

(No Model.)

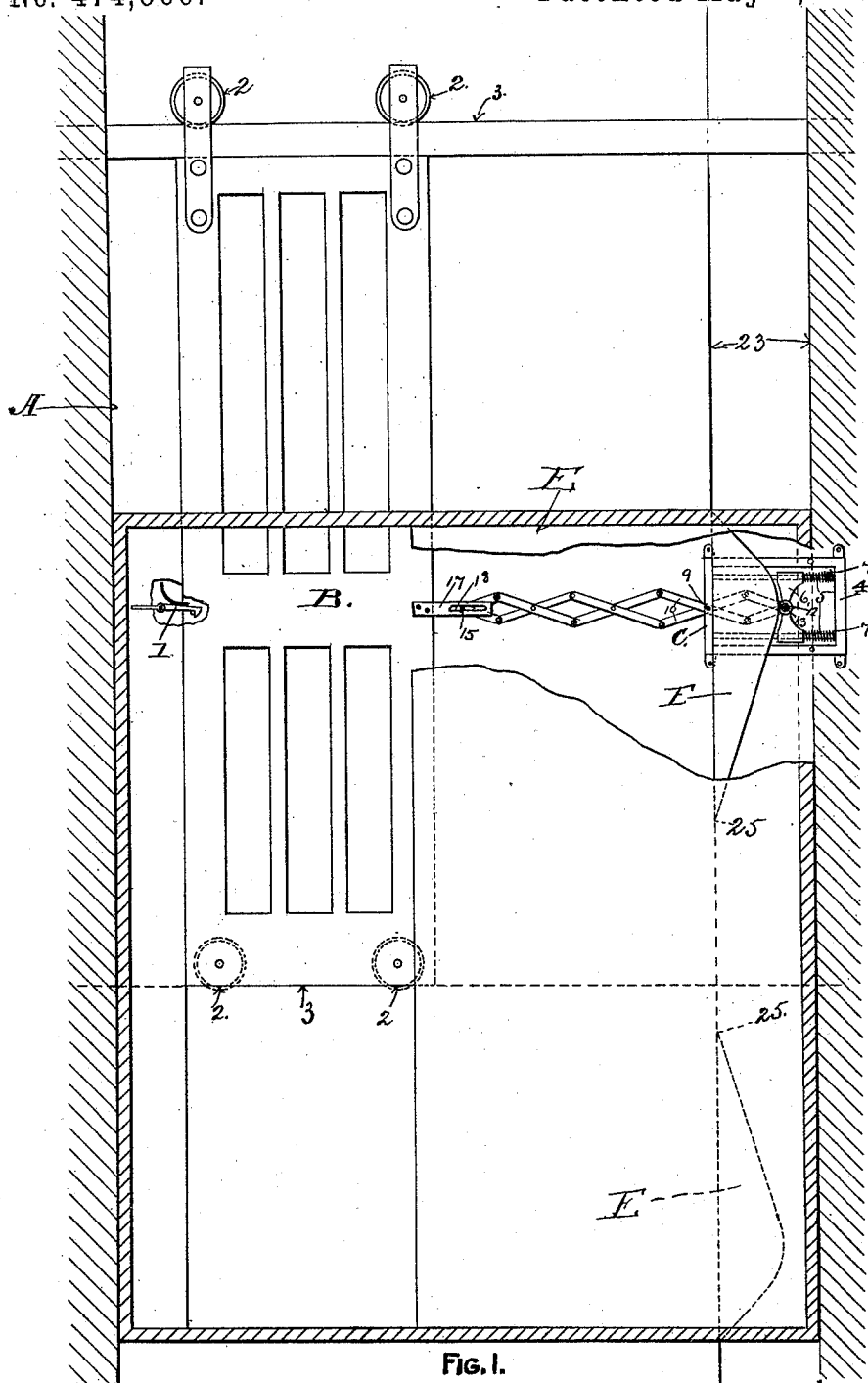
4 Sheets—Sheet 1.

E. SAVAGE.

DEVICE FOR OPERATING ELEVATOR DOORS.

No. 474,066.

Patented May 3, 1892.



WITNESSES:

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Plummer Jewell

INVENTOR:

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BY

William H. Low

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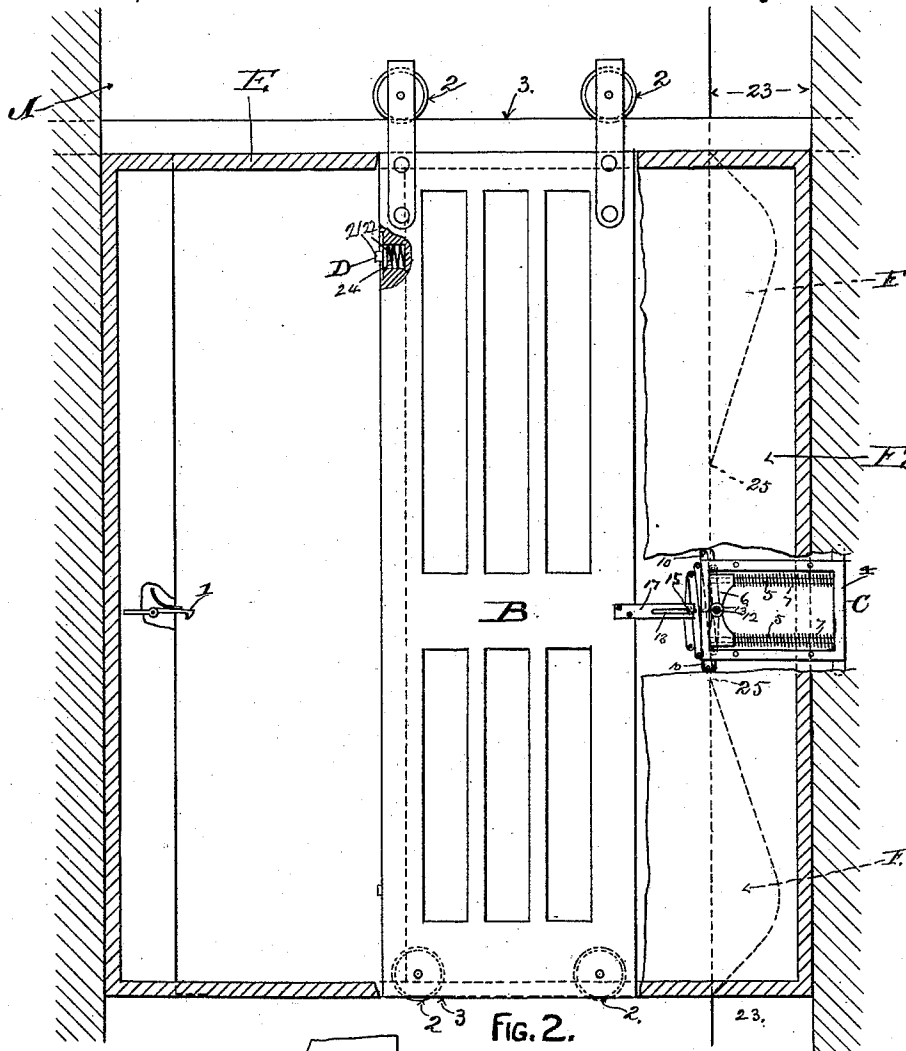


FIG. 2.

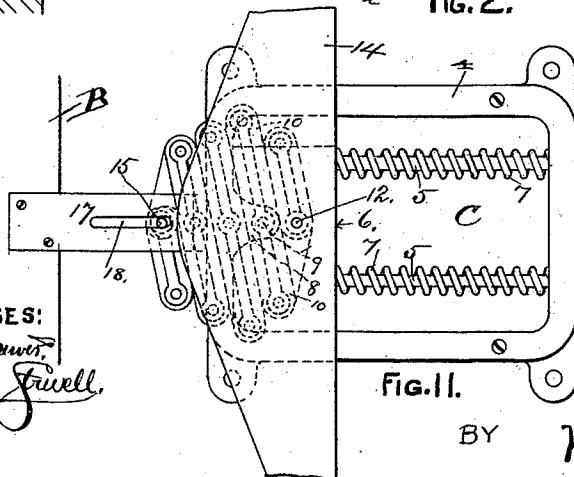


FIG. 11.

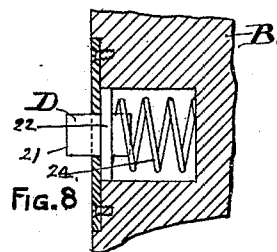


FIG. 8.

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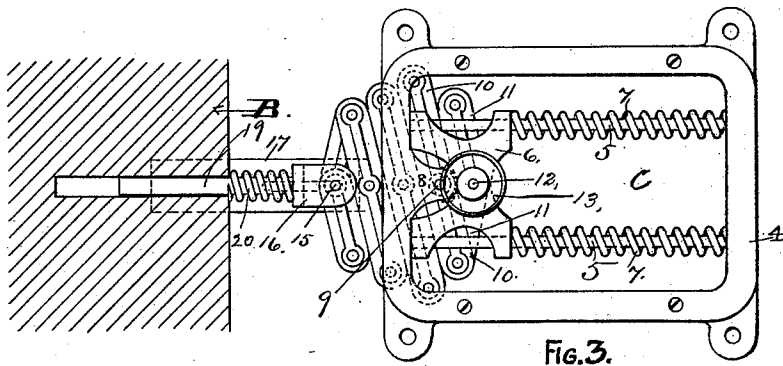


FIG. 3.

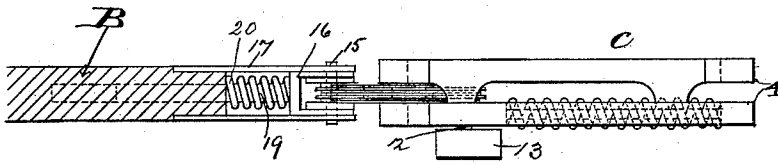


FIG. 4.

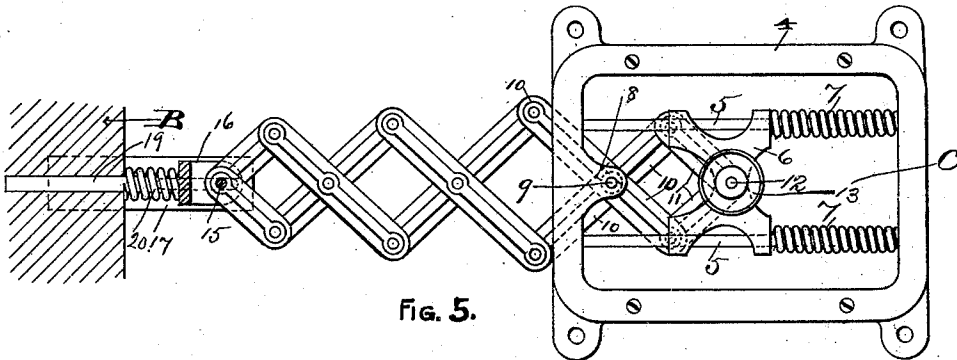


FIG. 5.

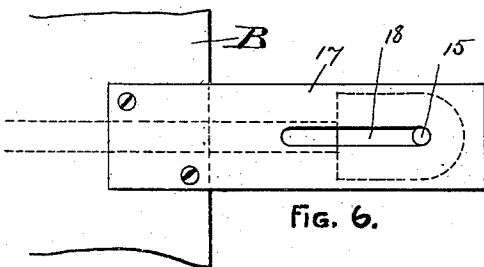


FIG. 6.

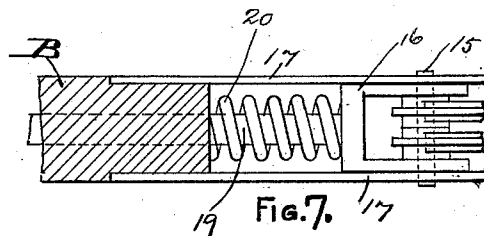


FIG. 7.

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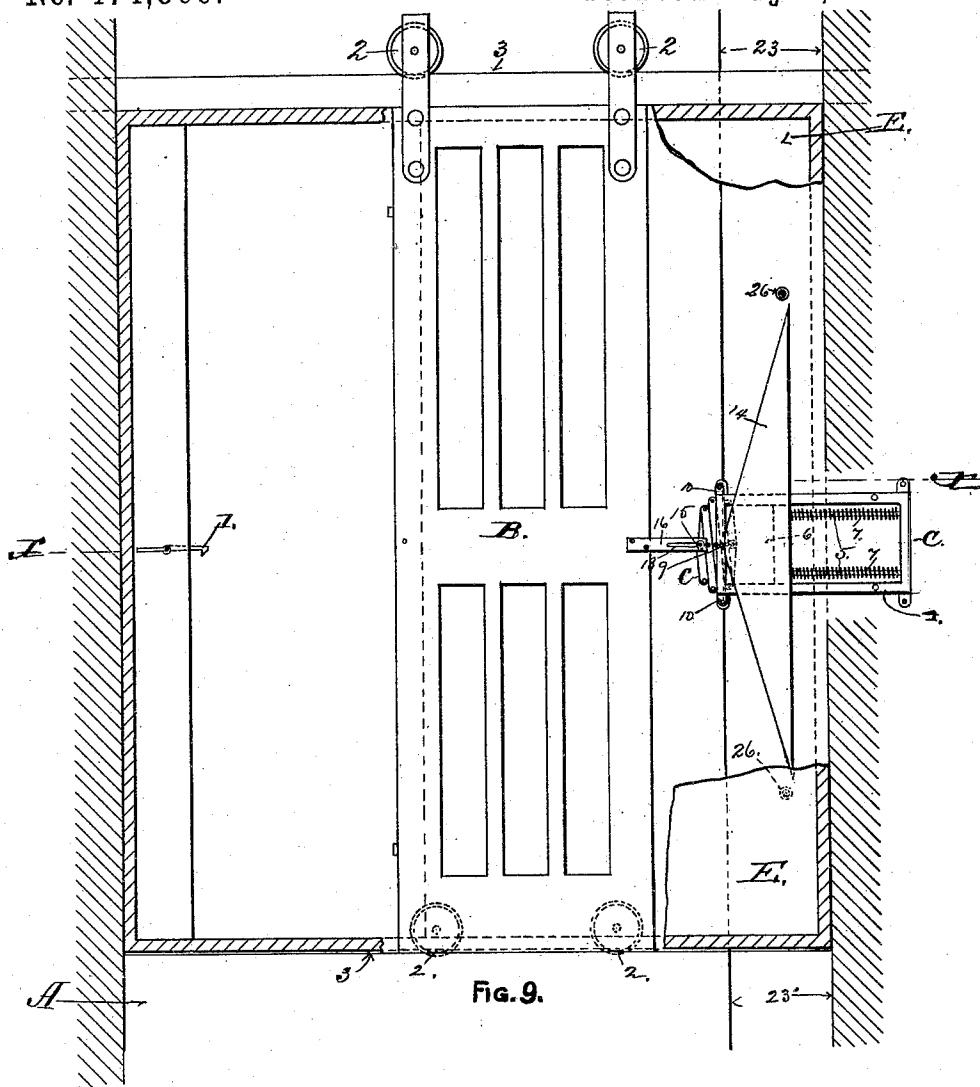


Fig. 9.

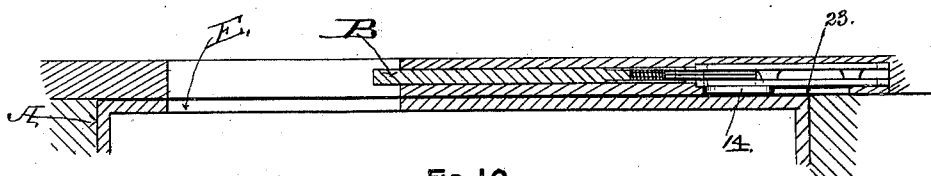


Fig. 10.

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DEVICE FOR OPERATING ELEVATOR-DOORS.

SPECIFICATION forming part of Letters Patent No. 474,066, dated May 3, 1892.

Application filed June 29, 1891. Serial No. 397,898. (No model.)

To all whom it may concern:

Be it known that I, EDMUND SAVAGE, of the city and county of Albany, in the State of New York, have invented new and useful Improvements in Automatic Mechanism for Opening and Closing Elevator-Doors, of which the following is a specification.

My invention relates to improvements in automatic mechanism for opening and closing the doors of elevators; and the object of my invention is to provide an effective and reliable mechanism for effecting the opening and closing the doors of elevators automatically. This object I attain by the mechanism illustrated in the accompanying drawings, which are herein referred to and form part of this specification, and in which—

Figure 1 is a vertical section of an elevator shaft and car provided with my invention, portions of the same being broken out to expose underlying parts and the door of the elevator-shaft being in a closed position. Fig. 2 is a like section showing the door in an open position. Fig. 3 is a detached and enlarged side elevation of the door-opening mechanism as when the door is open. Fig. 4 is a plan view of the same. Fig. 5 is a side elevation of said mechanism as when the door is closed. Figs. 6 and 7 are respectively a side elevation and a plan view of a spring mechanism interposed between the outer end of the door-opening mechanism and the edge of the door to compensate for any variation in the movement of the door and said opening mechanism in the operation of closing the door. Fig. 8 is a side elevation of a spring-buffer for decreasing the shock occasioned by closing the door. Fig. 9 is a vertical section of an elevator shaft and car, showing a modification of the means for effecting the closing movement of the door, the latter being shown in its open position. Fig. 10 is a horizontal section at the line X X of Fig. 9, the cam being shown in plan view; and Fig. 11 is an enlarged and detached side elevation of the door-opening mechanism provided with the modified form of mechanism for effecting the closing movement of the door, the extremities of the cam being broken off for the purpose of enlarging the scale of the figure.

As represented in the drawings, A designates an elevator-shaft or vertical chamber,

in which the car of the elevator has its movement. B designates one of the doors of said elevator-shaft, one of said doors being provided for each floor of the building wherein the elevator is located. Said door is held in its closed position by a spring-latch 1, of any ordinary and well-known construction, and said latch can be attached to the casing of the doorway, as shown in the drawings, or it may be placed on the door in the usual manner of employing latches of elevator-doors. The door B is provided with wheels 2, fitted to run on tracks 3, in the usual manner of equipping sliding doors.

C designates the mechanism for automatically opening the door. Said mechanism consists of a stationary frame 4, permanently fixed to the walls of the elevator-shaft and provided with parallel guides 5, on which a cross-head 6 is fitted to slide. Each of said guides is provided with a coil-spring 7, which is interposed between the cross-head 6 and the adjacent inner side of the frame 4, and said springs are fitted to normally force the cross-head 6 toward the adjacent edge of the door B for the purpose of effecting the opening movement of said door. The frame 4 is provided with a lug 8, to which is pivoted, as at 9, the first pair of levers 10 of a series of levers arranged to form a "lazy-tongs." For the purpose of obtaining an increased movement of the outer end of said series of levers in proportion to a slight movement of the cross-head the inner ends of the levers 10 are made shorter than the outer ends of the same. The inner ends of the levers 10 are connected by links 11 to a pivot 12 on the cross-head. Said pivot carries a roller 13, as shown in Figs. 3 and 5, or a cam 14, as shown in Figs. 9 and 11. The outer end of the lazy-tongs is connected to a pivot 15 of a forked head 16, which slides in slotted guides 17, secured to the door B. The slotted openings 18 in said guides will allow the forked head 16 to have a required movement toward and from the edge of the door B. Said forked head is provided with a stem 19, which is fitted to slide in an opening prepared for that purpose in the edge of the door B. A compressible spring 20, which encompasses the stem 19, is interposed between the forked head 16 and the edge of the door B for the purpose of afford-

ing a compensating device that will yield when the movement of the lazy-tongs exceeds the distance traveled by the door B. In such cases the spring 20, after the door is closed to the jamb which it is fitted to strike, will be compressed in length, and time will thereby be afforded to insure an engagement of the spring-latch 1 to secure the door in its closed position and the danger of breaking or injuring the lazy-tongs will be avoided when from any cause the movement of said lazy-tongs exceeds the distance in which the door is allowed to move. The spring 20 should be sufficiently strong to resist compression until the door bears against its jamb, and thereby the required movement of the door is insured before any compression of the spring can occur. For the purpose of avoiding the unpleasant and to many a startling sound produced by the forcible closing of the door the closing edge of the latter is provided with one or more spring-buffers D, each of which consists of a bolt 21, provided with a collar 22 and a spring 24, which is fitted to push said bolt outward to project slightly beyond the edge of the door, so that when the latter is closed forcibly the projecting ends of said bolts will receive the shock, and thereby the objectionable sound will be deadened and nullified.

E designates the elevator-car, which may be of any required form and size and made of any suitable material. Said car is propelled up and down the elevator-shaft A by any of the common and well-known means for operating such apparatus. As represented in Figs. 1 and 2, said car is provided with a pair of cams F, secured to the side of the car that is adjacent to the door B, and the corresponding side of the elevator-shaft A is provided with a vertical groove 23 to allow said cams to slide freely therein. The cams F have the form of a double inclined plane whose apex is slightly rounded. The inclined faces of said cams are preferably made of different lengths, the longer faces being arranged near the middle height of the car, and the inclined face of each cam is turned side-wise away from the door B. One of said cams is arranged near the top and the other near the bottom of the car, with their entering-point 25 turned toward the middle height of the car, with a short clear space left between said points, so that one of said cams will effect a closing movement of the door B during the downward movement of the car and the other will effect a like movement of said door by an upward movement of the car. The inclined face of the cam takes against the roller 13, and by pushing said roller outwardly from the pivot 9 elongates the lazy-tongs to effect the closing movement of the door B. When preferred, the cams F may be fixed in a groove in the face of the car E, instead of being placed on the face of the car, and in such cases the groove 23 in the elevator-shaft may be dispensed with.

In the modification shown in Fig. 9 the car

is provided with two friction-rollers 26, one of which is located near the top and the other near the bottom of the car, both being fixed on the side of the car that is adjacent to the door B, and said rollers are arranged to take against the cam 14, secured to the cross-head 6, as shown in Fig. 9. Said cam has the same form above and below the level of the pivot 12, and this form is given to said cam for the purpose of producing the same effect on the lazy-tongs, whether the car E is ascending or descending. In either case one of said rollers, if the door B is in its open position, will take against the corresponding inclined face of said cam and effect the prolongation of the lazy-tongs, thereby closing the door B in the manner hereinabove described.

My invention operates in the following manner: Premising that the car E has just been stopped at one of the doors B, the latter being closed, to open said door the spring-latch 1 is raised to release the door therefrom. The springs 7 will immediately expand and push the cross-head 6 toward the door B, and thereby the length of the lazy-tongs will be contracted to effect the opening movement of the door B. By the movement of the car E, either in an ascending or descending direction, one of the cams F will be carried into contact with the roller 13, attached to the cross-head 6, and thereby the latter will be pushed on the guides 5 to effect an extension of the lazy-tongs, whereby the door B will be pushed to its closed position. The latter movement is essentially completed just before the apex of the cam passes the roller. The interval during which such passing is effected gives sufficient time for the spring-latch 1 to engage with the door and effectually secure the latter in its closed position. While the cross-head 6 is being moved to effect an elongation of the lazy-tongs, the springs 7 are being compressed to be in readiness for again effecting an opening movement of the door in the manner just described. When the modification shown in Fig. 9 is employed, substantially the same effect is produced by the rollers 26 engaging with the cam 14.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An elevator-door provided with mechanism for automatically effecting the opening and closing movements of said door, said mechanism consisting of a cross-head fitted to move on guides, compressible springs which bear against said cross-head to normally press it toward the door, a lazy-tongs having one extremity connected to the door and the opposite extremity connected to said cross-head, and an attachment of said cross-head that is fitted to engage with operating devices on the elevator-car, in combination with an elevator-car provided with means, substantially as described, for engaging with said cross-head attachment, as and for the purpose herein specified.

2. The combination of an elevator-door

which is normally held in a closed position and is connected by means of a lazy-tongs to a cross-head fitted to slide on horizontal guides, compressible springs which bear against said cross-head for effecting the opening movement of said door, and an elevator-car provided with means, substantially as described, for moving said cross-head to automatically effect the closing movement of the door without the intervention of an attendant, substantially as herein specified.

3. The combination, with an elevator-door, of automatic mechanism for closing said door, a slotted guide secured to the edge of said door adjacent to said closing mechanism, said guide being slotted in a direction that corresponds to the movement of said door, a head attached to the end of the door-closing mechanism and fitted to slide in the slot of said guide, and a compressible spring interposed between said head and the edge of the door, said spring forming an elastic cushion whereby time will be afforded to permit the door to become secured in its closed position and the danger of damaging the door-closing mechanism

will be avoided, as and for the purpose herein specified.

4. The combination of an elevator-door which is normally held closed, a lazy-tongs connected to said door and to a cross-head, springs that are fitted to bear against said cross-head, a friction-roller pivoted to said cross-head, and an elevator-car which is provided with cams that are fitted to take against said friction-roller, as and for the purpose herein specified.

5. An elevator-door, a cross-head fitted to move on guides, a lazy-tongs having one of its extremities connected to said door and its opposite extremity connected to said cross-head, and a friction-roller pivoted to the cross-head, in combination with an elevator-car provided with means for engaging with said cross-head, whereby the closing movement of said door will be effected, substantially as specified.

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Witnesses:

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S. B. BREWER.