No. 825,393. PATENTED JULY 10, 1906.

J. W. KELLOGG.

CONTROLLING SWITCH FOR MOTOR OPERATED DOORS.

APPLICATION FILED JUNE 20, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

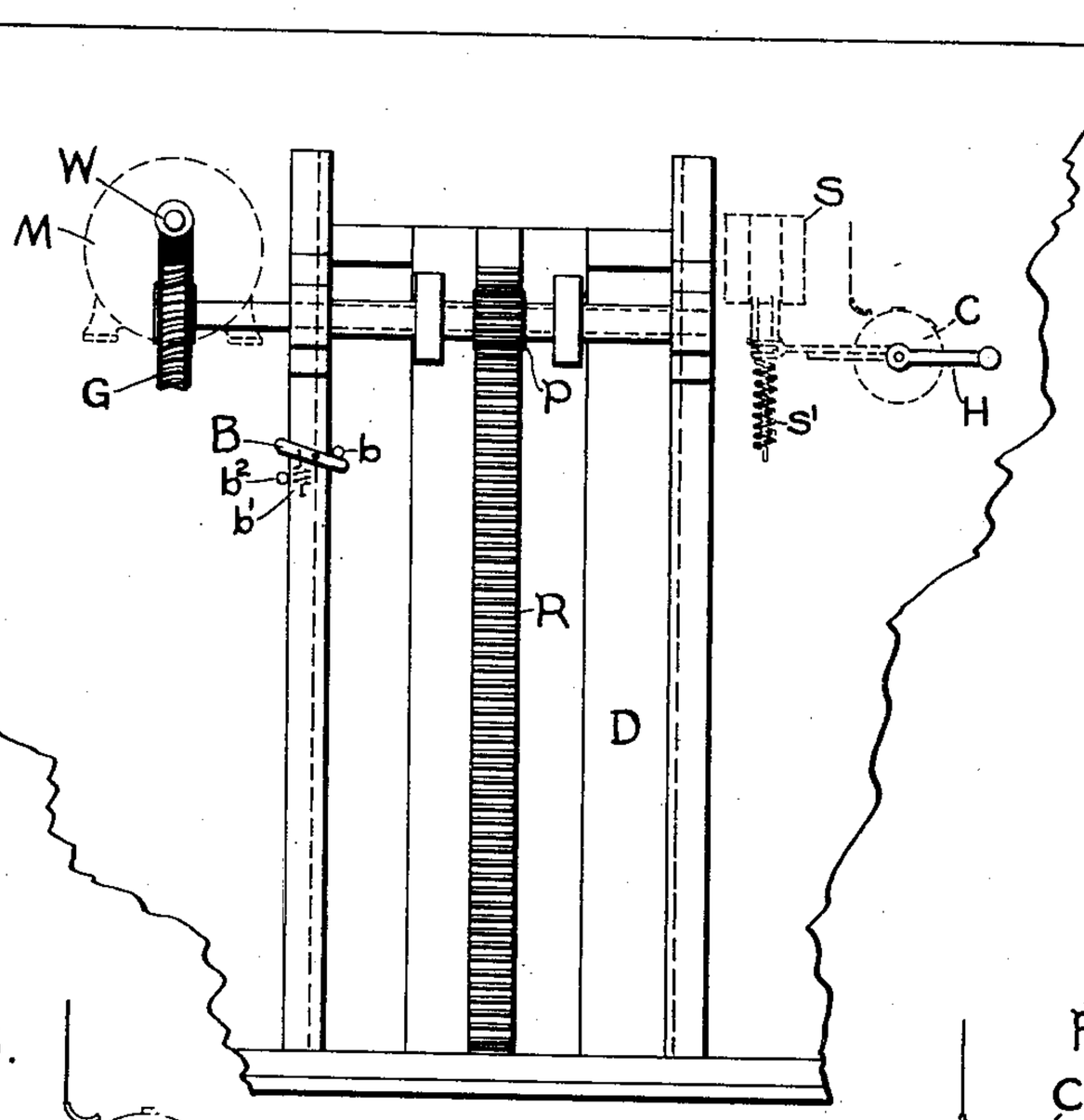


Fig. 3.

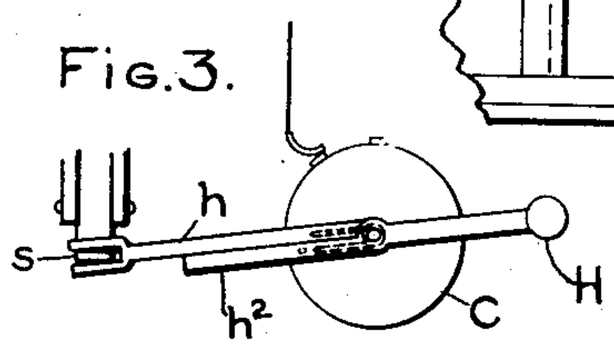


Fig. 4.

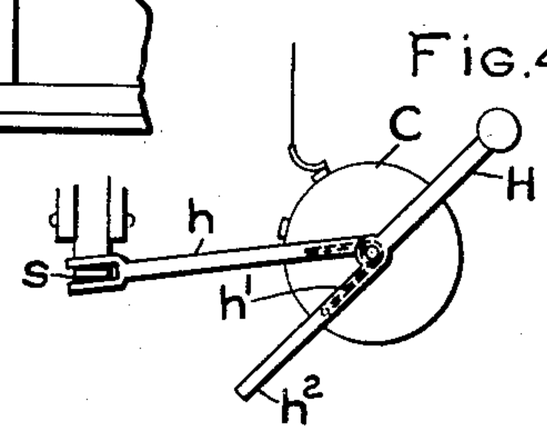
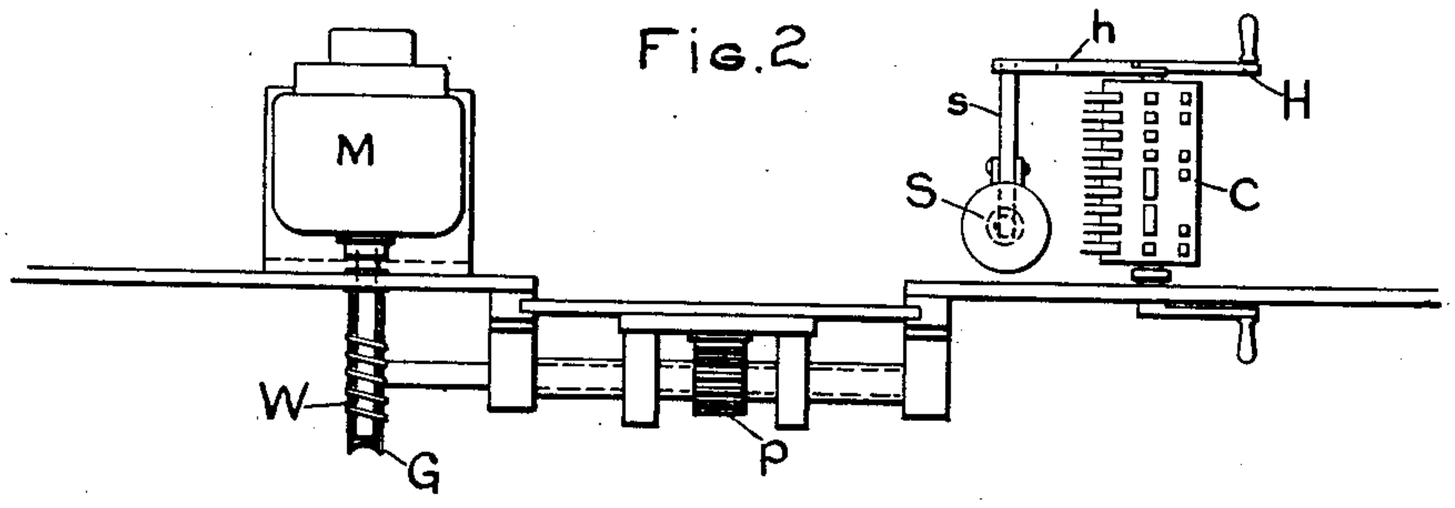


Fig. 2



WITNESSES:

Irving E. Steers.

Helen A. Ford

INVENTOR,

JAMES W. KELLOGG.

BY Albert G. Davis

ATT'Y.

No. 825,393. PATENTED JULY 10, 1906.

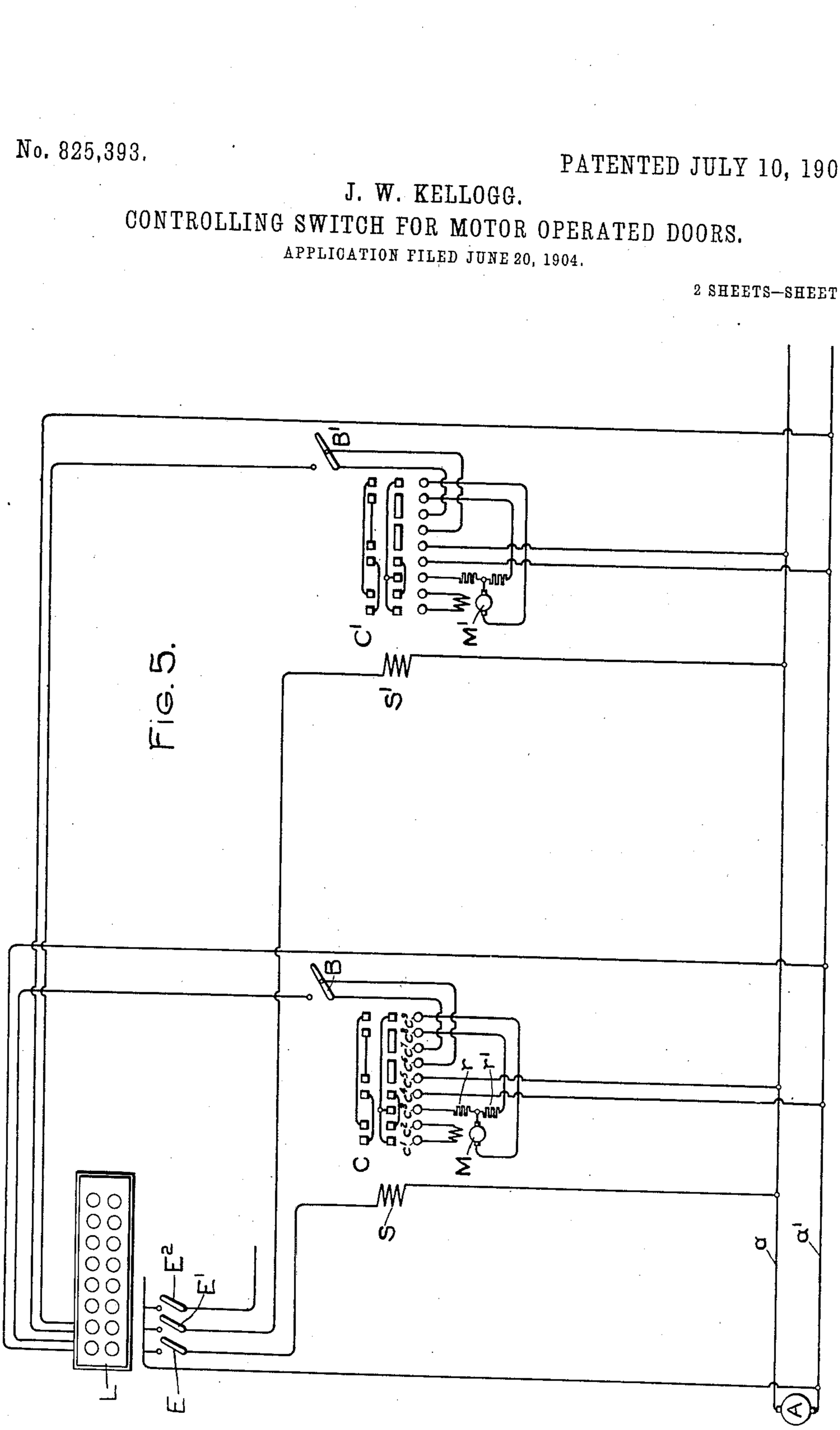
J. W. KELLOGG.

CONTROLLING SWITCH FOR MOTOR OPERATED DOORS.

APPLICATION FILED JUNE 20, 1904.

2 SHEETS—SHEET 2.

Fig. 5.



WITNESSES:

Irving E. Steers.

Helen Orford

INVENTOR,

JAMES W. KELLOGG.

BY Albert G. Davis

ATT'Y.

UNITED STATES PATENT OFFICE.

JAMES W. KELLOGG, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CONTROLLING-SWITCH FOR MOTOR-OPERATED DOORS.

No. 825,393. Specification of Letters Patent. Patented July 10, 1906.

Application filed June 20, 1904. Serial No. 213,254.

To all whom it may concern:

Be it known that I, JAMES W. KELLOGG, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Controlling-Switches for Motor-Operated Doors, of which the following is a specification.

My invention relates to controllers for electric circuits, and is particularly applicable to systems employing local and distant control.

In an application for United States Letters Patent, Serial No. 208,892, filed by Arthur A. Buck May 20, 1904, is described a system of control for motor-operated bulkhead-doors and similar devices. In this system a controlling-switch for the motor is placed at each door, which is arranged to connect the motor for raising and lowering the door. A solenoid is provided for moving each switch to the proper position to connect the motor for lowering the door. By means of these solenoids a number of doors may be closed from a distant point. The switch is furthermore arranged so that it may be moved manually to either position for raising or lowering the door without disturbing the circuit of the solenoid. In this way a man at the door can take the control away from the distant station temporarily, so as to raise the door; but when he releases the switch it will return to the position for lowering the door provided the circuit of the solenoid has been closed at the distant point.

The controlling-switch disclosed in the above application is arranged with the positions for raising and lowering the control on opposite sides of the off position of the switch. This arrangement necessitates moving the controller through the off position when the switch has been moved to lowering position by means of the distant control and it is desired to move the switch manually to raising position. Since the manual operation of the switch must be performed against the tension of a spring when the solenoid has been energized by the distant-control system, moving the switch through the off position requires the expenditure of a considerable amount of force.

The object of my invention is to so arrange the switch and its controlling means that it is necessary to move it only half the distance that is required with the arrangement of the above application when it is desired to move it from lowering to raising position. I accomplish this by placing both positions on the same side of the off position and by rearranging the manual controlling means, so that the switch may be controlled both electrically from a distance and manually by an operator at the door in the same manner as in the arrangement of the above application.

My invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 shows an elevation of a bulkhead-door provided with a controlling-switch arranged in accordance with my invention. Fig. 2 shows a plan view of the same. Fig. 3 shows the controller moved to lowering position. Fig. 4 shows the controller moved to raising position, and Fig. 5 shows diagrammatically the connections of a control system arranged in accordance with my invention.

Referring first to Figs. 1 and 2, M represents a motor carrying on its shaft the worm W. This worm engages a gear G, which carries on its shaft the pinion P. The pinion P engages a rack R on the bulkhead-door D. Thus by the rotation of the motor M the door D may be raised and lowered. C represents a controller controlling the circuit of the motor M. The controller C may be operated by the solenoid S or manually by the handle H. The connections between the solenoid S and the controller C are as follows: The core of solenoid S engages the short arm of a pivoted lever *s*, so that when solenoid S is energized the short arm of lever *s* is raised and the long arm depressed. *s'* is a tension-spring engaging the short arm of lever *s*, tending to hold the core of solenoid S at its lowest position and to keep the long arm of lever *s* raised. When solenoid S is deënergized and the long arm of pivoted lever *s* is held in its raised position by the spring, the controller C is in its off position unless manually moved therefrom. This is shown in dotted lines in Fig. 1. The connections for manual control of controller C are shown in Figs. 3 and 4. The handle H is rigidly secured to the controller-shaft and carries an extension h^2, which is connected to the lever *h* by means of the tension-spring *h'*. When the handle H is released, the spring *h'* brings the extension h^2 into engagement with the lever *h*, as shown in Figs. 1 and 3. The controller

is consequently returned to off position or to lowering position according as solenoid S is deënergized or energized. Solenoid S, by means of the pivoted lever *s*, determines the position of arm *h*, and consequently the position to which the controller returns when released by handle H.

With the parts in the position shown in Fig. 1 if solenoid S is energized the long arm of lever *s* will be depressed, as has been heretofore explained, and arm *h* will be pushed down into the position shown in Fig. 3. Arm H carries the extension h^2 along with it, rotating the controller C into the position shown for lowering the door, as shown in Fig. 3. If while the controller is in this position a man at the door desires to raise the door, he can do so by rotating the handle H into the position shown in Fig. 4. This rotation is opposed by the tension-spring *h'*; but since the contacts for raising and lowering the door are placed side by side instead of on opposite sides of the off position the force required for rotating the controller from lowering to raising position may be comparatively small.

Referring again to Fig. 1, B represents a spring-actuated switch which, when the door is raised, is held by spring *b'* in engagement with the contact b^2. When the door D is closed, however, as shown in Fig. 1, the stop or pin *b*, carried by the door, moves switch B out of engagement with the contact b^2. This, as will be seen, acts to open the circuit of the motor when the controlling-switch is in its lowering position.

Referring now to Fig. 5, the connections of the controlling-switch and of the system will be described. C C' represent two controlling-switches of the type heretofore described. *a a'* represent the mains, from which is obtained the current for operating the motors. These mains are energized by any suitable source of current, as A. M M' represent the motors for two doors. S S' represent the controlling-solenoids for the distant control, and B B' represent the switches operated by the doors in their closed position. These switches are shown in the position they occupy when the doors are open. E E' E^2 represent switches at the distant-control station controlling the several doors. L represents a bank of lamps or other signaling devices. The operation is as follows: If the door controlled by motor M is opened and it is desired to close it from the distant-control station, switch E is closed, closing the circuit of solenoid S. Controlling-switch C is thereby moved to bring the lower set of movable contacts into engagement with the stationary contact-fingers. The circuit is then completed as follows: line-wire *a'* to contact c^4, contact c^2, through field of motor M, contact *c'*. Here the current divides, part passing from contact c^3 through resistance *r* and part passing from contact c^9 through the armature of motor M. From the junction of resistance *r* and armature of motor M the circuit continues through resistance *r'*, contact c^8, contact c^7, switch B, contact c^6, contact c^5, and line-wire *a*. The motor consequently starts in a direction to lower the door and continues its rotation until the closing of the door opens switch B. This opens the motor-circuit and at the same time closes the circuit of a signaling device L to indicate to the operator at the distant station that the door is closed. The purpose of the resistance *r* in shunt to the armature M is to give the motor a strong field, so as to prevent its racing while the door is lowering and also to give it a strong torque for forcing the door into closed position. If while the solenoid S is energized for the purpose of closing the door it is desired by a man at the door to raise the door, controller C is moved manually in a manner that has been described heretofore to bring the upper set of movable contacts into engagement with the contact-fingers. It will be seen by tracing out the circuit that the direction of current through the motor-field is reversed, while the resistance *r* is no longer in shunt to the armature. Furthermore, the switch B is no longer included in the motor-circuit. When the handle of controller C is released by the operator, the switch returns either to off position or to lowering position, according as solenoid S is deënergized or energized. With the switch in the off position it is obvious that the controller may be moved manually to lower the door or to raise it. In other words, the distant control in no way interferes with the manual control at the door.

Switch B in addition to the function of breaking the motor-circuit when the door is closed, so as to prevent useless heating of the motor, enables the controlling-switch to be moved through the lowering position to raising position when the door is closed without starting up the motor until raising position is reached, since when the door is closed switch B is open and the controlling-switch in its lowering position cannot close the motor-circuit.

The controlling-switch and its circuits may be greatly modified without departing from the spirit of my invention, and I aim in the appended claims to cover all such modifications.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination, a switch having a plurality of operative positions on one side of its off position, means for holding said switch normally in off position, means controllable from a distance for moving said switch to an operative position, and connections between said switch and said moving means adapted to permit the continued movement of said

switch manually to another operative position.

2. In combination, a switch having a plurality of operative positions on one side of its off position, means for holding said switch normally in off position, means controllable from a distance for moving said switch to an operative position, and connections between said switch and said moving means adapted to permit the continued movement of said switch manually to another operative position without disturbing said moving means.

3. In combination, a switch having a plurality of operative positions on one side of its off position, means for holding said switch normally in off position, means controllable from a distance for moving said switch to an operative position, and a flexible connection between said switch and said moving means, whereby the movement of the switch may be continued manually to another operative position.

4. In combination, a switch having a plurality of operative positions on one side of its off position, means for holding said switch normally in off position, an electromagnet operatively connected to said switch and adapted when energized to move said switch to an operative position, and manually-operated means for continuing the movement of said switch to another operative position.

5. In combination, a manually-operated switch having a plurality of operative positions on one side of its off position, means for holding said switch normally in off position, and means controllable from a distance for moving said switch into an operative position.

6. In combination with an electric motor, a manually-operated reversing-switch having both operative positions on the same side of its off position, and means controllable from a distance for moving said switch into an operative position.

7. In combination with an electric motor, a reversing-switch having both operative positions on the same side of its off position, an electromagnet operatively connected to said switch and adapted to move it into the first operative position, means at a distance for controlling the circuit of said electromagnet, and means at the switch itself for manually operating said switch whether or not said magnet is energized.

8. In combination with a door, a motor for opening and closing said door, a reversing-switch for said motor having both operative positions on the same side of its off position, the closing position being between the off and the opening positions, and a switch operated by said door and arranged to maintain the motor-circuit broken when the door is closed until said reversing-switch is moved to its opening position.

9. In combination with a door, a motor for opening and closing said door, a reversing-switch for said motor having both operative positions on the same side of its off position, the closing position being between the off and the opening position, and a switch operated by said door and arranged to be opened when said door is closed, said reversing-switch being arranged in its closing position, and not in its opening position, to include said switch in the motor-circuit.

10. In combination with an electric motor, a manually-operated reversing-switch having both operative positions on the same side of its off position, means for holding said switch in off position, and means controllable from a distance for shifting said holding means to bring said switch to an operative position.

11. In combination, a switch having a plurality of operative positions on one side of its off position, means for holding said switch normally in its off position, manually-operated means for moving said switch to any of its operative positions, and means controllable from a distance and acting on said holding means to shift the position to which the switch returns when manually released.

12. In combination with an electric motor, a manually-operated reversing-switch having both operative positions on the same side of its off position, means for holding said switch in off position, means controllable from a distance for shifting said holding means to bring said switch to an operative position, and connections between said switch and said shifting means adapted to permit the continued movement of said switch manually to another operative position.

In witness whereof I have hereunto set my hand this 18th day of June, 1904.

JAMES W. KELLOGG.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.