quincy, in the county of Adams and State of Illinois, have invented a new and useful Improvement in Door-Operating Devices, of which the following is a full, clear, and exact description.

My invention relates to folding doors and more particularly to devices for operating the same, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide a novel and effective device for operating doors consisting of a plurality of sections hinged together and foldable with respect to one another.

A further object of my invention is to provide a device of the character described that has means for locking the door in closed position and for preventing relative movement of the door sections until the locking mechanism has been actuated to release the door.

A further object of my invention is to provide a device of the character described in which the parts are arranged for movement without binding and with very little friction, if any.

A further object of my invention is to provide a device of the character described in which the means for operating the door are arranged to connect with the latter at a plurality of separated points whereby a balanced construction is produced.

A further object of my invention is to provide a device of the character described that is relatively simple in construction and operation, not likely to get out of order easily, easy of operation, and thoroughly practical commercially.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application, in which—

Fig. 1 is a front view of a door embodying the invention,

Fig. 2 is a section along the line 2—2 of Fig. 1,

Fig. 3 is an enlarged detail of a fragmentary portion of the device,

Figures 4 and 5 are enlarged details of a

fragmentary portion of a modified form of the device.

In carrying out my invention, I make use of a door consisting of an upper section 1 and a lower section 2 that is hingedly connected along its upper edge to the upper section. Similar separated parallel bars or plates 4 are secured by screws 5 or other suitable fastening means to the upper section 1 and project above the same. These bars or plates are connected by hinges 6 to a wall 7 in which an opening 8 is provided and normally closed by the door.

The lower section 2 is provided with brackets 9 or the like secured thereto by screws 10 to project laterally of the lower section adjacent its lower edge and these brackets carry wheels 11 each arranged to move along a vertical rail 12 that is secured to the wall 7 in any suitable manner as by means of screws 13. Each rail consists of an angle iron positioned with one leg thereof at right angles to the wall, thereby preventing lateral movement of the section 2 while permitting the latter to be moved upwardly about its hinged connections with the section 1.

A horizontally disposed rock shaft 14 is journaled in bearings 15 secured to the front side of the upper section 1 parallel with and adjacent to the lower end thereof. The rock shaft 14 is fashioned with offset portions 16 and 17, these portions being located in different planes oblique to the section 1. A pair of cables 18 are secured at one end to the offset portion 16 which is intermediate the ends of the rock shaft 14 and consequently in the vertical median line of the door. The cables 18 are passed around an idler sheave 19 that is carried by a hanger 20 suspended from a ceiling 21 or other support, then around a sheave 22 carried at the end of a hanger 23, around a sheave 24, around another sheave 25 that is carried by the hanger 23 adjacent to its connection at 26 to the ceiling 21, and are then merged into a pair of cables 28 and 29 which are preferably integral with the cables 18—18. The latter are conducted oppositely around sheaves 30—30 through guide sheaves 31—31 (see Fig. 1), and then downwardly for connection at 32—32 with the brackets 9.

The sheave 24 is journaled in a frame 33 that is carried at the end of a cable 34. The latter is passed around and secured to a

drum 35 supported on a stand 36 that is secured to the wall 7 and the ceiling 21.

A spring 37 is secured at one end as at 38 to the adjacent side of the upper section 1 and at its other end to the offset portion 17, thereby tending to maintain the rock shaft 14 in position to occasion the engagement of laterally turned locking members 39—39 with keepers 40—40 that are secured to the angle arms 12 as at 41.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. The drum 35 is adapted for connection with a suitable power device (not shown) and may be rotated at will to occasion the winding of the cable 34 thereon or the unwinding of the same cable therefrom. When the drum 35 is actuated to wind the cable thereon, the sheave 24 will be moved inwardly or toward the drum, thereby exerting a tension on the cables 18 at a point approximately midway between the sheaves 22 and 25. The tension or pull on these cables is communicated to the cables 28 and 29 which are secured to the lower end of the lower panel 2 of the door. In the beginning, the pull is exerted in the plane of sections 1 and 2 and consequently the cables 28 and 29 will not be moved until the cables 18 have been moved sufficiently to rock the shaft 14, thereby causing the locking members 39—39 to disengage the keepers 40—40 and permitting the adjacent ends of the sections 1 and 2 of the door to be moved outwardly about their hinged connections with one another. The force will then be distributed equally on the cables 18—18 and 28 and 29, whereby the sections 1 and 2 will be moved into the positions indicated by the dotted lines in Fig. 2. It is to be noted that the distance from the lower edge of the upper panel 1 to the line of its connection with the wall 7 is somewhat greater than the height of the lower section 2 so that the latter may be moved into horizontal position without any binding resulting. When it is desired to close the doors, the power actuated drum 35 is operated to permit the unwinding of the cable 34 and the doors will close by gravity.

The means illustrated and described for locking the door in closed position is that preferred by me particularly when the door is heavy in construction. Obviously, I may make use of other locking mechanisms, such as illustrated in the modified form of the device shown in Figures 4 and 5. In that embodiment of the invention, I provide a plate 51 that is secured at 52 to the lower section 1 adjacent its upper edge. The plate 51 has integral upstanding lugs 53—53 integral with upturned sides 59—59 and a roller 54 is mounted for rotation therebetween. A cooperating plate 55 is secured at 56 to the upper section 1 in alinement

with the plate 51 and carries a roller 57 that is mounted between upstanding lugs 58—58 integral with upturned sides 60—60. The plate 51 has the upturned sides 59—59 and the plate 55 likewise has the upturned sides 60—60, thereby defining a guideway in which is disposed a slidable locking bolt 61. The latter is passed beneath the rollers 54 and 58 and is normally maintained in the position illustrated in Fig. 4 by a spring 62. The latter is disposed between a lug 63 integral with the plate 55 adjacent its upper end and the upper end of the locking bolt 61, whereby a tension is exerted on the latter that tends to force the same downwardly along the guideway. Only one of the cables 18—18 is provided and this cable is secured to a lug 64 that is integral with the locking bolt 61.

The remaining parts of the modified form of the device are identical in essential respects with the corresponding parts of the preferred form of the device and therefore require no further description. The same reference numerals have been used for like parts throughout the several views. The operation of the modified form of the device will be readily understood, since the stress on the cables 18—18 and 28 and 29 is first communicated along the cables 18—18 to the locking bolt 61. The latter is moved from locking position and the sections 1 and 2 then permitted to move toward open position. The pull on the cables 18—18 and 28 and 29 will then be equalized until the sections 1 and 2 have been moved into the position indicated by the dotted lines in Fig. 2.

While I have shown the device as embodied in a door consisting of vertically aligned sections adapted to be folded in a horizontal plane, it is obvious that the application of the invention is not restricted to this type of door and that many adaptations and modifications of the form of the device described in the accompanying drawings may be made without departing from the spirit and scope of the invention as described in the foregoing and outlined more particularly in the appended claims.

I claim:

1. The combination with a folding door consisting of a plurality of hingedly connected sections arranged to be edgewise aligned in a vertical plane when in closed position of a horizontally disposed rock shaft secured to the upper section of said door and being formed with locking members projecting laterally of the door, cooperating locking members secured at opposite sides of the door in position to be engaged normally by the first named locking members to hold the door against movement from closed position, cables connected to said rock shaft intermediately and to the lower section of said door, and means for operating

said cables to release the door and to move the sections thereof toward folded position.

2. The combination with a folding door consisting of a plurality of hingedly connected sections arranged to be edgewise aligned in a vertical plane when in closed position, of a horizontal rock shaft secured to the upper section of said door adjacent the lower edge thereof, and being formed with locking members at the outer ends thereof, said rock shaft having a lever portion intermediate its length extending outwardly from said section, cooperating locking members secured to opposite sides of the door opening to be engaged normally by said first named locking members, a cable connected at one end to said lever portion of said rock shaft, and at its other end to the lower section of said door, and means for moving said cable intermediate its length, whereby a pull will be exerted at both ends thereof.

JOHN E. W. FOGAL.