



No. 671,580.

Patented Apr. 9, 1901.

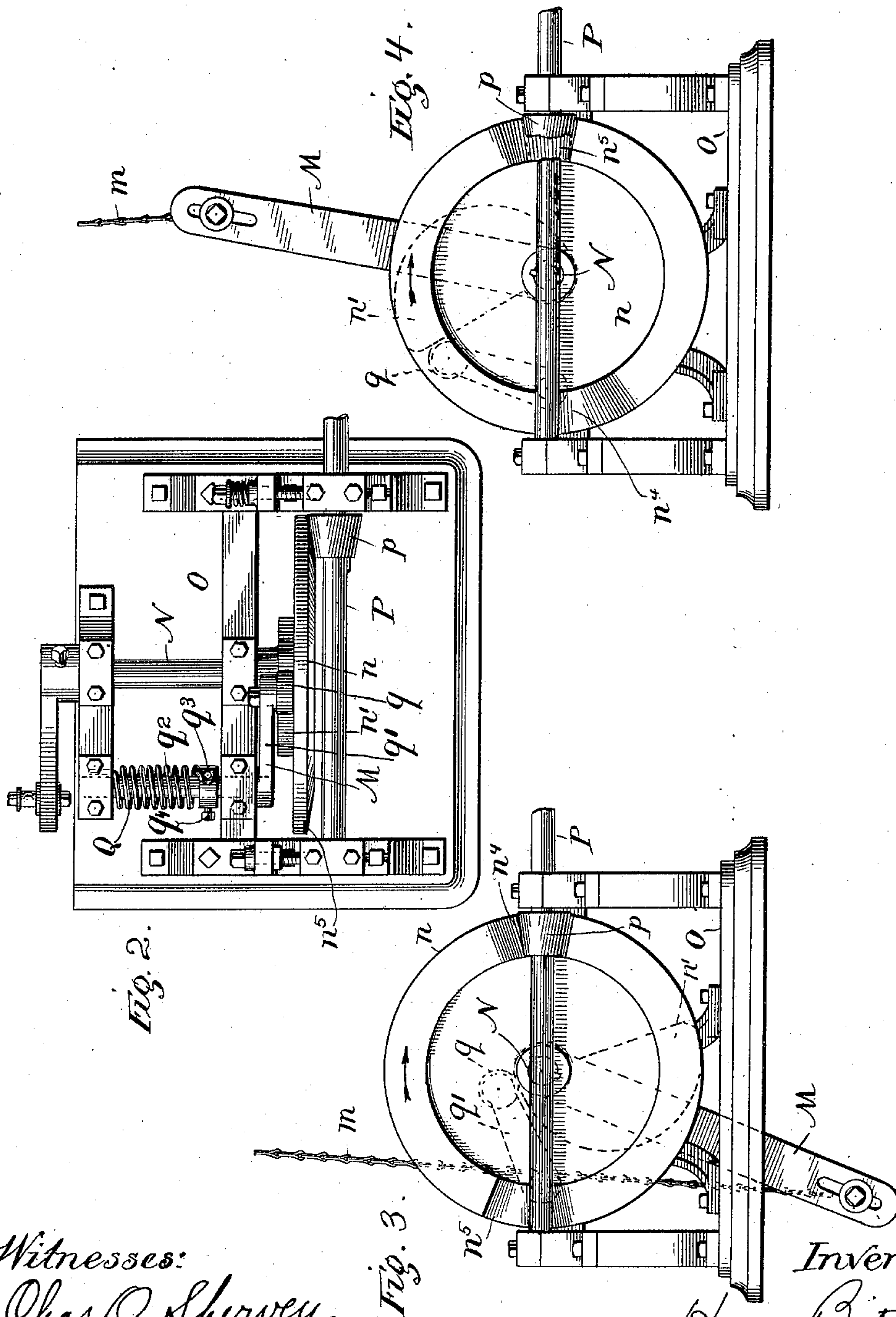
H. BITNER.

DOOR OPERATING DEVICE FOR ELEVATOR WELLS.

(Application filed July 2, 1900.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses:

Chas. O. Shervey  
S. Bliss.

Inventor:

Harry Bitner

by Miles & Bitner  
Attys.



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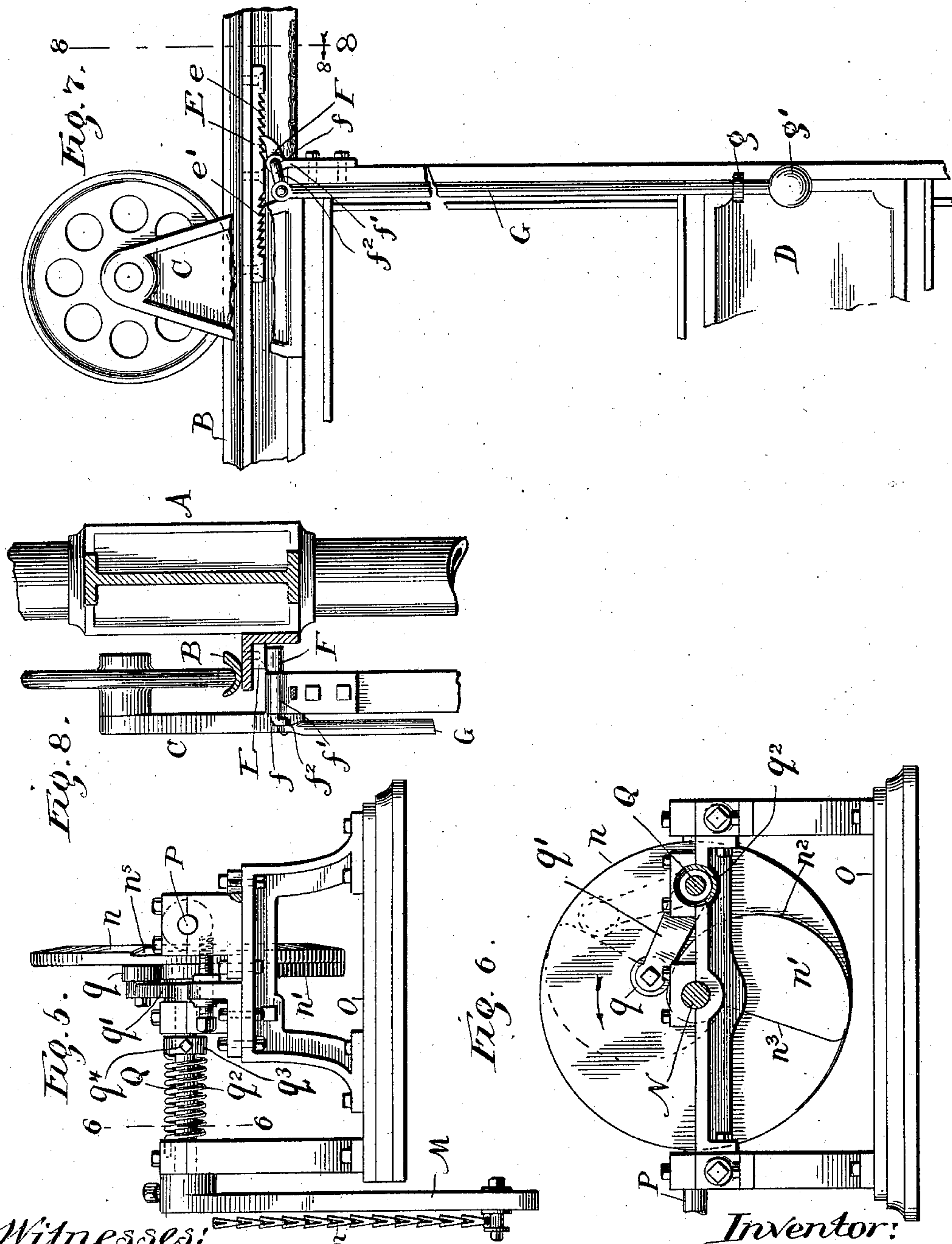
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# UNITED STATES PATENT OFFICE.

HARRY BITNER, OF BERWYN, ILLINOIS.

## DOOR-OPERATING DEVICE FOR ELEVATOR-WELLS.

SPECIFICATION forming part of Letters Patent No. 671,580, dated April 9, 1901.

Application filed July 2, 1900. Serial No. 22,247. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY BITNER, a citizen of the United States of America, residing at Berwyn, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door-Operating Devices for Elevator-Wells, of which the following is a specification.

My invention relates to certain improvements in door-operating devices for elevator-wells; and the object of the invention is to provide a simple and reliable mechanism for automatically opening and closing the doors of elevator-inclosures whenever the same are unlatched or unlocked by the attendant or otherwise.

To such end the invention consists in certain novel devices and combinations thereof, the preferred forms of which will be fully set forth below and the essential characteristics defined in the claims appended hereto.

In the drawings, Figure 1 is an elevation of a portion of an elevator-inclosure looking from the inside of a well and showing two stories of the same. Fig. 2 is a plan of certain gearing to be located in the basement or attic. Fig. 3 is a front elevation of said gearing as it appears when the elevator-doors are closed. Fig. 4 is a similar elevation as it appears when one of the elevator-doors is open. Fig. 5 is a side elevation of the gearing in the position shown in Fig. 3. Fig. 6 is a rear elevation, with a portion cut away, in the plane 6 6 of Fig. 5. Fig. 7 is a view, upon an enlarged scale and partly broken away, showing one of the door-latches; and Fig. 8 is a vertical section in plane 8 8 in Fig. 7 looking in the direction of the arrow 8.

Referring first to Fig. 1 for the mechanism which is applied to the elevator-doors, A represents the framework of an elevator-inclosure; B B, a series of tracks supported by said inclosure; C, a series of door-hangers running on said tracks, and D a series of doors carried by said hangers and moving horizontally between a closed position in front of the openings in the inclosure and an open position alongside of the inclosure itself.

The track is shown as provided with a ratchet-block E, Figs. 7 and 8, secured to its under side and each door with a pair of detent-latches F F', secured upon transverse

rods *f*, pivoted in brackets *f'*, secured to the opposite edges of the top of the door. Both detents are directed away from the door, and the block E has two sets of teeth *e e'*, adapted, respectively, to the respective detents, the teeth *e* being for engagement with the detent F to lock the door open and the teeth *e'* for engagement with the detent F' to lock the door shut. The rods *f* are bent to form crank-arms *f<sup>2</sup>* upon the opposite sides of the pivotal axes from the detents, and vertically-reciprocating rods G, pivoted upon these crank-arms, extend down along the edges of the door, are guided in eyes *g*, and terminate in handles *g'*, preferably weighted, if necessary, to throw the detents into engagement with the rack. The latches may be operated by any suitable means, those here shown being chosen for simplicity of illustration and being intended to be operated by hand by lifting upon the handles *g'*.

Each track is provided with a suitable box or casing H, containing an ordinary spring sash-balance, preferably operating through a metal ribbon *h*, attached to the top of the door, the spring tending at all times to pull the door open. To the opposite edge of each door is attached a chain I, running over a pulley *i* and secured to a vertical rod J, running from the top to the bottom of the well and counterbalanced by means of a weight K, hung upon a chain *k*, passing over pulleys *k' k<sup>2</sup>* and secured to the upper end of the rod. The counterbalance is intended to be placed in the attic, where it will not interfere with the design of the inclosure, and the rod J is reciprocated by suitable mechanism, either in the basement or in the attic, to operate the doors in conjunction with the respective door-opening springs. The lower end of the rod is secured to a crank-arm M by means of a chain *m*, running between guiding-pulleys *m' m<sup>2</sup>*. This crank-arm is fast upon a transverse shaft N, Figs. 2 to 6, journaled in suitable bearings upon a frame or base O, said shaft carrying at its opposite end a friction-gear *n*, adapted to be rotated by a friction-pinion *p* upon a shaft P, also suitably journaled in said frame or base and preferably kept in constant rotation during the operation of the elevators by means of suitable driving connections. One of these shafts is intended to op-



erate the doors of an entire battery of elevators when the same are so located as to make such a construction convenient. The gearing between the constantly-rotating shaft P and the door-operating devices is duplicated for each shaft or well. The gear  $n$  is shown as provided upon its rear face with a cam-block  $n'$ , upon which runs a roller  $q$ , journaled upon the end of an oscillating arm  $q'$ , secured to the end of the rock-shaft Q, bearing a coiled spring  $q^2$ , fast at one end to the frame and at the other to a collar  $q^3$ , adjustably secured to the rock-shaft by means of a set-screw  $q^4$ . The tension of the spring tends to hold the roller upon the cam, and the latter is provided with a curved face  $n^2$  to raise the roller against the tension of the spring and a substantially radial face  $n^3$  to give the spring a purchase upon the cam to advance the gear during a certain portion of the revolution of the latter. The face of the gear is cut away at two points  $n^4$   $n^5$ , so as to be out of contact with the pinion at said points.

Looking at Figs. 3 and 6, the gearing will be seen in the position occupied when all of the doors are closed, at which time the operating-rod J will be approximately at its lowest point and the mutilated portion  $n^4$  of the gear will be beneath the pinion  $p$ . As long as the doors are locked the gear remains immovable; but as soon as one of the doors is unlocked the opening-spring draws upon the operating-rod, which in turn pulls upward upon the crank-arm (which will be seen to be slightly past the dead-center) and advances the gear  $n$  until it comes into engagement with the pinion, after which the further opening of the door is timed by the crank motion and by the shaft P, which is driven at whatever speed may be required or may be desirable for the particular doors to be operated. When the crank-arm reaches its uppermost position, the door will be wide open and will be automatically locked in that position by the detent F, as seen in Fig. 7 and upon the lower door in Fig. 1. This checks the movement of the gear, and at the same time the mutilated portion  $n^5$  of said gear passes beneath the pinion, so that when the gear stops the pinion is out of contact therewith. Before the pinion runs off of the whole portion of the gear the point of the cam  $n'$  passes the roller  $q$ , and the latter runs down the radial face of the cam, advancing the gear until the same is checked by the chain  $m$ . The parts may now all remain stationary, with the exception of the constantly-rotating shaft, until the door is again unlatched, when the spring  $q^2$ , operating through the rock-shaft Q, crank-arm  $q'$ , and roller  $q$ , advances the gear until it again comes into engagement with the pinion  $p$ , when the latter takes up the work and closes the door, this movement being continued sufficiently to carry the crank-arm M beyond the dead-center, as seen in Fig. 3. When the door is closed, it is locked automatically by the weighted detent F' and

the parts are brought into the original position, completing the cycle of operation.

The details of the various mechanism here shown and described are thought to be immaterial to the broader characteristics of the invention, and great variation is believed to be possible in the specific construction without departing therefrom.

I claim as new and desire to secure by Letters Patent—

1. The combination with a suitably-mounted door provided with locks for locking it alternately in the open and in the closed position, of continuously-moving driving mechanism, intermediate operating mechanism between said driving mechanism and the door, suitably connected with the door to operate the same in one direction and with the driving mechanism to be driven thereby, automatic devices for throwing the driving mechanism out of operative relation to the operating mechanism whenever the door reaches one of the extreme positions, and automatic devices tending to move the operating mechanism into operative relation to the driving mechanism whenever the door is unlocked; substantially as described.

2. The combination with a reciprocating door provided with means for locking it alternately shut and open, of operating devices tending to reciprocate said door continuously between the open and shut positions, but permitting the same to remain stationary when locked; substantially as described.

3. The combination with a reciprocating door, of a yielding device constantly pulling upon the door in one direction, a constantly-driven device for moving the door in the opposite direction and for timing the movement of the door in both directions, intermediate gearing connected to the door in gear with said driven device except when the door is either open or closed, means for locking the door in either of these positions and means for automatically engaging the intermediate gear with the driven device when the door is unlocked from one of said positions, and connections between the door and the gear such that the pull of the door upon said connecting devices automatically throws said gear into engagement when the door is unlocked from the other of said positions; substantially as described.

4. The combination with a series of reciprocating doors provided with individual opening devices exerting a constant pull upon the doors to open them, of means for locking said doors alternately open and closed, a reciprocating connection connected to said doors adapted, when moved in one direction, to close them and when moved in the opposite direction, to permit them to open, operating-gear adapted to move said connection in a direction to close the doors and time its movement in the opposite direction and means tending to drive said operating-gear continuously, but thrown out of engagement therewith when



the door is locked open or closed; substantially as described.

5 The combination with a suitably-mounted door provided with locks for locking it alternately in the open and in the closed position, of continuously-moving driving mechanism, intermediate operating mechanism between said driving mechanism and the door, suitably connected with the door to operate  
10 the same in one direction and to time its movement in the other direction, and with the driving mechanism to be driven thereby, automatic devices for throwing the driving mechanism out of operative relation to the  
15 operating mechanism, whenever the door reaches one of its extreme positions, and automatic devices tending to move the operating mechanism into operative relation to the driving mechanism whenever the door is un-  
20 locked; substantially as described.

6. The combination with a series of doors, of operating-gear comprising a continuously-driven shaft bearing a pinion, an intermittently-driven shaft bearing a mutilated gear  
25 adapted to engage with said pinion, suitable connections between the said intermittently-driven shaft and said doors and means for moving said intermittent shaft when the pinion is at the mutilated portions of the gear;  
30 substantially as described.

7. The combination with a series of doors and an operating and connecting device, of gearing for moving said operating device comprising a continuously-rotating shaft, a  
35 pinion thereon, a mutilated gear adapted to

engage with said pinion, a shaft supporting said gear, a crank-arm on said shaft connected to said operating device and means for moving said gear past the mutilated portions; substantially as described.

8. The combination with a door and a lock therefor, of a mutilated operating-gear connected with said door and adapted to operate the same and a device put under tension during the engagement of the whole portion of  
40 the gear and acting to move the same past the mutilated portion when the door is unlocked; substantially as described.

9. The combination with a reciprocating door, of a constantly-driven shaft, a pinion  
50 thereon, a second shaft connected to the door, a mutilated gear thereon, adapted for engagement with said pinion except when the door is either open or closed, means for locking the door in either of said positions, a cam  
55 carried by the second shaft and a yielding device put under tension by one portion of said cam while a whole portion of the gear is in engagement and pushing upon another  
60 portion of said cam to move the gear past a mutilated portion; substantially as described.

In witness whereof I have hereunto set my hand, at Chicago, in the county of Cook and State of Illinois, this 28th day of June, A. D. 1900.

HARRY BITNER.

Witnesses:

CHAS. O. SHERVEY,  
S. BLISS.