J. M. GRAHAM.

ELEVATOR DOOR CLOSER.

APPLICATION FILED DEC. 5, 1917.

1,309,130. Patented July 8, 1919.

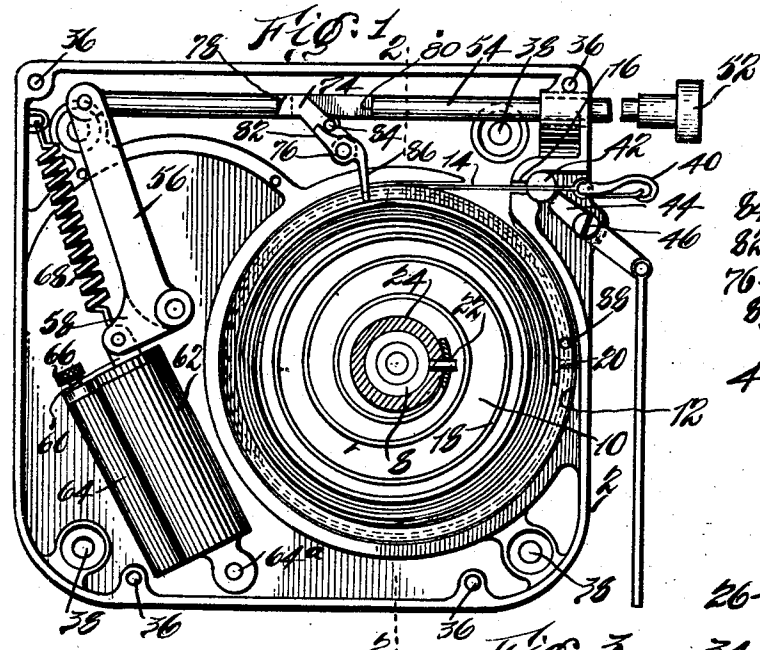


FIG. 1.

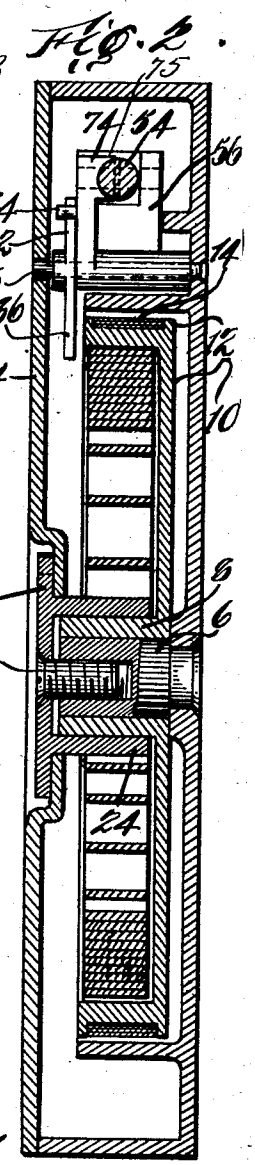


FIG. 2.

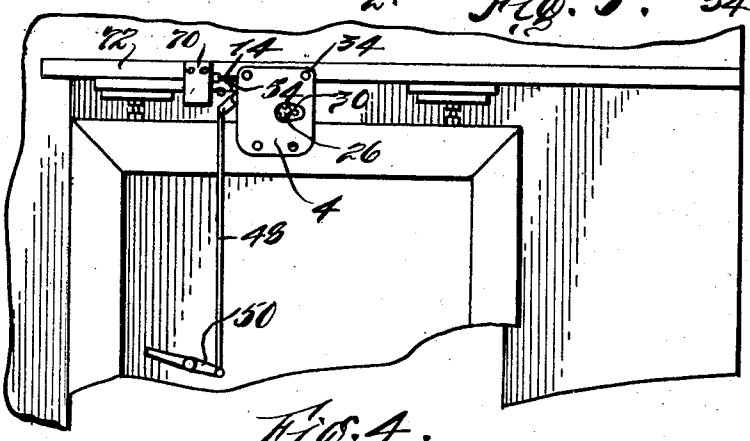
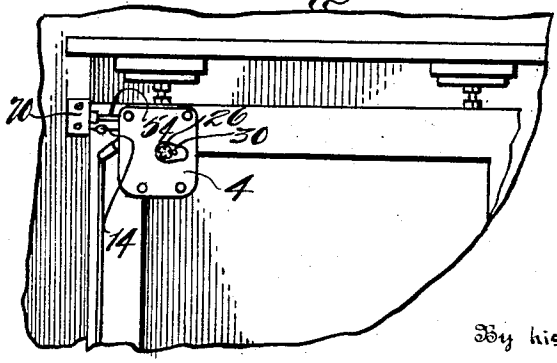


FIG. 4.



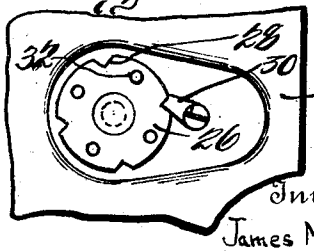


FIG. 5.

Inventor
James M. Graham

By his Attorneys
Newell & Neal

UNITED STATES PATENT OFFICE.

JAMES M. GRAHAM, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO ELEVATOR SUPPLIES COMPANY, INC., A CORPORATION OF NEW JERSEY.

ELEVATOR-DOOR CLOSER.

1,309,130. Specification of Letters Patent. Patented July 8, 1919.

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To all whom it may concern:

Be it known that I, JAMES M. GRAHAM, a citizen of the United States, residing at Maplewood, New Jersey, have invented certain new and useful Improvements in Elevator-Door Closers, of which the following is a clear, full, and exact description.

This invention relates to door controlling means and particularly to means for automatically effecting the closing or the opening movement of an elevator door.

In many places, at the present time, safety regulations require that automatic closing mechanisms be connected to the doors of elevator-wells. The installation of ordinary door closing mechanisms, particularly in old structures, is a difficult and expensive undertaking because of the diversity in the sizes and locations and ranges of travel of the doors at the different landings. Moreover, to some extent the same difficulty is experienced with new constructions. This is due to the fact that with the usual lever-operated automatic door-closers, it is necessary to take exact measurements for each floor of the size and range of movement of the door or doors, and a large proportion of the parts for each installation must therefore be made specially.

A general object of the present invention is to provide a simple, compact, substantially self-contained and noiseless door closing mechanism that will be effective for its purpose and yet can be quickly and easily installed either in old or in new structures. More particularly, the invention aims to provide a door closing mechanism which may be carried by the door without interfering with the door hangers or the other mechanisms, associated with the door, and which will not project materially to either side of the door.

An important feature of the invention is the arrangement of the actuating mechanism of the door-closer and a cushioning mechanism all in one casing which may be carried by the door, and all in one plane, so that the casing may be mounted flatwise of door and thus go into the narrow spaces provided, either in old or in new constructions, in the region of the door hangers.

Other objects and important features of the invention will appear from the following description and claims when considered in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of door-closing means embodying the present invention, the cover of the inclosing casing being removed;

Fig. 2 is an enlarged section on the line 2—2 of Fig. 1;

Fig. 3 is a detail elevation showing the door-closing means mounted upon the door between the door hangers;

Fig. 4 is a view similar to Fig. 3, showing the door-closing means mounted near one side of the door and beneath one of the hangers; and

Fig. 5 is a detail view illustrating the spring adjusting means.

The illustrated mechanism, which comprises means for effecting the movement of the door and means for cushioning this movement, is inclosed in a casing comprising a shallow box 2 having a removable cover 4. The box 2 carries a stud shaft 6, which receives the hub 8 of a drum 10. At its periphery, the drum 10 is provided with flanges 12; between which fits a strap 14 adapted to be wound upon itself upon the drum, this strap being guided through an opening 16 in the casing. The guide opening 16 and the flanges 12 cause the strap to be wound upon itself upon the drum, in the plane of the drum.

The drum is spring-actuated in the winding direction, the unwinding of the strap from the drum, as the door is moved to open position, tensioning the spring for the winding operation. In the illustrated construction the drum actuating spring is shown as a spirally-coiled spring 18, connected at its outer end at 20 to the cylindrical part of the drum, and at its inner end connected at 22 to the hub 24 of spring adjusting means 26 carried by the cover 4, the hub 24 surrounding the hub 8 of the drum.

The spring tensioning device 26 comprises a plate having notches 28 coöperating with a locking pawl 30 and having wrench-receiving openings 32 by which the plate 26 and its attached hub may be turned in the spring tensioning direction. The plate 26 has a central opening through which a screw 34 tapped into the stud-shaft 6 connects the spring tensioning device and with it the cover 4 to the box 2 and its contained parts. The cover 4 is also attached to the box 2

by screws, bolts or other means 34, entering the openings 36 in the box 2. The openings 38 are provided for the attachment of the device to the door with which it is associated.

The strap 14, which at one end is attached to the drum 10, carries at its other end a snap hook 40 or other suitable means for attaching it to the door frame or other stationary part and preferably also carries a stop 42 which serves both to limit the movement of the strap into the casing and also coöperates with a catch 44 pivoted upon the casing at 46 in such relation to the path of movement of the stop 42 that said stop will move past said catch as the strap is drawn into the casing. The catch 44, due to the weight of the link 48 and connected operating handle 50, will move into position to prevent the outward movement of the strap 14 until the catch 44 is released by the operator through the hand-lever 50.

To cushion the closing movement of the door, a stop 52 projects yieldingly from the end of the casing through which the strap 14 is drawn, the stop 52 being provided with a stem 54 guided in said casing and connected at its inner end to the long arm 56 of a bell-crank lever, the short arm 58 of which is connected to the plunger 60 of a dash-pot 62, pivotally supported at 64 near the bottom of the casing 2. The dash-pot 62 is of ordinary construction, including a by-pass 64 and an adjustable valve 66, and inasmuch as it does not specifically constitute a part of the present invention, it is not herein illustrated in detail. A spring 68, connected at one end to the casing and at its other end to the short arm 58 of the bell-crank and the associated plunger 60 of the dash-pot, tends, through its action on the bell-crank lever, to project the stop 52 from the casing 2 into position to receive the first impact of the door-closing action, the stop 52 coöperating with another stop 70 mounted upon the door frame or other convenient stationary part.

When the door-closing mechanism is mounted, as shown in Fig. 3 of the drawings, upon the upper end of the door between the door hangers so that the strap and stop may project above the top of the door, the coöperating stops 70 may be mounted upon the door-hanger support 72 as shown, and in this position of the parts the stop 52 may be normally projected its full distance from the casing 2 without projecting into the door opening. When, however, the door-closer is located upon the door in the position shown in Fig. 4, if the stop 52 were projected the normal amount from the casing 2, it might project into the door opening and thus interfere with people entering or leaving the elevator car. In order, therefore, to hold the stop in retracted position in such cases, mechanism is provided for automatically locking the stop in retracted position when the door is closed and for releasing the stop and permitting its normal projection from the casing when the door has been opened and again starts upon its closing movement.

The illustrated means comprises a dog 74, pivoted at 76 upon the casing 2, and provided with a lateral lug 75 coöperating with a shoulder 78 at one end of a recess milled out of the side of the stem 54 of the stop 52, to lock the stop 52 in its retracted position, the dog being thrown back into its locking position by the shoulder 80 at the other end of this recess when the stem 54 is moved into the casing during the door cushioning movement.

To release the dog 74, when the door again starts to close after having been opened, a trip lever is provided, which is fulcrumed upon the pin 76, and has one arm 82 arranged to engage a pin 84 upon the dog 74 and a second arm 86 projected into the path of travel of a pin 88 on the drum 10. It will be seen that the trip lever is so arranged that when the drum is moving in the strap unwinding direction, that is, when the door is being opened, the pin 88 will engage the arm 86 of the trip lever and rock this lever without moving the dog 74. When, however, the drum starts to wind the strap 14, that is, when the door starts to close, during the first quarter turn of the drum, the pin 88 will engage the right-hand side of the arm 86, Fig. 1, and rock both the trip lever and the dog 74 in the direction to disengage the lateral lug 75 on the dog 74 from the shoulder 78 of the stop stem 54, thus permitting the spring 68 to project the stop 52 to its normal distance from the casing 2, thereby bringing the stop 52 and its associated cushioning means into position to cushion the closing movement of the door.

From the foregoing description the operation of the device will readily be understood. When the parts are in the position shown in Figs. 1 and 3, the door is closed and locked, the catch 44 being in locking position in front of the stop 42 on the strap 14. By depressing the handle end of the lever 50, the operator may unlock the door and move it to open position against the action of the spring 18, which resists the unwinding of the strap 14 from the drum 10. While the strap is being unwound during the opening movement of the door, the pin 88 does not interfere with the position of the dog 74 which is then holding the stop 52 in retracted position. When, however, the door is released by the operator, the catch 44 will move up into position to be engaged by the stop 42, and the pin 88, which will then be moving in the other direction, that is counter-clockwise, Fig. 1,

will engage the arm 86 of the trip lever and move the dog 74 out of stop holding position, thus permitting the stop 52 to be projected by its spring 68, this movement at the same time drawing the piston out in the dash-pot 62 so that the dash-pot will retard the movement of the stop 52 when it engages the stop 70 and thus cushion the casing of the door. As the stem 54 and its shoulder 75 will then be moved to the left so as to cause the shoulder 80 to throw the dog 74 into engagement with the said shoulder 78, said engagement will be maintained until the pin 88 again strikes the arm 86.

It will be noted that this door-closing cushioning device is very compact and that the parts are all arranged substantially in one plane and inclosed in a relatively shallow casing, whereby the device may readily be installed either in old constructions or in new constructions in the comparatively narrow spaces which are usually found in the region of the upper end of the door and in the region of the door-hanger. Moreover, it will be noted that the whole mechanism is self-contained and requires neither alteration of the structure for its attachment, nor any particular skill in its installation in order to secure its proper working. The device readily adjusts itself to varying ranges of door movement and varying structural conditions.

What I claim as new is:—

1. Door closing means comprising, in combination, a relatively shallow casing adapted to be carried by the door substantially in the plane of the door movement, a strap and a strap winding drum located in said casing and arranged to wind the strap upon said drum to thereby close the door, said strap being guided through one end of said casing and adapted to be connected to the door frame, a door stop yieldingly projected from said end of said casing adapted to cushion the door when closed by said spring, said stop located at one side of said drum and in the plane thereof, a dash-pot located at another side of said drum and also in the plane thereof, and a bell-crank lever connecting said stop and said dash-pot.

2. Door closing means comprising, in combination, a relatively shallow casing adapted to be carried by the door substantially in the plane of the door movement, a strap guided through one end of said casing and adapted to be connected to the door frame, a strap winding drum in said casing and a spring located within said drum for rotating the same, a stop yieldingly projected from said casing in the direction of its movement with the door and movable in the plane of said casing, drum and spring, a dash-pot connected to said stop to cushion the door on closing thereof by said spring, said dash-pot located at the side of said drum and in the same plane therewith.

3. In door closing means, the combination with a casing, a strap and a spring-actuated drum normally tending to wind said strap into said casing, of a cushioning stop, means tending normally to project said stop from said casing, means for retaining said stop in retracted position, and means whereby said last mentioned means is released by the unwinding of said strap.

4. In door closing means adapted to be carried by the door and to coöperate with the door frame, the combination with a strap to be connected to the door frame, and automatic strap winding means to be carried by the door, of a yieldingly projected door cushioning stop also carried by the door, means for holding said stop in retracted position as the door is moved to open position, and means actuated by the winding of said strap as said door is automatically moved to closed position for releasing said stop.

5. Door closing means comprising a relatively shallow casing adapted to be carried by the door substantially in the plane of the door movement, a strap and a strap winding drum located in said casing and arranged to wind the strap within said plane, said strap being guided through one end of said casing, a door stop yieldingly projected from said end of the casing and located at one side of said drum, a dash-pot located at another side of said drum in the plane thereof, a bell-crank lever connecting said stop and said dash-pot, and means brought into action on the closing of the door for automatically locking said stop in retracted position.

6. In door closing means, the combination with a casing, a strap, a spring actuated drum for winding up said strap and closing said door, said strap unwinding as said door is opened, a latch fixed relatively to said casing so that said strap may be moved past it as said drum unwinds, and a stop carried by said strap and arranged to be engaged by said latch when said strap is wound into door closing position to thereby prevent unwinding of said strap and opening of the door.

7. In door closing means, the combination with a drum, a spring for rotating said drum spirally coiled within the drum and a strap connected to said drum to be wound thereon, said drum, spring and strap being arranged in one plane, of a casing for said parts, a stud-shaft in said casing, a hub on said drum surrounding said shaft, and spring tensioning means having a hub surrounding said drum hub.

8. In door closing means, the combination with a drum, a spring for rotating said drum spirally coiled within the drum and a strap connected to said drum to be wound thereon, said drum, spring and strap being

arranged in one plane, of a casing for said parts, a stud-shaft in said casing, a hub on said drum surrounding said shaft, and spring tensioning means having a hub surrounding said drum hub, said spring tensioning means having a wrench engaging part projecting to the outside of said casing.

9. In door closing means, the combination with a relatively shallow casing having a removable cover, of a strap, a strap winding drum and a spring within said drum for rotating said drum, all carried by said casing substantially in one plane, a stud-shaft carried by one part of said casing upon which said drum is rotatably mounted, and spring tensioning means carried by the other part of said casing and also comprising a part within which said drum is rotatably mounted.

10. In door closing means, the combination with a casing, of a strap movable relatively to said casing, and a spring-actuated drum normally tending to move said strap relatively to said casing, of a cushioning stop, means tending normally to project said stop from said casing, means for retaining said stop in retracted position, and means whereby said last-mentioned means is released concomitantly with the inward movement of said strap.

11. In door closing means, the combination with a casing, a cushioning stop for said door carried by said casing, means normally tending to project said stop from said casing, means for retaining said stop in retracted position, and means whereby said last-mentioned means is released concomitantly with the closing movement of the door.

Signed at New York city, N. Y., this 1st day of December, 1917.

JAMES M. GRAHAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."