

(No Model.)

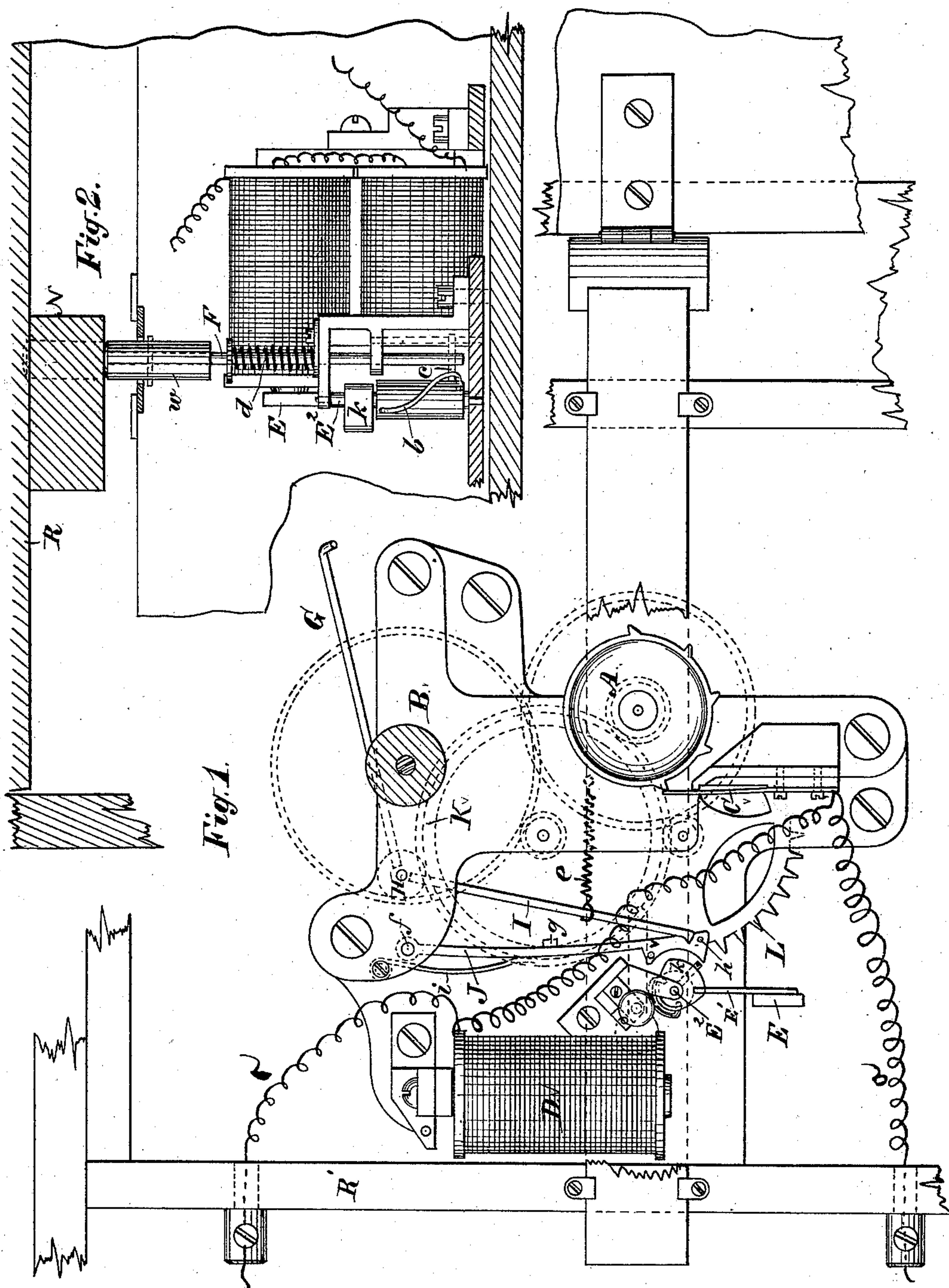
2 Sheets--Sheet 1.

J. M. GARDINER.

Electric Fire Alarm Signal Box.

No. 232,343.

Patented Sept. 21, 1880.



Witnesses:
Henry Dickling
A. S. Fitch

Inventor:
James M. Gardiner
By L. F. Fitch
att'y.

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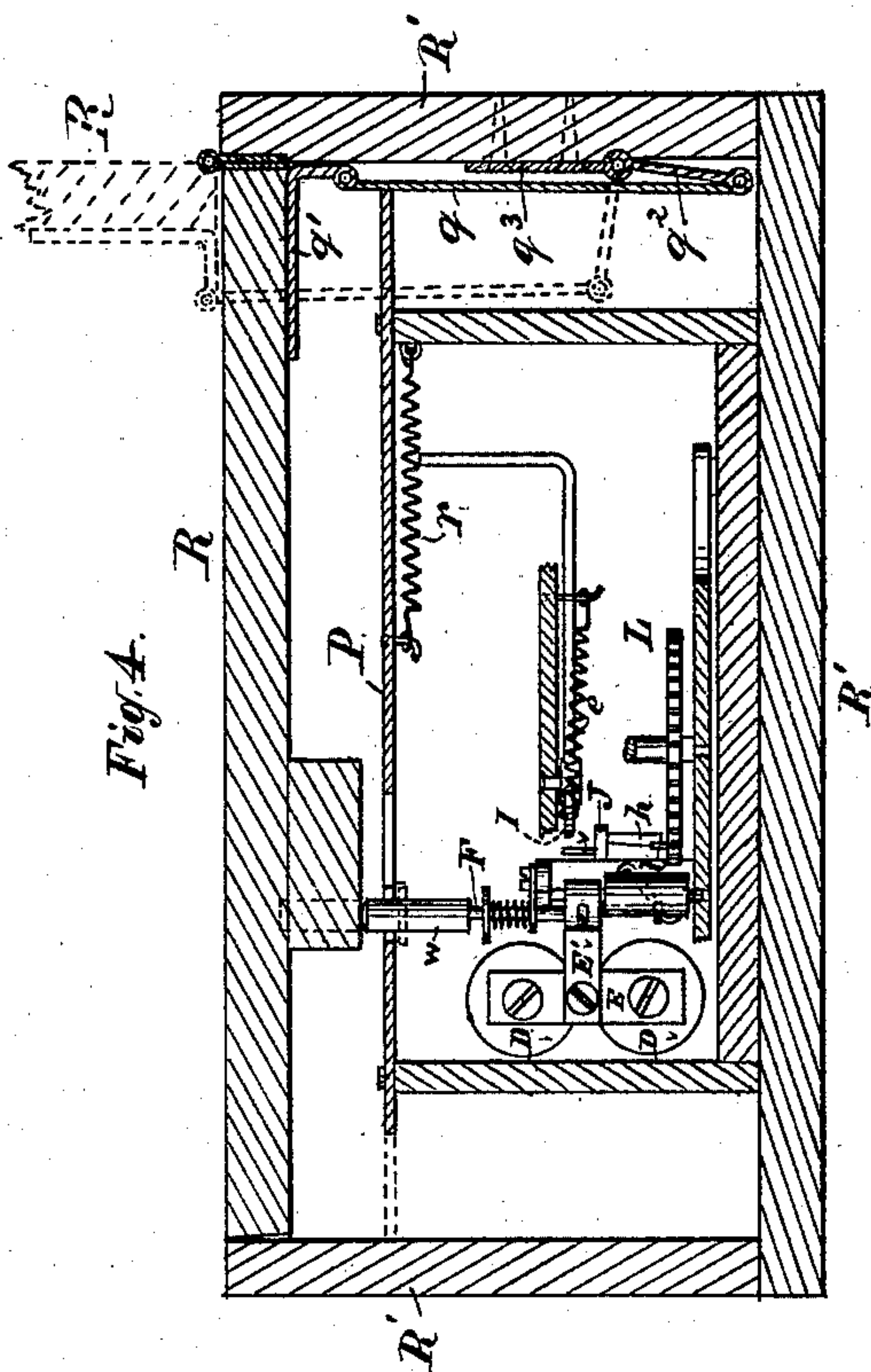
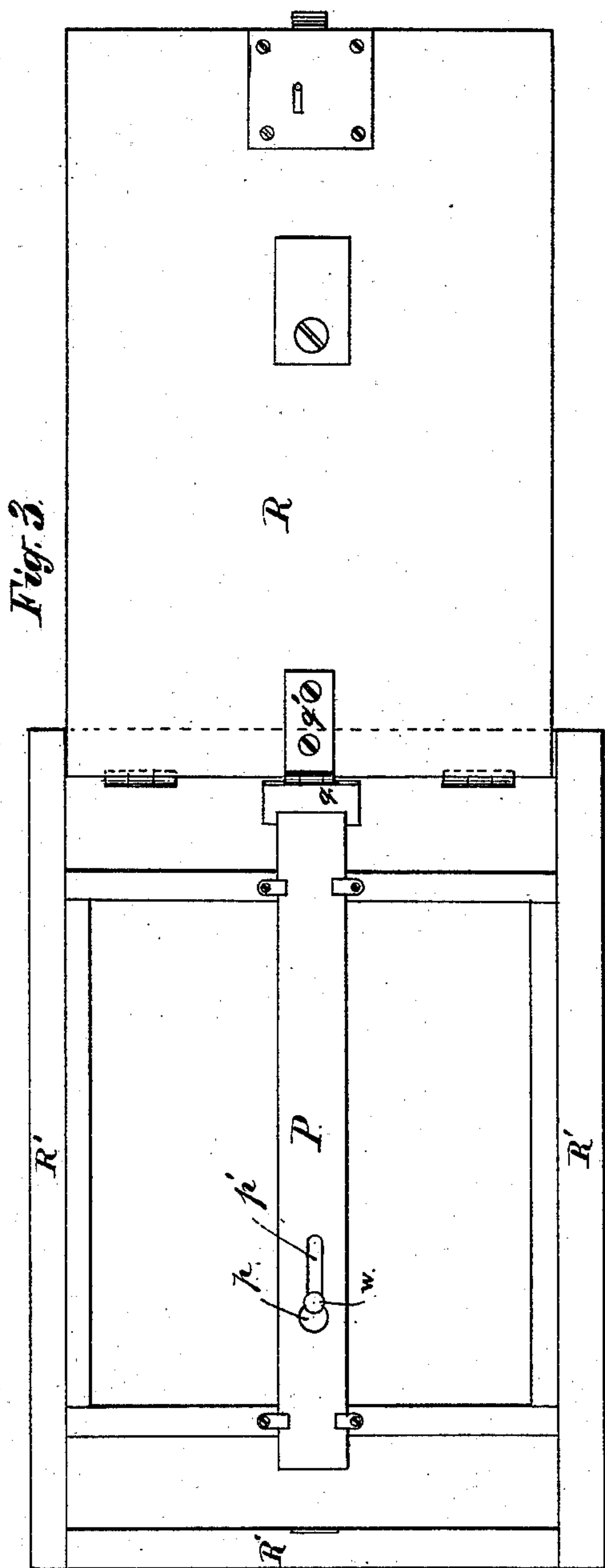
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UNITED STATES PATENT OFFICE.

JAMES M. GARDINER, OF HACKENSACK, NEW JERSEY.

ELECTRIC FIRE-ALARM SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 232,343, dated September 21, 1880.

Application filed April 12, 1880. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. GARDINER, of Hackensack, Bergen county, State of New Jersey, have invented a new and useful Improvement in Fire-Alarm-Telegraph Signal-Boxes, of which the following is a specification, reference being had to the accompanying drawings, forming part of the same.

Figure 1 is a front elevation of the mechanism of a signal-box containing my invention, the door of the box being shown as swung open and portions of the box being broken away. Fig. 2 is a detail view of a separate portion of the said mechanism. Fig. 3 is a front elevation of the box with the door open, showing only the sliding bar that is operated by the movement of the door, which is particularly described hereinafter. Fig. 4 is a horizontal section through the box, showing said bar and its connection with the door, also certain parts of the internal mechanism of the box, hereinafter described.

My invention is applicable to the fire-alarm telegraphs in common use, wherein a number of signal-boxes are placed in the same electric circuit and arranged to send alarm-signals from each box in the circuit to a common center, or any number of signal-stations in the circuit. Its object is to prevent interference between the boxes—that is to say, when a signal is being sent out from any box in the circuit disabling all the other boxes in the circuit from starting a signal.

The invention consists, essentially, in devices whereby the movement of the armature of an electro-magnet in the box is made to disable the starting-lever or pull of the box from starting the mechanism to give a signal, which is effected by interposing an obstacle to the effectual movement of said lever.

It is not necessary that I should describe particularly the signaling mechanism of the signal-box that is in common use and familiar to all skilled in the art. The most common form is a break-circuit wheel constructed to break and close the circuit a certain definite number of times at each revolution, this wheel being connected to a train of wheels, to which motion is given by a spring or weight, the train being set in motion by detaching a detent by means of a lever projecting from the box, or the necessary winding up of the spring

or weight for a single signaling operation being effected by the movement of a lever or crank.

I will proceed to describe my new non-interference mechanism.

A is the break-circuit wheel, of the usual form and construction. The train of wheels through which it receives motion is shown by dotted lines. These are mounted on a suitable frame, B.

C indicates the common spring-fingers connected with the circuit-wires *a*, whereby the circuit is broken and closed on the circuit-wheel. D is an electro-magnet in the circuit, of the usual form, placed in the box with its axis vertical.

E is an armature connected with an arm, E', that projects from a rocking shaft, E², the arrangement being such, as shown in the drawings, that when the armature is free to be acted upon by gravity alone it will fall down (rocking the shaft E² on its axis) away from the magnet and out of the field of its magnetic influence. On the said shaft E² is a spiral rib, *b*, (shown plainly in Fig. 2.)

F is a sliding rod, in the inner end of which is a pin, *c*, which engages the said spiral rib *b*, the arrangement being such that when the rod F is pushed in, as shown in Fig. 2, the pin *c*, acting on the rib *b*, will rock the shaft F and throw the armature up against the lower end of the core of the magnet.

d is a spring, which acts to force the rod F outward, so that it extends beyond the plane of the inner face of the door N of the box. Whenever the door is opened, therefore, the said rod is forced out, and the closing of the door pushes it in. While the magnet holds the armature attached to it this movement of the rod F may take place without rocking the shaft E²; but when the armature is released from the magnet and falls down the pushing in of the rod F will throw the armature up against the magnet, and its movement outward will allow the armature to drop.

G is a lever extending from the rock-shaft H, and I is an arm extending downward from the same shaft. The depression of the lever G will swing the lower end of the arm I to the left, as seen in Fig. 1.

e is a spring which acts to draw the said arm back to the right.

J is a swinging lever pivoted at *f* in the frame B. Near its lower end is a pin, *v*, which projects outward in the way of the arm I when the latter is swung to the left by the depressing of G, whereby the said lever J will be swung to the left by the movement in that direction of I. The lever J is provided with a lug or projection, *g*, which drops into a notch in a laterally-projecting flange on the perimeter of the wheel K (shown in dotted lines in Fig. 1) whenever the said notch by the revolution of the wheel comes opposite said lug. *i* is a spring which acts to press the lever J against the said flange. When the lever J is swung away from said flange and the wheel I starts in motion the lug *g* rides on the flange until the wheel has made a revolution and the notch in the flange comes opposite to the lug. Then the lug drops into the notch, permitting the finger *h* to engage the pin *l* and arrest the movement.

In the lower end of the lever J is a finger, *h*, which projects inward and engages with a stop-pin, *l*, Fig. 4, that projects forward from the side of the wheel L of the train when the lug *g* is in its notch in wheel K, but is disengaged from said pin when the lever is swung to the left, so as to raise the lug *g* out of its notch. The finger *h* and the pin *l* in the wheel L are shown more plainly in Fig. 4. It is thus obvious that the swinging of the lever J to the left far enough to lift the lug *g* out of its notch and disengage the finger *h* from the stop-pin in wheel L will start the train in motion, and such motion will continue until the said wheel makes one revolution, when, if the said lever is free to obey the stress of the spring *i*, the train will be stopped by the engagement of the stop-pin with the finger *h*. A single revolution of K is made to give two, three, or more revolutions to the break-circuit wheel A.

Upon the shaft E^2 is a cam, *k*, which, when the armature E drops away from the magnet down into the position shown in Fig. 1, stands in the way of the lever J and prevents its movement to the left far enough to effect the disengagement of the finger *h* from the pin *l* and raise the lug *g* out of its notch in the flange of said wheel; but when the armature is swung up against the magnet the said cam is turned so as to permit the lever J to swing far enough to disengage the said finger from the said pin and raise the lug *g* from the notch, and thus start the train of wheels in motion to give a signal. It is evident that a signal can be thus given by depressing the lever G only when the armature is held up to the magnet. This mechanism is inclosed in a suitable box, *R'*, the front of which is closed by a door, *R*, hinged to the box, as shown.

In the normal condition of the circuit in a fire-alarm telegraph in which the closed circuit is used the magnets of all the boxes in the line are charged, and their armatures are all held by magnetic attraction, swung up against the magnets. In this condition a signal can be sent from any box in the line by merely

depressing the lever G; but the instant the circuit is broken the armatures of all the boxes in the line are released from their magnets, and are prevented from falling only by the pin *c* in the rod F acting against the spiral rib *b* on the shaft E^2 . The armatures will remain thus suspended while the circuit remains open in the giving of the signal, so that if the door of any box in the line other than that from which a signal is being sent should be opened to start therefrom an alarm the armature in that box would drop down into the position shown in Fig. 1, bringing the cam *k* on the rock-shaft E^2 in the way of the lever J, thus locking the mechanism, so that it could not be started by depressing the lever G. The closing of the door will again throw up the armature against the magnet into the field of the magnetic influence. As soon as the signal that is being sent is concluded and the circuit is again closed the armatures in all the boxes the doors of which are closed are necessarily swung up against their respective magnets, in position to permit a signal to be sent. It is thus manifest that while a signal is being sent from any box in the line all the other boxes in the same line are mechanically disabled by the falling of the armatures from the magnets consequent on the opening of the door.

P is a sliding bar, the office of which is to lock the rod F, so that it cannot be pushed in while the door is open. It has a hole, *p*, through which the head *w* of said rod may pass when the hole is coincident with said head, and a slot, *p'*, extending from the hole, into which the shaft of the rod below the head *w* may pass as the bar is shifted to the left, as seen in Fig. 3. In this position it is manifest that the rod cannot be pushed in so as to throw the armature up to the magnet. The right-hand end of this bar P rests against a lever, *q*, that is jointed at one end to an elbow, *q'*, secured to the inner face of the door *R*, and at the opposite end to a short arm, *q''*, that is hinged to a plate, *q'''*, secured to the end of the box. It is manifest that when the door is closed this lever *q* will be in the position shown by the full lines in Fig. 4, and when the door is open will be in the position shown by the dotted lines.

The spring *r* acts to keep the end of the bar P in contact with the lever *q*. The arrangement is such that the bar P is in position to bring the hole *p* opposite the head of the shaft F only when the door is closed or nearly closed. When the door is started to be swung open the rod F will follow it, the head *w* passing through the hole *p*, and when the entire of the head has passed through, the bar P will, by the operation of the lever *q*, be shifted to lock the said rod, so that it cannot be pushed in again until the door is again closed. This arrangement is designed to guard against the possibility of accident, as without it a person in the excitement of a fire might, in attempting to start a signal while an alarm was in

progress from another box, open the door and then push in the rod F, and at the same time depress the lever G, which would, of course, start a signal. The devices just described are a complete safeguard against such an accident.

As is manifest from the foregoing description, the peculiar and essential feature of my invention is the interposing mechanically of an obstruction to the starting of the mechanism of the signal-box, whereby the circuit-breaker is set in motion to give a signal, this being effected by the movement of an armature away from an electro-magnet in the circuit in the box intended to be disabled, consequent upon the breaking of the circuit in sending a signal from another box in the line.

I am aware that the movement of the armature of an electro-magnet has heretofore been made to accomplish non-interference between the signal-boxes of a fire-alarm telegraph by interposing an obstruction to the starting of the signaling mechanism to give a signal. My claim is limited to the combination of such armature with the door of the box, whereby the opening or closing of the door is made to actuate the armature, as described, and to the subordinate combinations specified.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a signal-box of a fire-alarm telegraph, the combination, with the armature of an electro-magnet in the circuit, of the door of the box, whereby the opening of the door, when the circuit is broken, permits the armature to

recede from the magnet, as and for the purpose described.

2. In a signal-box of a fire-alarm telegraph, the combination, with the armature of an electro-magnet in the circuit, of the door of the box, whereby the closing of the door forces the armature to the magnet, as and for the purpose described.

3. In a signal-box of a fire-alarm telegraph, the combination of the armature E, the rock-shaft E², the sliding shaft F, provided with a head, w, the sliding bar P, provided with the aperture p and slot p', the spring r, and door R, and lever-connection for actuating the bar P, as and for the purpose described.

4. The combination of the box R', door R, and levers q q' q² q³, as and for the purpose described.

5. In a signal-box, the combination of the rock-shaft E², to which is attached the armature E, and carrying the cam k, the lever J, and levers I G, and springs e and i, as and for the purpose described.

6. In a signal-box, the combination of the sliding shaft F, provided with the finger c, rock-shaft E², provided with the spiral rib b, with which said finger engages, the armature E, secured by an arm, E', to the said rock-shaft E², as and for the purpose described.

JAMES M. GARDINER.

Witnesses:

B. S. CLARK,
A. S. FITCH.