Aug. 31, 1926. 1,598,583

H. B. COOK

SLIDE DOOR OPERATING DEVICE

Filed Jan. 23, 1925 2 Sheets-Sheet 1

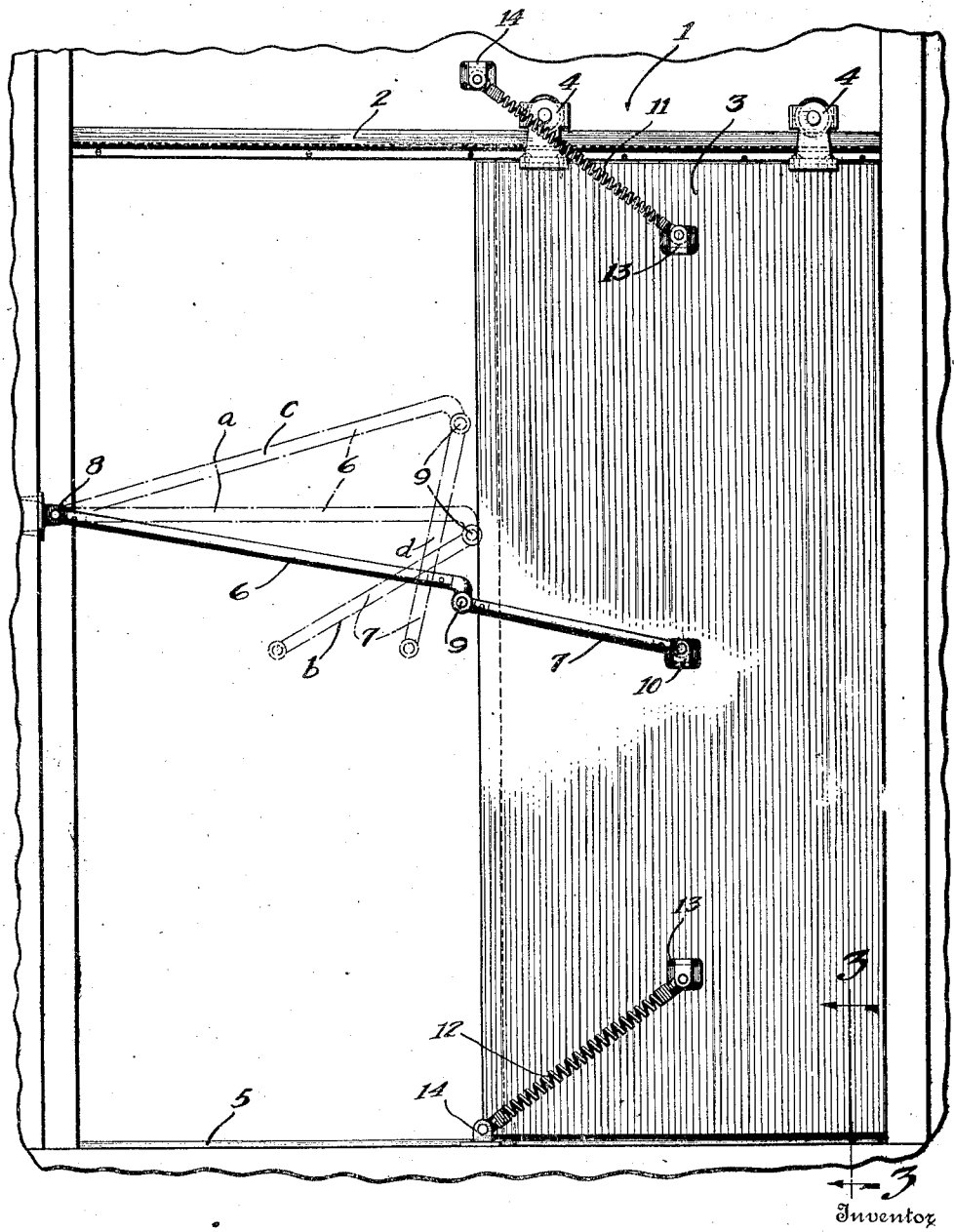


Fig. 1

Inventor

Howard B. Cook

By Wood & Wood

Attorneys

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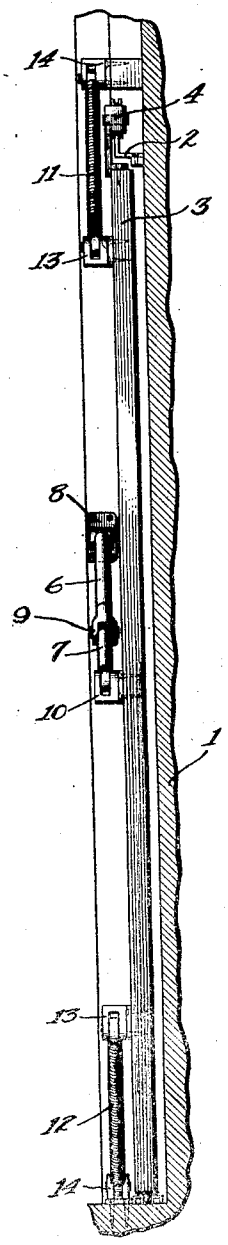


Fig. 2

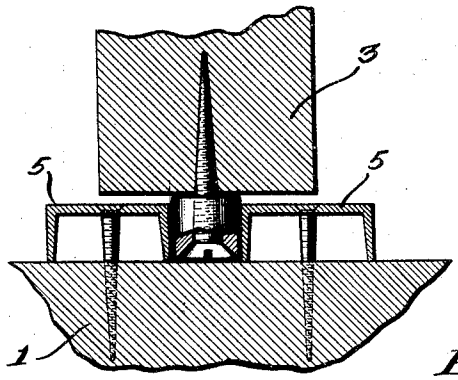


Fig. 3

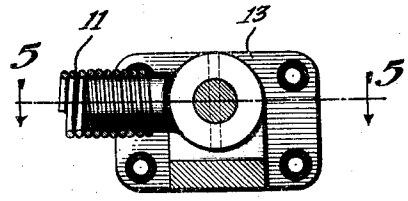


Fig. 4

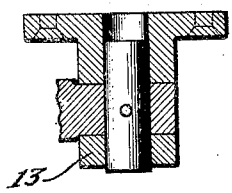


Fig. 5

Inventor
Howard B. Cook.

By Wood & Wood

Attorneys

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UNITED STATES PATENT OFFICE.

HOWARD B. COOK, OF NORWOOD, OHIO, ASSIGNOR TO THE WARNER ELEVATOR MFG. COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

SLIDE-DOOR-OPERATING DEVICE.

Application filed January 23, 1925. Serial No. 4,323.

The invention relates to improvements in slide door operating mechanism particularly adaptable for elevator doors.

An object of the invention is to render available the stored energy of a spring for moving a sliding door from either of two extreme positions to a mid-position under an accelerated motion so that the momentum of the moving door will carry it beyond the mid-position and with the assistance of a slight manual pressure the door is easily translated to an extreme opposite position with the spring again placed under full tension for the reverse operation, thereby relieving the operator from applying any excessive force for moving the door, facilitating the operation and at an increased rate of speed over a complete manual operation.

Another object of the invention is to provide a pair of toggle links for operating a sliding door to open and closed positions which will lock the door in either of its alternate positions and further in which the door is released and moved to a mid-position by lifting or moving the links in one direction and continuing for a full movement of the door by moving these links in an opposite or downward direction.

Another object of the invention is to utilize the stored energy of the spring or springs for applying the thrust to move or slide the door when released and to accelerate this movement to a mid-position to the relief of the operator, the spring swinging with the movement of the door to alternate sides of the central or neutral line so that the spring is tensioned as the door is moved to its sliding limits.

Further objects and advantages of the invention will be more fully set forth in the description of the accompanying drawing forming part of this specification, in which:

Figure 1 is a rear or inside elevation of the elevator door in closed position containing the improved door operating mechanism.

Figure 2 is an end elevation thereof.

Figure 3 is an enlarged section on line 3—3 of Figure 1.

Figure 4 is an enlarged horizontal section through one of the spring end supporting brackets.

Figure 5 is a section on line 5—5 of Figure 4.

Referring to the drawings, 1 indicates a door frame or opening structure of an elevator passway, a hanger track or rail as an angle bar suitably secured to the door framing at the upper end of the door extending longitudinally across the door opening for supporting and tracking the sliding door 3. The door is dependingly mounted upon the rail 2 by a pair of roller carrying hangers 4, 4, suitably fixed or secured to the upper end of the door. The lower end of the door is guided in a track groove formed by a pair of spaced channel bars 5, 5, secured to the sill plate of the door framing. The door mounting or hanging fixtures and tracks may be of any conventional or commercial form adaptable for sliding door service, the door hanging fixtures shown herein being of a simple and durable type highly adapted for heavy elevator doors.

The door is operated by a pair of toggle arms or links 6, 7, in the instance shown relatively of different lengths to obtain the desired door controlling functions and to meet a given dimension of door width and length of door controlling throw. The links operate to lock the door in both open and closed positions a release effected by moving one of the links upwardly and a lock by moving the links downwardly. The toggle as a unit at one end is pivotally connected with a stationary or fixed support as secured to the door frame and at the opposite end pivotally upon the door. In the capacity for a door as shown the longer link 6 at one end pivotally connects to a supporting bracket 8 secured to the elevator door framing and at its opposite end is provided with an angle joint 9 rigidly fixed to the link and pivotally connecting with one end of the second or shorter link 7. This provides an opposite connection for the center or joint of the toggle links enabling the links and particularly the link 7 to be swung to appropriate alternate positions without interference. The opposite end of the link 7 is pivotally secured to the supporting bracket 10 fixed to the door preferably centrally of the door with and at a slightly lower elevation than the connection of the link 6 with the stationary bracket 8 to incline the links downwardly when the door is in its closed position. Connecting

the link 7 with the door at a point centrally of its width distributes the sliding thrust in movement of the door from the toggle links to avoid tilting of the door, which would interfere with its free sliding motion.

The door is shown as of solid panel structure primarily for freight elevator service and the size and weight of doors of such class is continuously increasing until the thrust required by the operator to move them is becoming excessive. Therefore, energy means in the form of springs connecting with the door are employed for assisting and translating the door and increasing the speed of translation to the relief of the operator. Preferably two cylindrical springs 11, 12, connecting with and respectively disposed at opposite upper and lower ends of the door are employed, two being employed for the purpose of equalizing the action of the door and reducing their size and therefore are similar in construction and number.

One end of the springs respectively is pivotally connected to a bracket 13 fixed to the door preferably centrally of its width and the opposite end of the spring is pivotally connected to a bracket 14 secured to the door opening framing, the bracket 14 being located at the rear end of the door when in closed position or intermediate of the length of door throw so that the springs are under full tension when the door is in either of its alternate open or closed positions. When the door is in its closed position the toggle links 6 and 7 are in an extended or relatively linear position as shown in full lines in Figure 1, locking the door in such position and in a relatively angular position as represented in dot and dash lines *a* and *b* of Figure 1, likewise locking the door in its open position. In the extreme positions of the door the springs are flexed to a degree to offer sufficient tension or energy to move the doors when released by the toggle links to a mid-position from which the motion of the door can be continued by a downward pressure brought upon the link 6. To open the door the operator swings the toggle links upwardly by raising the toggle link 6 which action unlocks and slides the door, the sliding being aided and accelerated by the springs until the door reaches a mid-position at which the springs have moved slightly bevond a vertical position, the door under such movement having accumulated energy or motion or momentum sufficient to carry the door to bring the springs beyond a vertical position and likewise carry the toggle links to a relatively angular position as shown in dot and dash lines *c*, *d*, of Figure 1, whereupon when a downward pressure or movement is applied by the operator upon the link 6 to overcome friction and supply the energy required for extending the springs and bringing the toggle-links to a door locking and opening position with the springs under full tension the operation of closing the door is similarly performed, the operator raising the link 6 to break the locking position of the toggle links with the released tension of the springs and move the door in an opposite direction, which motion is continued by the operator again pressing down on the link 6 after the link 7 has been moved or swung to one side of a dead center or vertical position.

Having described my invention, I claim:

1. In a slide door operating mechanism, a sliding door, a pair of toggle links hingedly united and as a unit having one end fulcrumed to a stationary support and the opposite end to the door, adapted to be swung to relative positions for holding the door in alternate open or closed positions, and tension means connecting with said door effective for moving the door to a mid-position from either of its alternate positions.

2. The combination with a sliding door and a spring having one end fixed to the door and the opposite to a stationary support, and at a point midway of the alternate sliding limits of the door whereby the spring is under tension when the door is at either of its sliding limits, for accelerating the door translation to its mid-position when released, and means for locking the door at its translating limits.

3. In combination with a door casing, a door slidable across the casing, tension means connecting with the door effective for moving the door to a mid position from either of alternate positions, a pair of toggle links hingedly united, the free ends of the links respectively pivoted to the casing and door, said links substantially alignable for locking the door at one sliding limit, and further adapted to release the door and allow travel to an opposite limit, with the door-attached member, passing beneath the casing attached member across the hinging points for holding the door at that limit by downward pressure on the casing attached link.

4. In a sliding door operating mechanism, a door casing, a door slidable in the casing, tension means connecting with said door effective for moving the door to a mid position from either of alternate positions, a pair of toggle links hingedly united, having one end of one link fulcrumed to said casing and the end of the other link fulcrumed to the door, with the links alignable to lock the door at one of its sliding limits, and further adapted to be swung from substantially aligned locking position, upwardly to release the door, and further adapted to hold the door at an opposite limit by downward pressure upon the casing

attached link, after the passage of the door attached link across the pivotal point of the links.

5. In combination with a door frame, a door mounted to oscillate across said frame to block either side thereof, tension members adapted to impart harmonic motion to the oscillations of the door when unimpeded, manually operable members secured to said door for imparting friction overcoming force thereto, and for controlling said oscillations.

6. In combination with a door frame, a door mounted to oscillate across said frame to block either side thereof, springs pivoted between the center of the frame and the center of the door, said springs adapted to impart harmonic motion to the oscillations of the door when unimpeded, manually operable members secured to said door for imparting friction overcoming force thereto, and for controlling said oscillations.

7. In combination with a door frame, a door mounted to oscillate across said frame to block either side thereof, tension members adapted to impart harmonic motion to the oscillations of the door when unimpeded, and a toggle lever pivoted between the door and frame, said toggle lever adapted to be manually operated to impart friction overcoming force to the oscillations of the door, and hold the door stationary at one extreme position by the alignment of the toggle members.

8. In combination with a door frame, a door mounted to oscillate across said frame to block either side thereof, springs pivoted between the center of the frame and the center of the door, said springs adapted to impart harmonic motion to the oscillations of the door when unimpeded, and a toggle lever pivoted between the door and frame, said toggle lever adapted to be manually operated to impart friction overcoming force to the oscillations of the door, and hold the door stationary at one extreme position by the alignment of the toggle members.

In witness whereof, I hereunto subscribe my name.

HOWARD B. COOK.