

(No Model.)

2 Sheets—Sheet 1.

H. ROWNTREE.
CLOSURE CONTROLLING APPARATUS.

No. 596,946.

Patented Jan. 4, 1898.

Fig. 1.

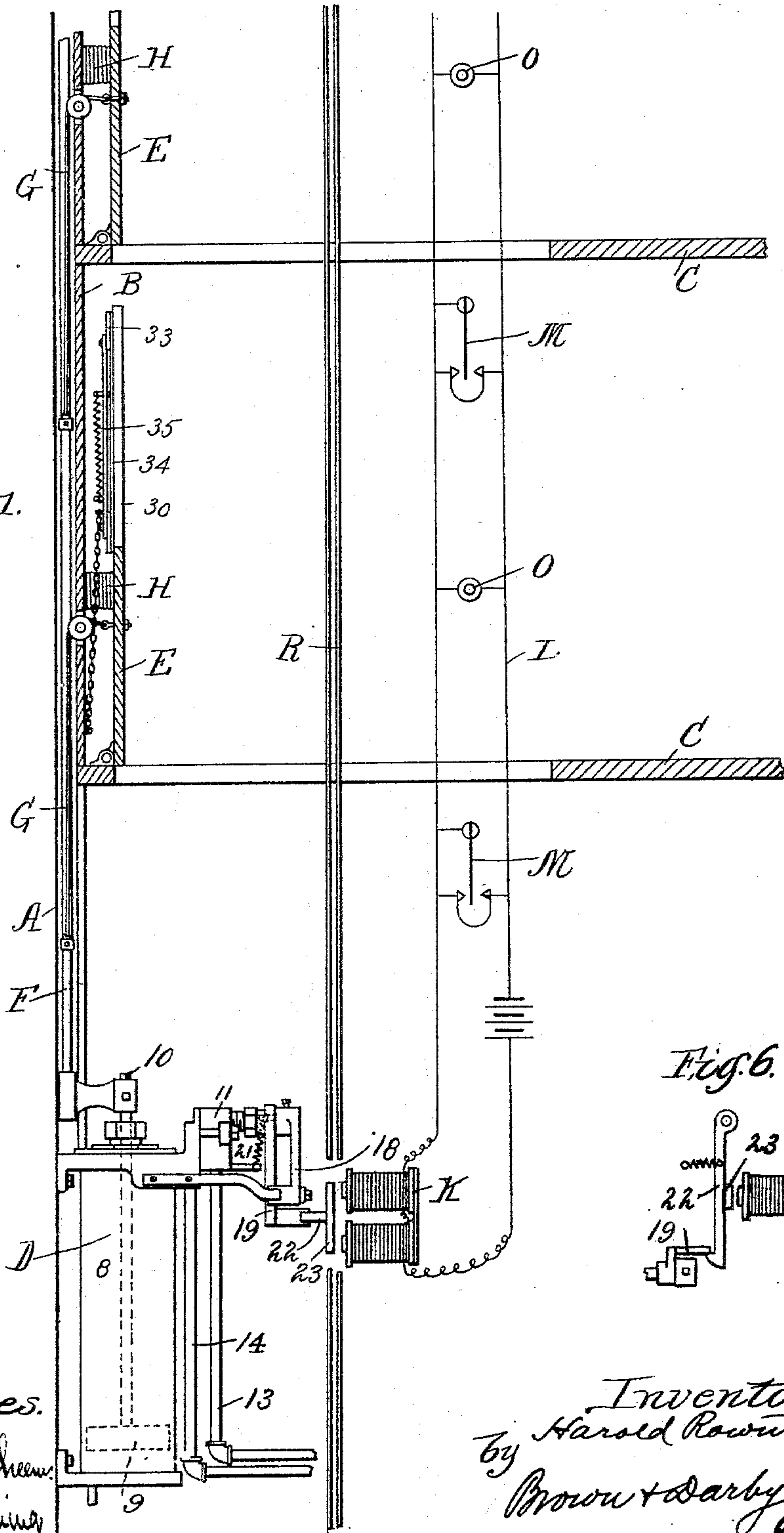
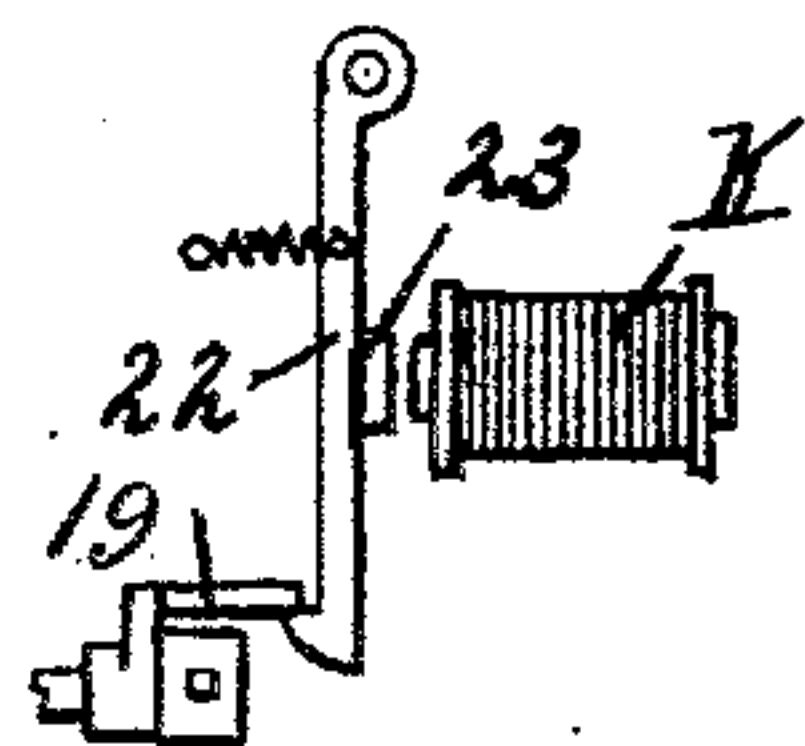


Fig. 6.



Witnesses.

Wm. M. Rhee.
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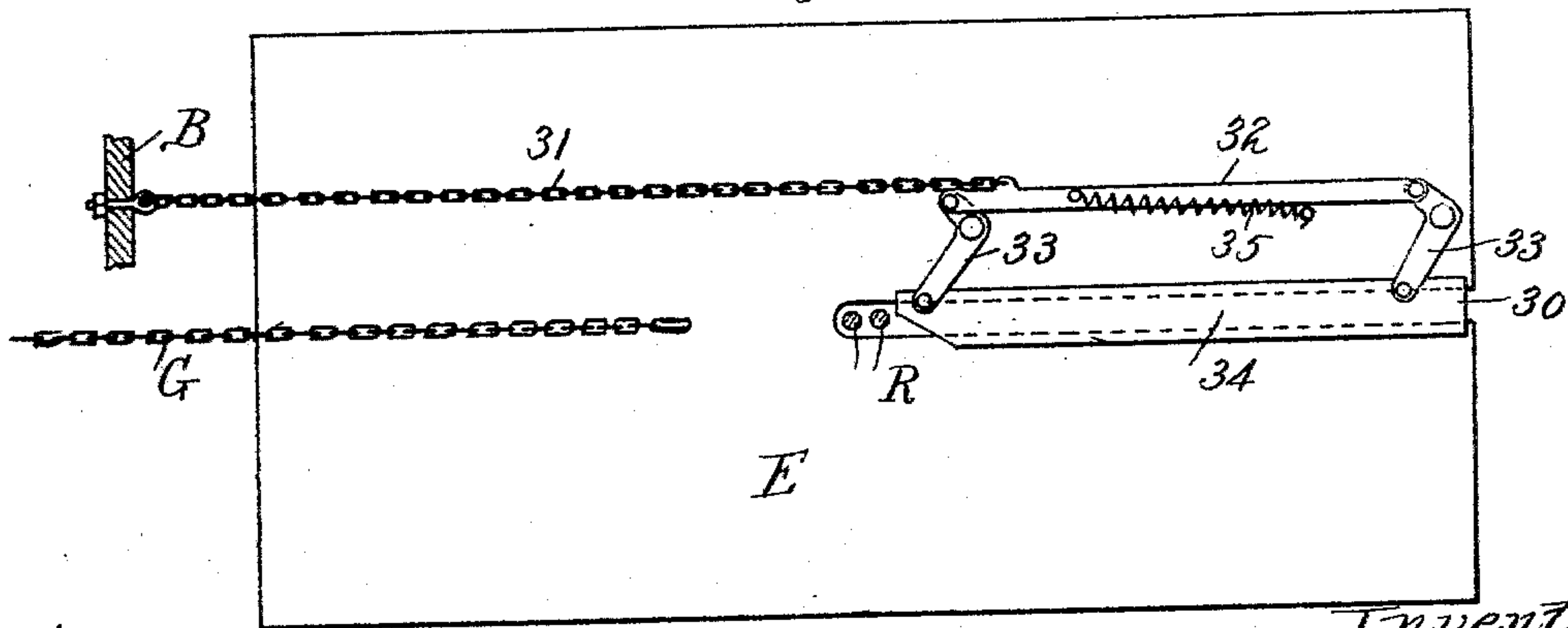
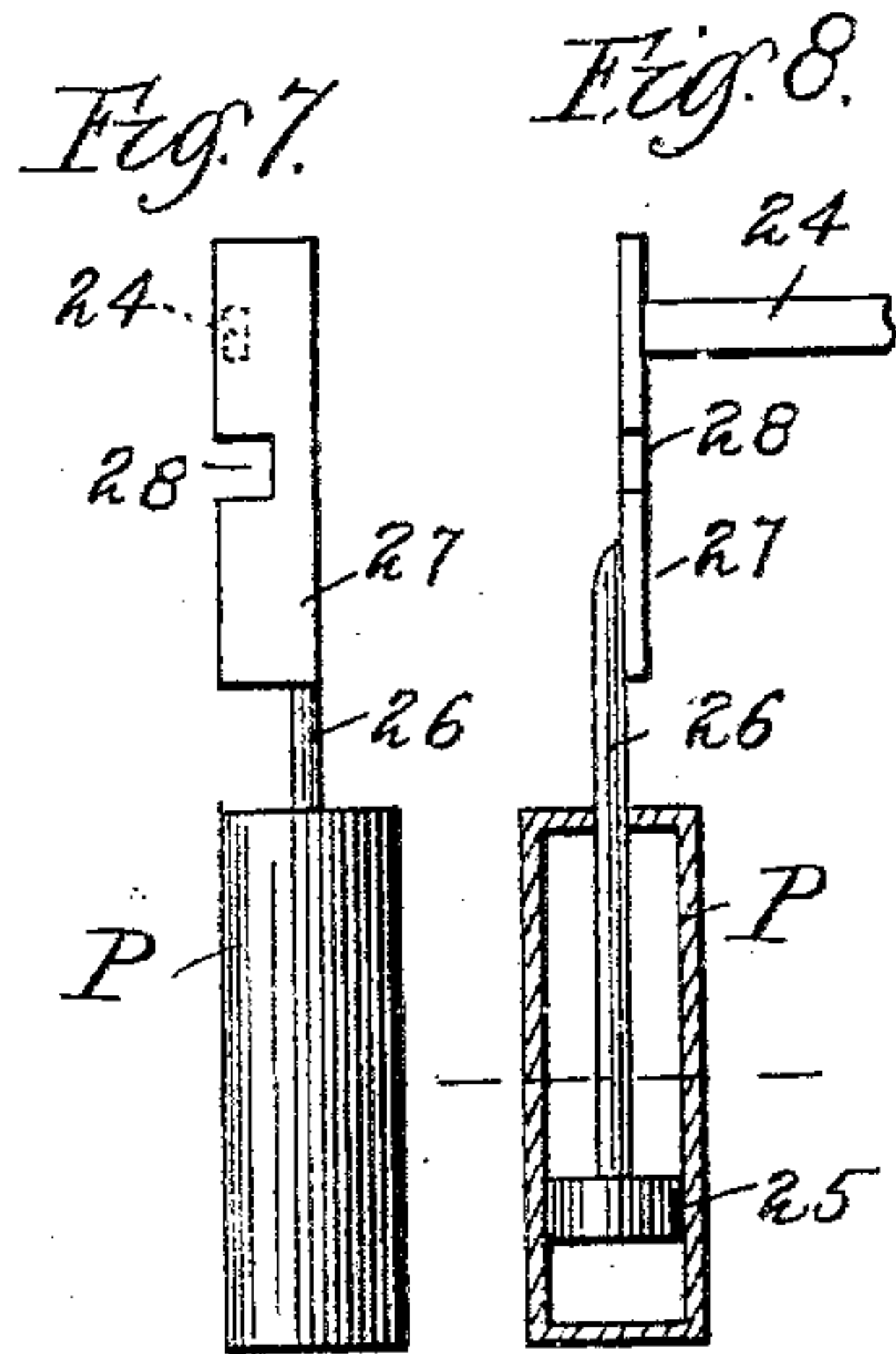
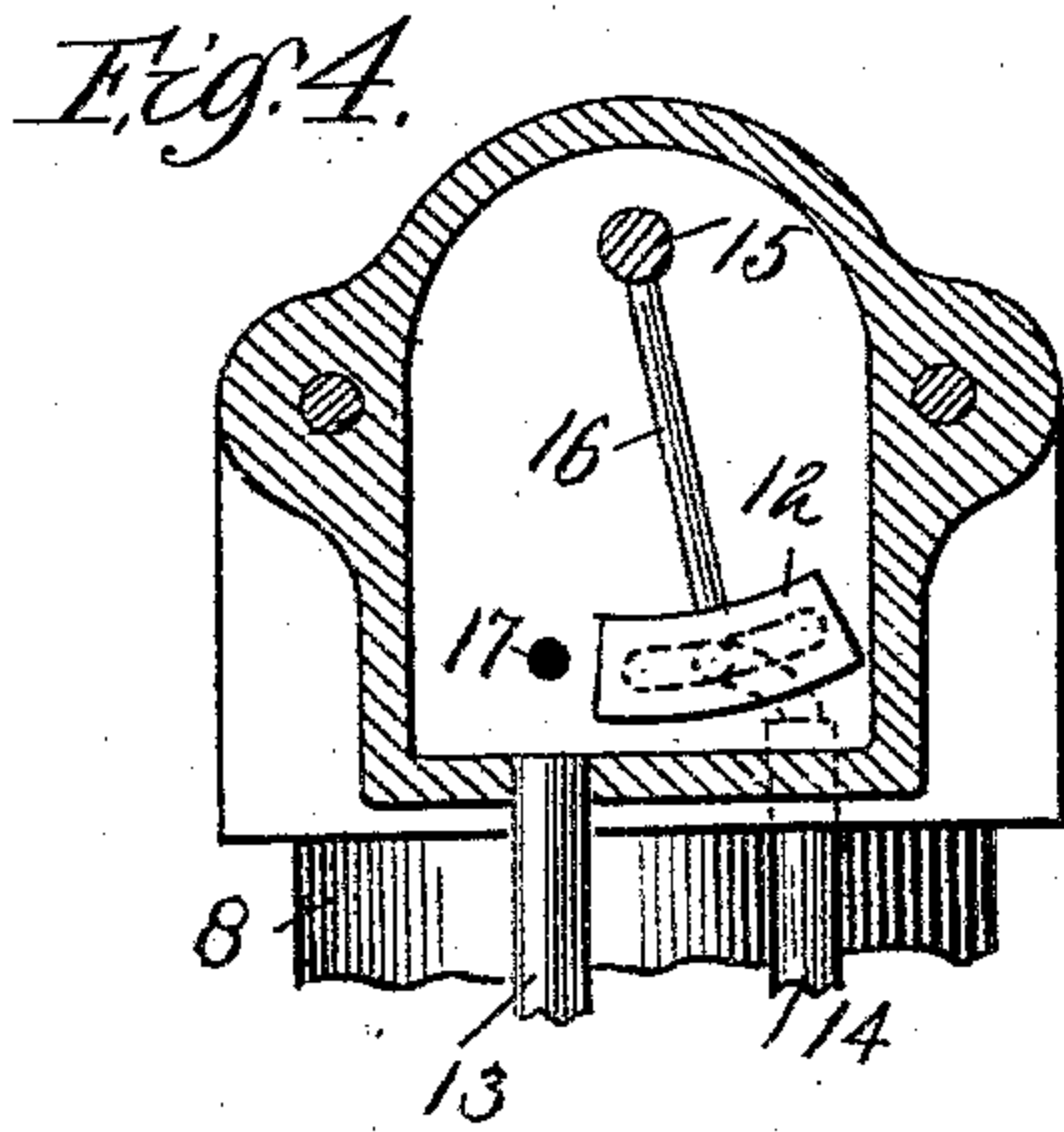
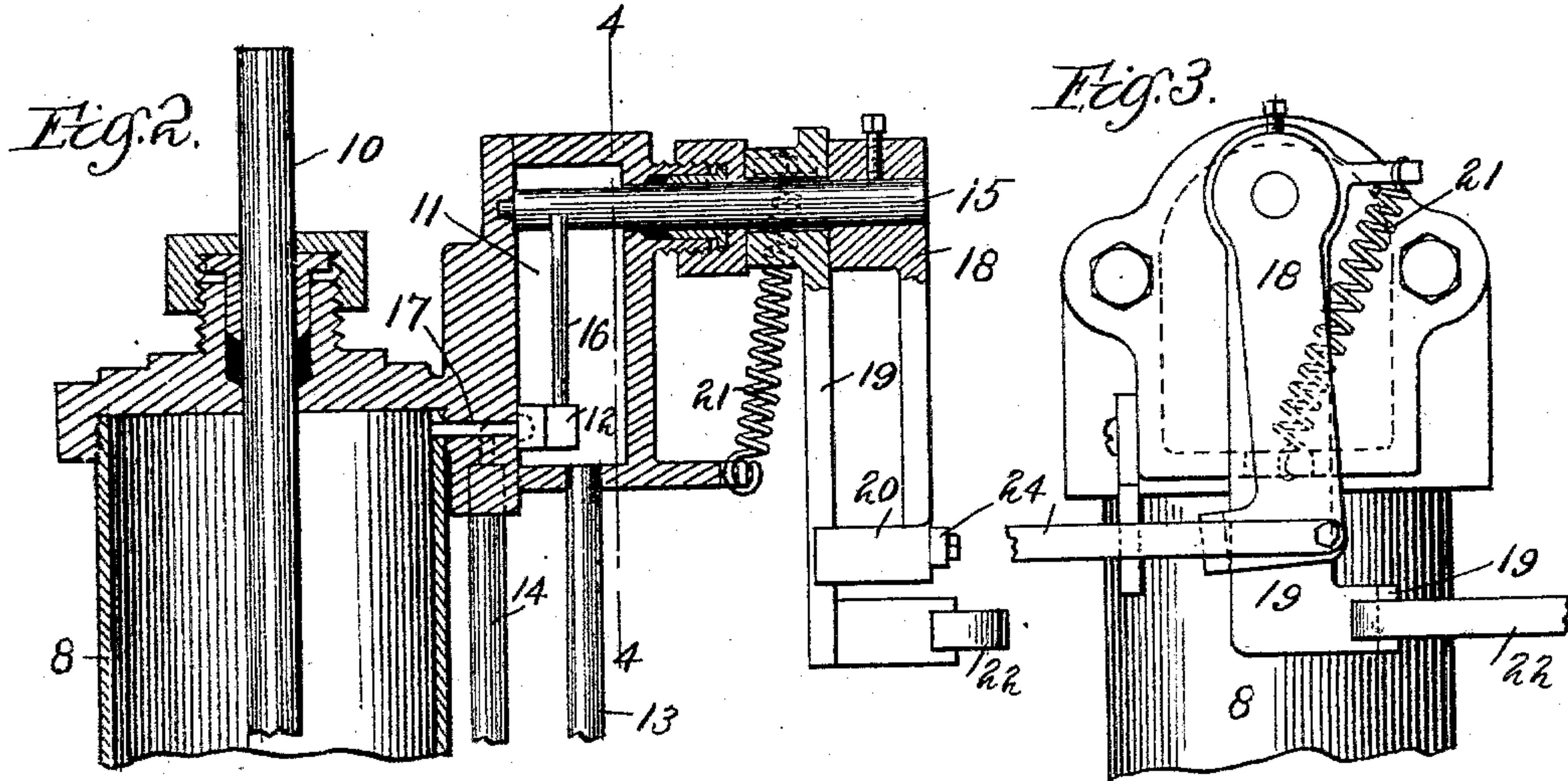
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2 Sheets—Sheet 2.

H. ROWNTREE.
CLOSURE CONTROLLING APPARATUS.

No. 596,946.

Patented Jan. 4, 1898.



Witnesses.
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UNITED STATES PATENT OFFICE.

HAROLD ROWNTREE, OF CHICAGO, ILLINOIS.

CLOSURE-CONTROLLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 596,946, dated January 4, 1898.

Application filed December 21, 1894. Serial No. 532,540. (No model.)

To all whom it may concern:

Be it known that I, HAROLD ROWNTREE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Closure-Controlling Apparatus, of which the following is a specification.

This invention relates to mechanism for controlling fire-doors, safety-gates, and similar closures.

The object of the invention is the provision of means of novel construction and arrangement for operating and controlling closures in a simple and effective manner.

The invention consists, substantially, in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter described, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Reference is had to the accompanying drawings, and to the various views and reference-signs appearing thereon, wherein—

Figure 1 is a view, partly in elevation and partly in vertical section, of an apparatus embodying my invention. Fig. 2 is a partial view in vertical section, illustrating a form of motor and its valve-controlling mechanism adapted for use in connection with my invention. Fig. 3 is an elevation of the same, looking from the right of Fig. 2. Fig. 4 is a sectional view taken on the line 4 4, Fig. 2. Fig. 5 is a detail view in plan of a closure embodying a feature of my invention. Fig. 6 is a detached detail view of an electrically-operated detent for the valve-controlling mechanism. Figs. 7 and 8 are details in elevation and longitudinal section, respectively, of a construction for automatically locking and releasing the valve-controlling mechanism.

The same reference-signs are employed to designate the same part wherever it occurs throughout the drawings.

In the drawings I have illustrated a construction wherein my invention is applied to operating fire-doors in an elevator-shaft. I desire it to be distinctly understood, however, that my invention is of general application and is adapted for use in various other constructions—as, for instance, in operating safety-gates, doors, skylights, and the like.

Reference-sign A designates the wall of the

elevator-shaft; B, the casing forming the elevator-well shaft; C, floors at different landings; E, the doors and the like to be operated, and D a motor for controlling the doors.

In carrying out the principles of my invention the object had in view is to operate simultaneously a series of closures. Many forms of apparatus may be provided for accomplishing this purpose. The form shown is an exceedingly simple and effective one, wherein a suitable rod, cord, or other similar connection F extends throughout the length of the elevator-well, as in the form illustrated in the drawings, and adjacent to the closures to be operated. Each closure E is connected in any suitable way with the operating rod or cable F. A flexible connection G is attached to the closure at one end and to the operating rod or cable F at the other end. A suitable spring H may be interposed between the closure and a fixed part of the casing adjacent thereto and normally acting to throw the closure into its closed position, the closure being held against the action of said spring by the operating rod or cable. When the operating rod or cord F is suitably moved, the tension on the flexible connection G is released, causing the springs to act upon the closures and effecting a closing thereof, and a movement of the operating cord or rod F in the opposite direction effects an opening of the closures. In practice and in the form shown the rod or cord F is normally held in the position where by the closures are held in open position. I will now describe the construction of a form of motor for effecting this result, although it will be understood that various forms of motors may be equally well adapted for accomplishing this result. The form of motor shown comprises a cylinder 8 and a piston 9, having a stem 10 rigidly connected in any suitable way to the operating cord or rod F. A convenient form and arrangement for maintaining the operating rod or cord F at one limit of its travel is shown, wherein the valve for admitting the operating medium to the cylinder 8 is so arranged as to permit the fluid to normally enter the said cylinder, to maintain the piston 9 and consequently the rod 10 and operating rod or cord F at one limit of their travel. When the valve is operated to relieve the piston 9 from the action

of its impelling medium, the piston is permitted to move toward the opposite limit of its travel, thereby operating rod F, whereby the closures are permitted to close the tension of the springs H, and gravity acting upon the closures when vertically-swinging closures are operated, effecting longitudinal pull on the operating rod or cord, thereby effecting a closure of all the closures simultaneously, the movement of the operating rod or cord effecting an exhaust of the operating medium from the cylinder, the valve mechanism for said cylinder being arranged to cut off the supply of medium to the cylinder and simultaneously therewith opening said cylinder to the exhaust. In this manner the piston is cushioned—that is, is opposed by the resistance offered to the exhaust of the operating medium—and hence acts as a buffer for the closures, thus avoiding a slamming of the closures to their closed position. Any suitable form of mechanism for accomplishing this purpose may be provided. I have shown a convenient form of mechanism wherein reference-sign 11 designates the valve-chamber, 12 the valve, 13 the supply-pipe, 14 the exhaust-pipe, 15 a rock-shaft, having an arm 16 rigidly connected to the valve. A single opening 17 is provided from the valve-chamber to the chamber of cylinder 8, which constitutes both the supply and exhaust port for the motor-cylinder. The valve 12 is constructed so as to normally close the opening to the exhaust-pipe 14, and when suitably operated, as will be more fully hereinafter described, it effects a communication between the opening or port 17 and the exhaust-pipe 14, thereby not only cutting off the supply of medium to the cylinder but also opening communication between said cylinder and the exhaust. Any suitable form of mechanism for manipulating valve 12 in order to accomplish this result may be provided, that shown being a convenient form wherein a crank-arm 18 is rigidly mounted upon shaft 15 and a crank-arm 19 is loosely mounted upon said shaft. Crank-arm 18 is provided with an arm 20, adapted to project into the path of movement of the arm 19, as shown. Any convenient form of arrangement may be provided whereby the loose crank-arm 19 is normally in engagement with the arm 20 of crank 18. In the form shown a spring 21 is suitably secured at one end to a part of the framework or to the valve-casing and at the opposite end to a lug formed upon the hub of the loose crank 19, the tension of the spring 21 acting to rock the loose arm 19 into engagement with the arm 20 of crank 18. Unless a hindrance is offered to the action of spring 21 its tension is sufficient to rock fixed crank 18, and hence shaft 15. A rocking of shaft 15 causes the valve 12 to open communication through port 17 between the motor-cylinder and the exhaust-pipe, thereby permitting the piston 9 to travel from its normal position at one limit of its stroke

toward the opposite limit of its stroke, thereby releasing control-rod or operating-cord F, and hence permitting the inclosures to move into their closed position.

In order to hold rigid crank 18 against the action of the tension of spring 21 and in position to hold valve 12, so as to open port 17 to the supply of operating medium and to close the exhaust-opening, any suitable automatically-operated catch or detent may be provided, that shown being a convenient arrangement, wherein crank 19 is adapted to be engaged by a hook or latch 22, suitably pivoted and carrying a pole-piece 23, which forms the armature of an electromagnet K, included in electric circuit L. Suitable circuit-closures may be provided in the electric circuit, whereby the electromagnet K may be operated when desired to attract the armature 23 thereto, and hence to release the detent or latch 22 from its engagement with crank 19, thereby permitting the spring to operate on said crank to rock the same and with it crank 18, thereby operating the valve.

When my invention is applied as a fire safety device the circuit-closures may comprise any suitable form of thermostat M, adapted to be operated by an undue increase in the temperature, to effect a closing of the electric circuit. If desired, suitable push-buttons O may be provided for accomplishing the same result.

In some instances it may be desirable to operate the rigid crank-arm 18 independently of the latch mechanism above described, and hence independently of the loose crank 19, whereby the valve may be operated to permit the closing of the closures without disturbing or affecting the electric circuit. In order to accomplish this result, I provide a suitable rod 24, secured in any convenient way to the crank-arm 18, and by suitably manipulating the connection 24 said crank-arm, and hence shaft 15 and valve 12, may be manipulated without disturbing the latch connection of crank 19, and hence independently of the spring 21. It will be observed that many other suitable constructions for accomplishing this purpose may be provided, and I do not desire, therefore, to be limited to the specific form shown.

It may be desirable to provide a construction wherein the valve-controlling mechanism may be automatically locked against displacement or actuation during certain intervals of time—as, for instance, when the invention is applied to elevator constructions it may be desirable to provide an arrangement wherein the valve mechanism is locked while the elevator-car is in motion, thereby avoiding the danger of having the closures operated while the elevator-car is between the landings. I have shown a convenient and exceedingly simple way of accomplishing this result, but I do not desire to be limited thereto, as many other forms of mechanism may be provided to accomplish the same

result. In the form shown P designates the valve for controlling the hoisting apparatus, which valve is adapted to be operated by the operating-cables from the car. As is well known, the piston of the valve P is moved to its midway position, as indicated by the dotted lines at 25, Fig. 8, to effect a stopping of the car, and said piston is moved either to one side or the other of its medial position in order to effect the movement of the hoisting mechanism to hoist or lower the elevator-car. I make use of this well-known arrangement in order to perfect a simple means for effecting a locking of the operating mechanism for valve 12 by mounting upon the rod 26 of the valve a plate 27, having a notch 28 therein, and I arrange lever or connection 24 adjacent to the path of travel of plate 27, and in position to register with the opening 28 therein when said valve is in its medial position, but adapted to bear against the side of plate 27 when said valve is moved to one side or the other of its medial position.

By the construction above described the arm 24 is locked, thereby locking the operating mechanism of valve 12 except when said arm registers with notch 28, and hence, as this register is not effected, as above explained, until the hoisting mechanism controlling-valve has moved to such a position as will arrest the hoisting mechanism, it will be impossible to effect an actuation of the valve 12 while a car is in motion. Of course any other arrangement for accomplishing the same purpose may be employed.

In many relations in which my invention may be applied it is necessary to provide slots in the closure to accommodate for various obstructions or obstacles. For instance, when my invention is applied for operating fire-doors in elevator-wells the closures may be slotted, as at 30, (see Fig. 5,) to accommodate the hoisting-cable R when the closure E is in its closed position. In order to close such openings when the closure is in its closed position, and hence in order to avoid any openings tending to form a well or draft, I provide suitable automatic mechanism for closing said slots. This may be accomplished in many ways, a simple and convenient arrangement being shown wherein a cord or any suitable connection 31 is secured at one end to a fixed part, as the casing B, and at the opposite end to a rod 32, pivotally secured to an arm of a pair of bell-crank levers 33, pivotally mounted upon the closure, as shown. Pivotally secured to the other arm of said bell-crank lever is a plate or cover 34. The bell-crank levers are pivoted adjacent to the slot or opening to be closed. The connection 31 is of a length adapted to be slackened as soon as the closure commences to open, thereby permitting a spring 35 to act upon the bar 32 and to rock bell-crank levers 33 in a direction to immediately draw the cover or plate 34 out of position as a cover for the slot or opening.

When said closure is closed, the cord or connection 31 by reason of its length effects a movement of the rod 32 in a direction opposed to the tension of spring 35, whereby the bell-crank levers 33 are rocked in the opposite direction and the plate or cover 34 is moved into a position to cover and close the slot or opening, as will be readily understood by reference to Fig. 5.

Many variations and changes in the location, arrangement, and detail of construction of parts may be made by any person skilled in the art without departing from the spirit of my invention. I do not desire, therefore, to be understood as limiting myself to the exact details shown; but,

Having now fully ascertained the object and nature of my invention, its principles of operation, and a form of mechanism embodying the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus of the class described, a series of closures, a fluid-motor, connections between said motor and each of said closures, a valve mechanism comprising a rock-shaft, a valve operated thereby, arms mounted thereon, one loosely and the other rigidly with respect thereto, means for imparting a tension to said loosely-mounted arm, whereby it engages said rigidly-mounted arm, and an automatically-operated lock for retaining said loose arm out of engagement with said rigid arm; as and for the purpose set forth.

2. In an apparatus of the class described, a series of closures, means for moving the same, comprising a motor, connections between said motor and each of said closures, a valve mechanism for said motor, comprising a rock-shaft, devices normally acting to impart a rotary tension to said shaft to shift the valve mechanism, means opposing said tension devices, and means for releasing said opposing means; as and for the purpose set forth.

3. In an apparatus of the class described, a series of closures, a motor, connections between said motor and each of said closures, whereby when said motor is operated, said closures are all simultaneously moved, a valve mechanism for controlling said motor, and means for locking said valve mechanism against movement during the travel of the elevator-car; as and for the purpose set forth.

4. In an apparatus of the class described, a closure, having a slot or opening therein, a pair of bell-crank levers pivotally mounted upon said closure adjacent to said slot or opening, a plate pivotally secured to one arm of each of said levers, a bar connecting the other arms of said levers, a spring connected to said bar, normally acting thereon to rock said levers, and uncover said slot or opening, a flexible connection between said bar and a fixed part of the framework, adapted when said closure is moved to its closed position to move said bar in opposition to said spring,

whereby said levers are rocked to move said plate to cover said slot or opening; as and for the purpose set forth.

5. In an apparatus of the class described, a series of closures, a motor provided with a piston, means for normally maintaining said piston at one limit of its stroke, connections between the rod of said piston and each of said closures, whereby said closures are maintained in open position when said motor is in its normal position, and means for permitting said piston to move to the opposite end of its stroke, thereby releasing said connections; as and for the purpose set forth.

6. In an apparatus of the class described, a series of closures, a fluid-motor having a piston, connections between the rod of said piston and each of said closures, devices for normally admitting fluid to said motor to maintain said piston at that limit of its travel which holds the closures open, and devices for automatically opening said motor to the exhaust, whereby said piston is permitted to move to the opposite limit of its travel, thereby releasing said connections, permitting said closures to move to a closed position and cushioning the movement; as and for the purpose set forth.

7. In a fire-door apparatus for elevators, an elevator shaft or well, a series of closures arranged at different landings therein, a motor, means for automatically controlling the action of said motor, and connections between said motor and each of said closures, whereby when said motor is actuated, all of said closures are simultaneously operated; said motor normally acting to maintain said closures in one limit of their movement as and for the purpose set forth.

8. In a fire-door apparatus for elevators, an elevator shaft or well, a series of closures arranged at different landings therein, a motor, means at will for automatically controlling the action of said motor, and connections between said motor and each of said closures, whereby, when said motor is actuated, all of said closures are simultaneously operated; as and for the purpose set forth.

9. In a fire-door apparatus for elevators, an elevator shaft or well, a series of closures arranged at different landings therein, a single motor, connections between said motor and each of said doors, a motor on each of said closures, means for automatically controlling the action of said motor in one direction, and means for releasing said motor at will, as and for the purpose set forth.

10. In a fire-door apparatus for elevators, an elevator shaft or well, a series of closures arranged at different landings, a motor, connections between said motor and each of said closures, means for normally maintaining said motor at one limit of its travel, and electrical means whereby said motor is automatically operated at will; as and for the purpose set forth.

11. In an apparatus of the class described,

the combination with a series of closures, of a motor, a valve mechanism for controlling the action of said motor, means for automatically actuating said valve mechanism, auxiliary means independent of said automatic means for actuating said valve mechanism, and connections between said motor and each of said closures; as and for the purpose set forth.

12. In an apparatus of the class described, the combination with a series of closures, of a motor comprising a cylinder and piston, a valve mechanism arranged to normally admit an operating fluid to said cylinder, whereby said piston is normally held at one limit of its travel, means for automatically shifting said valve mechanism to open said cylinder to the exhaust, and connections between said piston and each of said closures, as and for the purpose set forth.

13. In an apparatus of the class described, the combination with a series of closures, a motor, devices for automatically controlling the action of said motor, auxiliary means, independent of said automatic devices, for controlling said motor, connections between said motor and each of said closures, said motor normally held in one limit of its movement, and means for releasing said motor at will, as and for the purpose set forth.

14. In an apparatus of the class described, the combination with a series of closures, a motor, means for throwing said motor into action, including an electromagnet, means for opening or closing the circuit of said magnet, a valve mechanism controlled by said magnet, and connections between said motor and each of said closures; as and for the purpose set forth.

15. In an apparatus of the class described, the combination with a series of closures, a motor, a valve mechanism therefor, an electromagnet arranged to control said valve mechanism, means for automatically opening or closing the circuit of said magnet upon an abnormal rise of temperature, whereby said motor is actuated, and connections between said motor and each of said closures; as and for the purpose set forth.

16. In an apparatus of the class described, the combination with a series of closures, a cylinder and piston, connections between said piston and each of said closures, a valve arranged to control the supply to and exhaust from said cylinder, means for normally maintaining said valve in position to open said cylinder to the supply, whereby said piston is held in one extreme limit of its travel, and said closures are held in normal position, and automatic means for moving said valve to open said cylinder to the exhaust, whereby said closures are moved from their normal position; as and for the purpose set forth.

17. In an apparatus of the class described, the combination with a series of closures, a single motor, connections between said motor and each of said closures, means for normally

maintaining said motor open to its operating medium, whereby said closures are normally maintained in open position, a tension device against which the action of said motor normally operates, and means for automatically opening said motor to the exhaust, whereby said motor is released and said tension device effects a movement of said closures to their closed position; as and for the purpose set forth.

18. In an apparatus of the class described, the combination with a series of closures, a single motor, connections between said motor and each of said closures, means for normally maintaining said motor open to its operating medium, whereby said closures are normally maintained in open position, a tension device against the action of which said motor normally operates, automatic means for opening said motor to the exhaust, and auxiliary means independent of said automatic means, for opening said motor to the exhaust; as and for the purpose set forth.

19. In an apparatus of the class described, the combination with a series of closures, of a single motor, connections between said motor and each of said closures, means for normally maintaining said motor open to its operating medium, whereby said closures are normally

maintained in open positions, tension devices against which said motor normally operates, said tension devices normally tending to close said closures, each of said closures provided with slots, means operated by the movement of said closures to their closed position for automatically closing said slots, and means for releasing said motor; as and for the purpose set forth.

20. In an apparatus of the class described, the combination with a series of closures, a rod or cord arranged adjacent thereto, a motor, connections between said motor and said rod or cord, a flexible connection between said rod or cord and each of said closures, means for normally maintaining said motor at one limit of its action, whereby said closures are normally maintained in open position, tension devices against the action of which said motor normally operates, and means for automatically releasing said motor at will from any desired point, as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 18th day of December, 1894.

HAROLD ROWNTREE.

In presence of—

M. I. CAVANAGH,

S. E. DARBY.