No. 773,413. PATENTED OCT. 25, 1904.

L. C. NORTON.

SLIDING DOOR CLOSING FIXTURE.

APPLICATION FILED OCT. 7, 1903.

NO MODEL.

Fig. 1.

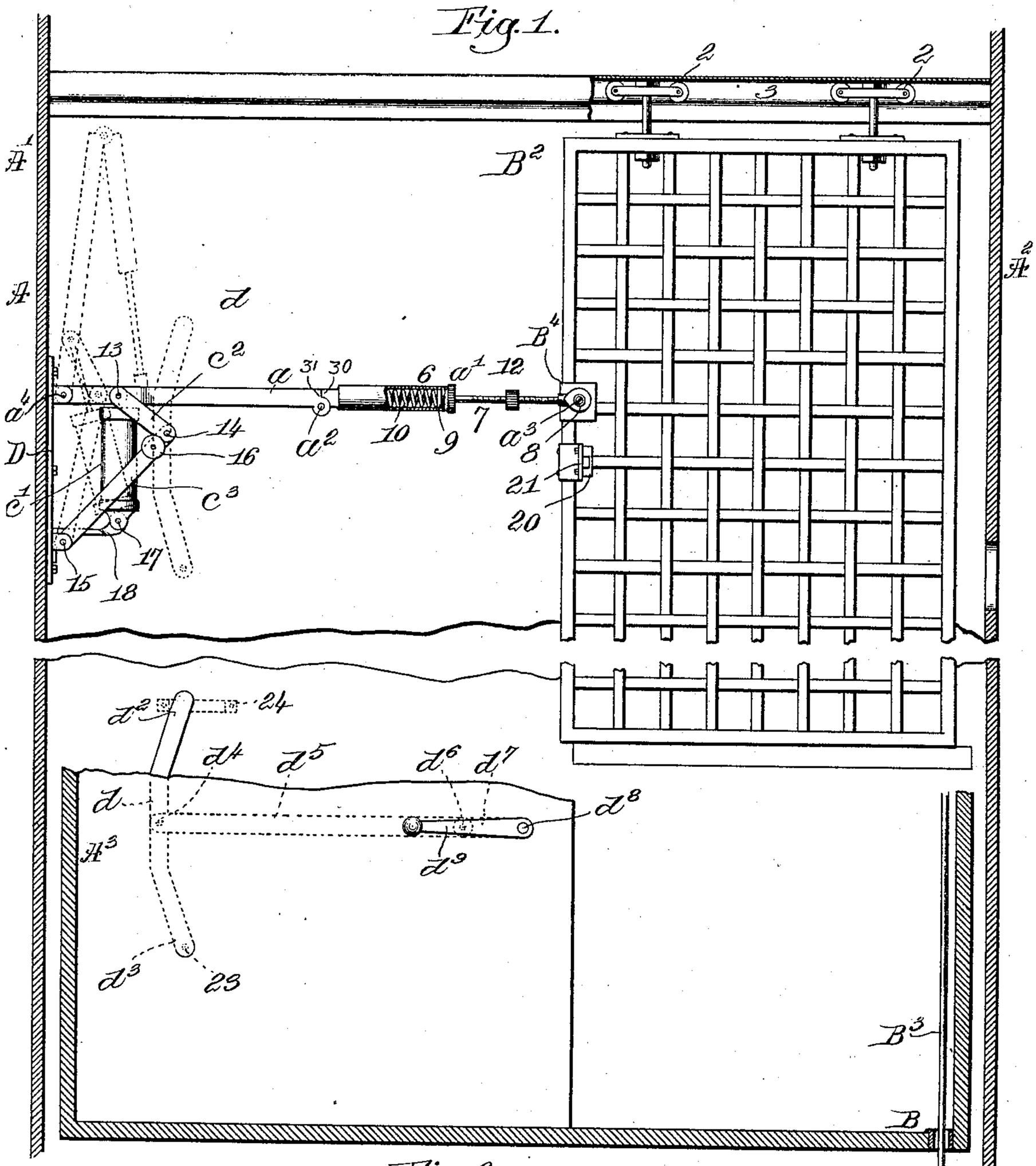


Fig. 2.

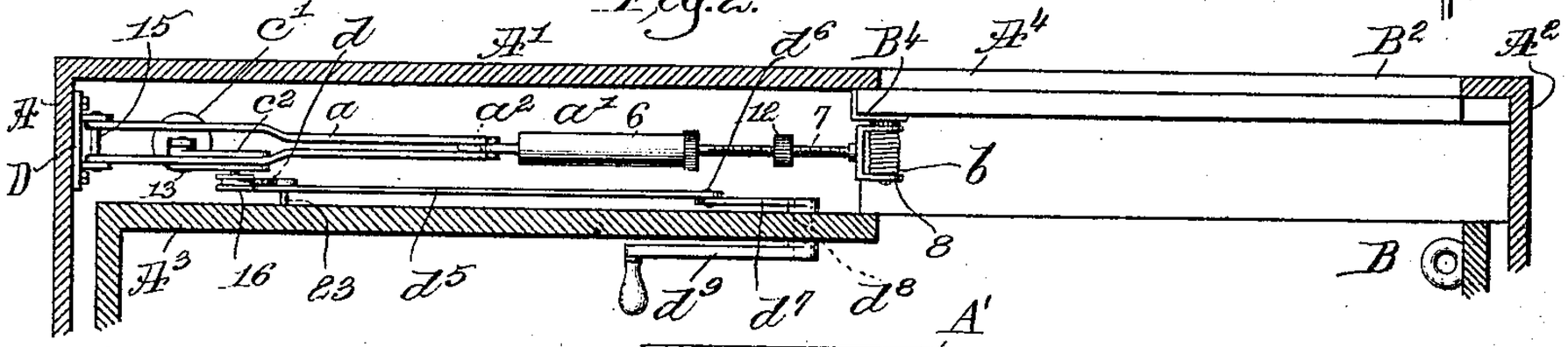
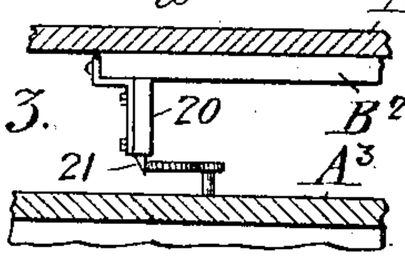


Fig. 3.



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No. 773,413. Patented October 25, 1904.

UNITED STATES PATENT OFFICE.

LEWIS C. NORTON, OF NEWTON, MASSACHUSETTS.

SLIDING-DOOR-CLOSING FIXTURE.

SPECIFICATION forming part of Letters Patent No. 773,413, dated October 25, 1904.

Application filed October 7, 1903. Serial No. 176,096. (No model.)

To all whom it may concern:

Be it known that I, LEWIS C. NORTON, a citizen of the United States, and a resident of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Sliding-Door-Closing Fixtures, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The sliding doors leading into elevator-wells of passenger-elevators are commonly opened and closed by hand, and frequently the elevator-operator neglects the closing of the door and accidents happen.

The object of my invention herein to be described is to provide novel means whereby a well-door may be opened by hand only when opposite a well-door landing, the door being closed automatically after the elevator-car starts upwardly or downwardly from the landing.

As I have chosen to herein illustrate my invention, I employ a toggle-joint one bar or member of which is jointed to the door and the other to one wall of the elevator-well, the two bars at their junction having abutting shoulders to limit the movement of the bars constituting the toggle in one direction, as when the well-door is closed. One member of the toggle-bars has connected with it joint-springing means and the other member a spring, the joint-springing means in the movement of the elevator-car approaching a well-door in the ascent or descent of the car being moved to spring the toggle-joint, that the operator may engage the well-door when the car arrives opposite said door and open the same by hand, said spring acting to automatically close the door when the car is started, and the actuator in the ascent or descent of the car retires from the joint-springing means. When the well-door is fully open, a fastening device connected with the well-door and shown as a latch automatically engages a part of the actuator for the joint-springing means, said actuator being carried by the car, and locks the open door, holding it locked open until the car is started up or down, when the portion of the latch engaged with said actuator travels away from and becomes disengaged therefrom, and immediately the spring referred to connected with one member of the toggle acts to close the door. An elevator-car as it passes each well-door in going up or down will when the floor of the car is substantially level with the sill of the well-door move the toggle-joint in the same direction sufficiently to break the joint, so in case the car is stopped the operator of the elevator may complete the opening of the well-door by hand. I have combined with the toggle-joint referred to a door-check that will prevent the slamming of the well-door as it is being closed automatically by the action of said spring.

Figure 1 indicates part of the walls of an elevator-well in a building in which may be moved an elevator-car, said figure showing the well-door sustained at its top and closed. Fig. 2 is a plan view showing the door and the door-closing means connected therewith and part of a car, and Fig. 3 is a detail showing the latch in engagement with the actuator for the joint-springing means.

In the drawings, A A′ A^2 represent parts of the side walls of an elevator-well in which may be moved up and down by any usual car-moving means a car A^3 that may be of a width and breadth to more or less fill the cross-sectional area of the well. The bottom of the car has a hole, usually lined with a brass bushing B, through which will pass the usual rope B^3, it may be, for starting and stopping the elevator-actuating mechanism of whatever nature employed, that depending on the power used to move the car. The side A′ of the elevator-well next a landing in a hall has a space A^4 leading into the well, and this space is closed by a well-door B^2, which may be of metal in the form of grillework or of any usual construction, and the door will preferably be suspended from its upper end by rollers 2, running on usual tracks 3, sustained preferably inside the well. The well, car, and sliding door, and means for sustaining and guiding the door in its opening and closing movements, may be of any usual kind.

I connect with the inner edge of the well-door and with a bracket D, secured inside the

well, door-closing means comprising in the form in which I have herein chosen to illustrate my invention a toggle-joint in which there are two bars $a\,a'$ jointed together at a^2, the bars having shoulders 30 and 31 that abut, as do the well-known top-prop joints. When the toggle-joint occupies the position, Fig. 1, full lines, and the door is closed, the pin a^2 of the joint will be below a line intersecting the centers of the pivots $a^3\,a^4$, uniting the two bars, respectively, to the well-door and to a casting at the inner side of the well. When the shoulders 30 and 31 abut, as shown, the joint cannot be farther moved downwardly. Before the well-door can be opened for the entrance into the car or the exit therefrom of passengers the toggle-joint must be slightly raised, so that the pin a^2 will occupy a position above a line intersecting the pins $a^3\,a^4$, and thereafter the door may be opened manually by the operator engaging the well-door by hand.

The well-doors in my invention, one at each landing, are not provided with usual locking-latches to keep the door closed, as the door-closing means shown acts, as has been described, to retain the door closed except when the elevator-car is substantially opposite the well-door.

I have represented the bar a' as a yielding member—*i. e.*, it is composed of a cylinder 6 and a rod 7, having a forked head 8 and a piston 9, the latter being within the cylinder and acted upon by a spring 10, the spring resisting the entrance of the piston into the cylinder. The rod has a stop 12, made as a nut, applied to the threaded shank of the rod. The stop may be adjusted, and by its position on the rod will limit the distance that the piston and its rod may enter the cylinder.

The pin a^3, uniting the forked head 8 of the arm with the plate B^4, connected with the door, is surrounded by a strong spiral spring b, one end of which is connected with said pin and the other with the head, said spring acting normally on the bar a', forming part of a toggle-joint and connected with the well-door to move said joint in a direction to close the door.

Where an elevator is used in a house and a janitor is not kept to run the same, the yielding part a' of the rod is especially desirable, for the reason that a person standing in the hallway may engage the well-door and slide the same in a direction to open the door for, say, two or three inches, according to the adjustment of the stop 12, to thereby enable any one desiring to use the elevator to reach in and engage the elevator-rope B^3 to start the car. Whenever the car arrives in position opposite the landing where the person stands who wishes to enter the car, then and then only the door may be fully opened, as will be described.

I have jointed to the bar a of the toggle-joint at 13 one member of joint-springing means, said means comprising a link c^2 and a link c^3, united by a pin 14, the opposite end of link c^3 having its fulcrum on a stud 15, extended through an ear in a plate D. The link c^3 is provided with a roller 16. The pin 13, connecting the link c^2 with the bar a, also sustains the usual plunger or piston of a door-check, the cylinder of which is herein designated c', said cylinder being pivoted at 17 on an arm 18, extended into the well from the plate D.

When the bars $a\,a'$ are in the full-line position, Fig. 1, the door is closed; but when the door is open the bars occupy the dotted-line position, Fig. 1.

In Fig. 1 it will be noticed that the door-check also aids in keeping the bars in their door-closing position, and the door-check, the piston of which is movable with the bar a of the toggle-joint, retards the closing of the door by the spring b and prevents the well-door from slamming at the end of its closing movement.

The car is provided at its outer side with an actuator for the joint-springing means, said actuator being represented as a projection d, having inclined end portions $d^2\,d^3$. As either inclined end portion of said actuator strikes the roller 16 of the joint-springing means as the car is ascending or descending the links $c^2\,c^3$ are moved to the left, Fig. 1, far enough to lift the bar a of the toggle-joint sufficiently to raise the pin a^2, connecting the bar a with the bar a', above a line intersecting the pins $a^3\,a^4$, thus making the toggle-joints so that as the car-floor arrives opposite the sill of the well-door the operator may engage the well-door and open the same. As the door is opened, the center part of the toggle-joint having been raised to thus break the toggle, the bars comprising said toggle are moved into their dotted-line position, Fig. 1, such movement of the door also acting through the bar a to withdraw the plunger of the door-check from the cylinder in which it is located.

The well-door is provided with a locking device comprising a casing 20 and a spring-latch 21, the end of the latch being so beveled as to be pushed back into the casing against the latch-moving spring of usual construction by contact with the central or straight part of the actuator d, connected with the bar, said latch when the door is fully open engaging said actuator and retaining the door open as long as the car stands opposite a space uncovered by opening the well-door.

Passengers having entered the car or left the same and the car again started up or down, the actuator for the joint-springing means retires from contact with the roller 16, and immediately the spring b acts to straighten the toggle-joint, putting the same into its full-line position, Fig. 1, and closing the door, the

movement of the toggle continuing until the shoulders 30 and 31 thereof abut, and as the final movement of the door in closing is completed the door-check prevents slamming of the door, thus avoiding a noise which is very objectionable. If the car has been started by a person standing in a hall, the door having been opened far enough, due to the spring 10 yielding and the position of the stop 12, to form a space to enable a person who wishes to start the elevator to reach the elevator-rope, then when the car arrives substantially opposite the well-door where it is desired to enter the elevator-car the actuator will meet the roller 16 of the door-springing means and break the toggle-joint, lifting the same slightly, so that the person standing in the hallway may engage and fully open the well-door and enter the elevator-car. When my device is employed in an office building where an attendant is employed to run the elevator, the actuator may and preferably will be movably sustained at the outside of the car, said actuator being shown as pivoted at 23, near one end thereof, to the car. The upper end of the actuator is embraced by a strap 24, which limits the movement of the actuator laterally with relation to the elevator-car. The actuator may have jointed to it at d^4 a link d^5, in turn jointed at d^6 to an arm d^7, fast on a rock-shaft d^8, the inner end of the rock-shaft inside the bar having a crank d^9, that may be turned when desired. When the handle occupies the position shown, the actuator by contact with the roller 16 will lift the bars a a' of the toggle and break the joint as the car approaches the landing in either direction, and if the car is to be stopped the well-door may be opened by the hand of the elevator attendant. If, however, the car is not to stop at each landing where there is a well-door, this fact being known to the operator the latter may turn the handle and move the actuator laterally, or to the right viewing Fig. 1, for a distance sufficient to pass the roller 16 and not move the joint-springing means to break the joint, the operator taking care, however, that the actuator occupies its outward position, or to the left, as the car approaches any landing where a well-door is to be opened. There will be a toggle-joint and joint-springing means at each landing, the drawings, however, showing but one such toggle-joint and one set of joint-springing means. Should the stop 12 be turned on the rod 7, so as to abut the end of the cylinder, then in such condition the well-door could not be opened at all from the hallway by a person in the hall, said well-door being opened under such conditions only from the interior of the car when the latter was opposite the well-door.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sliding door for an elevator-well, jointed bars connected one with said door and the other with the interior of the elevator-well, said bars constituting a toggle-joint the movement of which is restricted in one direction, joint-springing means connected with said toggle, and an actuator carried by the car to break the joint of the toggle whichever direction the car is moving as the same approaches the well-door, to enable the door to be fully opened by hand, said door as it is opened folding the toggle-joint.

2. A sliding door for an elevator-well, combined with a toggle-joint composed of bars constructed to abut each other when the door is closed, and a spring acting upon one of said bars to move the toggle-joint in a direction to close the door and cause said shoulders to abut one the other in which position the door is retained closed.

3. A sliding door for an elevator-well, combined with a toggle-joint composed of bars constructed to abut each other when the door is closed, and a spring acting upon one of said bars to move the toggle-joint in a direction to close the door and cause said bars to abut one the other and retain the door closed, joint-springing means, and an actuator moved by the car to contact with said joint-springing means and spring the toggle-joint that the operator may thereafter engage the door and fully open the same.

4. A sliding door for an elevator-well, and a toggle-joint composed of connected bars jointed one to the door and the other to the interior of the elevator-well, the pivot uniting the bars of the toggle-joint when the door is closed occupying a position out of line with the pivots connecting said bars respectively with the door and the elevator-well.

5. A sliding door for an elevator-well, and a toggle-joint composed of connected bars jointed one to the door and the other to the interior of the elevator-well, the pivot uniting the bars of the toggle-joint when the door is closed occupying a position out of line with the pivots connecting said bars respectively with the door and the elevator-well, joint-springing means connected with one of said bars, a door-check one member of which is connected with one of said bars and an actuator carried by the car and adapted to meet and move said joint-springing means to spring the joint of the toggle and actuate the door-checking means, putting it in position to prevent the door slamming when closed, and a spring acting automatically to move said joint to close the door when the car is moved away from the well-door in either direction.

6. A sliding door for an elevator-well combined with a toggle-joint connected with said door and the interior of the well, one member of said joint being made telescopic as and for the purpose set forth.

7. A sliding door for an elevator-well combined with a toggle-joint connected with said

door, composed of members one of which is connected with said door and the other with the interior of the well, one member of said joint being made telescopic, and a stop to limit the extent to which said telescopic member may yield as and for the purpose set forth.

8. A sliding door for an elevator-well, a toggle-joint having shoulders to abut one another, and composed of bars one of which is connected with the sliding door and the other with the elevator-well, and a spring to close the door acting on said toggle-joint to close the door automatically after said door has been opened, combined with a door-check comprising a cylinder and piston to prevent the door from slamming as it is finally closed.

9. A sliding door for an elevator-well, a toggle-joint comprising bars having shoulders which abut when the door is fully closed, joint-springing means connected with one member of said toggle-joint, an actuator connected with the car and adapted to move said joint-springing means whenever the car approaches the well-door as the car ascends or descends, thus moving the toggle-joint to disengage the abutting shoulders and spring the joint, leaving the door free to be opened by the hand of the operator, and a spring coacting with one member of said toggle-joint and made operative when said actuator retires from said joint-springing means in either direction, said spring immediately acting to automatically close the door.

10. A sliding door for an elevator-well, a toggle-joint comprising bars jointed together and presenting shoulders to abut when the door is closed, one of said bars being connected with the sliding door and the other with one of the walls of the elevator-well, an actuator carried by the car, joint-springing means connected with one bar of the toggle-joint and with the elevator-well, and adapted to be struck by said actuator as the car approaches a well-door in the ascent or descent of said car, a door-check comprising a cylinder and piston, the piston being connected with one member of said toggle-joint and being withdrawn from its cylinder as the well-door is opened by the hand of the operator, the toggle-joint having been broken, and a spring acting normally to close the well-door after the actuator carried by the car has been moved out of contact with the joint-springing means.

11. A sliding door for an elevator-well, combined with a toggle-joint composed of two bars one connected with said door and the other with the interior of the well, one of said bars being made telescopic for the purposes set forth, and a door-check connected with the other of said bars, and a spring to automatically close the open door when the car passes above or below the landing of the well-door.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS C. NORTON.

Witnesses:
GEO. W. GREGORY,
EDITH M. STODDARD.