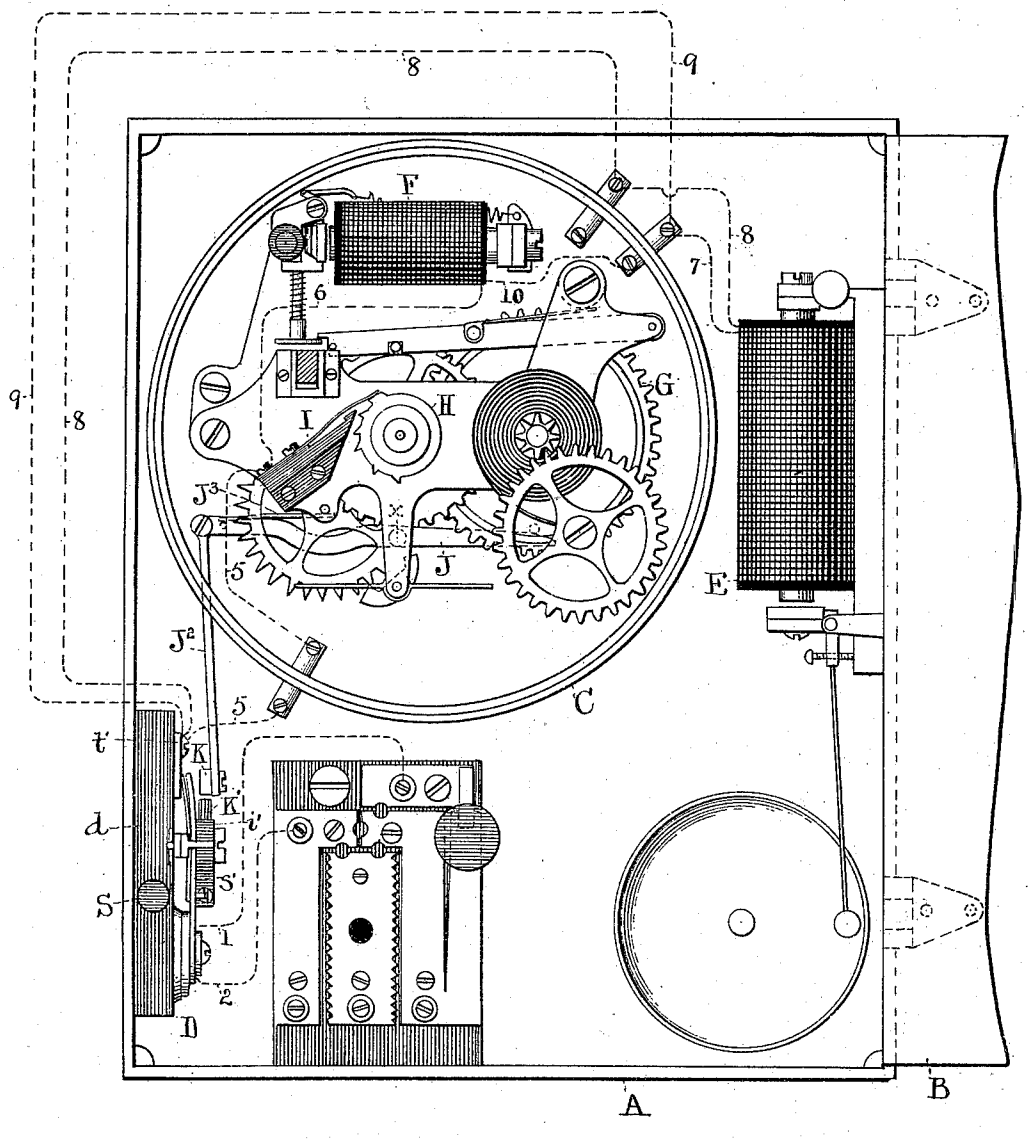
(No Model.) 2 Sheets—Sheet 1.

N. H. SUREN.

SIGNAL BOX.

No. 546,037. Patented Sept. 10, 1895.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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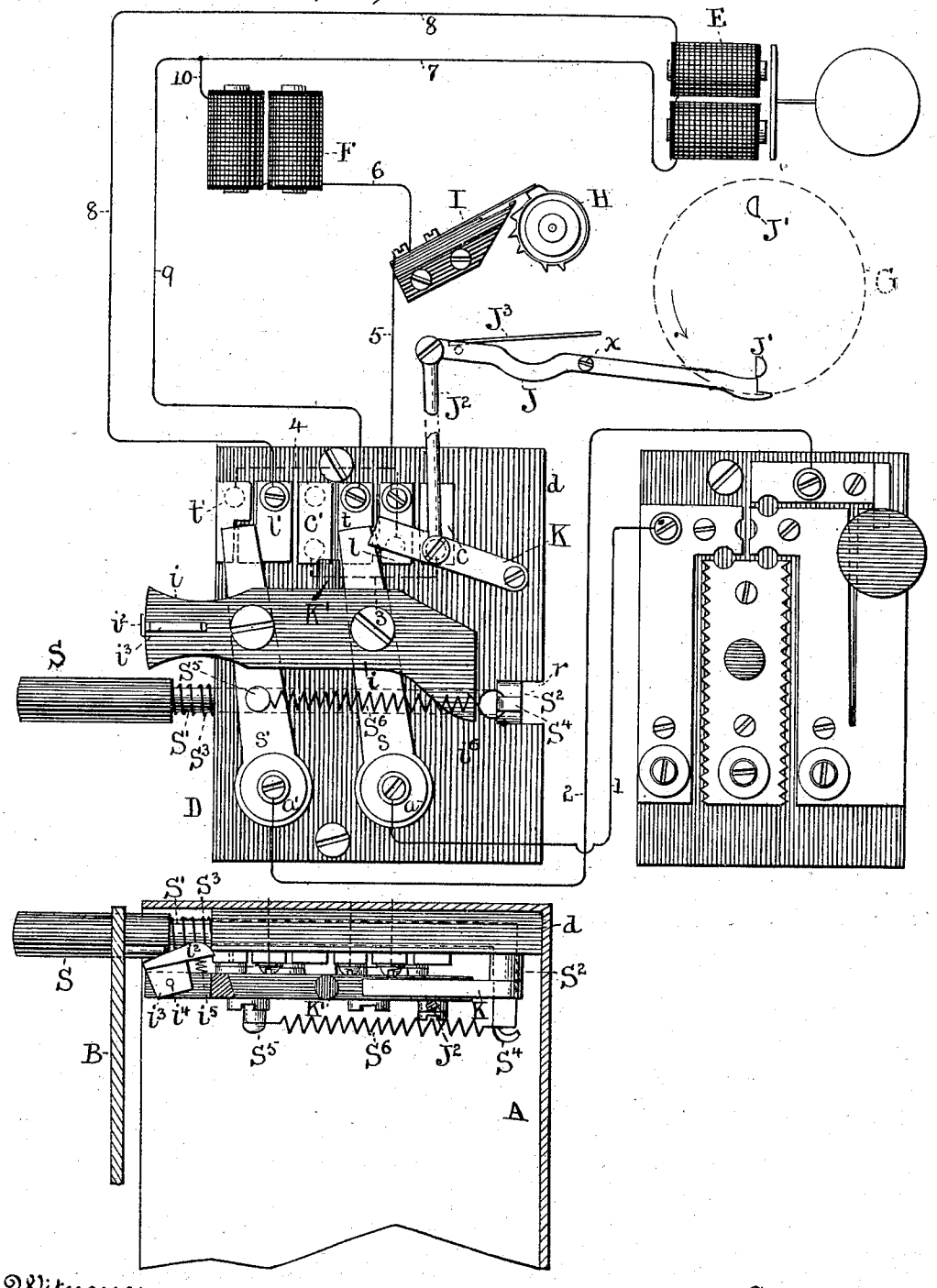
No. 546,037. Patented Sept. 10, 1895.

Fig. 2.



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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. 546,037, dated September 10, 1895.

Application filed January 25, 1894. Serial No. 498,006. (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 a simple and effective cut-out switch for signal-boxes of any construction, particularly fire-alarm signal-boxes, and which will combine in a single device all the functions of the door-and-wheel-movement switches heretofore employed, and also perform the functions of a test-switch.

In carrying out my invention in its application to a fire-alarm box I connect the circuit-breaking pens, the non-interfering magnet, and the bell-magnet in a local circuit or loop, which circuit is thrown into and out of the main line by the cut-out switch. The 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. The local or box circuit is thrown into the main line by this switch upon opening the door, and upon pulling the box the clock-movement shifts a detent into the path of movement of the switch, locking it against return movement by the act of closing the door. When the signal is transmitted, the detent is withdrawn, whereupon the switch returns to its normal position, cutting out the box. The switch is rigidly secured within the inner box, but exterior to the case containing the signal mechanism, and preferably consists of a base of insulating material having line-terminals, short-circuit, local-circuit, and test-circuit contact-plates, two pivoted switch-arms connected with the line-terminals, and situated so as to be capable of contact with either set of contact-plates, and a spring-stud connected with said switch-arms, operating upon the opening or closing of the door of the outer box to move the switch-arms onto the local-circuit or the short-circuit contact-plates. The switch-arms are connected together by a bridge of insulating material, so that they will move together, and this bridge also serves as a handle for moving the switch-arms onto the test-circuit contact-plates. A detent is provided on said handle for retaining said switch-arms on the test-circuit contacts against the tension of a spring provided for returning the switch-arms to the local-circuit contacts, and said detent is released by the act of closing the door of the inner box, whereupon the switch will be moved onto the local-circuit contacts, and in closing the door of the outer box the spring-stud is moved inward and carries the switch-arms with it, moving them onto the short-circuit contacts.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the interior of the inner box, the outer box not being shown; Fig. 2, a view partly in diagram, the magnets not being shown in proportion, showing the circuit connections and a plan view of my improved cut-out switch with the switch-arms on the test-circuit contacts; and Fig. 3, a cross-section of a portion of the box, showing the the door of the inner case about to release the detent which retains the switch-arms on the test-circuit contacts.

A is the inner box, B the door, and C the the case placed within box A and containing the signal mechanism.

D is the cut-out switch.

E is the bell-magnet; F, the non-interfering magnet; G, the main wheel of the clock movement; H, the break-wheel; I, the contact-pens; J, a lever, which is tilted downward by spring J^3 and raised by projections J′ on wheel G acting on the opposite end of the lever, and K the detent operated through the movements of lever J.

The cut-out switch D has a base *d* of insulating material, upon which are mounted the terminals *a a′*, to which the main-line wires 1 2 are connected.

l l′ are the local or box circuit contact-plates.

c c′ are the short-circuit or cut-out contact-plates, and *t t′* are the test-circuit contact-plates. The short-circuit contacts are connected by a wire 3, and local-circuit contact *l* and test-circuit contact *t′* are connected by a wire 4.

s and *s′* are the switch-arms, and *i* is the bridge of insulating material connecting the

switch-arms together and terminating at one end in a handle i', and this handle is provided with detent i^2, which has a lug i^3 entering a slit in the handle, and through the handle and lug passes a pin i^4, whereby the detent is pivoted to the handle. A spring i^5 is provided for throwing the detent outward to engage the base of the switch.

S is the stud with which the door of the outer box engages. This stud has a shank S′, which passes through the base d and terminates in a head S^2, which preferably works in a recess r in base d. A spring S^3 is coiled around shank S′, the object of which is to force the stud outward to the limit of its movement. The bridge i at its inner end has an oblique extension i^6, with which head S^2 engages, as hereinafter explained. Head S^2 has a hook S^4, and between this hook and a similar hook or projection S^5 on switch-arm s' is a spring S^6. The switch-arms s and s' in their normal position—*i. e.*, when the door of the outer box is closed and no signal is being transmitted—are held on contacts c and c', respectively. This is accomplished by the door pushing stud S inward, and the head S^2 on the shank S′ being connected to the switch-arms by spring S^6, which has considerable tension, the arms are drawn in the direction of movement of stud S until the stud reaches the limit of its movement, when the arms will rest on contacts c and c'. By this movement of the stud spring S^3 is placed under tension, and upon opening the door of the outer box this spring will force the stud outward until head S^2 reaches the limit of its movement in recess r, and this movement places arms s and s' on contacts l and l', respectively. This is accomplished by head S^2 engaging the oblique extension i^6 of bridge i, it being understood that extension i^6 is always against head S^2, except when the switch-arms are drawn onto the test-circuit contacts t and t', when the relative positions of extension i^6 and head S^2 will be shown in Fig. 2, in which position spring S^6 will be under increased tension, and upon releasing the switch-arms from the test-circuit contacts by disengaging detent i^2 the switch-arms will be drawn onto the local-circuit contacts l and l' by spring S^6, whereupon extension i^6 will abut against head S^2. The spring S^6 is of such strength that it will not stretch when head S^2 is forced backward. Thus the switch-arms will be drawn backward as stud S is pushed inward. Spring S^6 also serves as a yielding connection between head S^2 and the switch-arms when the box is pulled and the door closed again, as hereinafter explained. The switch-arms are locked against cutting out the box while a signal is being transmitted by detent K, which is moved into the path of a projection K′ on bridge i. This detent is connected with lever J by connecting-rod J^2. Lever J is pivoted at x, and when the signal mechanism is idle projections J′ on main wheel G will be in the position shown—that is, one of them engaging the lever and tilting same and withdrawing the detent K from the path of projection K′, whereupon the switch-arms are free to move to cut out the signal mechanism. When, however, the box is pulled and wheel G begins to revolve, the projection J′, engaging lever J, will be removed from engagement therewith, whereupon spring J^3 will force lever J downward and place detent K in the path of projection K′ and prevents the switch-arms being removed from the local-circuit contacts onto the short-circuit contacts. The closing of the door after pulling the box forces stud S inward, and as the switch-arms are held by detent K spring S^6 will be stretched. Thus a yielding connection between head S^2 and the switch-arms is provided, and in addition to this, spring S^6 being under tension, it will act with springs S^3 to move the switch-arms onto the short-circuit contacts when detent K is removed. Main wheel G is designed to make a half-revolution while a signal is being transmitted and therefore is provided with two projections J′. If the wheel is designed to make a whole revolution, it will be provided with one projection J′ or with more than two projections should it be designed to make less than a half-revolution.

The circuit when the box is in its normal condition—*i. e*, when the door of the outer box is closed and no signal is being transmitted—is as follows: line-wire 1 to terminal a, switch-arm s to contact-plate c, wire 3 to contact-plate c', switch-arm s' to terminal a', and line-wire 2, in which condition the signal mechanism is cut out of circuit.

When the door of the outer box is opened and the circuit is in condition for transmitting a signal, or while a signal is being transmitted, the circuit will be as follows: line-wire 1 to terminal a, switch-arm s to contact-plate l, wire 5 to one of the contact-pens I through break-wheel H to the other contact-pen I, wire 6 to the non-interfering magnet F, wires 10 and 7 to the bell-magnet E, wire 8 to contact l', switch-arm s' to terminal a', and line-wire 2.

When testing, the circuit to the bell-magnet will be as follows: line-wire 1 to terminal a, switch-arm s to contact t, wires 9 and 7 to the bell-magnet E, wire 8 to contact l', switch-arm s' to terminal a', and line-wire 2.

The circuit to the contact-pens and non-interfering magnet will be as follows: line-wire 1 to terminal a, switch-arm s to contact-plate t, wires 9 and 10 to the non-interfering magnet F, wire 6 to one contact-pen I through the break-wheel H and the other contact-pen I to wire 5, to contact-plate l, wire 4 to contact-plate t', switch-arm s' to terminal a', and line-wire 2.

What I claim is—

1. In a signal box wherein the non-interference and bell magnets and contact pens are included in a local circuit, the combination

of a double pole switch, two of the contacts of which are connected with the terminals of said local circuit, two other of said contacts being short circuited, a spring pressed plunger released by the opening of the box door for moving the switch arms of said switch into contact with the former contacts, a detent for locking said switch arms in such position upon the starting of the signaling mechanism, and being withdrawn from engagement with the switch arms upon the stopping of the signaling mechanism, and a yielding connection between said spring pressed plunger and said switch arms, whereby the outer box door can be closed during the operation of the signal mechanism without shifting the switch arms, substantially as set forth.

2. In a signal box wherein the non-interference and bell magnets and contact pens are included in a local circuit, the combination of a double pole switch, two of the contacts of which are connected with the terminals of said local circuit, two other of said contacts being short circuited, a spring pressed plunger released by the opening of the box door, a stop on said plunger engaging with said switch arms for moving them into contact with the former contacts, a detent for locking said switch arms in such position upon the starting of the signaling mechanism and being withdrawn from engagement with the switch arms upon the stopping of the signaling mechanism, and a spring connecting said spring pressed plunger with said switch arms, whereby when the outer door is closed during the operation of the signaling mechanism said spring pressed plunger will be forced inwardly so as to put said spring under tension, so that when said detent is withdrawn said spring will retract the switch arms, substantially as set forth.

3. In a signal box wherein the non-interference and bell magnets and contact pens are included in a local circuit, a switch normally cutting the local circuit out of the line, a spring pressed plunger released by the opening of the box door, a stop on said plunger engaging with said switch for throwing the local circuit into the line, a detent for locking said switch in such position upon the starting of the signaling mechanism and being withdrawn from engagement therewith upon the stopping of the signaling mechanism, and a spring connecting said spring pressed plunger with said switch, whereby when the outer door is closed during the operation of the signaling mechanism, said spring pressed plunger will be forced inwardly so as to put said spring under tension, so that when said detent is withdrawn, said spring will operate the switch to cut out the local circuit, substantially as set forth.

4. In a signal box, the combination with the break wheel, non-interfering magnet, and a door operated plunger controlling the armature of the non-interfering magnet, of a switch having independent short circuit and local circuit contacts, a door operated plunger controlling the movement of said switch independently of the non-interfering plunger, and a detent moved into the path of the switch when the box is started and withdrawn by the wheel movement as it stops, substantially as set forth.

5. The combination with a signal box, of a switch having local-circuit, short-circuit and test-circuit contacts, and switch arms for making contact with said contacts, said arms being moved onto the local-circuit contacts upon the opening of the door, onto the test-circuit contacts by hand, and onto the short-circuit contacts upon the closing of the door, substantially as set forth.

6. In a signal-box, the combination with the inclosed signal mechanism, of a switch located in the box, external to the case of the signal mechanism, local and short-circuit contacts carried by said switch, and a movable element to said switch operated jointly by the closing of the door and by the signal mechanism, which acts upon said switch by a connection extending through the case of the signal mechanism, substantially as set forth.

7. The combination of a signal box, of a switch having local-circuit, short-circuit and test-circuit contacts, switch arms for making contact with said contacts, a spring-pressed stud connected with said switch arms and adapted to be engaged by the door to move the switch arms onto the short-circuit contacts, said spring-pressed stud adapted to move the switch arms onto the local-circuit contacts upon opening the door, and a handle connected with said switch arms for moving them onto the test-circuit contacts, substantially as set forth.

8. The combination of a signal box, of a switch having local-circuit, short-circuit and test-circuit contacts, switch arms for making contact with said contacts, a spring-pressed stud connected with said switch arms and adapted to be engaged by the door to move the switch arms onto the short-circuit contacts, said spring-pressed stud moving the switch arms onto the local circuit contacts upon opening the door, a handle connected with said switch arms for moving them onto the test-circuit contacts, a detent for retaining said switch arms on the test-circuit contacts, and a spring for returning said switch arms to the local-circuit contacts upon disengaging said detent, substantially as set forth.

9. In a signal box, the combination with a switch having independent local-circuit, short-circuit and test-circuit contacts and switch arms for making contact with said contacts, of a detent, means for moving said detent in the path of said switch arms after they are moved onto the local-circuit contacts and maintaining the switch arms in that position during the transmission of a signal, and means operated by the wheel-movement

for withdrawing said detent, as the wheel-movement comes to rest permitting the shifting of the switch arms from the local-circuit contacts, substantially as set forth.

10. The combination with a signal box, of a switch D having local-circuit, short-circuit and test-circuit contacts, switch arms, spring-pressed stud S and spring S^6, and detent K connected with lever J, substantially as set forth.

This specification signed and witnessed this 24th day of January, 1894.

NATHAN H. SUREN.

Witnesses:
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GEO. B. CRONK.