

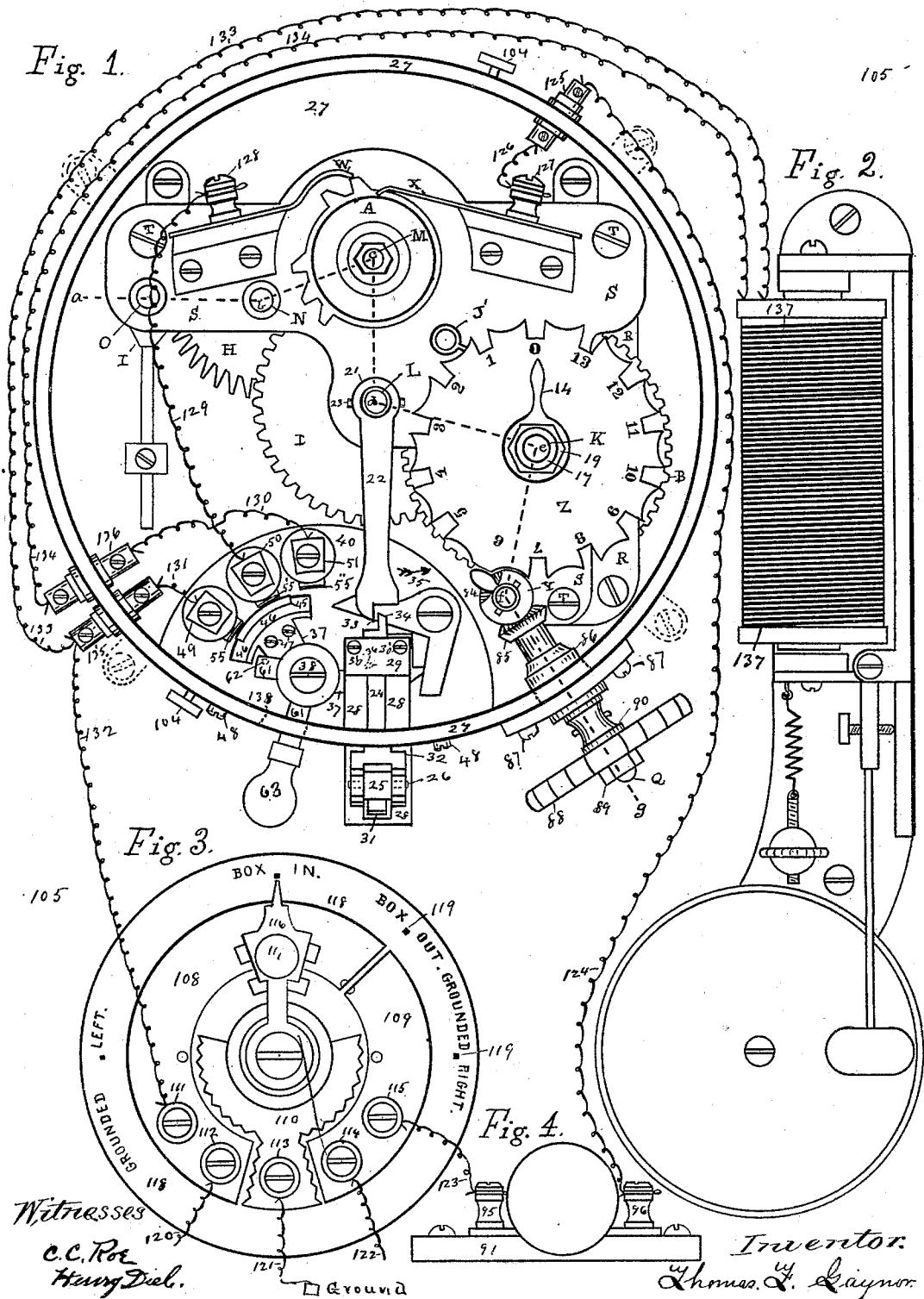
(No Model.)

3 Sheets—Sheet 1.

T. F. GAYNOR.
ELECTRICAL SIGNAL BOX.

No. 466,604.

Patented Jan. 5, 1892.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

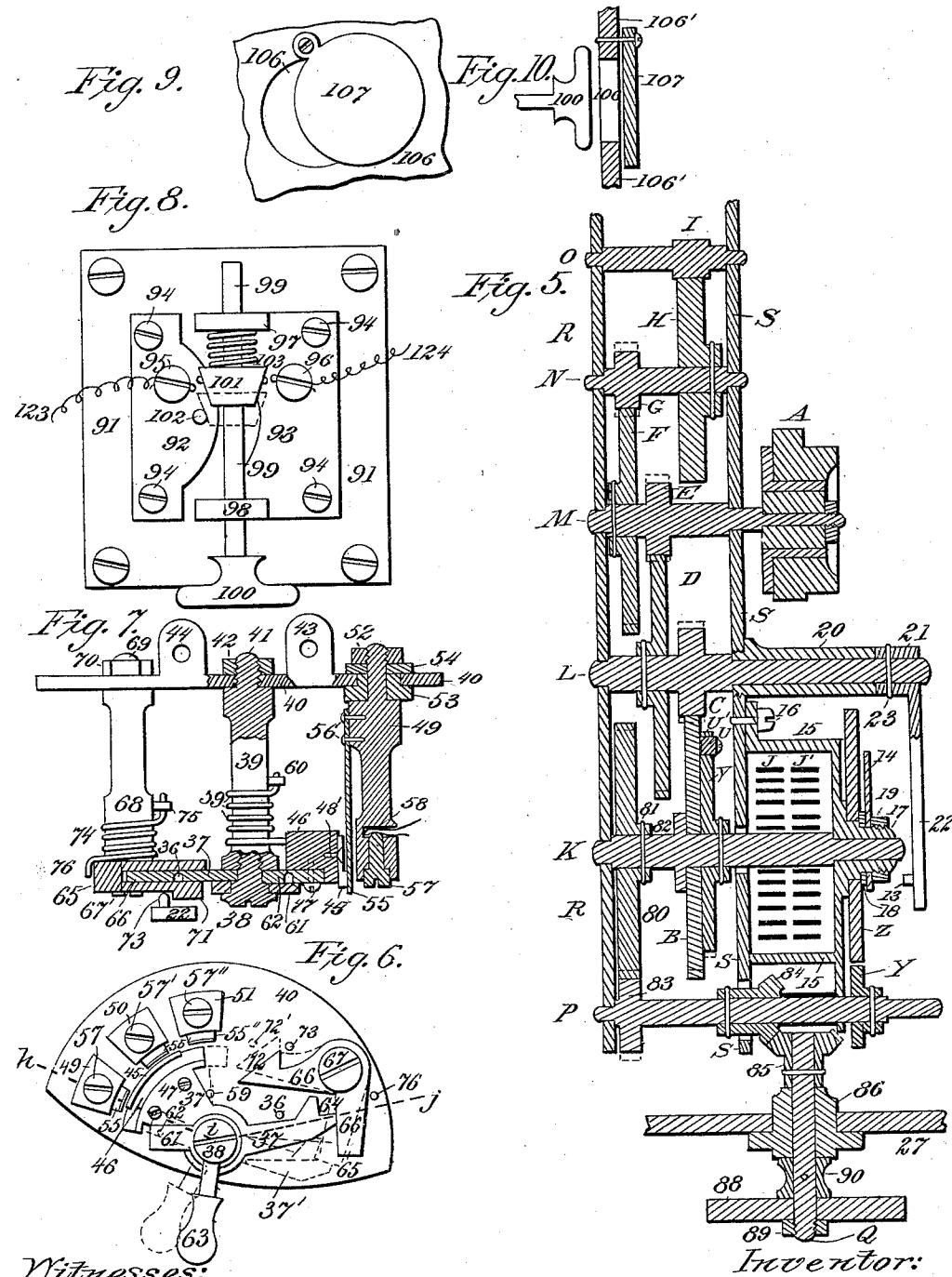
(No Model.)

3 Sheets—Sheet 2.

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Witnesses:

W. D. Harrington
W. W. Morrissey.

Inventor:

(No Model.)

3 Sheets—Sheet 3.

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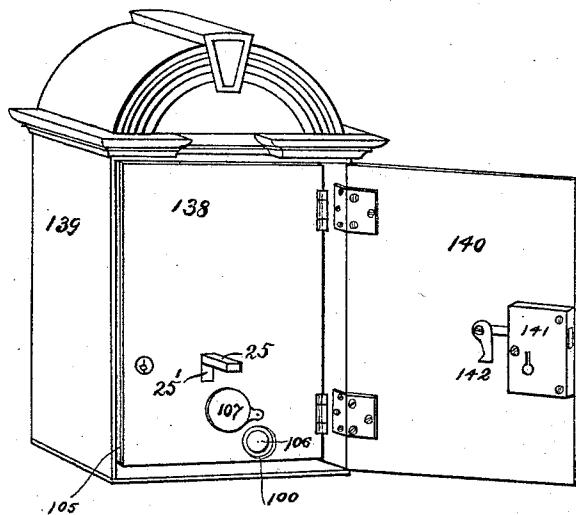


Fig. 11.

WITNESSES.

E. H. Stephens

T. P. O'Brien

INVENTOR.

T. F. Gaynor

UNITED STATES PATENT OFFICE.

THOMAS F. GAYNOR, OF LOUISVILLE, KENTUCKY, ASSIGNOR TO THE GAYNOR ELECTRIC COMPANY, OF SAME PLACE.

ELECTRICAL SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 466,604, dated January 5, 1892.

Application filed January 23, 1888. Serial No. 261,635. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. GAYNOR, of Louisville, county of Jefferson, State of Kentucky, have invented new and useful Improvements in Electric Signal-Boxes, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates more particularly to that class of signal-boxes which are used for fire-alarm service.

The object of my invention is to provide a means for shunting the electric current which the circuit-wheel mechanism of the box breaks in giving signals into the electro-magnetic bell-magnets which are usually placed in boxes of this class and which are normally out of circuit and to do this shunting without necessitating the opening of the box-door.

The object of my invention is, further, to arrange the shunt mechanism in such proximity to the circuit-wheel mechanism that by the action of the detent-lever in its revolution upon its axis during the time the circuit-wheel mechanism is giving a round of signals the bell-magnets shall be cut out of circuit upon the completion of the alarm.

The object, further, is to arrange this shunt mechanism in such close proximity to the clock-work mechanism as will admit of its being inclosed within the cylindrical box which usually increases the clock-work mechanism without necessitating the increase in size of the said box.

The invention further consists in providing means by which the bell-magnets can be brought into circuit temporarily, if desired, for independent signal purposes without operating the circuit-wheel mechanism and without opening the inclosing box.

The invention further consists in making all the connections (both electrical and mechanical) with the important mechanism inclosed within the cylindrical box in such a manner as to control the operation of its various parts from the outside of the box without necessitating the opening of the box at any time, (except for purposes of adjustment or repair,) that the mechanism may be protected from injury or derangement by dust

or other substances, which are liable to enter boxes that must be opened to reach the mechanism for ordinary purposes of operation, winding, and the like.

My object further consists in providing a winding mechanism for the spring which moves the circuit-wheel clock-work, which shall be permanently affixed thereto, so that the necessity of the lineman having to carry a special key to wind the spring is avoided.

The invention will be more fully understood from the following particular description in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a signal-box provided with my improvements, the front cover of the cylindrical box being removed. Fig. 2 is a front elevation of an electro-magnetic bell of well-known construction. Fig. 3 is a front elevation of an improved electric switch, fully described in my application for United States Letters Patent for an improvement in electric switches, Serial No. 261,636, of even date herewith. Fig. 4 is a front elevation of an electric circuit breaker or key having my improvements. Fig. 5 is a section of Fig. 1 through line *a b c d e f g*, looking upward from the bottom. Fig. 6 is a front elevation of the shunt mechanism, the detent-lever being removed. Fig. 7 is a sectional view of Fig. 6 in a reversed position through line *h i j*. Fig. 8 is a top view of Fig. 4. Fig. 9 is a front view of a part of a door of a box in which the entire mechanism is inclosed, showing part of the hole through which the circuit-breaker can be manipulated without opening the door. Fig. 10 is a side view of Fig. 9, showing part of the door in section through the hole. Fig. 11 is a perspective view of the box, showing the inner and outer door.

Similar letters or figures refer to similar parts in the several drawings.

In Figs. 1 and 2, *A* represents a circuit-breaking wheel of ordinary construction, which is controlled in its revolution by the train of wheels *B, C, D, E, F, G*, and *H* and the pallet *I*, which train is driven through shafts *K L M N O* by the two springs *J J'*, as seen in section in Fig. 5. *R* and *S* represent the

frame-plates which support the mechanism. These plates are held in position by pillars, which are not shown, the screws T T T of which, however, may be seen in Fig. 1. U 5 represents a ratchet affixed to wheel B, and V represents a ratchet-wheel, which allows the spring J J' to be wound up without causing the train to move around, all of which is similar to other clock-trains of this class. 10 Hence a more detailed description of these parts will be omitted.

In Fig. 1, W and X represent the contact-springs which close the circuit through circuit-wheel A. Y and Z represent an improved stop mechanism having an index 14 and index characters shown by the numerals 0 1 2 3, &c., which prevents the spring from being overstrained in winding, and which also shows the number of alarms given since the 15 spring was wound up last, all of which is more fully described in my application for United States Letters Patent for an improvement in stop mechanism for trains of wheel-work, Serial No. 261,634, of even date herewith, and 20 to which reference may be had. 15 represents a cylindrical cover which incloses the springs J J'. It is affixed to the frame-plate S by means of screws, one of which is shown at 16 in Fig. 5. The front part of this cover 25 extends forward in the form of a hollow hub 17, upon which the stop-wheel Z is pivoted, outside of which is a washer 18 and index 14, the whole held in position by nut 19, screwed upon the end of the hub 17. The shaft L is 30 extended through a sleeve 20, which is screwed into plate S, and through the hub 21 of detent-arm 22, to which it is firmly attached by pin 23. 35 24 represents a trigger which prevents the detent-arm 22, with its shaft L, from revolving until released by the depression of the tripping-lever 25, to which it is pivoted by the pivot 26, Fig. 1. The action and office of this 40 detent-arm and the tripping-lever are substantially the same as described in my United 45 States Letters Patents for improvements in fire-alarm telegraphy and fire-alarm signals, Nos. 335,026 and 335,027, bearing date of January 26, 1886, to which reference may be had, the only difference being the interposition of 50 the trigger 24 to reach the end of the detent-lever 22 within the case 27 from the outside of said case and without coming through its cover, which is not shown. The trigger 24 slides vertically upon a back support 28, which 55 is attached to the under surface of the outside of the case 27 by means of screws, which are not shown. The trigger 24 and its support 28 extend through the side wall of the case 27, being closely fitted in a hole or slot through the 60 side of the case, which hole or slot is of the same shape as the cross-section of the trigger 24 and its support 28. The upper end of the trigger is held in position and guided in its vertical movement by a guide or yoke 29, which is attached to support 28 by means of screws 30 65 30'. Its lower end is enlarged into a yoke, which straddles the tripping-lever 25, the end

of which is seen, and through both of which the pin 26 is fitted, as already described. This connection guides the lower end of the 70 trigger 24. A spring, the end of which is seen at 31, keeps the tripping-lever 25 up and the trigger 24 against the outside of the case 27 by reason of the shoulders 32 coming in contact therewith, this being the normal position of the trigger 24. As a consequence, the detent-arm 22 is prevented from revolving with its shaft L by its end 33 coming in contact with the trigger end 34 until the tripping-lever 25 is depressed in the act of giving 80 a signal, when the detent-arm 22, being no longer held by the end 34 of the trigger 24, which is depressed with the tripping-lever 25, allows the circuit-wheel mechanism to operate, the detent-arm moving in the direction 85 shown by the arrow 35. This depression of the tripping-lever is only for a few moments, when the trigger again assumes the position shown, so that when the detent-arm makes its complete revolution during the transmission of the alarm it is stopped by the trigger again, thus preventing the giving of more than one round of signals until the tripping-lever is again depressed for the purpose of giving another alarm, when the operation 90 above described is repeated. In the back of the trigger a pin 36 is inserted, which is shown in the detail, Figs. 6 and 7. The back of the support 28 is cut away to allow this pin to pass through it and to come in contact with 100 the shunt-lever 37. This lever is pivoted upon the screw 38, which is screwed into the pillar 39, which is attached to the base-plate 40 by means of a threaded end 41, having a nut 42 thereon. This base-plate 40 is affixed to the inside of the case 27 by means of screws 48, which fit in the holes 43 and 44. The large end of the shunt-lever 37 is provided with an insulated circuit-closer 45, which is insulated by means of the block of 105 hard rubber 46, which is secured upon the lever 37 by means of screws 47, (shown in Figs. 1, 6, and 7,) and to which the circuit-closer 45 is attached by screw 48'. 49, 50, and 51 represent terminal binding-posts attached to 110 base 40 by means of threaded ends having nuts, one of which is shown at 52 in Fig. 7. The threaded ends of each of these posts 49 50 51 pass through hard-rubber bushings and washers, one of each being shown at 53 and 115 54, by which the posts are insulated from base 40. Each of these posts is provided with a contact-spring 55, 55', or 55'', which presses against the circuit-closer 45 when the latter is opposite it. These springs are 120 riveted to the back part of the posts, as shown at 56, Fig. 7. Each post is provided with a binding-screw 57, which binds the wire, which is inserted in a hole 58, Fig. 7. The pillar 39 has a spring 59 around it, one end 125 of which is hooked around a pin 60 in the pillar 39, the other end hooking against the upper edge of the lever 37. The tension of this spring keeps the lever 37 normally in 130

the position shown in Figs. 1 and 6, thus closing the circuit through posts 49 and 50. 61 represents a bell-crank lever pivoted upon an enlarged portion of the screw 38 and having 5 upon one end a pin 62, which impinges against the lower edge of lever 37, the other end being extended through a hole in the side of the case 27, Fig. 1, and having a handle of hard rubber 63 thereon. The hole in the case through which 10 the handle part of this lever is fitted is wide enough to allow a side movement equal to that required to move the lever 37 to the position indicated by the dotted lines in Fig. 6, which movement brings the circuit-closer 45 in contact with the spring 55" of post 51 and clears 15 the spring 55 of posts 49, thus establishing circuit through posts 50 and 51. The depression of trigger 24, with its pin 36 impinging against the upper edge of lever 37, causes the latter to move around upon its pivot-screw 38 far enough to permit the end 64 to clear the 20 end 65 of a locking-lever 66, which is in contact therewith. This depression simply causes the circuit-breaker 45 to move around in the 25 direction in which lever 61 causes it to move but a little farther or sufficiently to allow the end 65 of lock-lever 66 to move against the shoulder shown upon the end 64 of the lever 37. The further movement of lever 37 is arrested by the limited movement of trigger 24 and by its edge 37' abutting against the inner surface of case 27. Lock-lever 66 is of a 30 bell-crank shape, being pivoted upon screw 67, which screws into pillar 68, which in turn 35 is affixed to base 40 by threaded end 69 and nut 70. The upper end of lever 66 is thicker than the other parts, as seen at 71, Fig. 7. It has a beveled face 72, against which a pin 73 in the detent-lever impinges as the lever 22 40 completes its revolution with its shaft L in giving an alarm. This sliding of pin 73 against face 72 of lever 66 causes it to be depressed, which throws the lower end 65 away from end 64 of lever 37 when the latter assumes the 45 normal position, as shown by the full lines in the drawings. The lever 66 is thrown against the shoulder of lever 37 at 64 by the tension of spring 74 around pillar 68, one end of which is hooked around pin 75 in pillar 68, the other 50 end 76 being hooked over lever 65, as seen at 76. The dotted lines show the position of lever 66 when the lever 37 is locked down by the end 65 of lever 66 after the tripping-lever 55 has been pulled to give an alarm. 72' represents the position of pin 73 when about to impinge against the beveled face 72 of lever 66, which by depressing will release lever 37 and allow the latter to assume its normal position by the action of its spring 59.

60 In Figs. 1 and 5 is shown an arrangement of parts by which the springs J J' can be wound up from the outside of the case 27. The shaft K is provided with a toothed wheel 80, firmly attached thereto by means of a pin 81 through its hub 82. This wheel engages with a pinion-wheel 83, forming part of shaft P. 84 represents a bevel-gear pinned upon shaft P, which

engages with another similar bevel-gear 85, which is pinned upon shaft or stem Q. This shaft or stem Q is fitted to a sleeve 86, which extends through a hole in the case 27, and is firmly attached thereto by screws 87. Upon the outer end of this shaft or stem a hand-wheel or winding-key 88 is fitted and secured by means of a nut 89. 90 represents a bushing pinned upon shaft Q. Near the front end of shaft P a stop-wheel Y is pinned, which engages with index-wheel Z. By this construction of the parts it will be seen that the turning of the hand-wheel or winding-key 88 causes shaft P to turn through bevel-gears 84 and 85, and the shaft K is revolved through pinion 83 and wheel 80, and the springs J J' are wound up. The revolution of shaft P also causes the stop-wheel Y 85 to operate index-wheel Z, thus preventing the overstraining of the springs J J'. The shaft P being geared to shaft K positively, as the clock-train runs down the stop-wheel Y turns the index-wheel Z in the opposite direction, 90 thus showing the number of alarms given since winding on the index mechanism. The ratchet-wheel V and ratchet U, attached to wheel B, allow the free winding up of the shaft K without moving the clock-train; but 95 when the winding is complete the energy of the springs is imparted to the wheel B, which runs the train through the ratchet U and ratchet-wheel V in the manner of ordinary clock-work trains. U' represents the end of 100 the ratchet-spring.

Figs. 4 and 8 represent a circuit breaker or key, in which 91 represents a base of hard rubber, to which terminal plates 92 and 93 are secured by screws 94 94, each plate having a 105 binding-post 95 96 attached thereto. Plate 93 has two vertical lugs 97 98, having round holes, through which the round rod 99 is loosely fitted, so that it may slide endwise. The front end has a hard-rubber push-button 110 100 attached thereto. Between the lugs 97 98 a conical sleeve 101 is pinned upon the rod 99 in such a position as to come in contact with a terminal post 102 upon plate 92 when pushed forward by a spring 103 between the 115 sleeve 101 and the lug 97, and being around the rod 99, which keeps it in position. When the button 100 is pushed inwardly to the position shown by the full lines in Fig. 8, the contact between the sleeve 101 and the terminal 102 is broken, thus breaking the circuit, which is made again when the rod is let free, which causes the sleeve to come in contact with the post, as shown by the dotted lines, having been pushed forward by the 120 spring 103.

Figs. 9 and 10 represent parts of the hinged door of a common inside iron case in a fire-alarm box, which is not otherwise shown. In this class of signal-boxes it is customary to 130 inclose the more delicate mechanism in an inner cylindrical box, of which a front elevation is shown by 27 in Fig. 1, the cover being removed. The cover is usually of glass and

held in its place by means of a ring, which is secured to the case by a fastening of the well-known bayonet principle, the studs being shown at 104. This whole case is inclosed in 5 another iron box, which may be similar in front outline to the marginal line 105 in Sheet 1 of the drawings, and having hinged thereto a door of ordinary shape and construction. This whole box is inclosed by a third or out- 10 side box, which is the only one visible when the apparatus is in position and in service. When the outside box-door is opened, the inside box is visible, but its door remains locked with the tripping lever or hook (which is the 15 part manipulated in giving an alarm) projecting through a hole in it. It sometimes happens that a lineman, in examining a signal-box, accidentally trips the lever and sends in an alarm, calling out the fire department 20 before he has time to unlock the inner door and countermand the signal. The hole 106 in Figs. 9 and 10 is for the purpose of enabling him to instantly insert his finger and push the button 100, thus breaking the circuit and stopping the transmission of the 25 alarm, and to give independent or countermanding signals or to recall the department. 107 represents a shield to keep the hole covered when not in use.

30 Fig. 3 represents an improved switch having terminal plates 108 and 109, a ground-plate 110, to which ground-wire 121 is attached, binding-posts 111 112 113 114 115, and an index-circuit closer 116, having a handle 117, the 35 whole mounted upon the base 118, having index characters 119, as printed, all of which is fully described in my application for United States Letters Patent for an improvement in electric switches, Serial No. 261,636, of even 40 date herewith, to which reference may be had.

Fig. 2 represents an electro-magnetic bell of ordinary construction. The mechanism, as shown, is for a closed circuit. The circuit, when the mechanism is at rest, is from line-wire 120 to post 112, to plate 108, to post 111, to post 135, to post 49, to spring 55, to circuit-breaker 45, to spring 55', to post 50, to wire 129, to post 128, to contact-spring W, to wheel A, to contact-spring X, to post 127, to wire 126, to post 125, to wire 124, to post 96, to plate 93, (see Fig. 8,) to lugs 97 98, to rod 99, to sleeve 101, when closed, as shown by the dotted line, to terminal 102, to plate 92, to post 95, to wire 123, to post 115, to plate 109, to post 114, to line-wire 122. It will thus be seen that the bell-magnets 137 in Fig. 2 are normally out of circuit, and are therefore not liable to injury by lightning, nor do they offer any resistance to the main circuit. When the trigger 24 is 55 depressed by the action of the tripping-lever 25 in giving an alarm, the lever 37 is moved around by the action of pin 36 in such a manner as to cause the circuit-breaker 45 to leave spring 55 of post 49 and its other end to make 60 connection with spring 55' of post 51, while the other end 64 is depressed, so as to allow the end 65 of lever 66 to engage with the

shoulder at 64, in which position it will remain locked until the pin 73 of detent-arm 22 throws it out again at the end of its revolution by sliding upon the beveled face 72 of the upper end of the lever 66, when the levers 37 and 66 will again assume their normal position. While the lever 37 is thus locked, however, the bell-magnets will be in circuit, 75 as will be seen by following the circuit, which is from line-wire 120 to post 112, to plate 108, to post 111, to wire 132, to post 135, to wire 133, (wire 131 being open at spring 55,) to bell-magnets 137, to wire 134, to post 136, to wire 130, to post 51, to spring 55", to circuit-breaker 45, to spring 55', to post 50, to wire 129, to post 128, to contact-spring W, to wheel A, to contact-spring X, to post 127, to wire 126, to post 125, to wire 124, to post 96, to plate 93, 80 to lugs 97 98, to rod 99, to sleeve 101, to post 102, (see dotted lines, Fig. 8,) to plate 92, to post 95, to wire 123, to post 115, to plate 109, to post 114, to line-wire 122, thus establishing a circuit through the bell-magnets 137. By 85 pressing the handle 63 of lever 61 to the left the same circuit is established through the bell-magnets, as just described; but the lever 37 is not locked in that position, and is kept there only while the handle 63 is held in position. The lever 61, coming against the end of the hole or slot 138 before the end 64 of lever 37 is sufficiently depressed to allow the end 65 of lever 66 to engage with the shoulder of lever 37 at 64, prevents the locking of the 90 lever 37 in permanent position, as is the case when the trigger 24 is depressed, as already described. The practical results attained by this arrangement are: First. The bell-magnets are automatically brought into circuit and 95 caused to give signals on the bell when an alarm is being transmitted, and taken in connection with my fire-alarm-box lock for which United States Letters Patent were granted me bearing date of January 26, 1886, and 100 No. 335,025, it allows of the shunting in of the bell-magnets whether the alarm-box door is opened or not, as in that device the action of the key alone turns in the alarm regardless of the opening of the door. This lock is seen 105 at 141 in Fig. 11 in the act of unlocking the door 140. A key causes the trigger 142 to depress the tripping-lever 25, thus setting the box mechanism into operation, as already described. Second. Upon the completion of the 110 sounding of the alarm the bell-magnets are automatically cut out of circuit again, and remain in that state until thrown into circuit again by the action of the signaling mechanism. Third. When the inner door of the box 115 is opened, a person can throw the bell-magnets in or out of circuit by means of the handle 63, enabling him to hear his signals to the central office sounded upon the bell, and also the answering-signals from the central office, 120 and when he has finished signaling and releases the handle the bell-magnets are again automatically cut out of circuit. Fourth. The 125 entire shunt mechanism being adjacent to

the circuit-wheel mechanism or train admits of being inclosed in the cylindrical case therewith without requiring any material increase in size of said case and permits the increase in size of said case and permits the increasing of the device within the case 27.

5 By the aid of the winding shaft or stem Q, with its hand wheel or key 88, a person can wind up the springs J J', when necessary, without removing the cover of the case 27 and without having to provide and carry a special key for that purpose. The index mechanism shows at sight whether the springs need winding or not and the number of alarms, if any have been given since last winding.

15 The circuit-breaker 101 in Fig. 8 gives a firm wedging electrical contact, and the hole 106 through the door 106' enables a lineman to promptly signal a countermand in case of an accidental alarm, and also to communicate 20 from the box with headquarters by independent signals.

The switch device, Fig. 3, enables a person to promptly make the various connections necessary in fire-alarm telegraphy and indicates clearly the connection made by the registering index and characters with which it is provided.

25 By the term "winding-key" I mean an instrument that is held by the fingers in winding up the springs or weights in the mechanism, substantially the same as an ordinary clock-winding key, or similar to the button upon the end of the winding-stem of the modern stem-winding watch, as distinguished from 30 the winding-levers of that class of electric call-boxes in which the winding of the spring is done when signals are about to be given and in which the lever when let go permits the train to run down while giving the signals.

40 I claim—

1. The combination of the terminals 55 55'

55", the circuit-closer 45, provided with the tension-spring 59, the lever 61, adapted to control the movement of the circuit-closer and being provided with a handle 63 and a 45 tripping-trigger 24, also adapted to control the circuit-closer and being provided with a tripping-lever 25, substantially as described.

2. The combination of the terminals 55 55' 55", the pivoted circuit-closer 45, provided 50 with a tension-spring 59, a tripping-trigger 24, adapted to control the movement of said circuit-closer and being provided with a tripping-lever 25, by which its own movements may be controlled, a pivoted locking-lever 66, 55 adapted to lock said circuit-closer in permanent position with reference to the terminals and being provided with a beveled face 72 on its upper end and having a tension-spring 74, adapted to bring it to its normal position, and 60 the detent-lever 22, connected with the circuit-wheel train, provided with the pin 73, which is adapted to depress the locking-lever when it comes in contact therewith, and thereby cause the release of the circuit-closer in the 65 manner set forth, substantially as described.

3. In combination with the circuit-wheel train of an electric signal-box, a winding-shaft P, provided with the bevel-gear 84, and the winding-stem Q, having the bevel-gear 85, 70 adapted to engage with the gear 84, being provided at its outer end with a winding-key 88, the stop-wheel Y, secured upon the shaft P, and the index-wheel Z, with which the stop-wheel Y is adapted to engage and being provided with the index 14, substantially as described. 75

THOMAS F. GAYNOR.

Witnesses:

T. F. O'BRIEN,
L. S. DAY.