(No Model.) 2 Sheets—Sheet 1.

N. H. SUREN.

SIGNAL BOX.

No. 546,036. Patented Sept. 10, 1895.

Fig. 1.

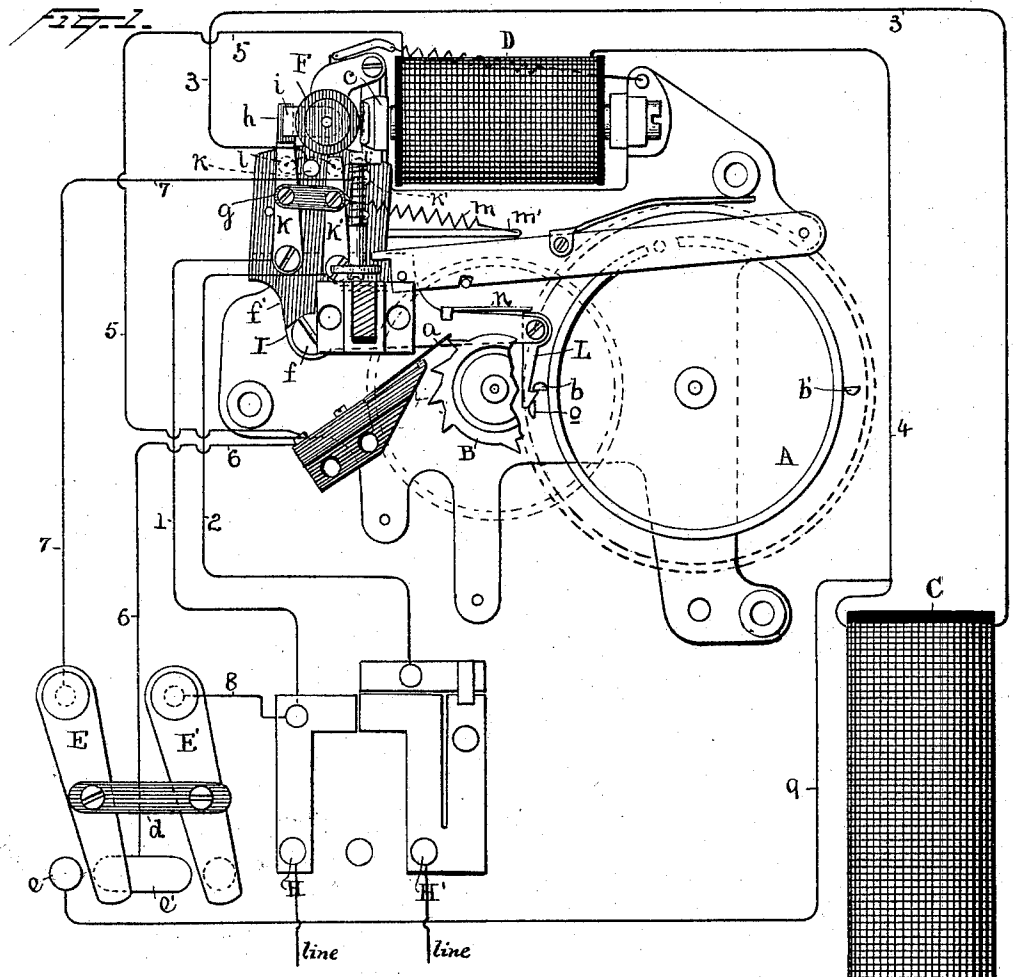
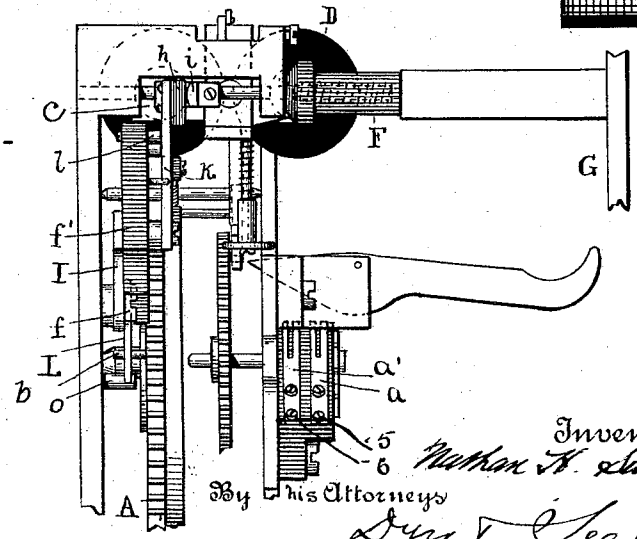


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

N. H. SUREN.

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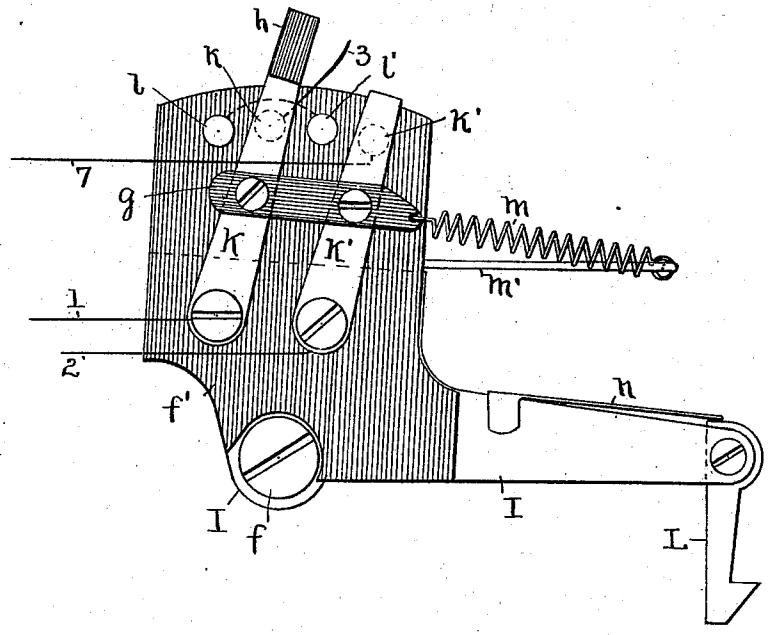
Fig. 3.



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UNITED STATES PATENT OFFICE.

NATHAN H. SUREN, OF NEW YORK, N. Y., ASSIGNOR TO THE GAMEWELL FIRE-ALARM TELEGRAPH COMPANY, OF SAME PLACE.

SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 546,036, dated September 10, 1895.

Application filed August 22, 1893. Serial No. 483,739. (No model.)

To all whom it may concern:

Be it known that I, NATHAN H. SUREN, a citizen of the United States, residing in the city of New York, county and State of New York, have invented a certain new and useful Improvement in Signal-Boxes, of which the following is a specification.

The object I have in view is to produce an effective switch for cutting out the operative elements of signal-boxes which will combine in a single device all the functions of the door-and-wheel-movement switches heretofore employed. The invention is more especially applicable to fire-alarm signal-boxes, although it may be applied to signal-boxes used for other purposes.

In carrying out my invention in its application to a fire-alarm signal-box I connect all the elements of the box—viz., the circuit-breaking pens, the non-interfering magnet, the bell-magnet, and the test-switch—in a local circuit or loop, which is thrown into and out of the main line by the cut-out switch. This cut-out switch requires for its operation the joint action, simultaneously or successively applied, of the door of the box and the clock-movement which rotates the circuit-breaking wheel. It is composed of a pivoted base-piece carrying the two terminals of the local circuit, which run to insulated contact-points upon such base-piece, and also carrying two other insulated contact-points alternating in arrangement with the local-circuit contacts and connected together electrically by a conductor of ample current-carrying capacity. Through the short circuit formed by these connected contacts the line-current passes when the local circuit or loop is cut out by the switch, and hence these contacts I will distinguish from the local-circuit contacts by calling them the "short-circuit" contacts. Upon the pivoted base-piece and insulated therefrom are two parallel switch-arms. These are pivoted to the base-piece and are connected together by a bar of insulating material, so as to move together. The insulated pivots of these switch-arms, and hence the arms themselves, are connected with the line and form the terminals at the box of the main-line circuit. The free ends of the switch-arms play over the local-circuit and short-circuit contacts before referred to. One of the pivoted switch-arms is extended beyond the base-piece and engages with a wedge or inclined surface carried by a spring-stud, which is pushed inwardly when the door of the box is closed. The effect on the switch-arms when the spring-stud is pushed in by closing the door of the box is to tend to move such switch-arms in the direction to bring them into connection with the short-circuit contacts. If the switch-arms are on the local-circuit contacts and the pivoted base-piece is free to move, the inward movement of the spring-stud will swing the base-piece on its pivot without shifting the switch-arms over the contact-points; but if the pivoted base-piece is held by the wheel-movement, and thus prevented from swinging on its pivot, the pushing in of the spring-stud will shift the switch-arms on the contacts. A pin on the wheel-movement engages with a pawl on the pivoted base-piece and holds it from swinging on its pivot, or, if already swung in one direction by the spring door-stud, catches it and draws it in the opposite direction, moving the contacts on the base-piece under the switch-arms, if such arms are held by the wedge surface of the spring door-stud. The base-piece is freed from the wheel-movement while the latter is running by a stationary inclined pin, which moves the pawl out of engagement with the pin on the wheel-movement when the latter starts to run, and hence the base-piece is held by the wheel movement only in its position of rest. Consequently the cut-out switch will be operated to cut out the local circuit or loop by either the stopping of the wheel-movement or by the closing of the box-door, provided the switch is held by the spring door-operated stud or by the pin on the wheel-movement. In other words, the operation of the cut-out switch requires the joint action of the door and wheel-movement, applied either successively or simultaneously. Another element in the operation of the switch is a spring connecting the switch-arms and base-piece and tending to draw the arms over the local-circuit contacts and away from the short-circuit contacts. This spring acts to operate the switch and to throw the local or box circuit into the line when the switch-arms are re-

leased from the spring-stud—*i. e.*, when the box-door is opened—if the base-piece is held by the wheel-movement. This spring also prevents the spring-stud from moving the switch-arms across the contacts when the base-piece is not held by the wheel-movement and causes it to swing the base-piece on its pivot, although the friction opposing the movement of the switch-arms could be made sufficient for this latter purpose. The spring-stud, which is pushed inwardly by the closing of the box-door and has a wedge surface engaging the extended end of one of the switch-arms, is the same spring-stud which is usually employed to restore the armature of the non-interfering magnet to the field of that magnet. It performs that function in the box illustrated, in addition to its function in connection with the cut-out switch. When the spring-stud is released by the opening of the door and springs outwardly, it first releases the switch-arm and then the armature of the non-interfering magnet, so that such magnet will be thrown into the main circuit and will attract its armature before it can fall out of the magnetic field.

In the accompanying drawings, forming a part hereof, Figure 1 is a view, partly in diagram, illustrating the principal elements of a signal-box and their connection with my cut-out switch; Fig. 2, a view, partly in section, showing the relation of the spring-stud to the door of the box, the switch-arm, and the armature of the non-interfering magnet; and Fig. 3, an enlarged view of the cut-out switch and the circuit-wires connected thereto.

A is the main wheel of the clock-movement which turns the circuit-breaking wheel B, upon which bear the contact-pens *a a'*. The wheel A carries pins *b b'* at diametrically-opposite points. This wheel makes a half-revolution each time the box is pulled.

C represents the bell-magnet, D the non-interfering magnet, and *c* the armature of the latter magnet.

E E' are the arms of the test-switch. These are parallel arms connected together by a bar *d* of insulating material and playing at their free ends across two contacts *e e'*.

F is a sliding stud which is thrown outwardly by a spring and is pushed inwardly by a projection on the box-door G. The binding-posts and connected plates for the ends of the line-wire are shown at H H'.

I is the base-piece of the cut-out switch. It has an L shape and is pivoted to the case at the junction of its vertical and horizontal arms by the screw *f*. The vertical arm of the pivoted base-piece I is faced with a plate *f'* of insulating material, upon which are pivoted the parallel switch-arms K K', connected by a bar of insulating material. The switch-arm K is extended beyond the base-piece and has an end *h* of insulating material, which engages with a wedge *i*, carried by the spring-stud F. The insulating-plate *f'* of the base-piece also carries the local-circuit contacts *k k'* and the short-circuit contacts *l l'*, the latter being connected together electrically around the intermediate local-circuit contact *k* by a conductor of ample current-carrying capacity. The bar *g* connecting the switch-arms K K' is connected with a spiral spring *m*, whose other end is fastened to an arm *m'* from the base-piece I. The spring *m* tends to draw the switch-arms away from the short-circuit contacts *l l'* and upon the local-circuit contacts *k k'*. The horizontal arm of the base-piece I has hanging from it a pawl L, having a beveled end, which is thrown into the path of the pins *b b'* on the main wheel A by a leaf-spring *n*. When the wheel-movement of the box comes to the position of rest, the pawl L is held by one of the pins *b b'* in the position shown in Fig. 1. The beveled end of the pawl rests at such times on a stationary pin *o*, secured to the case, which pin forces the pawl back away from the pin on the main wheel when that wheel starts to rotate and releases the base-piece, which remains free from the main wheel until that wheel again approaches the end of its movement.

The circuit connections are as follows: The main circuit within the box is formed by wires 1 and 2, which respectively connect the line-posts H H' with the switch-arms K K'. The local box-circuit or loop begins at the contacts *k k'*. From *k* a wire 3 runs to the bell-magnet C. The other end of the wire of the bell-magnet is connected by a wire 4 with the coils of the non-interfering magnet D, from the other end of which runs a wire 5 to the contact-pen *a*. From contact-pen *a'* a wire 6 extends to the contact-plate *e'* of the test-switch, and from the arm E of the test-switch a wire 7 runs to the other local-circuit contact *k'*. The line-post H is connected with the arm E' of the test-switch by a wire 8, and the outer contact E of the test-switch is connected with the wire 4 between the bell-magnet and non-interfering magnet by the wire 9. In Fig. 1 the switch is shown in the position when the door of the box is closed and the wheel-movement is at rest—*i. e.*, the normal position of the parts when the box is not opened or operating. In this position the line-current passes from post H through wire 1, arm K, connected contacts *l l'*, arm K', and wire 2 to post H'. The local box-circuit or loop is entirely cut out. A person now approaches the box to send in a signal. He first opens the door. This releases the stud F, which springs outwardly, releasing the switch-arms, which are drawn to the right by the spring *m* and move the switch-arms onto the local-circuit contacts *k k'*, throwing the local circuit into the line. The "pull" of the box is then operated. This starts the wheel-movement and the pin on the main wheel passes the pawl on the switch base-piece, releasing it. The door of the box may then be shut while the box is running. The effect will be to swing the base-piece of the switch on its pivot, but not to shift the switch or interfere with the signal.

When the main wheel approaches the end of its movement, one of its pins *b b'* will catch the pawl L and draw it downward by shifting the switch back again to its normal position and cutting out the local circuit. If the box-door is kept open while the wheel-movement is running, the pin on the main wheel will catch the pawl and hold it, but will not shift the switch. This will then be accomplished by the shutting of the door, which will force the switch-arms to the left. While the box is in operation sending in a signal the current takes the following path: from H through 1, K, *k*, 3, C, 4, D, 5, *a*, *a'*, 6, *e'*, E, 7, *k'*, K', and 2 to H'. If it is desired to test the box, the door of the box is first opened, throwing the local circuit, including the test-switch, into the line, and the test-switch is then swung to the left, bringing E upon *e* and E' upon *e'*. This produces two circuits through the box, one through the contact-pens and non-interfering magnet and the other through the bell-magnet, the latter being constantly closed and the former being broken at the contact-pens when the box is operated. The first of these circuits is from H *via* 8, E', *e*, 6, *a'*, *a*, 5, D, 4, 9, *e*, E, 7, *k'*, K', and 2 to H'. The second of these circuits is from H *via* 1, K, *k*, 3, C, 4, 9, *e*, E, 7, *k'*, K', and 2 to H. This box being pulled the first of these circuits will be broken at the contact-pens in accordance with the signal which the circuit-breaking wheel is constructed to transmit. The line-circuit will not be broken, however, since that is kept constantly closed by the second circuit described, and hence no effect will be produced upon the line. The effect will be purely a local one and will cause the bell in the box to sound the box-signal, due to the fact that when both circuits are closed the bell-magnet will not receive current enough to hold its armature, such current being shunted away from it by the lower resistance of the non-interfering magnet, and when the contact-pens again break the circuit in which they are located the whole current will pass through the bell-magnet, causing it to attract its armature and strike the bell. This method of testing the box forms no part of the present invention, except so far as the testing-switch is combined with the cut-out switch.

Another advantage arising from the fact that my cut-out switch throws the local circuit into the line by the opening of the box-door is that it can be used on a box having a non-interfering magnet whose armature falls out of the magnetic field unless held by the closed door or by the current. The opening of the door switches the current through the non-interfering magnet before the armature falls away from the magnet. A switch operated wholly by the wheel-movement would not accomplish this end.

What I claim is—

1. In a signal box, a cut-out switch composed of two mechanically co-acting movable parts, in combination with means for moving one of such parts by the stopping of the wheel movement of the box and means for moving the other of such parts by the closing of the box door, whereby the switch is controlled by the combined action of the wheel movement and the door substantially as set forth.

2. In a signal box, a cut-out switch having as one element a movable base-piece carrying contacts and having as its second element movable switch arms which play over such contacts, in combination with a device on the wheel movement for moving one of such switch elements as the wheel movement approaches the point of stopping and holding such switch element while the wheel movement is at rest, and a device operated by closing the door for moving the other switch element and holding it while the door remains closed, substantially as set forth.

3. In a signal box, a cut-out switch having independently movable and mechanically co-acting contacts and switch arms, comprising the two elements of the switch devices operated by the door and wheel movement engaging the two elements of the switch, and a spring moving the switch arms in one direction relative to the contacts, substantially as set forth.

4. In a signal box, the combination with the contact pens and the non-interfering magnet having an armature adapted to fall out of the field of the magnet, of a cut-out switch, and a stud moved in one direction by closing the box door and in the other direction by a spring, such stud having wedge surfaces which control the switch and the non-interfering armature, substantially as set forth.

5. In a signal box, the combination with the contact pens and the non-interfering magnet having an armature adapted to fall out of the field of the magnet, of a cut-out switch, a stud moved in one direction by closing the box door and in the other direction by a spring, such stud having wedge surfaces which control the switch and the non-interfering armature, and a connection between the switch and wheel movement also controlling the switch, substantially as set forth.

6. In a signal box, a cut-out switch having a pivoted base-piece carrying the local-circuit and short-circuit contacts, and provided with switch arms pivoted upon the base-piece and connected with the line terminals, in combination with a spring connecting the switch arms and base-piece and acting to move the switch arms onto the local-circuit contacts, a wedge surface moved by the door and engaging the switch arms, and pins on the wheel movement engaging the base-piece, substantially as set forth.

7. In a signal box, the combination with the cut-out switch, having a pawl with beveled end for engaging the wheel movement, of a stationary beveled pin moving the pawl out of engagement with the wheel movement

when the latter is running, substantially as set forth.

8. In a signal box, the combination with the pivoted L-shaped base-piece, carrying contacts, the switch arms pivoted on the base-piece, the pawl on the base-piece engaging pins on the wheel movement, the stationary pin releasing the pawl from the wheel movement, the spring connecting the switch arms and base-piece, and the door-stud engaging the switch arms, substantially as set forth.

This specification signed and witnessed this 16th day of August, 1893.

NATHAN H. SUREN.

Witnesses:
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NORRIS A. CLARK.