(No Model.) 2 Sheets—Sheet 1.

E. M. T. BODDAM.

DEVICE FOR OPENING OR CLOSING ELEVATOR DOORS.

No. 491,832. Patented Feb. 14, 1893.

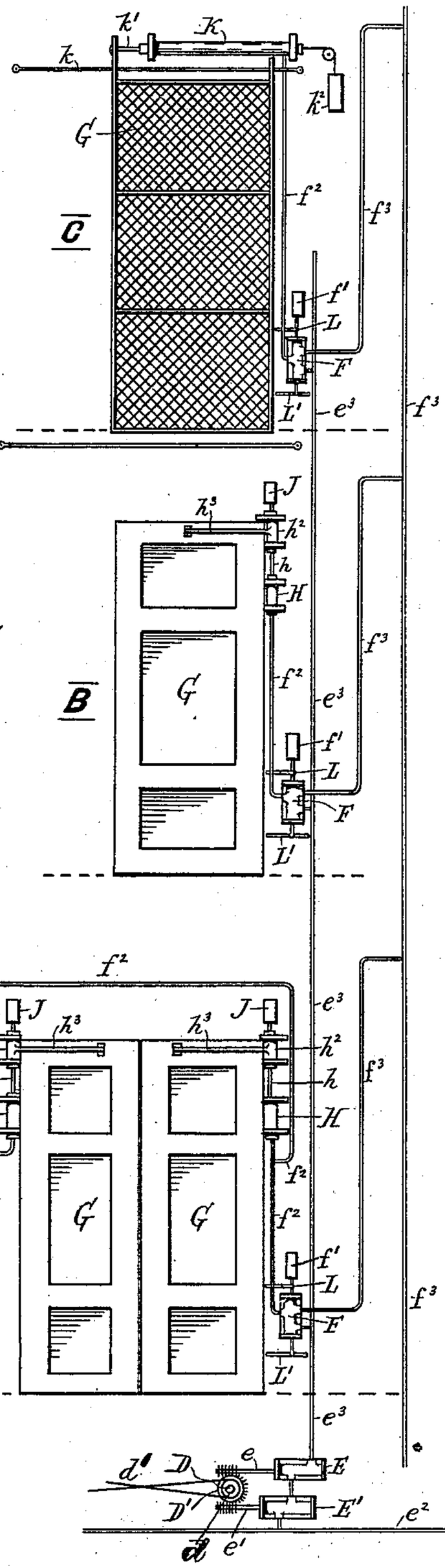

FIG. 1

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 4

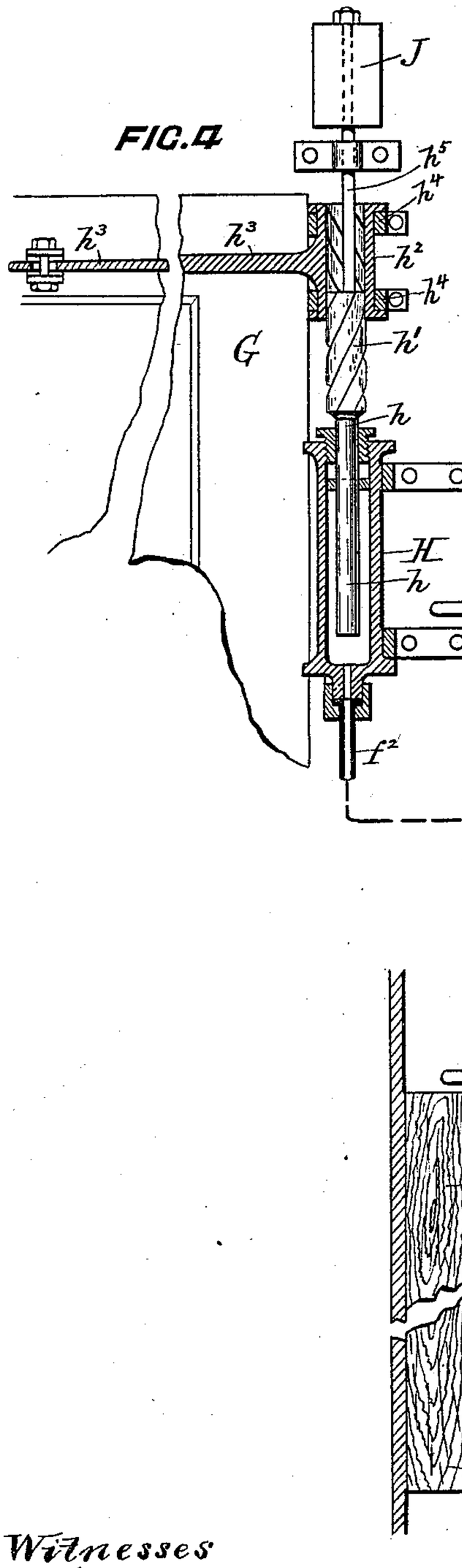


FIG. 5

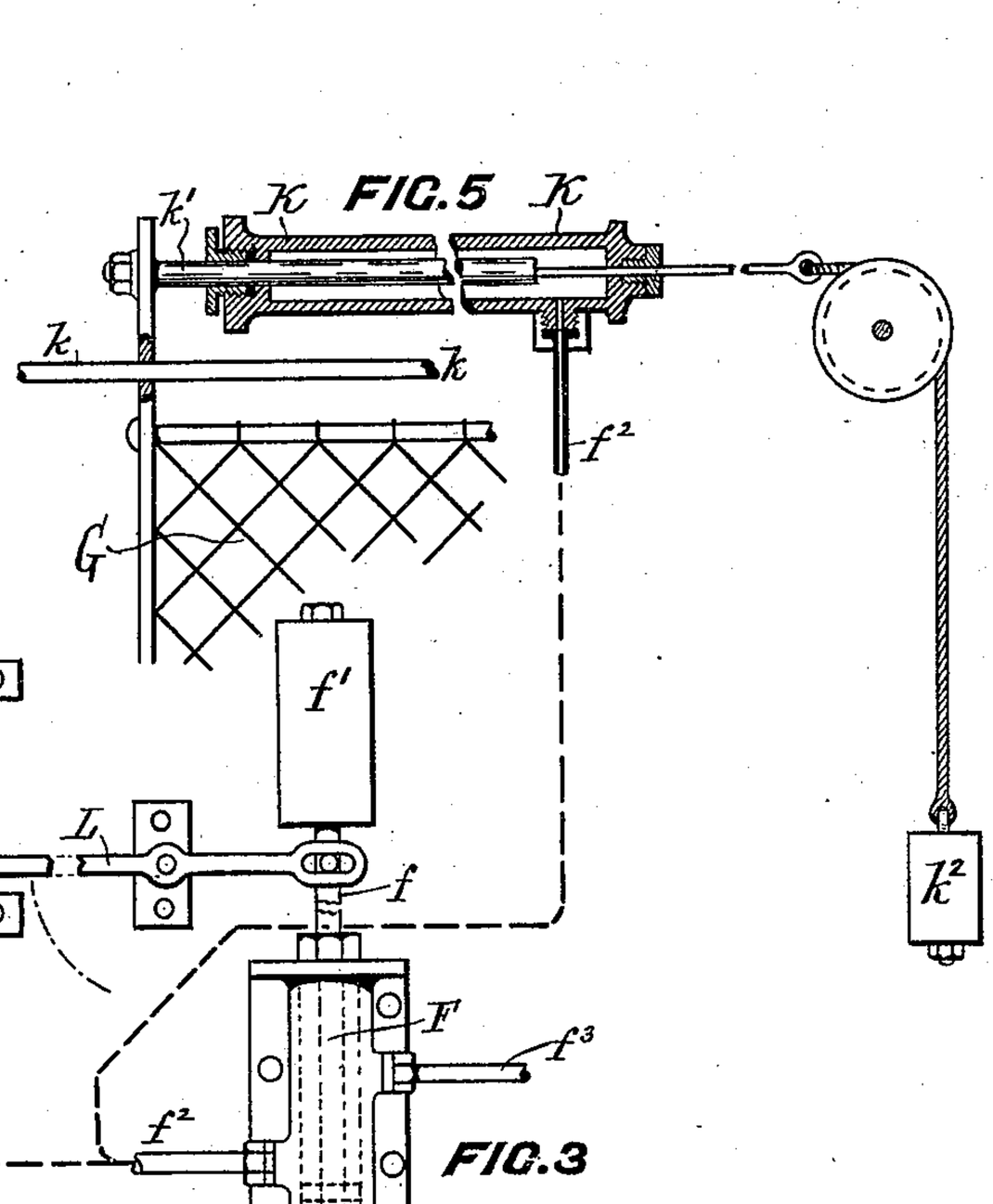
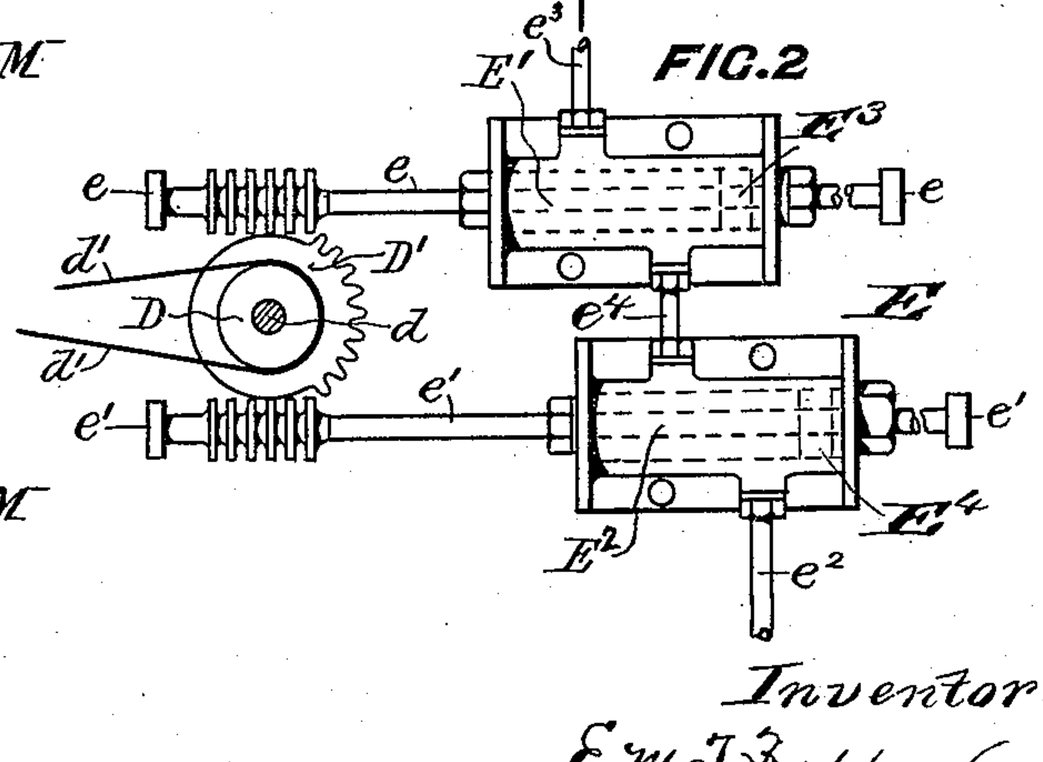


FIG. 3

FIG. 2



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UNITED STATES PATENT OFFICE

EDMOND MEYER TUDOR BODDAM, OF SYDNEY, NEW SOUTH WALES.

DEVICE FOR OPENING OR CLOSING ELEVATOR-DOORS.

SPECIFICATION forming part of Letters Patent No. 491,832, dated February 14, 1893.

Application filed July 2, 1892. Serial No. 438,741. (No model.)

To all whom it may concern:

Be it known that I, EDMOND MEYER TUDOR BODDAM, engineer, of Sydney, New South Wales, Australia, have invented a new and Improved Device for Opening and Closing Elevator-Doors, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved device for automatically opening and closing the doors leading to the shafts of hydraulic elevators.

The invention consists of a hydraulic ram connected with the door to be opened or closed, a valve controlling the said hydraulic ram, and a double valve controlling the inlet to the said single valves for the several doors, the said double valve operating in conjunction with the valve which admits water to the lift or elevator cylinder.

The invention also consists of certain parts and details, and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as arranged on a third story elevator, the stories being designated by the letters A, B, C; Fig. 2 is an enlarged side elevation of the double valve and its connections; Fig. 3 is a side elevation of a single valve and its connections; Fig. 4 is a sectional side elevation of the hydraulic ram and its connections with a hinged door; and Fig. 5 is a similar view of the same showing connection with a sliding door.

As shown in Fig. 1, the door leading to the elevator on the first floor A is arranged in the shape of a pair of folding doors, while the door on the second floor B is a single hinged door, and the door on the third floor C is in the shape of a sliding door.

A double valve E shown in detail in Fig. 2, is formed with two cylinders E′ and E^2 containing the pistons E^3 and E^4 respectively, held on piston rods *e*, *e′* respectively, formed at their outer ends with screw threads adapted to be alternately engaged by a segmental gear wheel D′ secured on a shaft *d* carrying a pulley D connected by belting *d′* with the valve which admits water to the lift or displacement cylinder or allows it to escape therefrom. The cylinder E^2 is provided with an inlet pipe e^2 connected with the pressure water for actuating the elevator cage and from the cylinder E′ leads an outlet pipe e^3 through which the water is conveyed to valves F, one for the door on each floor, A, B, or C. The cylinders E′ and E^2 are connected with each other on opposite ends by a pipe e^4 as will be readily understood by reference to Fig. 2. The arrangement of the pistons E^3 and E^4 in the cylinders E′ and E^2 is such that a direct connection is established between the inlet pipe e^2 and the outlet pipe e^3 only when the water is cut off from the elevator or lift cylinder, and the carriage stopped at a floor.

When the carriage of the elevator is either ascending or descending either the piston E^3 or E^4 will be in such a position as to close its respective cylinder, and the water entering through the pipe e^2 will not pass into the outlet pipe e^3 but when the carriage is about to stop at a floor then the segmental gear wheel D′ is actuated and the two pistons are moved in an opening position so that the water from the inlet pipe e^2 can pass through the two cylinders to the outlet pipe e^3 and into the several valves F on the different floors. Each of these valves F is provided with a piston F′ secured on a piston rod *f* mounted to slide vertically and pivotally connected with levers L and L′ on opposite ends of the valve F. The levers L and L′ are adapted to be engaged alternately by a stop M secured on the carriage of the elevator so that the carriage in ascending acts with its stop M on the lever L′ to move the piston rod *f* upwardly whereby the other lever L swings downward with its free end as will be readily understood by reference to Fig. 3. The pipe e^3 leads into the cylinder of the valve F near one end of the same and from the middle of the latter extends a pipe f^2 which leads to a hydraulic ram H for actuating the respective door G on that floor. From the other end of the cylinder of the valve F leads an outlet pipe f^3 so that when the piston F′ is in the position as shown in Fig. 3, the pipe f^2 is in communication with the pipe f^3 but when the stop M imparts a swinging motion to the lever

L′ as above described, then the piston F′ is shifted above the pipe f^2 and communication is established between the pipe e^3 and the pipe f^2. Thus, if the water passing under pressure through the double valve E into the pipe e^3 passes to and through the valve F into the pipe f^2 and from the latter to the hydraulic ram H to actuate the piston h therein. A spring or weight is connected with the piston rod f so as to return the latter to its normal position as soon as the stop M has passed the respective lever L′ or L. As shown in Fig. 4, the piston h of the hydraulic ram H is formed with a thread h' engaging a correspondingly threaded sleeve h^2 mounted to turn in suitable bearings h^4 secured to the wall or door casing. From this sleeve h^2 extends an arm h^3 engaging a pin held on the door G so that when the hydraulic ram piston h moves upward the threaded portion h' thereof imparts a turning motion to the sleeve h^2 and the arm h^3, thus opening the door G at the time the elevator carriage is at a standstill on that floor. The door remains open to permit passengers to leave or enter the carriage, and when the latter is again started on its ascent or descent then it engages the respective lever L or L′ and the above described operation is repeated, that is, the piston F′ is again shifted to establish communication between the pipes f^2 and f^3, so that the water can run out of the hydraulic ram H by the pipe f^2, the valve F and pipe f^3.

As shown in Fig. 4, the upper end h^5 of the ram piston h is made square to prevent the piston from rotating, while moved upward so as to cause the sleeve h to revolve as described. On the upper end of this square part h^5 of the ram piston h is held a counter-weight J which will force the piston h down again as soon as the pressure of the water in the hydraulic ram ceases on shifting the valve F′, as before described.

For sliding doors as shown in Fig. 5, the arrangement is similar to that shown in Fig. 4, the only difference being that the hydraulic ram K is directly connected by its piston rod k' with the sliding gate or door G at one end, the other end of the said piston being connected with a rope passing over a pulley and carrying a counter-weight k^2. Thus, when the hydraulic ram piston is moved forward by the pressure of the water admitted to its cylinder, then the door is opened and as soon as this pressure is removed by shifting the piston F′ as before described, then the door is again closed by the action of the counter-weight A^2. The door G is steadied in its movements by a guide k as shown in Figs. 1 and 5.

It is understood that the levers L and L′ are so arranged as to move inward whether the stop M ascends or descends with the carriage so that the piston rod f is moved in the same direction. Thus, as long as the carriage remains opposite the end door of one of the floors A, B, or C and the lever L or L′ is in contact therewith the water under pressure will pass through the valve F′ to the hydraulic ram to hold the door open as described.

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

1. In a device for opening and closing elevator doors, the combination with a double valve comprising parallel connected cylinders having their pistons connected by a gear controlled from the valve of the elevator cylinder, of a single valve one for each floor and connected with one cylinder of the said double valve, a supply pipe for the motor fluid connected with the other cylinder and a hydraulic ram connected with the said single valve and adapted to open and close the door to the elevator shaft, substantially as shown and described.

2. In a device of the class described, a double acting valve comprising the parallel cylinders having a connecting pipe or passage between the outlet of one cylinder and the inlet of the other cylinder, pistons in said cylinders, a gear connecting said pistons and operated from the spindle of the admission valve for the pressure water to the elevator cylinder, substantially as shown and described.

3. In a device of the class described, the combination with a double valve controlled from the spindle of the valve which admits pressure water to the lift or elevator cylinder, of a single valve connected with the said double valve and adapted to be actuated by a stop on the elevator carriage, and a hydraulic ram connected with the said single valve and controlling the movement of the doors of the elevator shaft, substantially as shown and described.

4. In a device of the class described, the combination with a stop on the elevator carriage, of a valve controlled by the said stop, a hydraulic ram connected with the said valve, means for connecting the said ram with the door to be opened, and a double valve connected with the said single valve and comprising two connected cylinders provided with pistons connected by a gear controlled from the spindle of the admission valve for the pressure water to the elevator cylinder, substantially as shown and described.

5. The combination, with the weighted door closing and opening ram, of a piston valve the cylinder of which is connected between its ends by a pipe f^2 with the ram cylinder, an exhaust in the valve cylinder above the said pipe, a piston in the valve cylinder having its weighted rod extending through both ends thereof, levers L L′ connected with the respective ends of the piston rod for operation by a projection on the elevator car, and the double valve E, comprising the two cylinders E′ E^2 having a connecting pipe e^4, a pipe e^3 leading from the cylinder E′ beyond the pipe e^4 to the valve cylinder F below its pipe f^2, the fluid inlet e^2 entering cylinder E^2 at the opposite side of the pipe e^4, the pistons

E^3 E^4 having their rods *e e'* provided with teeth, and the gear D' meshing in said teeth operated from the elevator operating mechanism, substantially as set forth.

6. The combination, with the weighted ram for operating the door, the piston of which has a spiral portion *h'*, exterior to the cylinder, of a sleeve having internal spiral threads corresponding with the portion *h'*, bearings for the sleeve, and an arm projecting from the sleeve for connection with the door to be operated, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDMOND MEYER TUDOR BODDAM.

Witnesses:
MANFIELD NEWTON, *C. E.*,
J. S. WHITELOCKE.