(No Model.) 2 Sheets—Sheet 1.

W. H. KIRNAN.

NON-INTERFERENCE SIGNAL BOX.

No. 450,239. Patented Apr. 14, 1891.

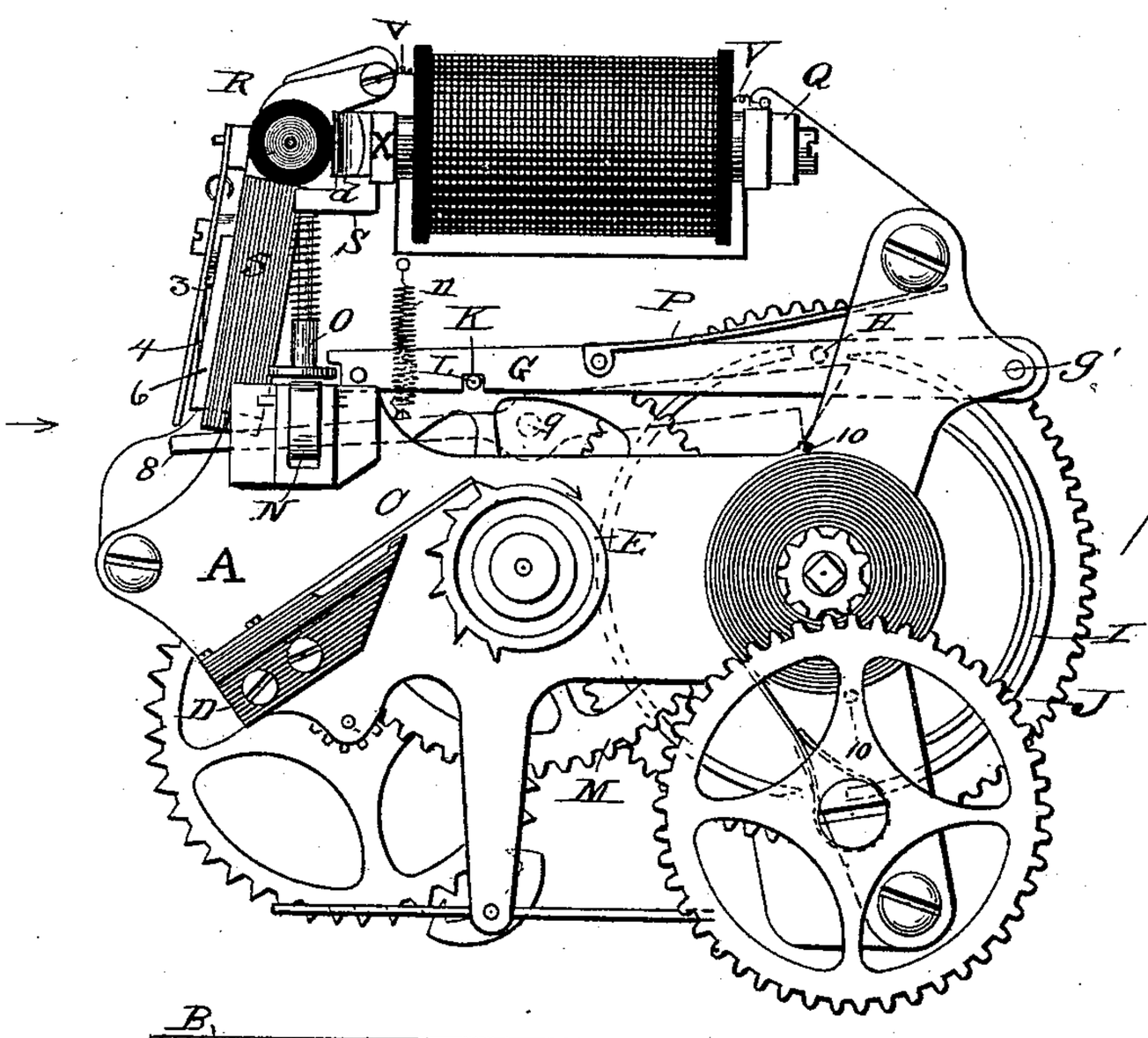

Fig. 1.

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

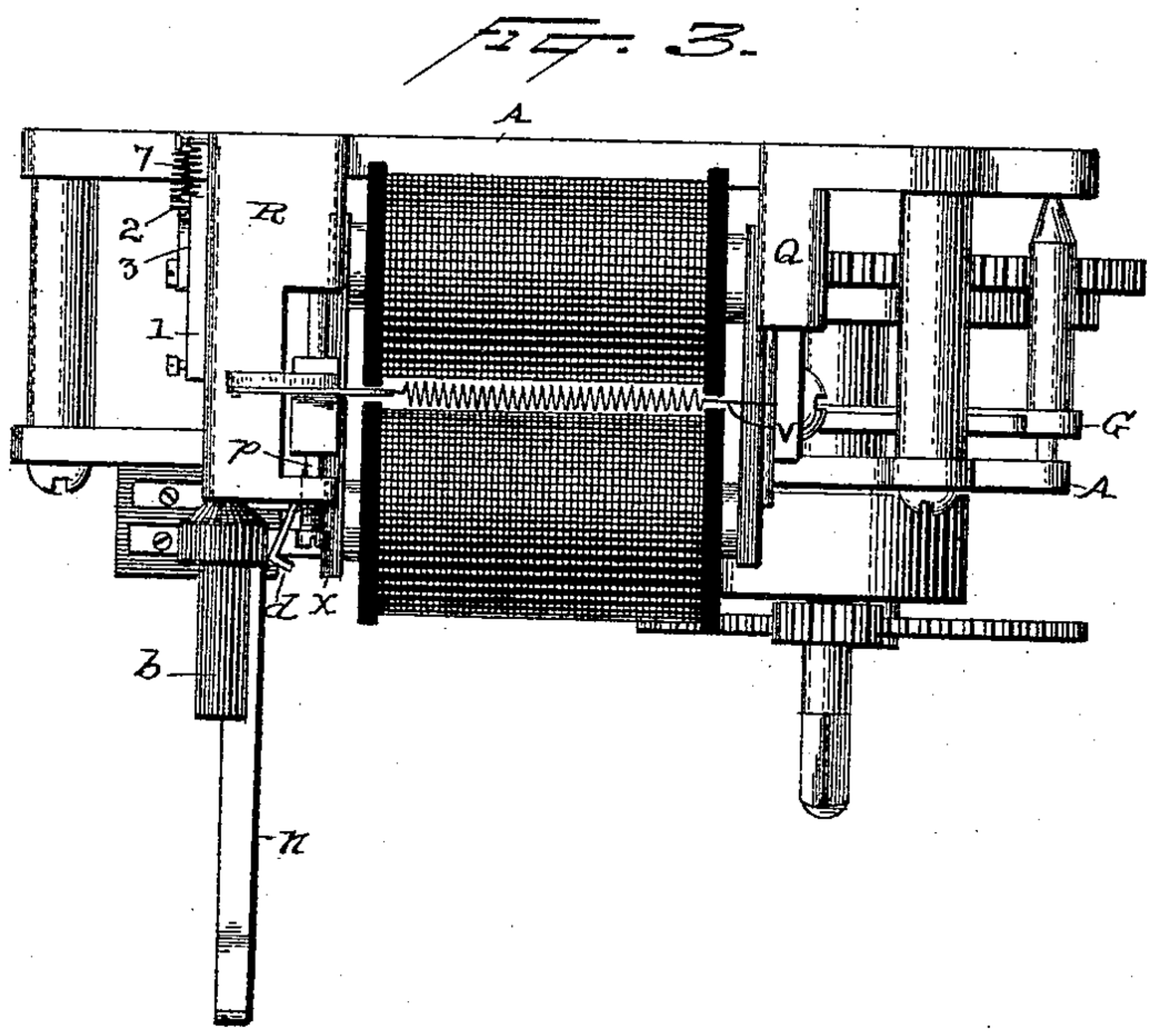
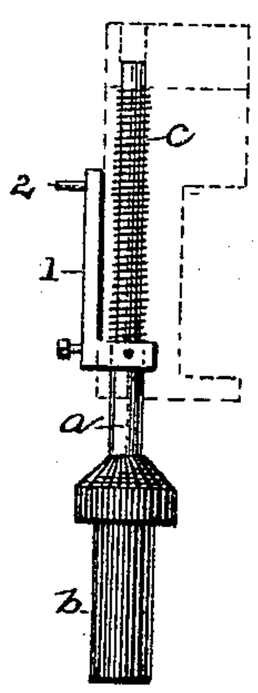


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM H. KIRNAN, OF BROOKLYN, ASSIGNOR TO THE GAMEWELL FIRE-ALARM TELEGRAPH COMPANY, OF NEW YORK, N. Y.

NON-INTERFERENCE SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 450,239, dated April 14, 1891.

Application filed August 18, 1890. Serial No. 362,258. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. KIRNAN, a citizen of the United States, residing in the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Non-Interference Signal-Boxes, of which the following is a specification.

My invention relates to transmitters of the character generally employed in fire-alarm, police, or municipal telegraph systems for sending over a circuit a definite signal to indicate the number of the box or station sending the signal or any other desired information.

The invention consists in a device for maintaining the circuit in its most efficient condition by cutting out the magnets, circuit controlling springs, &c., of all the idle boxes, and closing the circuit through or around such boxes by a circuit of low resistance while they are out of use, and in means for locking the switch by which the circuit is changed, whereby when a signal is started the switch cannot be moved by the hand or by shutting the box door to re-establish the low-resistance circuit and put the apparatus in its normal condition or condition of rest until the signal is completed.

In the accompanying drawings, which illustrate my invention, Figure 1 is a side view of a transmitter with the inclosing box removed. Fig. 2 is an end view of the same transmitter, looking in the direction of the arrow shown in Fig. 1, and showing the inclosing-box in cross-section. Fig. 3 is a plan view of the transmitter shown in Fig. 1, and Fig. 4 is a detached view of a feature hereinafter described.

The main features of construction of the transmitter are the same as shown in my application, No. 301,703, filed March 1, 1889; but the device for resetting the mechanism shown in that application is omitted in the present application, while in the present application certain features constituting the improvement are shown which do not appear in the earlier case.

The motor for driving the signaling mechanism may be of any usual or desirable form. I have shown the ordinary clock-work mechanism for this purpose, the construction and operation of which will be readily understood from an examination of the drawings without further explanation. This mechanism, together with the signaling and other mechanism, is mounted on a frame A and the whole inclosed in a suitable box or case B. The signaling mechanism may be of any usual or suitable form. As shown, it comprises the spring-fingers C, of which there are two, insulated from each other on the block D, mounted on the frame A, and the circuit-wheel E, mounted on a shaft driven by the motor. When the apparatus is at rest, the first tooth of the circuit-wheel is in contact with the two springs C. The mechanism for starting and stopping the motor may also be of any suitable form. I have shown a lever G, pivoted at one end to the frame A, as shown at g'. A pin H is carried by this lever and rides on the flange I of the gear J. A notch K is formed in the lever, designed to drop over the pin L on the gear M of the clock-train and arrest its movement. A pivoted pull N, projecting outward from the frame, bears against a sliding head O, which, when the pull is drawn downward, lifts against the end of the lever G and carries it up sufficiently to release its notch from the pin L. The pull N is so arranged that when the head O is out of its path of movement it will not strike the lever G to raise it. O may be called a "disabling device" for the detent mechanism. When detent G is raised, the clock is free to operate and the transmission of the signal will be begun. To stop the clock-work after the signal is sent, the flange I is cut away at a determined point, so that at the cessation of the signal the pin H of the lever will drop from the flange, the spring P, bearing on top of the lever, aiding this action, and thereby the notch K will descend and engage the pin L, thereby stopping the clock-work.

The magnet of the transmitter is preferably arranged in a horizontal position, being supported on a piece Q, projecting from the back plate of the frame A. On another piece R, projecting from the back plate of the frame parallel with the piece Q, is the pivot p of the armature-carrier S, which is provided with a retracting-spring V, as shown in Fig. 3, although the retracting-spring may be arranged

in any other suitable manner. By this arrangement the tendency of the spring is to withdraw the armature X from the magnetic field of the magnet. Upon the frame-extension R is mounted a sliding pin *a*, having a head *b*. Between a shoulder on the pin *a* and the frame is arranged a spring *c*, the tendency of which is to project and hold the head *b* a short distance beyond the end of the armature X.

In Fig. 4 the pin *a*, the spring *c*, and the block 1 thereon are shown in full lines, and the position of the frame R is indicated in dotted lines. In this figure the pin has been moved forward by its spring.

On the back of the armature is an outwardly-bent spring *d*, having a bent or inclined end, as shown. When the armature is held up against the magnet, this spring will be out of the path of movement of the head *b;* but when the armature is out of the magnetic field of the magnet the spring *d* will be in the path of movement of the head *b*, and such is the amount of bend of the spring that it will be forced by an inward movement of the head toward the magnet sufficiently to carry the armature into its magnetic field.

The block 1 is connected to and moves with the rod *a*, and by means of said block and a pin 2 carried thereby is operated a switch-arm 3, to the under side of which may be connected a contact-spring 4. This switch-arm is pivoted on an insulating-block 5, on which are also two conducting-pieces 6 6′. The arm 3 is connected to a retracting-spring 7, which tends to hold the arm in contact with the piece 6. The spring *c* is stronger than spring 7. Hence when the door is opened and the stop removed from the head *b* spring *c* will force rod *a* and block 1 forward, and pin 2 will carry the upper end of arm 3 along with it, thereby carrying the lower end onto 6′.

8 is a lever pivoted to the frame A at 9 and its rear or inner end being beveled, as clearly indicated in Fig. 1. This end normally rests on a pin 10, carried by the wheel J. A spring 11, connected to the lever and to the plate *a*, tends to raise the forward end of the lever to bring it into the notch 12 in insulating-block 5 and into the path of movement of the arm 3.

It will be understood that the pivot 9 may be a post of sufficient length to bring the lever 8 into line with notch 12, or the pivot may be directly on plate A and the lever 8 bent to bring its ends into line with said notch and the pin on wheel J, respectively.

A projection *f* on the door of the box is located so as to come in contact with the head *b* when closing and push it inward to restore and hold the armature in the magnetic field of the magnet and to move the switch-arm 3 to the position shown in Fig. 2 when the door is closed.

The circuit connections are as follows: The line 13 is connected to one plate of a lightning-arrester and from thence to the switch-arm 3. From the contact 6 a wire 14 extends to the wire 13′, which is the wire which extends to the succeeding box or station or back to the fire-alarm station. The circuit just indicated is a circuit of low resistance, which does not include the magnets or the circuit-controller springs of the transmitter. The contact-piece 6′ is connected by a wire 15 to one of the springs C, and the second spring C′ is connected by wire 16 to the magnet *d″*, and from said magnet extends the wire 13′. When therefore the arm 3 rests on 6′ the low-resistance circuit is broken and the circuit is closed through the circuit-controlling springs and the magnet.

It will be seen that by the construction which has been described when the door of a box is opened the projection *f* will be withdrawn from the head *b* and the spring *c* will project said head beyond the spring *d*, thereby permitting a movement of the armature out of the magnetic field of the magnet and at the same time reversing the switch-arm 3. Now if all the boxes in the circuit are idle the armature of every box will be retained forward by the head *b*, so that the sleeve O will be in position to be lifted by the pull N against the lever G, and thereby release the motor to transmit a signal. When a door has been opened, removing this device for holding the armature in the field, if a signal is being transmitted from any box in the series (which may be called the "first box") the circuit will be broken, since the apparatus works on open circuit with momentary closures only, and the armature of the second box—that is, the box pulled after the signal has been started at the first box—will fall back, carrying the sleeve O out of the range of movement of the starting-lever, thus providing for non-interference with the signal already being transmitted.

Although the operation has been set forth to a considerable extent in the above description of the apparatus, a brief recapitulation of the operation will now be given. Normally all of the transmitters are in the condition shown in the drawings. Suppose a box-door to be opened. This carries *f* away from *b*, allowing the spring *c* to press said head forward out of the path of movement of the armature-spring and simultaneously moves the switch-arm 3 from contact 6 to 6′, breaking the low-resistance circuit and closing the main line through the circuit-controlling springs and the box-magnet. This latter circuit is closed before the head *b* allows the armature to drop back, so that the magnet itself holds the armature forward and maintains the sleeve O in operative position. The hook is now pulled downward, raising the detent-lever G and allowing the clock-work to revolve. At the first movement of the circuit-wheel the circuit is broken at the springs C. This allows the armature of the magnet to drop back. At the same time the pin 10 passes from under the end of lever 8 and spring 11 pulls the other end of said lever up into the path of movement of

arm 3. This prevents an operator mutilating the signal before the signal is entirely transmitted, since if he closes the door, thereby forcing head *b* and block 1 back, the switch-lever 3 is prevented from leaving contact 6′ (opening the signal-circuit and closing the low-resistance circuit) by the lever 8. When the wheel J has turned a half-revolution, a second pin 10 strikes the beveled end of the lever, throwing it up and the outer end down, so that when the pin H drops from the flange I the hook rests on pin 10.

The lever 8 not only locks the switch-arm, as just described, but it also prevents the possibility of an operator mutilating a signal being sent from another box by pressing in the head *b* and pulling lever N, since lever 8 would rise behind switch-arm 3 and hold it in the position shown before the operator could release the apparatus.

If during the operation of this instrument a second box-door is opened, the head *b* therein will move forward, as already described; but since the circuit is open during the operation of a signal, except for the instant when the teeth of the circuit-wheel pass under the springs, the circuit will be opened and the armature will drop back before the operator can reach and move the pull N. This renders it impossible for him to break in on the signal already being sent.

It is not essential that the switch for changing the circuit should be of the exact construction which has been set forth. The important item is to operate the switch automatically by the opening and closing of the door and at the same time to mechanically control the armature and the releasing device of the clock-work.

Without limiting myself, therefore, to all the details of construction described, what I claim is—

1. In a signal apparatus, the combination of a magnet adapted to be connected in the signal-circuit, a circuit-controller and a motor therefor, a detent for the motor, means for tripping the detent, operative only while all instruments on the line are at rest, a switch moved by opening the alarm-box from a cut-out contact to a contact connected to the magnet and circuit-controller, and a lock for said switch, substantially as described.

2. In a signal apparatus, the combination of a magnet adapted to be connected in the signal-circuit, a circuit-controller and a motor therefor, a detent for the motor, means for tripping the detent, operative only while all instruments on the line are at rest, a switch moved by opening the alarm-box from a cut-out contact to a contact connected to the magnet and circuit-controller, a lock for said switch, and means for releasing and restoring the switch at the close of the signal, substantially as described.

3. In a signal apparatus, the combination of a magnet adapted to be connected in the signal-circuit, a circuit-controller and a motor therefor, a detent for the motor, a pull or handle and an intermediate piece for tripping the detent, an armature for the magnet, carrying said intermediate piece, said armature in its retracted position being out of the magnetic field of the magnet, a push-rod or similar device for mechanically moving or holding the armature forward, and a switch, also controlled by the push-rod, for throwing the magnet and circuit-controller into and out of circuit, substantially as described.

4. In a signal apparatus, the combination of a magnet adapted to be connected in the signal-circuit, a circuit-controller and a motor therefor, a detent for the motor, a pull or handle and an intermediate piece for tripping the detent, an armature for the magnet, carrying said intermediate piece, said armature in its retracted position being out of the magnetic field of the magnet, a push-rod or similar device for mechanically moving or holding the armature forward, and a switch, also controlled by the push-rod, for throwing the magnet and circuit-controller into and out of circuit, and a lock for said switch, substantially as described.

5. In a signal apparatus, the combination of a magnet adapted to be connected in the signal-circuit, a circuit-controller and a motor therefor, a detent for the motor, a pull or handle and an intermediate piece for tripping the detent, an armature for the magnet, carrying said intermediate piece, a push-rod or similar device for mechanically controlling the armature, and a switch, also controlled by the push-rod, for throwing the magnet and circuit-controller into and out of circuit, and a lock consisting of a pivoted lever controlled by a moving part of the motor, substantially as described.

6. The combination, in a signal-box, with a rod or similar device moved by a door of the box, of a cut-out switch and a disabling device for the detent of the alarm mechanism simultaneously controlled by said rod, and a lock for said switch, substantially as described.

7. The combination, in a signal-box, of a circuit-wheel, a motor therefor, a detent for said motor, a cut-out switch moved by opening the box, a pivoted locking-lever separate from the detent, normally held out of engagement or out of the range of movement of said switch, but thrown into the range of the switch by the first movement of the transmitter, substantially as described.

This specification signed and witnessed this 4th day of August, 1890.

W. H. KIRNAN.

Witnesses:
D. H. DRISCOLL,
W. PELZER.