(No Model.) 3 Sheets—Sheet 1.

F. T. ELLITHORPE.

MEANS FOR OPERATING DOORS FOR ELEVATOR WELLS.

No. 606,003. Patented June 21, 1898.

Fig. 1.

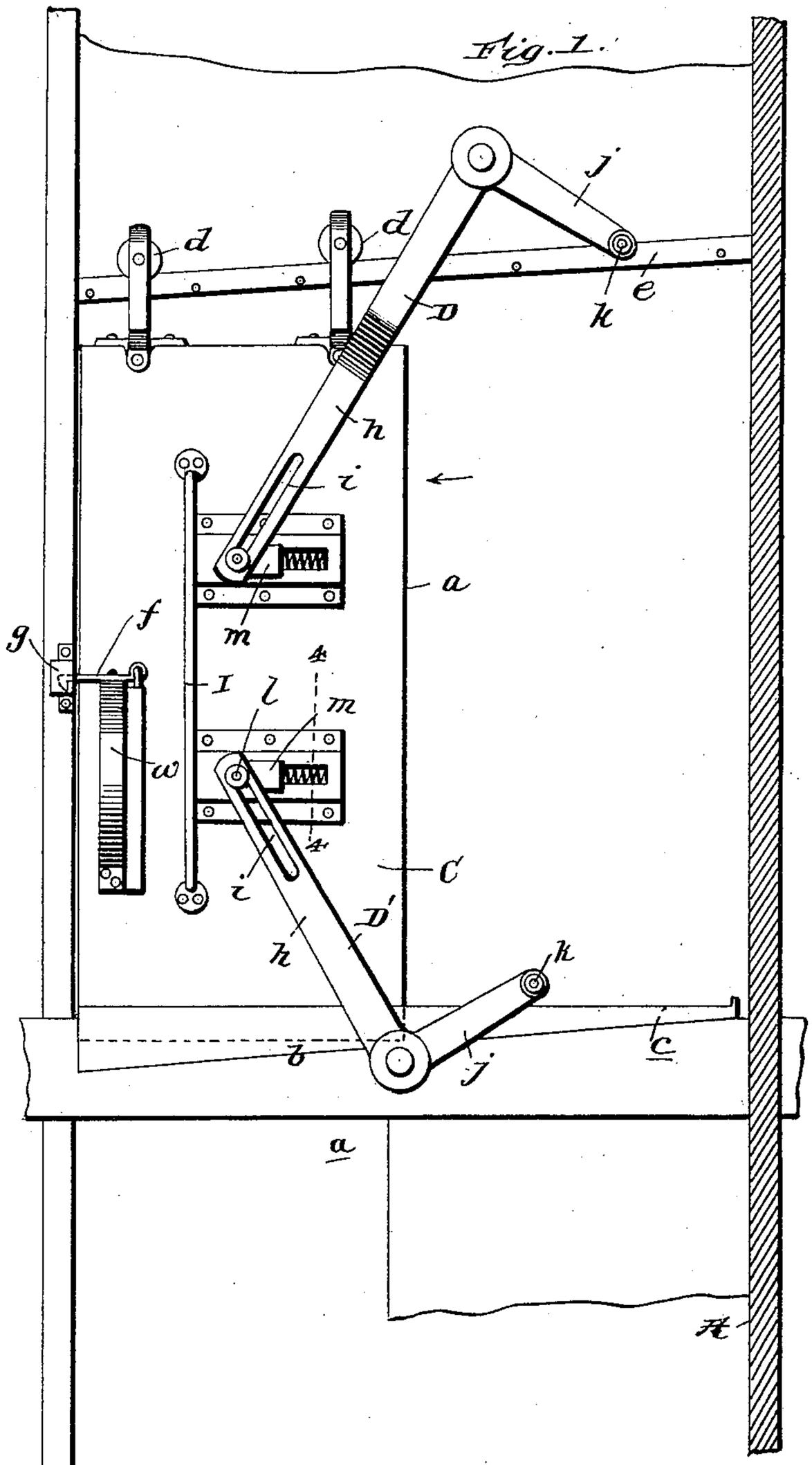
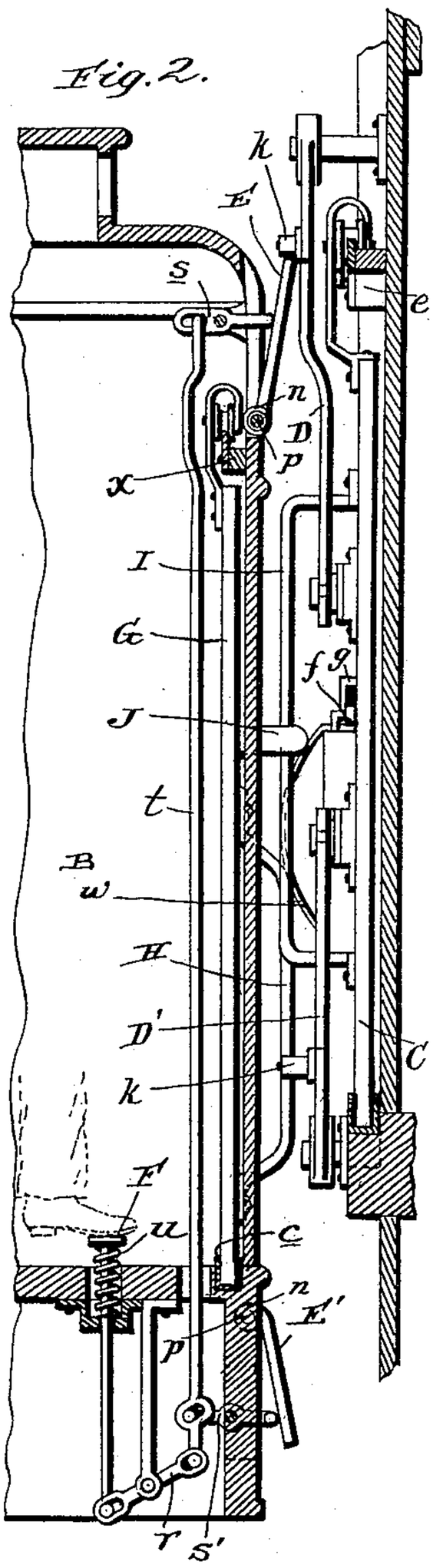


Fig. 2.



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(No Model.)

3 Sheets—Sheet 2.

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MEANS FOR OPERATING DOORS FOR ELEVATOR WELLS.

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Fig. 3.

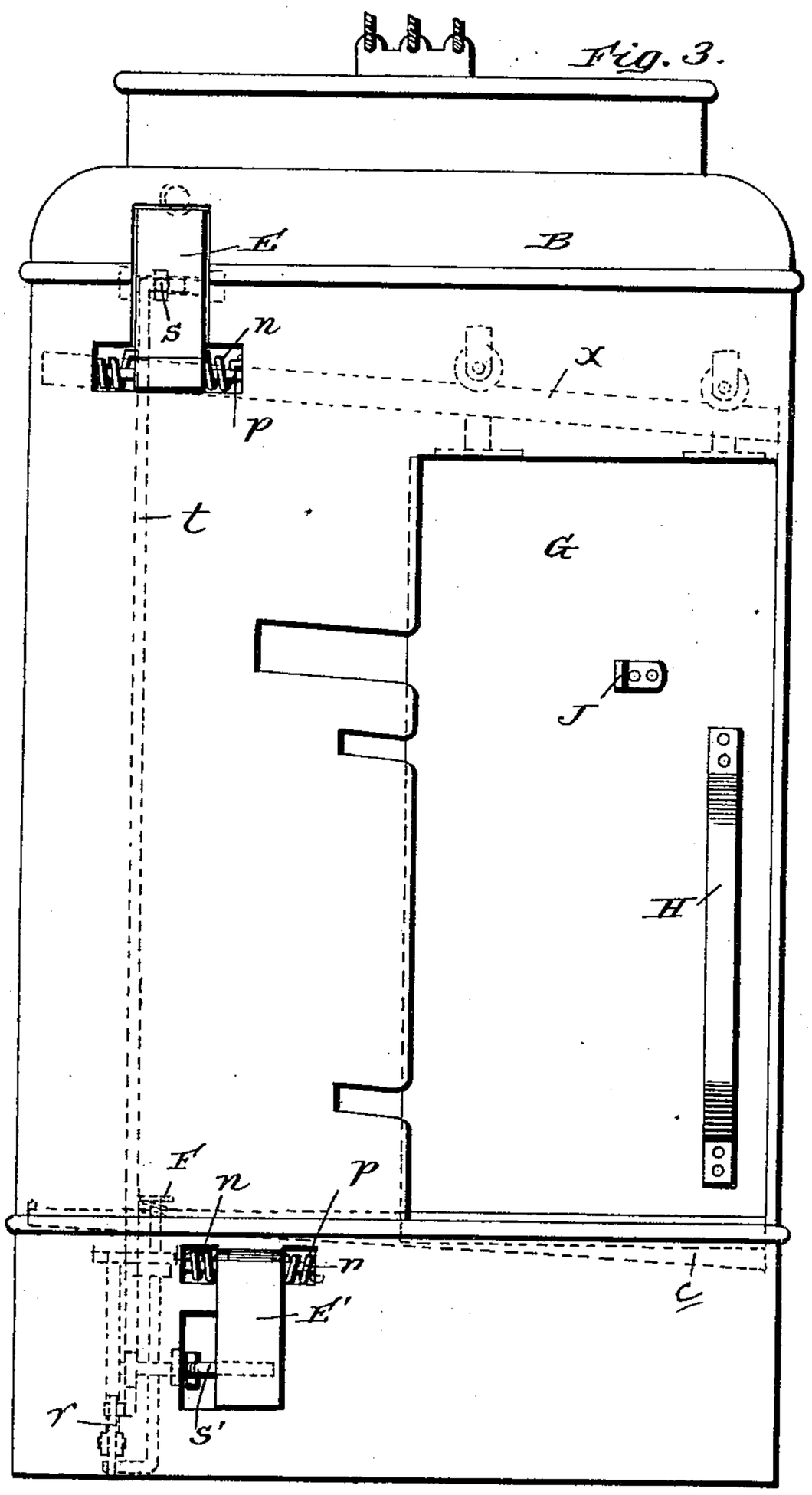


Fig. 4.

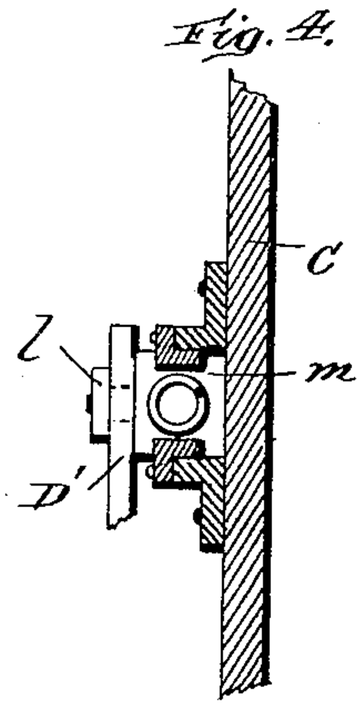
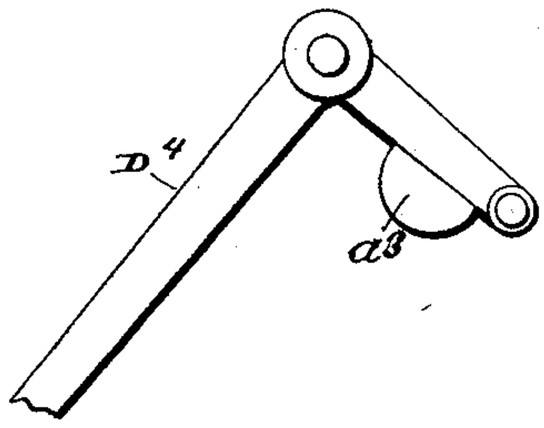


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

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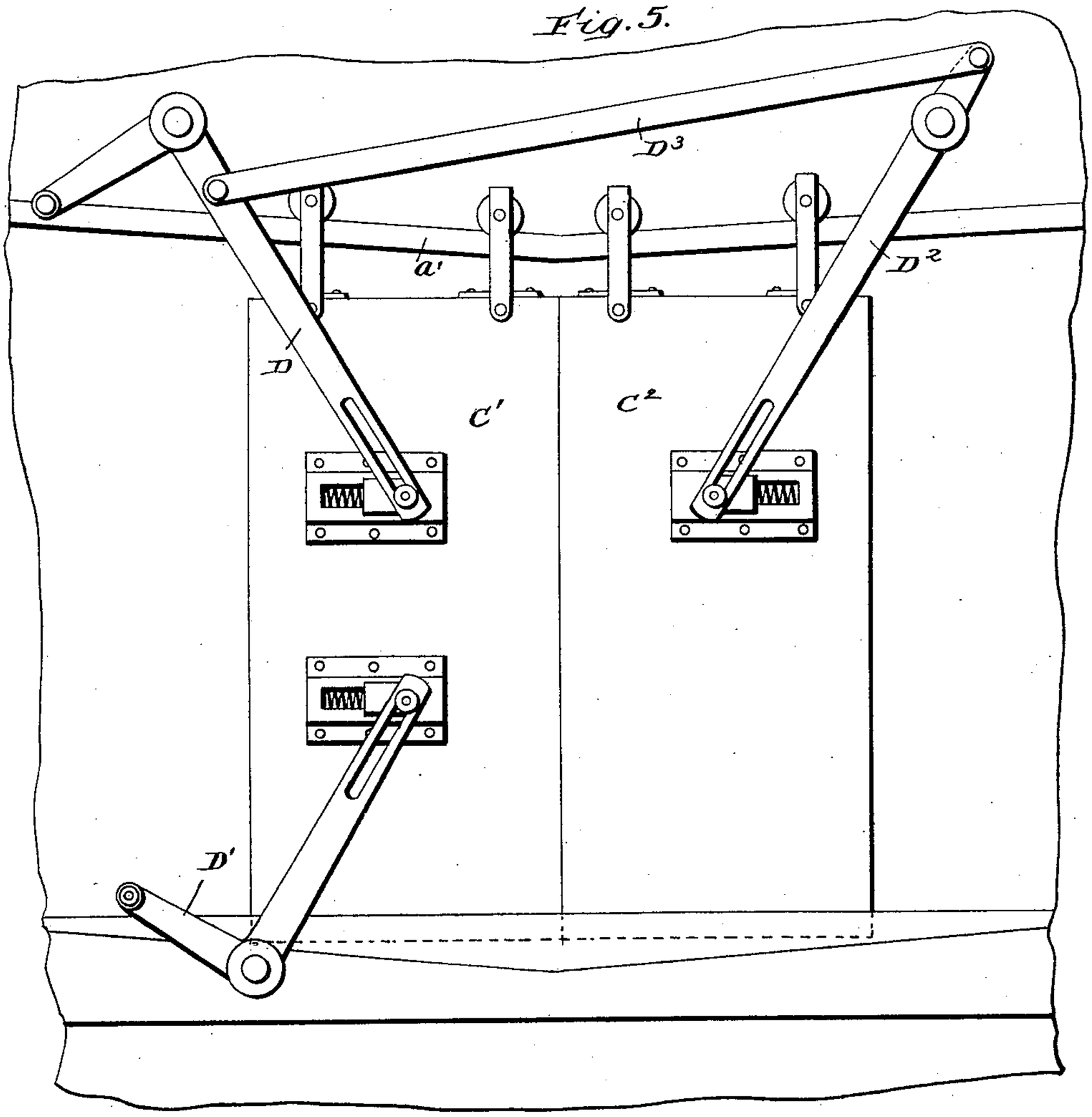
MEANS FOR OPERATING DOORS FOR ELEVATOR WELLS.

No. 606,003. Patented June 21, 1898.

Fig. 5.



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UNITED STATES PATENT OFFICE.

FREDERICK T. ELLITHORPE, OF NEWARK, NEW JERSEY.

MEANS FOR OPERATING DOORS FOR ELEVATOR-WELLS.

SPECIFICATION forming part of Letters Patent No. 606,003, dated June 21, 1898.

Application filed March 26, 1898. Serial No. 675,313. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK T. ELLITHORPE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Means for Operating Doors for Elevator-Wells, of which the following is a specification.

My invention relates to doors for elevator-wells, and has for one of its objects to provide a self-closing door and simple and reliable coacting devices connected with the door and an elevator-car, respectively, whereby the conductor of the car is enabled to open the door at pleasure when the car is moving up or down and is also enabled to release the door and permit the same to close prior to starting the car in one direction or the other from the landing at which the door is situated.

Another object of the invention is to provide simple and effective coacting devices on the elevator-car and well-door for unlatching said door prior to the engagement of the coacting door-opening devices.

Another object is to provide a self-closing door on the car and coacting devices on said door and the well-door, whereby when the well-door is opened the car-door will also be opened.

With the foregoing ends in view the invention will be fully understood from the following description and claims when taken in conjunction with the annexed drawings, in which—

Figure 1 is an elevation illustrating the well-door and its appurtenances as they appear from the inside of the well. Fig. 2 is a section of the car and well, taken in a plane at right angles to Fig. 1 and illustrating the manner in which the coacting door-opening devices operate to open the well-door and car-door when the car is moving upwardly. Fig. 3 is a front elevation of the elevator-car. Fig. 4 is an enlarged transverse section taken in the plane indicated by the line 4 4 of Fig. 1. Fig. 5 is a view similar to Fig. 1, illustrating the invention as applied to double well-doors; and Fig. 6 is an elevation of a portion of a modified form of door-operating lever.

In the said drawings similar letters designate corresponding parts in all of the several views, referring to which—

A designates an elevator-well having a door-opening *a* above a landing or floor *b*.

B designates a car movable in the well, and C designates a self-closing well-door which controls the opening *a*. The said door preferably has its lower end arranged in a guide *c*, increased in depth toward one end and is hung from wheels *d*, arranged and adapted to travel on a track *e*, inclined after the manner shown in Fig. 1, whereby it will be seen that when the door in its open position is released it will, by reason of gravity, move in the direction indicated by arrow in Fig. 1 to the closed position shown in said figure. This manner of rendering the door C self-closing is entirely reliable and is highly desirable because of its simplicity and durability and also because the door does not close with sufficient force to inflict serious injury upon a person caught by the same. For the purpose of locking the door when closed, as stated, said door is provided with a latch *f*, adapted to automatically engage a keeper *g* on the well-wall.

D D′ designate levers adapted, when acted upon by tappets, presently described, on the car B, to open the door C. These levers D D′ are fulcrumed above and below the door-opening *a*, respectively, and they are each provided with an arm *h*, having a slot *i* and an arm *j*, carrying an antifriction-roller *k*, the said rollers being provided in order to reduce the friction incident to the engagement of the levers by the tappets on the car. The arms *h* of the levers are connected by antifriction-rollers *l*, which extend loosely through the slots *i* thereof, with buffers or spring-backed devices, preferably slides *m* on the door, this mode of connection being employed in order to prevent concussion should the car-conductor inadvertently set a tappet to engage the roller *k* of one of the levers when the car is running at full speed. Each buffer or spring-backed slide also serves to take up the shock incident to the initial movement of its lever when said lever is engaged by a tappet on a car running at low speed. While this is so, it will be observed that after the spring behind the slide is compressed the lever will transmit positive movement to the

door and the door will move in concert with the lever.

E E′ designate the upper and lower tappets on the car B, the upper tappet being designed when properly set to engage the roller *k* of the lever D when the car is moving upwardly and the lower tappet being designed when properly set to engage the roller *k* of the lower lever D′ when the car is moving downwardly.

In the preferred embodiment of my invention the tappets E E′ are pivotally connected with the car B at their lower and upper ends, respectively, and are normally held flat against the outside of the car by coiled springs *n*, the said springs surrounding the trunnions *p* of the tappets and being connected at one end to the tappets and at their opposite ends to the car, as shown. In their normal position the tappets will pass the levers D D′ without engaging and moving the same. When, however, the free ends of the tappets are pressed out from the car, after the manner shown in Fig. 2, the tappet E is adapted on the up movement of the car to engage the roller *k* of lever D and through the medium of said lever open the door, and the tappet E′ is adapted on the down movement of the car to engage the roller *k* of lever D′, and thereby open the door. After the door C is opened it will be held in such position so long as the tappet and lever which effected the opening remain in engagement. When, however, the tappet is returned to its normal position against the side of the car B, which is necessary before the car can continue its movement or the car is moved in a direction opposite to that by which it effected the opening of the door, the said door will be released and by reason of gravity will return to its closed position.

For the purpose of enabling the elevator-conductor to control the tappets E E′, I provide the elevator-car B with a pedal F and suitable mechanism intermediate of the same and the tappets. This mechanism in the preferred embodiment of the invention comprises a lever *r*, connected at one end to the pedal F, levers *s s′*, which impinge against the tappets, and a connecting-rod *t*, joining the levers *r s s′*, as better shown in Fig. 1. In virtue of this construction it will be seen that when the pedal F is depressed the free ends of the tappets will be moved outwardly from the car, while when pressure is removed from the pedal it, together with the several levers and the connecting-rod, will be returned to their normal position by a spring *u*. It will also be observed that the operator is enabled to depress the pedal F with his foot, which is advantageous, because it leaves him free to use both of his hands in controlling the running of the car.

It is necessary that the latch *f* be disengaged from the keeper *g* before the door C can be opened through the medium of one of the tappets and levers, as just described. To this end I connect one end of a bow-spring *w* to the latch *f* and its other end to the door C and provide the door G of the elevator-car with a shoe H, the said shoe H being arranged in the same vertical plane as the spring (see Fig. 2) and being consequently adapted to press the spring in the direction opposite to that in which it is bowed, and thereby straighten said spring and raise the latch from the keeper prior to the engagement between tappet E′ and lever D′ on the down movement of the car and prior to the engagement between the tappet E and lever D on the up movement of the car. Said shoe H will obviously engage the spring *w* on all movements of the car past the door C; but no harm will result therefrom, because when the car has passed without opening the door the latch will simply resume its position in the keeper and again lock the door.

The door G of the elevator-car is hung from an inclined track *x* therein, and is consequently enabled when opened and released to automatically return by reason of gravity to its closed position and normally remain in such position. Said door G is also arranged to open in the same direction as the well-door C. This is done in order to enable coacting devices—*i. e.*, a bar I on door C and a finger J on door G—to open the said door G when the door C is opened. The operation of these parts is as follows, viz:

On either the up or down movement of the car B the finger J on the car-door will assume a position at the left-hand side of the bar I on door C prior to the movement of said door toward the left by the devices before described, and consequently when said door C is so moved to an open position the door G will also be moved to an open position and held in such position so long as the door C remains in its open position.

The door G of the car is highly advantageous, because it will prevent passengers from falling through the door-opening of the car and will also prevent a passenger from standing in the doorway, where he or she is liable to be struck. It is also highly advantageous to have the door G self-closing, as this insures the door being closed when the car is between landings. The automatic opening of the door G, like that of the door C, is desirable, because it leaves both of the hands of the conductor free to control the running of the car.

In Fig. 5 of the drawings I have illustrated my invention as applied to double well-doors. One of these doors, C′, is similar in construction to the door C and is adapted to be automatically opened and to close, by reason of gravity, like the same. Said door C′ is hung from a track *a′*, which is inclined upwardly from its middle toward its opposite ends. The other door, C^2, is also hung from the track *a′*, but is arranged at the opposite side of the lowermost portion of the same with respect to the door C′, whereby it will be seen that when released said doors will by reason of

gravity assume a closed position, as shown. A lever D^2 is connected to the door C^2 in the same manner and for the same purpose as the levers D D′ are connected to door C′. This lever D^2 also has its upper end connected by a pitman D^3 with the lever D, whereby it will be seen that when the door C′ is opened through the medium of the lever D or through the medium of lever D′ the door C^2 will also be opened.

When it is not desirable to employ a gravitating door, operating-levers having counterbalance-weights on their outer or free arms, which are depended upon to close the door, may be employed instead of the levers D D′. One of these levers D^4 is shown in Fig. 6, and, as will be readily observed, it is similar in construction to the levers D D′, with the exception that its outer arm is weighted, as indicated by a^3.

It is obvious that when the free arm of the lever D^4 is released from a car-tappet the weight a^3 will rock the lever in a direction opposite to that in which it was rocked by a tappet, and thereby move the door to its closed position.

In addition to the advantages before enumerated my improvements are desirable because, in the event of the door becoming inoperative from any cause, the elevator-conductor can conveniently open it by hand in the usual manner.

In practice all of the wearing parts of my improvements are formed of hardened steel or other suitable material, so as not to require lubrication.

Having thus described my invention, what I claim is—

1. In an elevator, the combination of a well-door, upper and lower levers connected with said door, and upper and lower tappets on the elevator-car for engaging the upper and lower levers on the up and down movements, respectively, of the car, substantially as specified.

2. In an elevator, the combination of a well-door, cushioned slides or buffers on said door, upper and lower levers connected with the cushioned slides or buffers, and upper and lower tappets on the elevator-car for engaging the upper and lower levers on the up and down movements, respectively, of the car, substantially as specified.

3. In an elevator, the combination of a well-door, upper and lower levers connected with said door, upper and lower tappets on the elevator-car for engaging the upper and lower levers on the up and down movements, respectively, of the car; said tappets normally resting in a position to pass the levers without engaging the same, and suitable means under the control of the elevator-conductor for extending the tappets when it is desired to have them engage the levers, substantially as specified.

4. In an elevator, the combination of a gravitating self-closing well-door, cushioned slides or buffers thereon, upper and lower levers connected with said slides or buffers, upper and lower tappets on the elevator-car for engaging the upper and lower levers on the up and down movements, respectively, of the car; said tappets normally resting in a position to pass the levers without engaging the same, and suitable means under the control of the elevator-conductor for extending the tappets when it is desired to have them engage the levers, substantially as specified.

5. In an elevator, the combination of a well-door, a device thereon movable in the same direction as the door, a spring backing the movable device, a car, and coacting devices on the wall of the elevator-well and the car for opening the door; the device on the wall of the well being connected with the movable device on the door, substantially as specified.

6. In an elevator, the combination of a well-door, a vertically-movable latch therefor, a vertical spring having one end fixed and its opposite end connected directly to the latch; said spring being normally bowed in a direction away from the door, a car, and a shoe arranged on the car in the same vertical plane as the bowed spring so as to engage said spring on the up and down movements of the car, substantially as specified.

7. In an elevator, the combination of a well-door, upper and lower levers connected with said door, upper and lower, oppositely-disposed tappets pivotally connected with the elevator-car, springs for normally holding the tappets against the car, a pedal and devices connected with the pedal for extending the tappets, substantially as specified.

8. In an elevator, the combination of a well-door, a device thereon movable in the same direction as the door, a spring backing the movable device, a lever having one of its arms connected with the movable device on the door, a car, a tappet on the car normally resting in a position to pass the lever without engaging the same, and suitable means, under the control of the elevator-conductor, for extending the tappet so as to enable the same to engage the lever, substantially as specified.

9. In an elevator, the combination of a well-door, a lever connected with said door, a tappet for engaging the lever pivotally connected with the elevator-car, a spring for normally holding the tappet against the car, a lever fulcrumed on the car and engaging the tappet, and suitable means under the control of the elevator-conductor for rocking said lever.

10. In an elevator, the combination of a gravitating, self-closing well-door, levers fulcrumed above and below and loosely connected with said door, upper and lower tappets on the car for engaging the upper and lower levers on the up and down movements, respectively, of the car; said tappets normally resting in a position to pass the levers without engaging the same, and suitable means under

the control of the elevator-conductor for extending the tappets when it is desired to have them engage the levers, substantially as specified.

11. In an elevator, the combination of a track inclined upwardly from its middle, well-doors hung from said track and arranged at opposite sides of the middle thereof, levers connected to said doors, a pitman connecting the said levers, a car, and a tappet on the car for engaging and moving one of the levers, substantially as specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FREDERICK T. ELLITHORPE.

Witnesses:
FRANK L. BOPPE,
M. G. ELLITHORPE.