

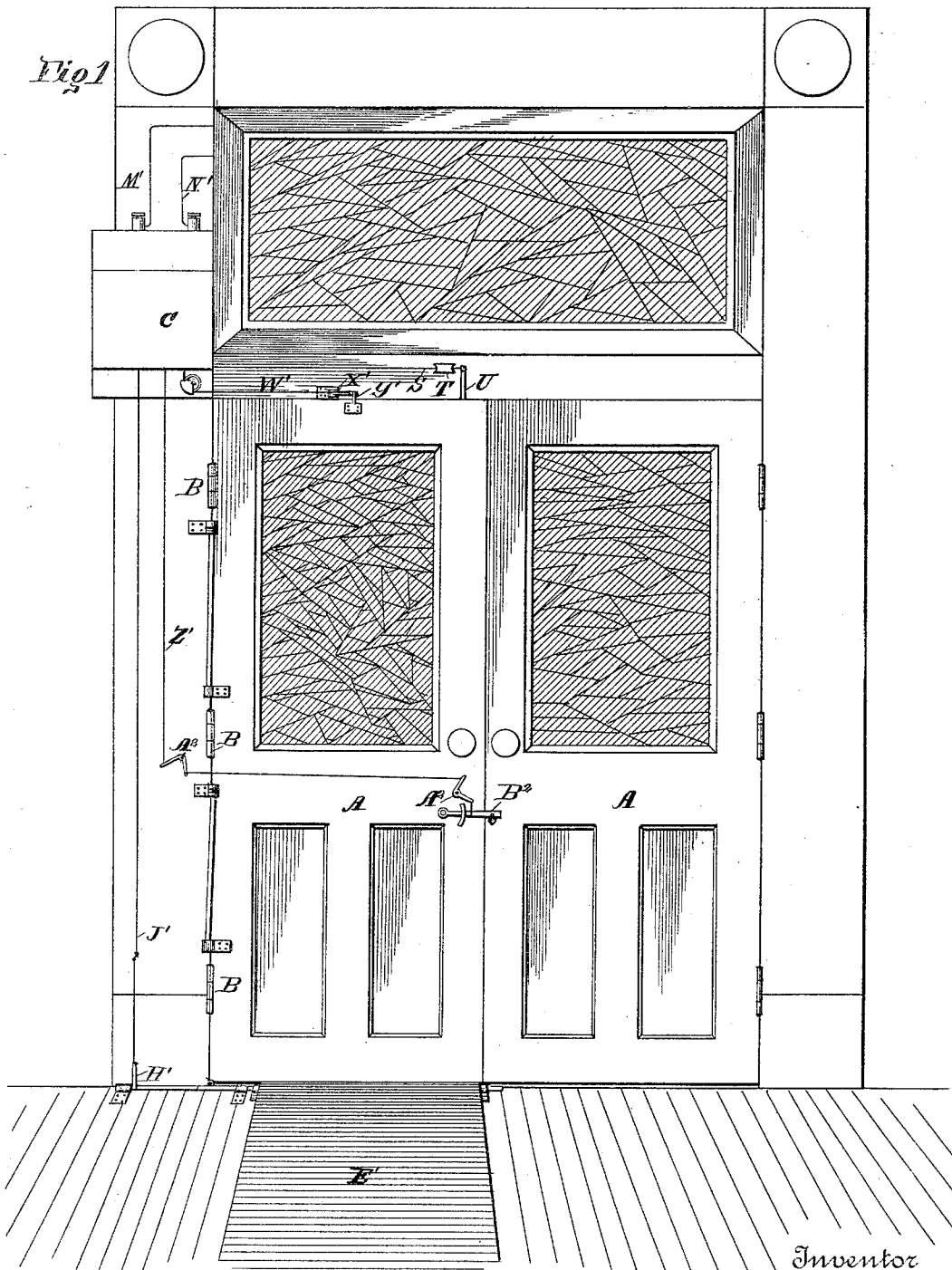
(No Model.)

8 Sheets—Sheet 1.

R. F. TROY.
ELECTRIC DOOR OPERATING DEVICE.

No. 461,122.

Patented Oct. 13, 1891.



Witnesses

Louis S. Julihn.
C. P. Jewell

Inventor

Robertus F. Troy.

By Nathaniel & Atkins
Attorneys

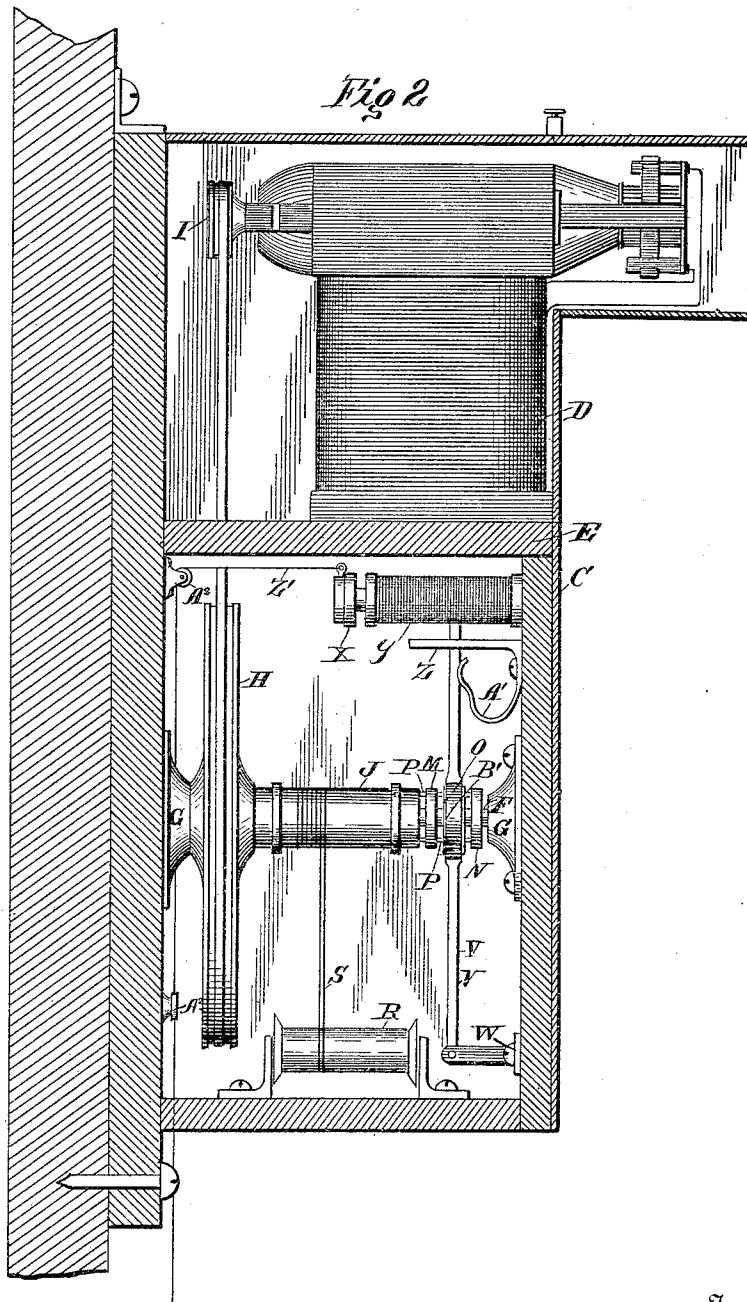
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Witnesses
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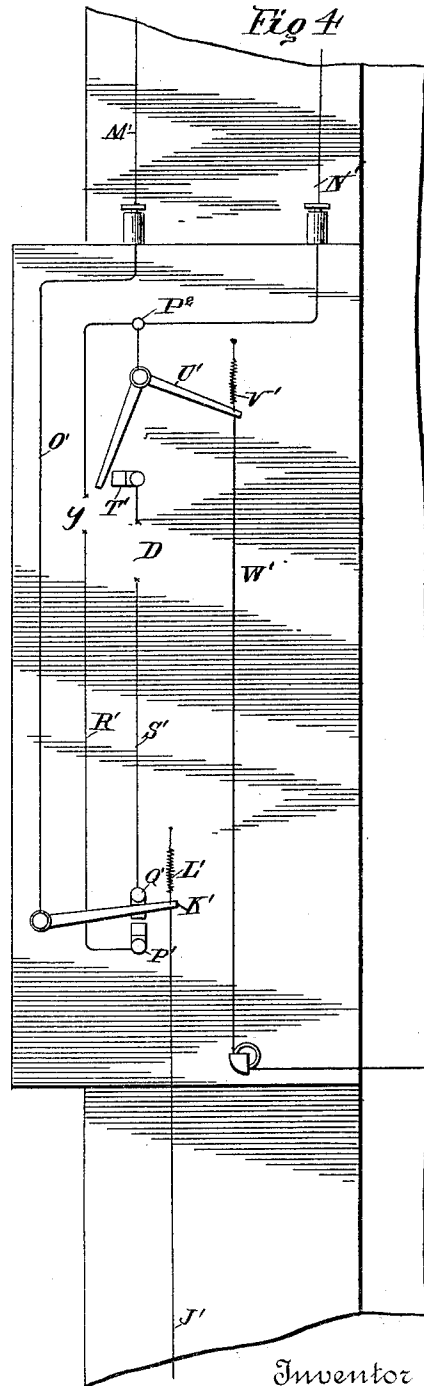
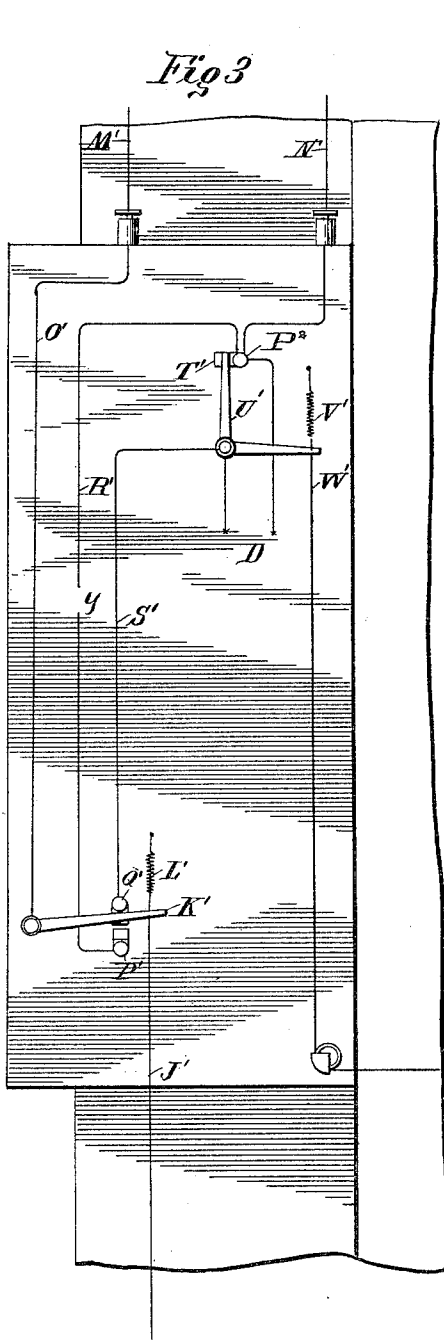
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Witnesses

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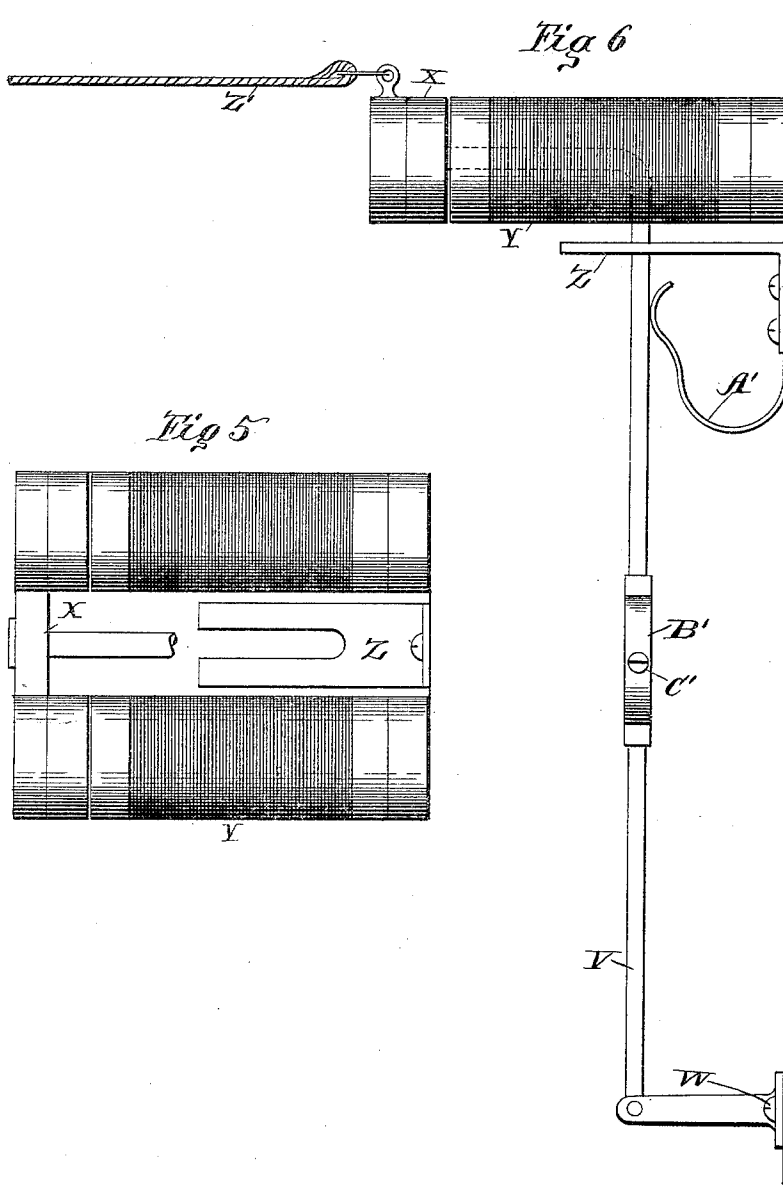
(No Model.)

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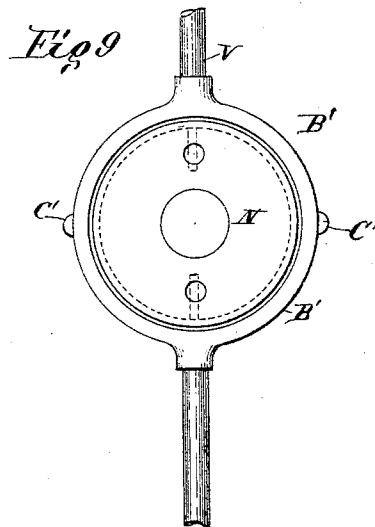
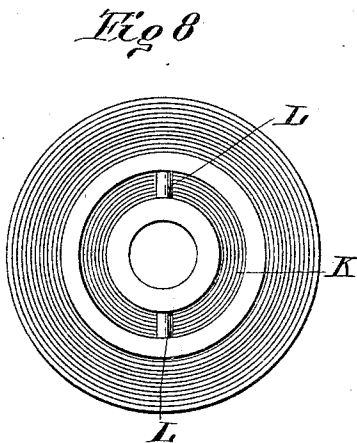
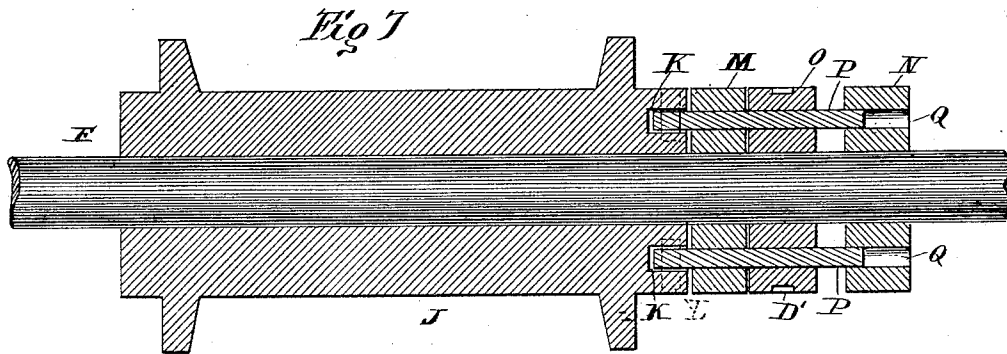
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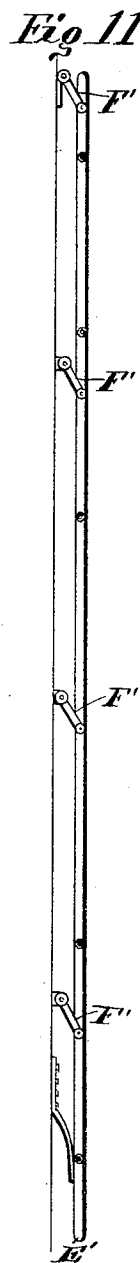
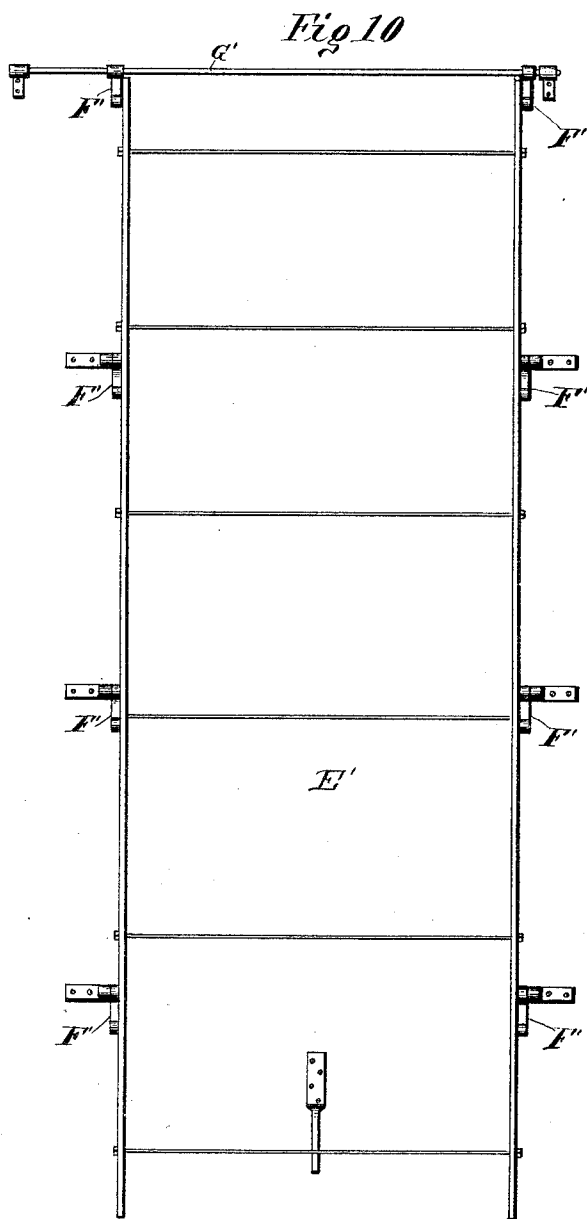
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8 Sheets—Sheet 7.

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Fig 12

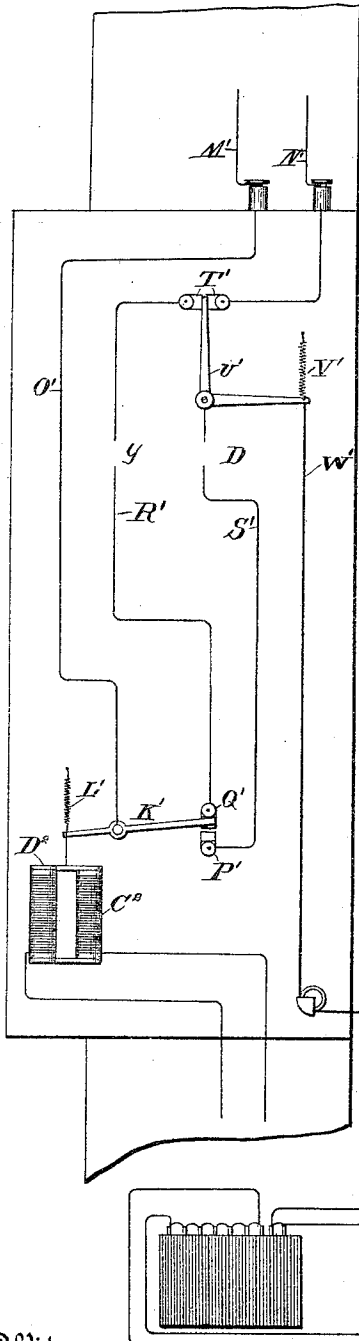
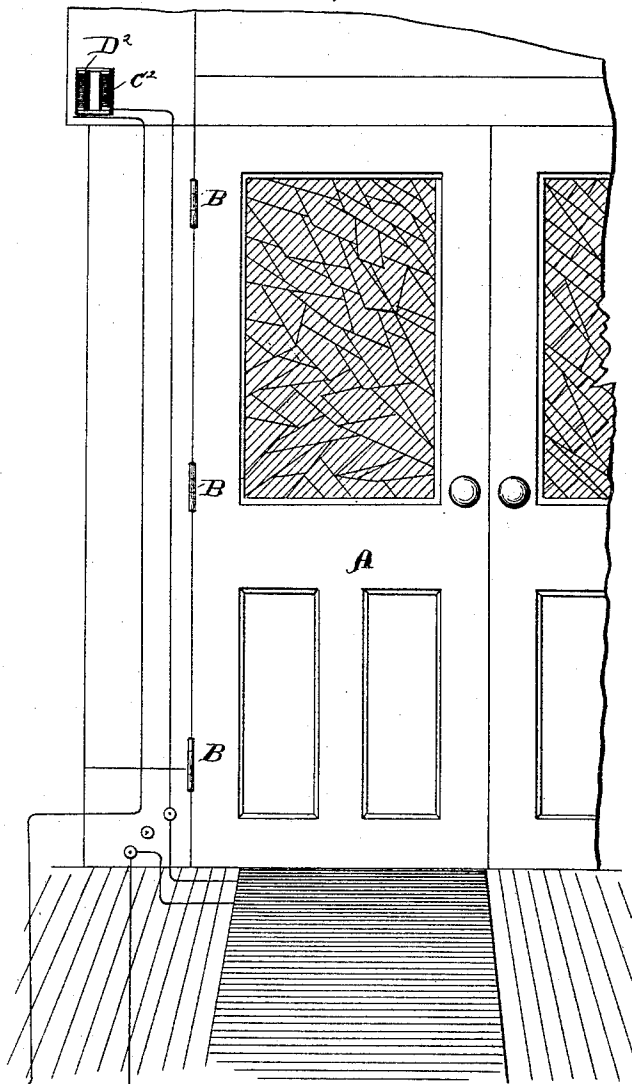


Fig 13



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(No Model.)

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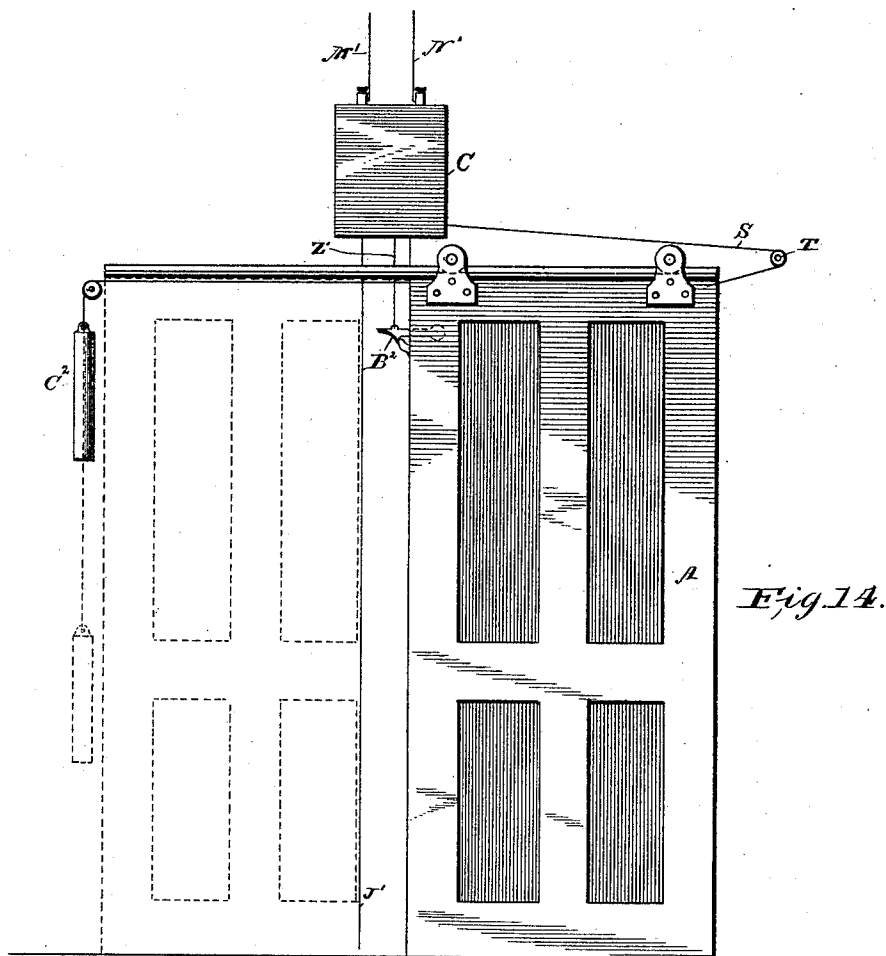


Fig. 15.

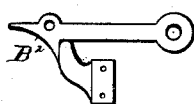
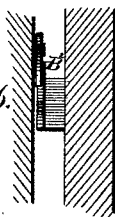


Fig. 16.



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UNITED STATES PATENT OFFICE.

ROBERTUS F. TROY, OF MADISON, WISCONSIN.

ELECTRIC DOOR-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 461,122, dated October 13, 1891.

Application filed September 18, 1890. Serial No. 365,338. (No model.)

To all whom it may concern:

Be it known that I, ROBERTUS F. TROY, of the city of Madison, county of Dane, and State of Wisconsin, have invented certain new and useful Improvements in Door Opening and Closing Devices, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to produce a device that will open and close a door automatically upon a person approaching and passing through the doorway.

In the accompanying drawings, Figure 1 shows a door and its frame provided with my invention. Fig. 2 is a sectional view of the door-opening part of my apparatus. Figs. 3 and 4 are diagrammatical views showing the arrangement of the magnet and motor wires. Fig. 5 is a view of the details of an electro-magnet. Fig. 6 shows an electro-magnet in combination with the clutch-lever. Figs. 7, 8, and 9 are views of the clutch mechanism in detail. Figs. 10 and 11 illustrate the switch-operating platform, and Figs. 12 and 13 a modified form of switch-operating mechanism for directing the electric current through the magnets of the motor. Fig. 14 illustrates my invention as applied to a sliding door. Fig. 15 is a side elevation of a latch adapted to be used with a sliding door, and Fig. 16 an end view thereof.

Referring to the letters on the drawings, A indicates an ordinary door, preferably provided with any suitable springs or spring-hinges B, such, for instance, as torsion-spring hinges, as shown in the drawings, preferably set so as to tend to keep the door open; but any suitable power instead of springs may be used. Upon the hinge side of the door, preferably secured to the frame just above the top of the door, is a box C, of any suitable shape and size provided with a motor D, that is set upon the middle partition E.

F indicates a shaft supported in suitable bearings G in the sides of the box and provided with the countershaft-pulley H, that is belted to the driving-shaft I of the motor. Upon the shaft F is loosely mounted the spool J, that is provided on its end opposite the pulley H with an annular groove K, across which

on opposite sides project pins L. (See Figs. 7 and 8.)

M and N indicate collars keyed or otherwise secured to the shaft F, and between them is loosely mounted a sliding collar that carries on its sides horizontal pins P, that are adapted to slide in perforations Q in the collars M and N. By sliding the collar O toward the spool J the pins P are projected into the groove K in the path of the pins L, thereby communicating motion when in this position to the spool.

R indicates a guide-pulley, around which passes a rope S, that is wound around the spool J at one end, and passing around the guide-pulley T is fastened at the other end to a projection U, that is secured to the door. It will be observed that by the above-described arrangement the door would normally be kept open by the action of the spring-hinges B, but that when the spool J is clutched to the shaft F and the electro-motor set in operation to cause the shaft to revolve, the door will be drawn shut by the rope S. The spring-hinges B exert their maximum resistance when the door is closed, so that instead of slamming the door is drawn noiselessly into its frame.

If in place of hinges adapted to open a door self-closing hinges were used, by dispensing with the guide-pulley T the operation and the relative offices of the springs and motor might, by a slight change, be reversed.

In order to operate the clutch mechanism above described, I have provided a lever V, fulcrumed to the side of the box C at W, and secured at its opposite end to the armature X of an electro-magnet Y. Z indicates a guide for this lever, and A' a spring, which tends to keep the armature separated from its magnet. The lever V is provided near its middle with a band B', that loosely surrounds the sliding collar O. This band is provided with set-screws C', that enter the groove D' in the periphery of the collar O, thereby allowing the collar to turn freely upon its axis, but subjecting its lateral motion to the operation of the lever V.

In order to automatically operate the above-described mechanism, I prefer to use some

sort of device in the shape of a platform upon each side of the door operatively connected with a current of electricity for controlling the operation of the closing mechanism above described.

In Figs. 10 and 11 I have illustrated a platform E', set upon rockers F', by which it is allowed vertical play. The rockers are all parallel and have equal length, so as to keep the platform level. The shaft G' of the last set of rockers is rotatable, and is secured to its rockers so that when the platform is depressed a slight motion is imparted to the shaft. H' indicates a key secured to this shaft and fastened to the cord J', that is fastened at its other end to the switch-lever K'.

L' indicates a spring adapted to keep the switch-lever elevated and the cord J' taut.

M' and N' indicate service-wires that are supposed to communicate with any source of electricity not shown in the drawings.

O' indicates a wire connected by a suitable binding-post with the wire M' and the switch-lever K'.

P' and Q' indicate the respective parts of the electric switch, P' being connected with the wire N' through the electro-magnet Y by the wire R'. The part Q' is connected with the same service-wire by the wire S', that passes through the electric motor and unites with the wire R' at the post P².

T' indicates a switch-plate connected with the wire R', and U' indicates a bell-crank switch-lever adapted to make and break connection in the wire S'. The bell-crank switch-lever, as shown in Fig. 3, is kept normally closed—that is, while the door is shut—so as to pass current through it from S' to N'. As shown in Fig. 4, it is kept normally open by the same means. The springs V' tend to operate it in the opposite direction and is ready, therefore, as soon as the door is open, to change the position of the switch-lever. The means of connection between the switch-lever and the door is a cord W', which, by suitable pulleys, is fastened to the trigger X', that is pivoted to the lintel of the door. In the path of this trigger, upon the face of the door, is secured a projecting finger Y' that, when the door is closed, pulls against the trigger X', which breaks the circuit through the motor.

The armature X is connected by means of a cord Z' and levers and pulleys A² with the latch B² of the door.

The operation of my device will be understood from the following description: Suppose the door to be closed, as shown in Fig. 1. If a person steps upon the platform on either side of the door, the key H' will depress the switch-lever K', causing a current of electricity to pass from the wire M' through the wire O' and the wire R' by way of the electro-magnet Y into the wire N'. As the current passes through the electro-magnet the armature X is attracted, thereby simultaneously lifting the latch B² and operating the lever V to release the spool J, so that it will revolve freely

upon the shaft F. As soon as this takes place the springs throw the door open, which position it maintains until the person leaves the platform, when the switch-lever K' is drawn back by its spring, the switch-lever U' having, by the opening of the door and simultaneous action of the springs V', been previously separated from its switch-plate T'. Thereupon a current of electricity is passed through the wire S' and the motor around to the service-wire N'. The armature X will have been released by the switching of the current from the attraction of its electro-magnet, and will allow the lever V to clutch the spool J to the shaft F, so that when the current sets the motor in motion the shaft F being caused to revolve by it will wind the rope S and thereby draw the door shut. As soon as it is closed, the finger Y' upon the door pulls against the trigger X', switches the current off from the motor, and leaves the mechanism in rest.

The diagram illustrated in Fig. 3 shows the wires arranged for use in circuit where it is desirable that the main circuit should never be shut off. That in Fig. 4 shows an arrangement where the circuit is to be broken and the passage of a current to be prevented, as where, for instance, a local battery, such as a storage-battery, may be employed.

Instead of mechanical means for operating the switches I may employ an electro-magnet such as illustrated in Figs. 12 and 13. With this arrangement, instead of a depressible platform, I use a well-known circuit-making mat, which causes a current to pass from the battery through the electro-magnet C², whose armature D² is connected with the switch-lever K' and causes it to operate as by the means heretofore described.

I have illustrated and described what I consider to be a preferable embodiment of my invention; but I do not wish to limit myself to the exact details, because it is apparent that they may be in many ways varied without departing from the scope of my invention. For instance, a sliding door may be obviously substituted for a swinging door, arranged, for instance, as shown in Fig. 14 of the drawings. In that figure the office of all the parts remain the same, as described, in relation to the swinging door, except that a weight C² is substituted for the spring-hinges to cause the door to open.

What I claim is—

1. The combination, with a door and its frame, of an electric motor operatively connected with the door, with its wire connections, an electric switch adapted to switch a current of electricity through or around the motor, and a platform in front of the door adapted to be operated to work the switch to set the motor in motion to operate the door, substantially as set forth.
2. The combination, with the door and its frame, of an electric motor and its wires, an electric switch adapted to switch an electric current through or around the motor, a spool

operatively connected with the motor and adapted to wind a rope fastened to the door, an electro-magnet communicating with the current of electricity that operates the motor, a clutch adapted to engage and disengage the spool, a lever connected with the armature of the electro-magnet, whereby it is operated, an electric switch adapted to be operated by the opening and closing of the door, and a platform for operating the first switch, as and for the purpose specified.

3. The combination, with a self-opening door and its frame adapted to be closed by the operation of an electric motor connected therewith, of the service-wires M' and N', the wire O', connected with the switch-lever K', the wire R', connecting the plate P' with the wire N' by way of an electro-magnet, the armature of said electro-magnet being operatively connected with the electric motor to start or stop it and with the latch of a door to lift it, the wire S', connecting the plate Q' with the wire N' by way of the electric motor, the switch-lever U', adapted to be operated by the opening

and closing of the door, and means for operating the lever K', substantially as set forth.

4. In combination with the switch-arm of an electric switch, a platform set upon rockers, the shaft of one set of rockers being secured to its rockers, a key upon the shaft, and connecting parts between said key and the switch-lever, substantially as set forth.

5. A clutch consisting of the combination, with a shaft, of a longitudinally-immovable revoluble spool carried thereon and provided with an annular groove in one end and pins projecting across said groove, two perforated collars keyed to the shaft, a sliding collar between the same provided with pins adapted to fit and slide within the perforations of the fixed collars, and means for operating said sliding collar, substantially as set forth.

In testimony of all which I have hereunto subscribed my name.

ROBERTUS F. TROY.

Witnesses:

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C. P. ELWELL.