

(No Model.)

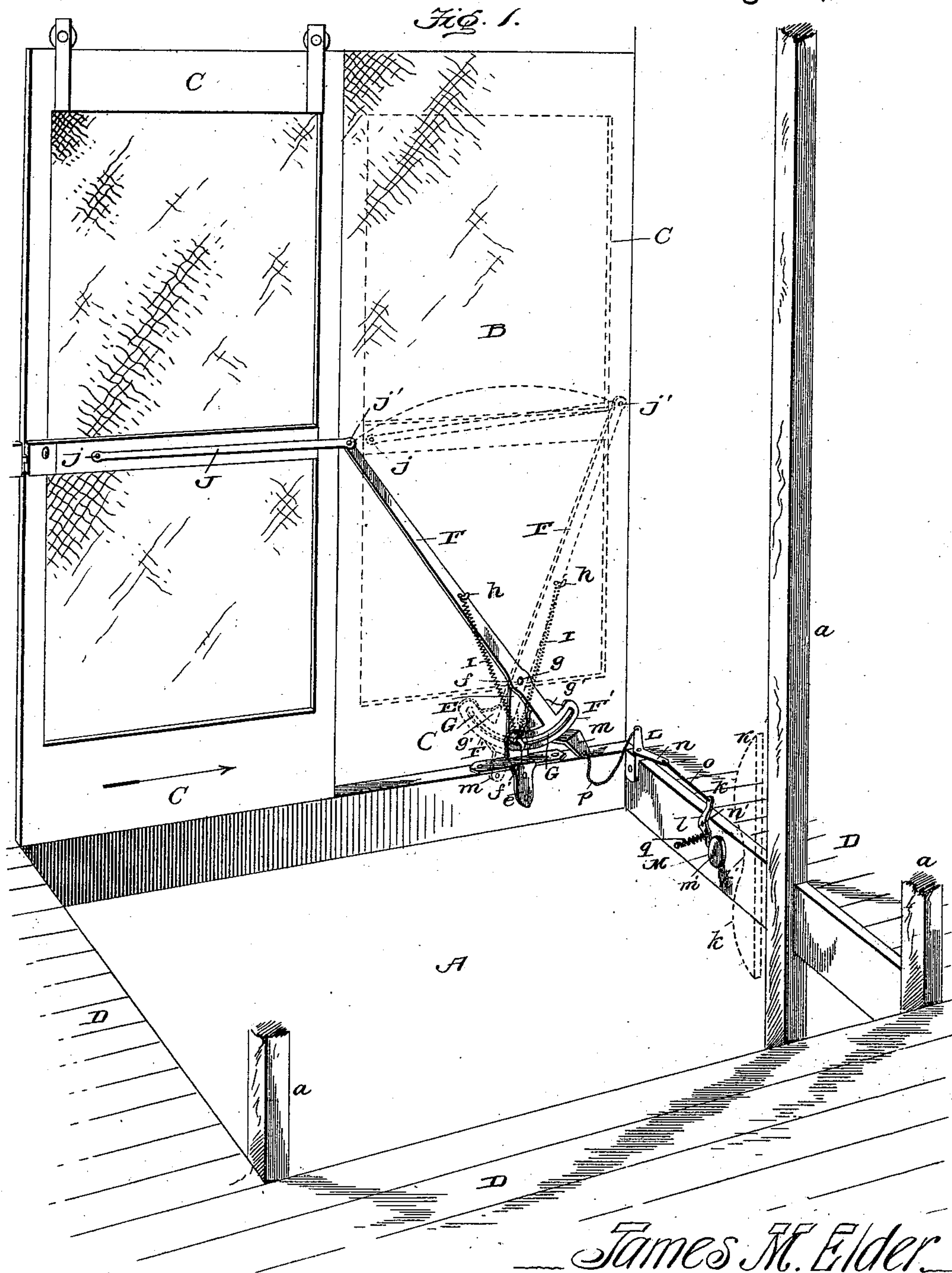
2 Sheets—Sheet 1.

J. M. ELDER.

AUTOMATIC HATCHWAY DOOR OPERATING DEVICE.

No. 544,667.

Patented Aug. 20, 1895.



Witnesses:

Inventor.

Wm O. Washburn
H. J. Burkhart

By Edson Bros

Attorneys

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

Fig. 3.

Fig. 5.

Fig. 4.

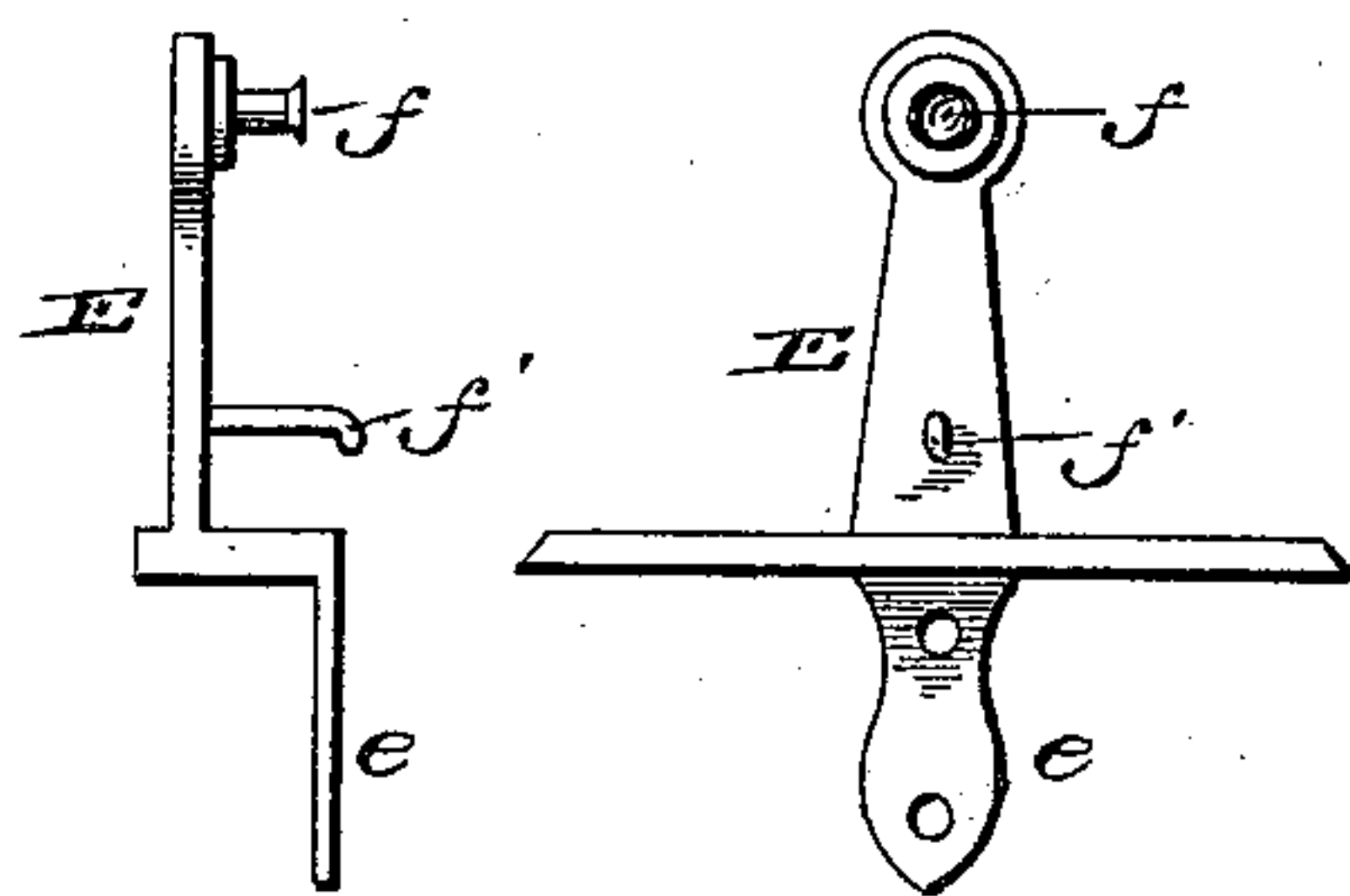
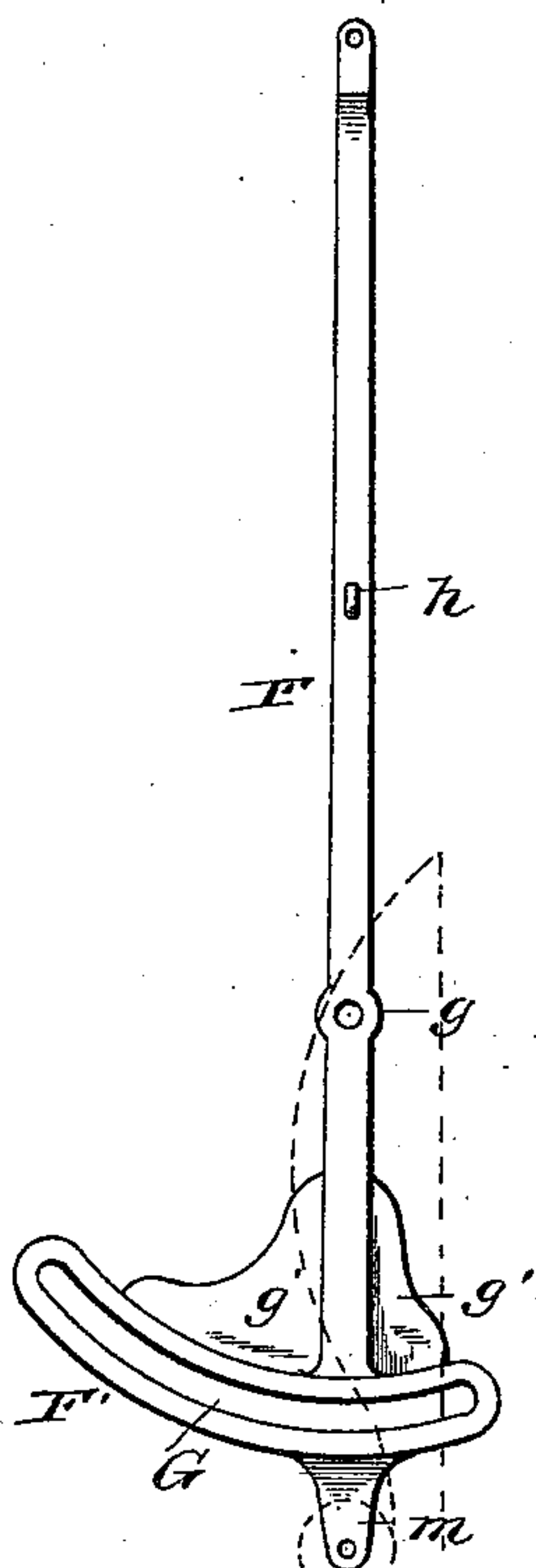
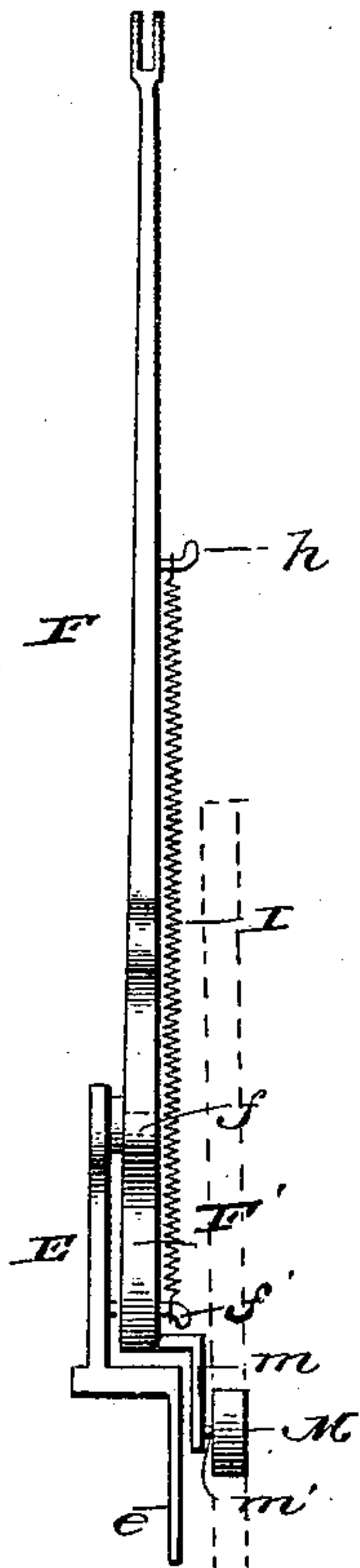


Fig. 8.

Fig. 7.

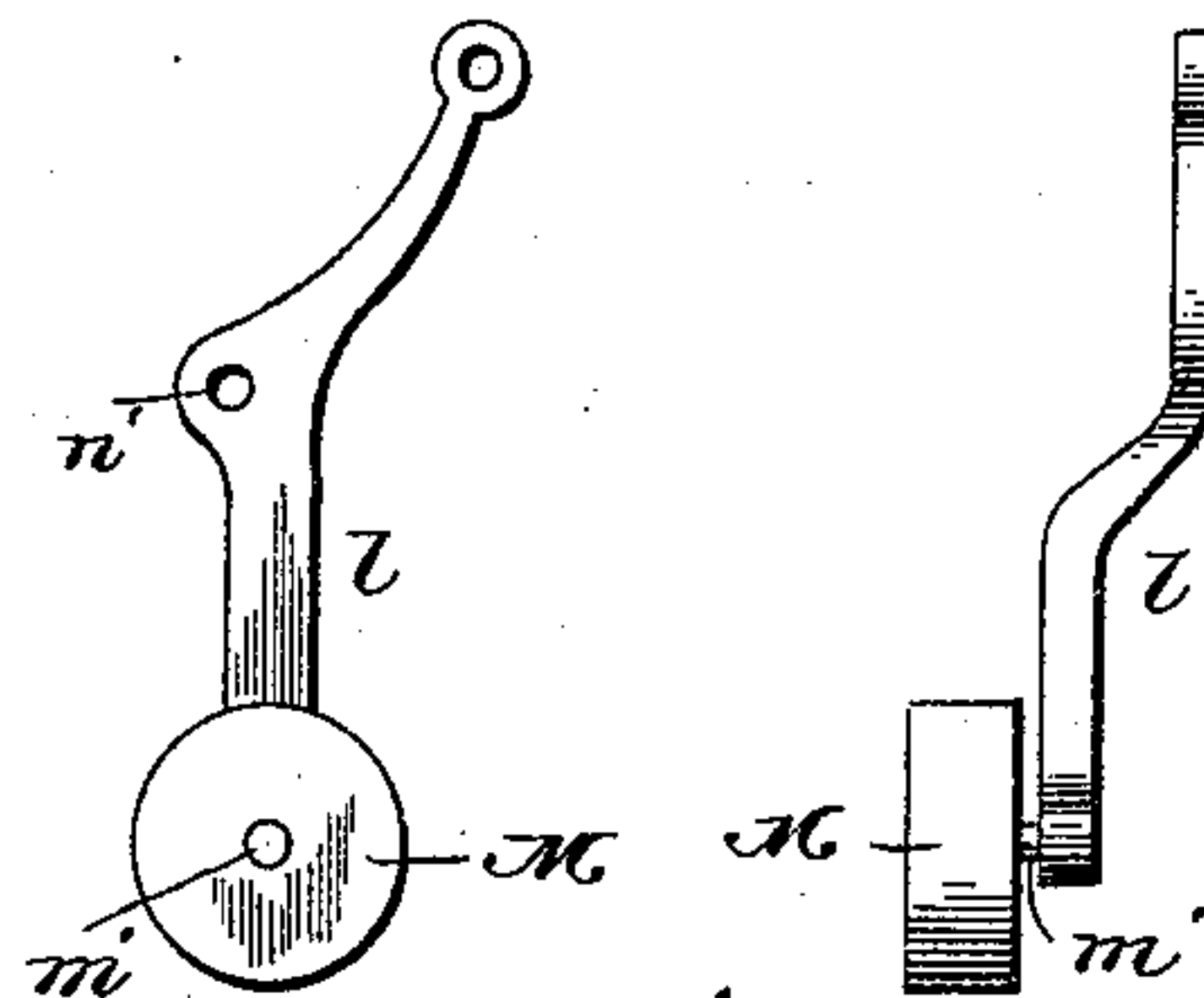
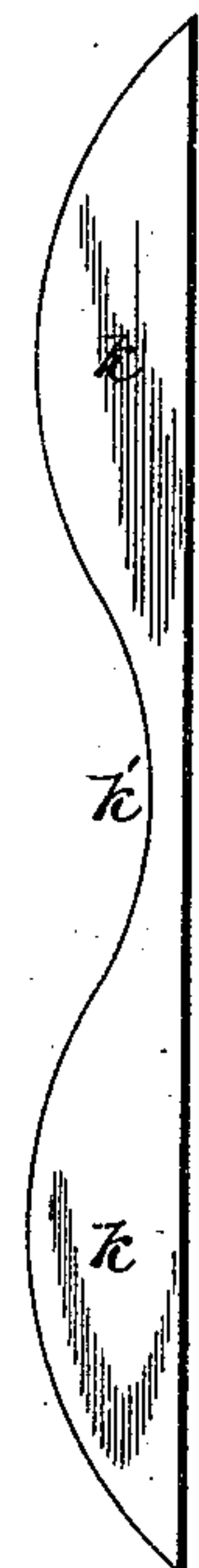
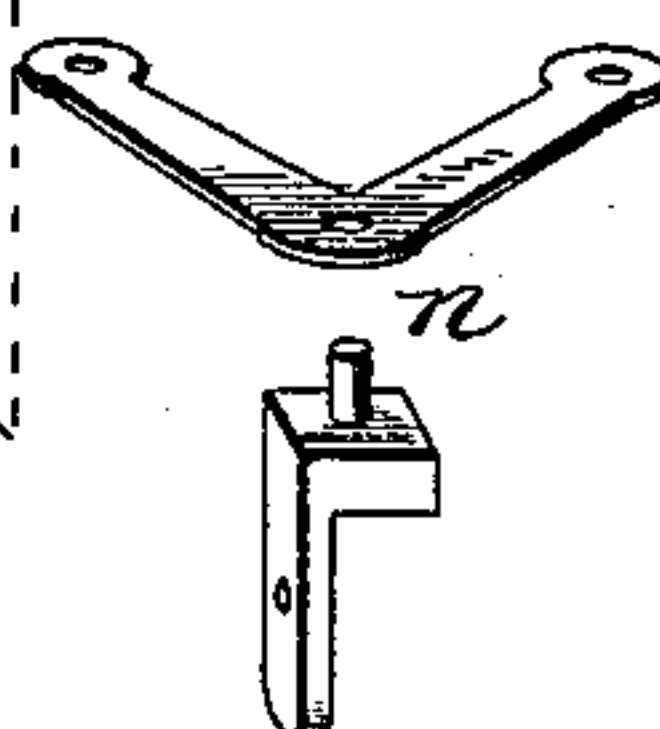
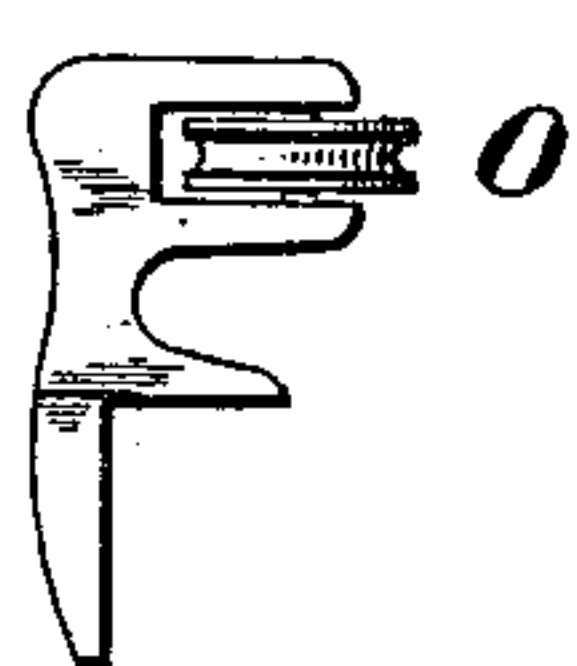


Fig. 10.

Fig. 9.

Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES M. ELDER, OF INDIANAPOLIS, INDIANA.

AUTOMATIC HATCHWAY-DOOR-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 544,667, dated August 20, 1895.

Application filed June 19, 1894. Serial No. 515,064. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. ELDER, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Automatic Hatchway-Door-Operating Devices for Passenger-Elevators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to means for closing the doors of swift-running passenger-elevators.

The leading feature of this invention is a device for moving the door of an elevator-shaft to its closed position after the actuating device has been set in motion by the car attendant or by contact with a cam in the cage, the further movement of which actuating devices is automatically effected by a tension device to complete the closing of the door without any attention on the part of the elevator attendant or without any further contact with the elevator after the actuating device has been once started.

In the preferred embodiment of my invention I provide a lever which is connected with a horizontally-slidable door and is controlled by a spring which, when the lever has received its initial movement, either from the attendant or the elevator-cam, to move the same past its center, acts to complete the throw or movement of the lever in either direction and thereby open or close the door to its full limit, the lever and spring acting independently of any further contact with the elevator-cam to close the door when the elevator moves vertically either up or down after leaving the floor or landing. This action of the lever and its controlling-spring independently of any further contact with the elevator-cam and without any attention on the part of the attendant after the initial impulse has been given to the lever is important in a door-operating device for swift-running passenger-elevators, because the liability of the parts to breakage and damage by continued contact with the elevator-cam is thereby obviated, the efficiency of the device is promoted,

and the certainty of closing and locking of the door is insured, all of which considerations are important in a door-operating device for passenger-elevators. The door-operating lever is hung or fulcrumed at an intermediate point of its length to a suitable bracket or stand fixed in the hatchway, and this stand has a stud to which is connected one end of the tension-spring, the other end of which spring is connected with the lever on the opposite side from (or above) its fulcrum, so that when the lever is moved in either direction past its center the contractile force of the spring serves to complete the throw or movement of the lever either to open or close the door. This door-actuating lever may be operated directly from the elevator-cam when there is sufficient room between the front of the elevator-cage and the hatchway to receive the said cam; or the lever may be operated by connections from a side auxiliary lever when the elevator-cam is placed on one side of the cage or car.

The invention further consists in a means for limiting the throw or movement of the lever in either direction; and it finally consists in the construction and combination of devices, which will be hereinafter fully described and claimed.

To enable others to understand my invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a perspective view illustrating a portion of an elevator shaft or well with the door closed, and showing the means by which the lever is operated from a cam on the side of the cage or car. Fig. 2 is an enlarged detail view of the lever, its bracket or stand, and the spring, also showing the cam contact pulley or sheave by which the lever may be actuated directly from an elevator-cam on the front of the cage or car. Fig. 3 is a detail face view of the lever. Figs. 4 and 5 are detail views of the lever bracket or stand. Fig. 6 is a detail view of the elevator-cam. Figs. 7, 8, 9, and 10 are detail views of the connecting mechanism between the side lever and door-lever, used when the cam is placed on the side of the cage or car.

Like letters of reference denote corresponding parts in all the figures of the drawings, referring to which—

A designates the elevator shaft or well; *a a*, the guides therein for the elevator cage or car; B, the screen around the elevator shaft or well; C, the horizontally-slidable door, which is fitted to move back and forth between suitable guideways or suspended by trolley-wheels from an elevated track, and D the floor or landing, all of which parts are of the usual or any preferred construction.

To the floor or landing D, at one side of the doorway and within the screen B, is erected the stand or bracket E, to which is fulcrumed the upright door-operating lever F. This stand is cast in a single piece of metal with the angular foot *e*, which fits against and over one edge of the floor D, to which it is fastened in any suitable way, and this stand is provided at its upper end with a fulcrum-pin or stud *f* and with a hook-shaped stud *f'* below the fulcrum-pin *f*.

The door-operating lever F is provided at an intermediate point of its length with a transverse aperture or socket *g*, which receives the fulcrum-pin *f*, and thus the lever is pivotally supported on the stand to swing back and forth, the end of the pin *f* being upset or provided with a suitable retainer—such as a key or nut—to prevent the lever from working off the fulcrum-pin. At or near its lower end the lever F is formed with an integral arched or segmental part *F'*, which is braced or reinforced by the webs *g'* on opposite sides of and integral with the lever, and in this part F is formed an arc-shaped slot G, which is concentric with the fulcrum-pin *f* of the lever, said slot G extending beyond the longitudinal axis of the lever on both sides thereof. When the lever is fitted or hung on the fulcrum-pin *f*, the hook-shaped stud *f'* passes through the arc-shaped slot G, and the lever is thus permitted to play or rock back and forth a limited distance in either direction, the stud *f'* serving to limit the movement of the lever in both directions, because it comes against the closed ends of the slot G in the part *F'* of the lever. Near its upper end and above the fulcrum-pin *f* the lever has a hook-shaped stud *h*, and to the studs *f'* *h* are connected the ends of the tension device I, which operates to complete the throw or movement of the lever F after the start or initial impulse has been given to the lever. This tension device, in the preferred embodiment of my invention, consists of a coiled spring or of an elastic piece of rubber which, by its contractile force, will operate to forcibly impel the lever in either direction after it has been started or moved past its center; but I do not strictly confine myself to this particular form of tension device herein shown and described, nor do I limit myself to the particular slotted segment for limiting the throw of the lever in either direction, as it is evident that a skilled mechanic can

modify the construction and secure the same results without departing from the spirit of my invention.

The upper end of the lever F is connected to the door C by a link J, which is pivoted at one end to the door, as at *j*, and at its other end to the lever at *j'* in Fig. 1. The lower part of the lever may be constructed in either of two ways for the purpose of being actuated directly from the cam K on the front side of the elevator cage or car or through the transmitting mechanism L from the cam K on one side of the car. This cam K is placed in an upright position and formed on its working-surface with two inclines or swells *k k*, and is depressed at the middle at *k'*, where is received the cam contact-roller when the car stops on a level with the landing D. When there is space enough between the screen and floor B D and the elevator cage or car to receive the cam K, it is placed on the front side of the cage or car in such relation to the lever F that the cam contact-shoe M will bear upon the cam K, said lever in this instance being cast with the extension *m* below the segment *F'*, and provided with the journal-pin *m'*, on which the shoe or roller M is loosely fitted, so as to rotate freely thereon, as indicated in the detail side view of the door-actuating lever shown by Fig. 2 of the drawings.

In some elevators there is not room enough between the floor and cage to accommodate the cam K on the cage, and in this event the cam is placed on one side of the car in the position indicated by dotted lines in Fig. 1, and this side cam then actuates the lever F through the transmitting mechanism shown in Fig. 1 and in Figs. 7 to 10, inclusive. This transmitting mechanism consists of a shoe-carrying lever *l*, a lever *n* at the corner of the hatchway between the levers *n* F, and the connections *o p*. The shoe-lever *l* is bent or curved laterally and longitudinally, as indicated in Figs. 7 and 8, and it is fulcrumed at an intermediate point of its length, as at *n'*, on a stud or bracket attached to one side of the hatchway. The lower end of the lever has a pin or stud on which the roller-shoe M is journaled, and to the upper end of the lever is connected the link *o*. The part *n* may consist of a bell-crank lever disposed in a horizontal position at the corner of the hatchway and fulcrumed on a vertical pintle of an angular bracket, (shown in Fig. 9); or it may consist of a roller or sheave O, as shown by Fig. 10, which roller O is journaled between horizontal jaws of the bracket and on a vertical pin or arbor supported in said bracket, as shown by Fig. 10. In case the guide-sheave of Fig. 10 is used, a chain *p* is employed to connect with the pin and extension *m'* *m* of lever F, said chain *p* passing around the sheave and connected to the link *o*; but when the bell-crank lever of Fig. 9 is employed, the connection between the lever F and said bell-crank may be either a chain or a continuous link. The shoe-carrying lever *l* is normally held by a spring *q*

out of the path of the cage-cam K, so that the cage can rise and fall in the hatchway past the landing without affecting the transmitting mechanism L and moving the door; but when the car is stopped at the landing and the attendant moves the door or the lever to open the door, the lever *l* is moved to cause the shoe M to bear against the cam K and rest in the depression *k'* therein, so that as the elevator-cage moves vertically either up or down and leaves the landing the lever *l* will be moved by one or the other of the inclines *k* to start the door-lever F and bring into action the spring I to complete the movement of the lever F and door, whereby the door is automatically closed without any attention by the car attendant by a slight impulse from the cage-cam K imparted to the lever *n*, and thence through the transmitting mechanism L to the lever F to move the latter past its center, whereupon the spring I forces the lever in a direction to close and lock the door with certainty.

The operation may be briefly described as follows: The spring I holds the lever to its inclined position shown in Fig. 1 to close the door, and the shoe M is out of the path of the cage-cam K to enable the cage or car to rise or fall vertically without affecting the door. As the car stops at the landing D, the attendant starts the door or lever F backward in the direction indicated by the arrow on Fig. 1, and thus gives to the door and lever F the initial movement which is sufficient to move the lever F past its vertical center, whereupon the contractile force of the spring I forces the lever to the full limit permitted by the arc-shaped slot G and opens the door to its widest extent and holds the door in its full wide-open position, the shoe M being moved by the lever into contact with the cam K and into the depression *k'* therein. Now, when the car moves vertically, either up or down, one of the surfaces *k* thereof bears against the shoe M and gives to the lever F its initial movement, sufficient to force the lever past its center, and the spring I contracts to force the lever back to its normal position and close the door, whereby the door-operating devices do not remain in contact with the cam K throughout its surface, but the door is automatically closed by a slight impulse derived from the cam K as the car leaves the floor and by the action of the spring I, thus obviating any liability of damage to the door-operating devices by continued contact with the cam as the car rises or falls.

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

1. The combination with a slidable door, a cam, and a lever having a link connection with said door, of a contact shoe connected with said lever and arranged in the path of the cam to impart to the lever its initial movement, and a tension device connected with

said lever to complete the movement or throw thereof in either direction independently of the action of the cam upon said shoe and lever, substantially as and for the purposes described.

2. The combination with a slidable door, and a car cam, of a lever connected with said door and having means arranged to be acted on by said cam to impart to the lever its initial movement, and a spring connected to said lever to complete the throw of movement thereof in either direction independently of the influence of the cam on said lever, whereby the spring impels the lever to open or close the door to its fullest extent after the initial impulse has been given to the lever, as set forth.

3. The combination with a horizontally slidable door, of a lever F connected with said door, and a spring attached at one end to said lever and having its other end attached at a point in vertical line with the fulcrum of the lever, substantially as and for the purposes described.

4. The combination with a horizontally slidable door, of a fixed lever-support E, a lever F, fulcrumed to the support and linked to the door, and a spring attached at one end to the lever and at its other end to the support in the vertical line of and below the fulcrum of said lever, substantially as and for the purposes described.

5. The combination with a horizontally slidable door, of the stand or support E fixed at one side of the path of the door, a lever fulcrumed to the stand and provided with means to limit the throw or movement of the lever in either direction and a spring having its upper end attached to the lever and its lower end fastened to the stand below, and in vertical line with, the fulcrum of the lever, substantially as and for the purposes described.

6. The combination with a door, of a stand, provided with a stop, a slotted lever fulcrumed thereto, and having the stop fitted in the slot thereof and a spring connected to said stand and the lever, substantially as and for the purposes described.

7. The combination with a door, of a lever connected thereto, a stand on which the lever is fulcrumed and provided with means to limit the movement of the lever, and a spring connected to the lever at one side of its fulcrum, and arranged to be shifted with said lever for the purposes described, substantially as set forth.

8. The combination with a door, of a lever linked thereto and provided with an arc-shaped slot, a stand on which the lever is fulcrumed, a stop-pin on the stand fitted in the slot, and a spring connected to said stop-pin and the lever, substantially as described.

9. The combination with a door, and a car-cam, of a lever linked to the door and provided with the slotted segment, a stand to which the lever is fulcrumed, a stop fitted in the slot, a spring between the lever and stop,

and a cam-contact shoe, substantially as described.

10. The combination with a door, of a car-cam provided with the swells and with the
5 depressed seat between the swells, a spring-controlled lever connected to said door, and a contact shoe, substantially as described.

11. The combination with a door, and a car-cam, of a spring-controlled lever connected
10 with said door, a shoe-carrying lever adapted to contact with said cam, and connections between said shoe-carrying lever and the door-operating lever, substantially as described.

12. The combination with a sliding door,

of automatic means for opening and closing 15
the same embodying a lever, a car-cam, a contact shoe connected with the lever and arranged in the path of the car cam, and a spring acting on the lever to impel the latter independently of the contact of the shoe with 20
said cam, substantially as and for the purposes described.

In testimony whereof I affix my signature
in presence or two witnesses.

JAMES M. ELDER.

Witnesses:

R. F. CATTERSON,

DANIEL MANNINGER.