(No Model.) 2 Sheets—Sheet 1.

H. THAU.

ELECTRICAL SIGNALING APPARATUS.

No. 335,852. Patented Feb. 9, 1886.

Fig. 1.

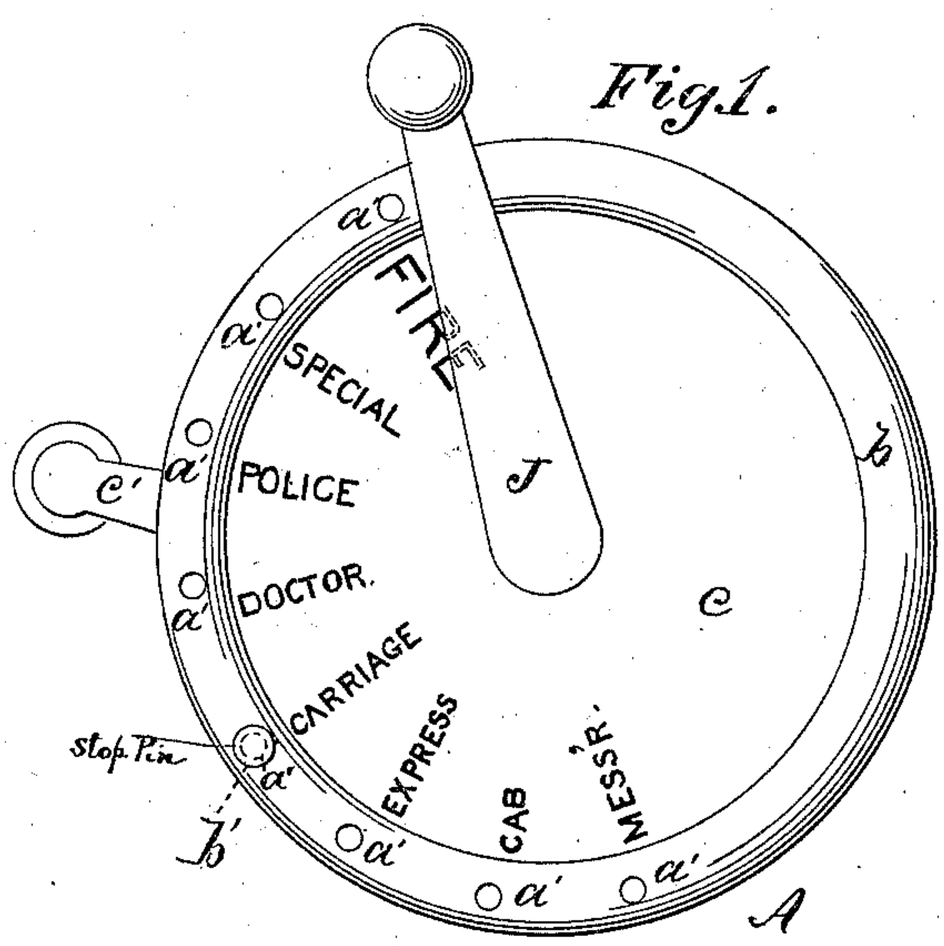
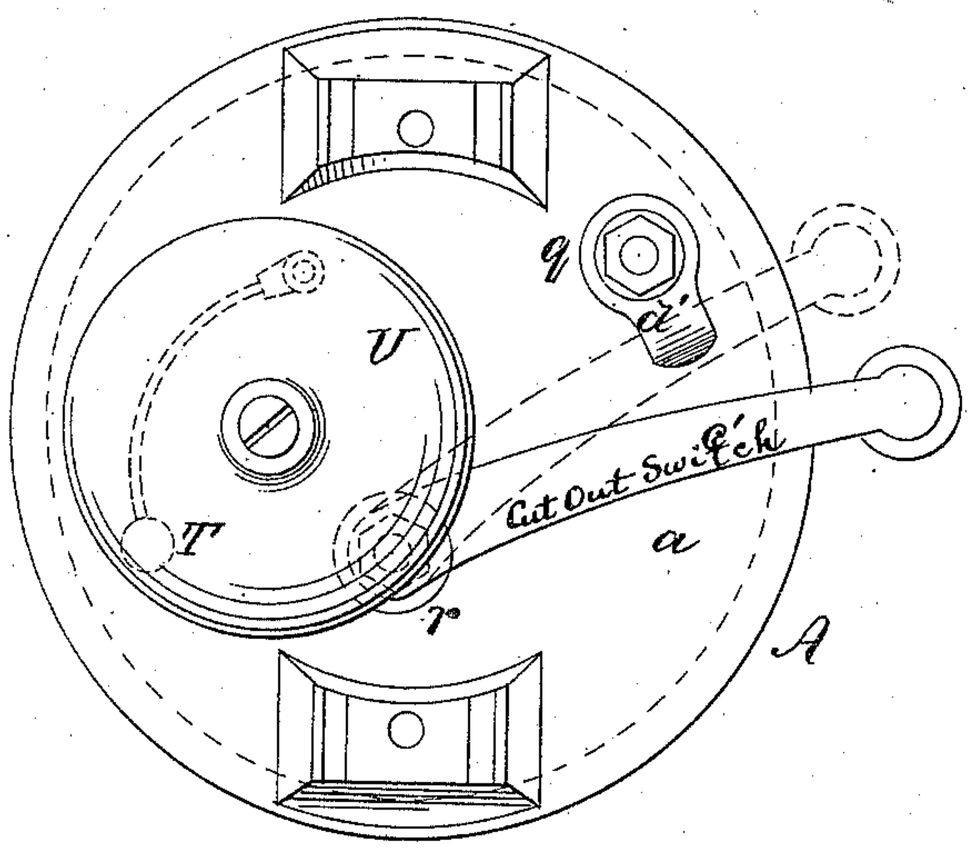


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

H. THAU.

ELECTRICAL SIGNALING APPARATUS.

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Fig. 3.

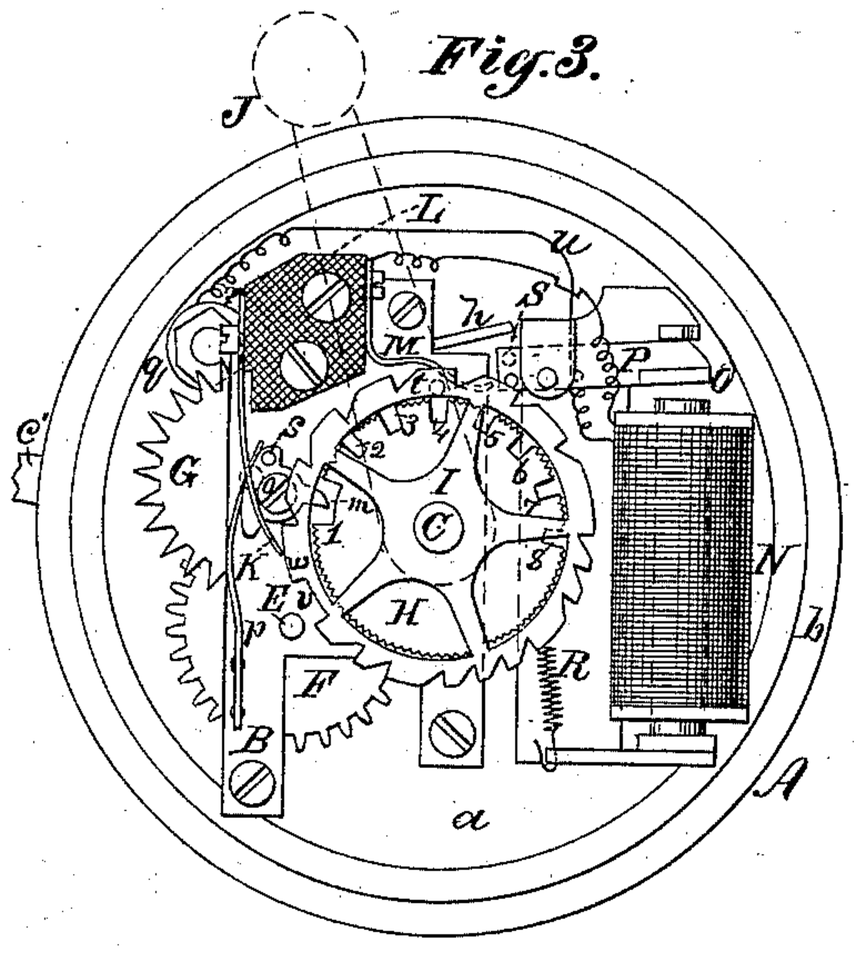


Fig. 4.

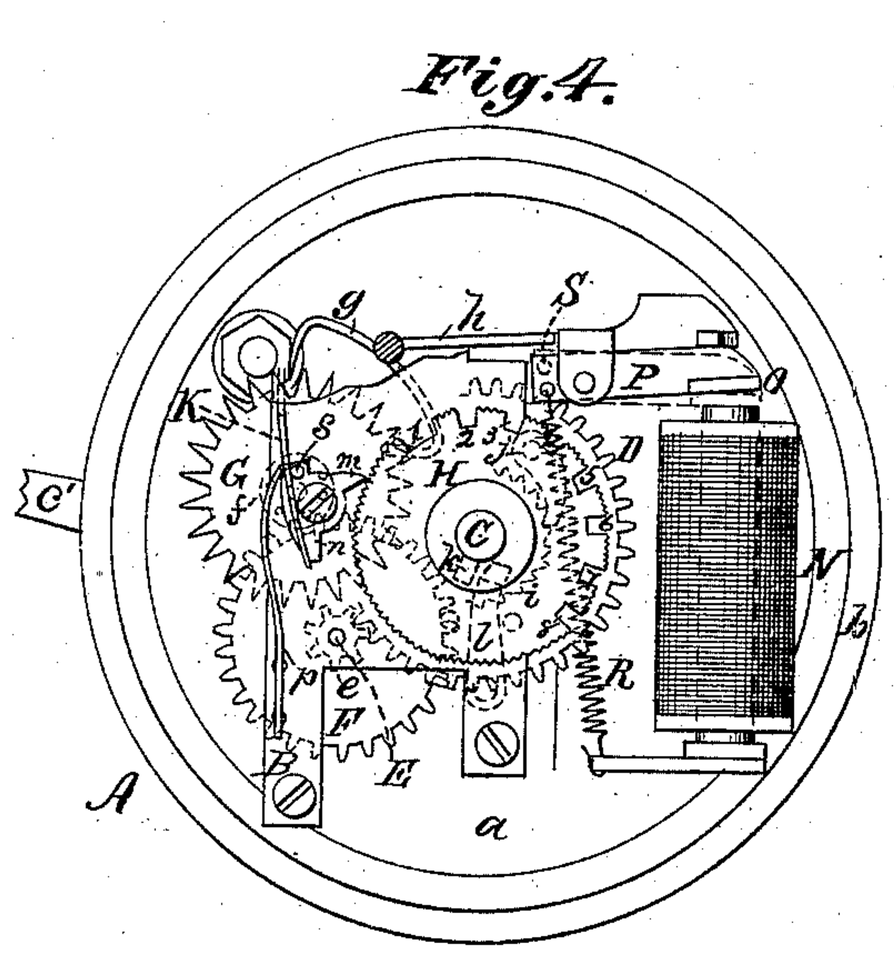


Fig. 5.

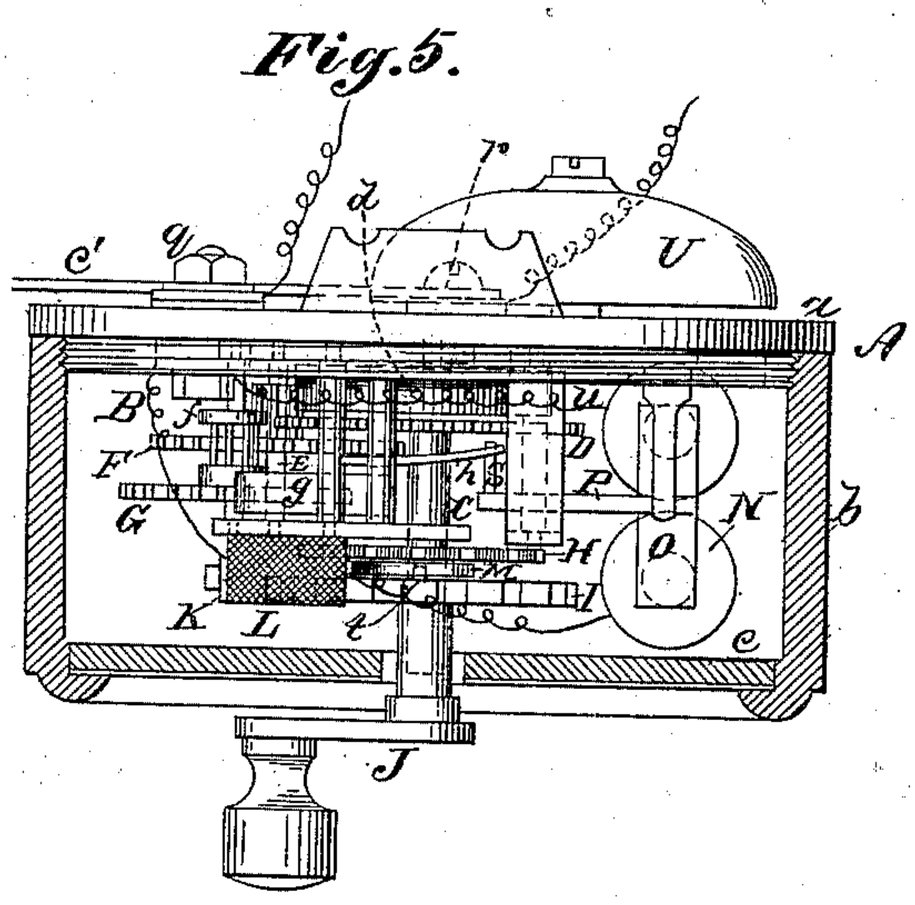


Fig. 6.

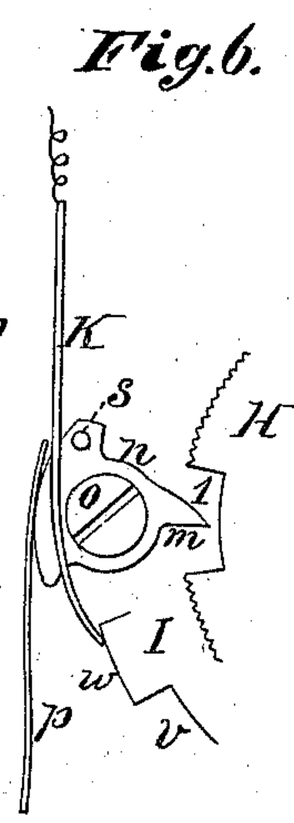


Fig. 7.

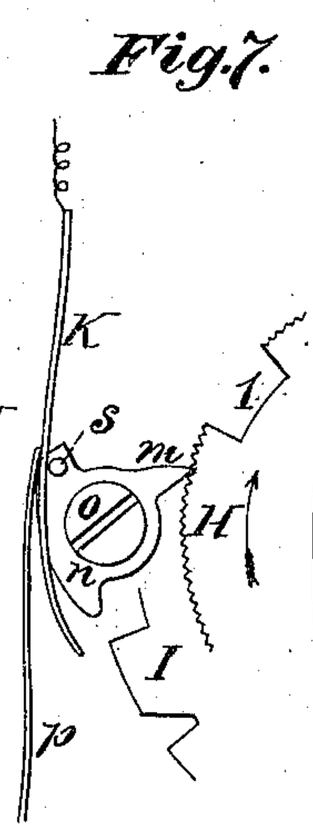
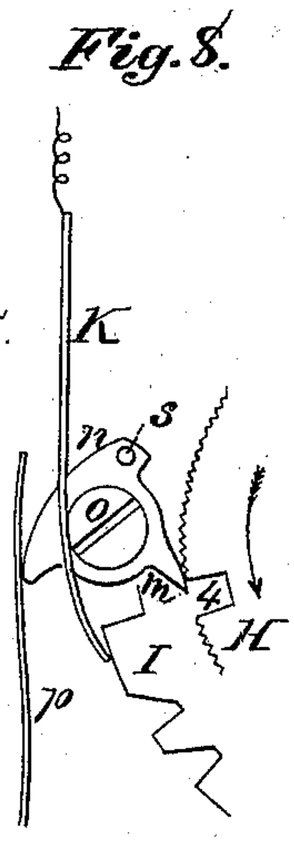


Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY THAU, OF NEW YORK, N. Y.

ELECTRICAL SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 335,852, dated February 9, 1886.

Application filed February 12, 1884. Serial No. 120,459. (No model.)

To all whom it may concern:

Be it known that I, HENRY THAU, a citizen of the United States, residing in New York city, in the county and State of New York, have invented a new and Improved Electrical Signaling Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings, forming a part of this specification.

My invention relates to the class of apparatus employed in sending a number of different electric signals automatically from a single signal-box; and it consists of a ratchet-wheel mounted on the same shaft with the break-wheel, and having deep notches corresponding in position with the beginning of every complete signal, the said notches being of sufficient depth to admit of the turning therein of the point of the pawl engaging the ratchet-wheel, the pawl being arranged to engage the ratchet-wheel and prevent retrograde movement of the break-wheel except at the beginning of every signal.

My invention further consists in forming the pawl on a three-arm lever, and inserting in one of the arms thereof a pin for lifting the contact-spring from the break-wheel when the break-wheel and ratchet-wheel are moved forward preparatory to sending a signal.

It also further consists in an electro-magnetic stop arranged in an auxiliary circuit under control of a contact carried by the break-wheel and capable of arresting the motion of the motor-train just before the break-wheel has completed its return movement, to enable the central-office operator to release the motor-train by momentarily breaking the circuit, and thus notify the sender of the signal that his signal has been received.

It also consists in combining with the binding-posts of the signal-box a switch, by which the signaling apparatus may be cut out of the circuit when it is desired to return the signal to its point of rest without signaling after having moved it forward to send a signal.

Figure 1 is a front elevation of my improved signal-box. Fig. 2 is a rear elevation. Fig. 3 is a front elevation with the dial removed. Fig. 4 is a front elevation with the dial and break-wheel removed, and portions broken away to show the internal parts. Fig. 5 is a plan view partly in section, and Figs. 6, 7, and 8 show three positions of the pawl, ratchet-wheel, break-wheel, and contact-spring.

In the different figures of the drawings, the same parts are designated by the same letters of reference.

The casing A, preferably of insulating material, and composed of a back, *a*, rim *b*, and front *c*, contains a spring-motor, B, having an arbor, C, provided with an actuating-spring, *d*, and carrying the first wheel, D. The wheel D engages a pinion, *e*, on the arbor E, and this arbor carries the wheel F, which meshes into a pinion, *f*, on the arbor of the scape-wheel G. Pallets *g*, pivoted in the frame of the motor, and carrying the vibratory arm *h*, engage the teeth of the scape-wheel G. A ratchet, *i*, (shown in dotted lines) is secured to the arbor C and engaged by a pawl, *j*, also shown in dotted lines, on the first wheel, D. A stop-pin, *k*, projects from the arbor C in position to engage a stop-arm, *l*, pivoted to the inner surface of the motor-frame between two pins. The stop-pin *k*, when turned in one direction, carries the stop-arm *l* against one of the pins which limit its motion, and when the said stop-pin is moved in the opposite direction it carries the stop-arm against the other pin. This arrangement allows the arbor C to make one complete revolution in either direction, but no more.

To the arbor C are secured a mutilated ratchet-wheel, H, and break-wheel I within the casing A, and to the outer end of the said arbor C outside of the front *c*, is secured the crank J, by which the arbor is turned.

A pawl, *m*, formed on a three-arm lever, *n*, turning on the pivot *o*, is capable of always engaging the teeth of the ratchet-wheel H, excepting when it drops into one of the deep notches 1 2 3 4 5 6 7 8, formed in the wheel. These notches are arranged in relation to the signals given by the break-wheel I, so that one of the notches will come under the pawl *m* at the end of every forward movement of the break-wheel I necessary to complete one signal, and the teeth of the ratchet-wheel H will be engaged by the pawl *m* at all other times, so that the spring *d*, which is wound by every forward movement of the crank J, can-

not return the ratchet-wheel and break-wheel to the point of starting and thus send in an incomplete signal.

When the ratchet-wheel H is at the point of rest, the pawl *m* projects into notch 1, where it is held by a spring, *p*, which presses upon the flat side of the three-arm lever *n* and tends to retain the pawl in a central position, as shown in Fig. 6. When the pawl is in this position, the contact-spring K rests upon the contact *w* of the break-wheel I, and the electric circuit is complete from the line to the binding-post *q* to the spring K, from the said spring to the break-wheel I, from the break-wheel through the frame of the motor B to the binding-post *r*, back to the line.

When the instrument is in a state of rest, the pawl *m*, forming one of the arms of the three-armed lever *n*, is held in the middle of the notch 1 of the ratchet-wheel H by the spring *p*, and the contact-spring K rests upon the contact-surface *w* of the break-wheel I, and the signaling-circuit is completed through the said spring K and the break-wheel I.

When it is desired to send a signal, the break-wheel I and ratchet-wheel H are turned forward in the direction indicated by the arrow in Fig. 7, and the engagement of the ratchet-wheel H with the pawl *m* lifts the pawl from the notch 1, bringing it into engagement with the serrated edge of the said ratchet-wheel, and turns the three-armed lever *n* on its pivot, bringing the pin *s*, carried by the lever *n*, into engagement with the spring K, lifting the said spring from the contact-surface *w* of the break-wheel I, first completing the circuit through the frame of the spring-motor, the lever *n*, pin *s*, and spring K, before breaking contact between the spring K and the break-wheel I, to prevent the interruption of the circuit and the sending of any signal to the central office. The contact-spring K being raised from the periphery of the break-wheel I in the manner described, permits of turning the said break-wheel forward without catching upon the end of the said spring, and without in any way affecting the current. The forward movement of the ratchet-wheel H and break-wheel I is continued until the point is reached, which will enable the return movement of the break-wheel I to send in the required signal. The pawl *m* during this time rides upon the periphery of the ratchet-wheel H until it drops into that notch of the said ratchet-wheel which is located opposite the end of the series of contact-surfaces on the break-wheel I which are required to send in the signal during the return of the ratchet-wheel H and the break-wheel I to their original position. When the pawl *m* drops into the notch which determines the signal in the manner described, the lever *n* being turned on its pivot by the spring *p*, the pin *s* is withdrawn from the contact-spring K, and the said contact-spring is allowed to touch the periphery of the break-wheel I on the contact-surface, which first completes the circuit and sends the first electrical impulse of the signal to be given.

When the ratchet-wheel H and break-wheel I are released by the operator and allowed to return to their original position by the action of the spring-motor under the control of the escapement, the pawl *m* rides upon the periphery of the ratchet-wheel H, as shown in Fig. 8, and the several contact-surfaces of the break-wheel I required to produce the desired signal, are brought successively under the contact-spring K, making the required number of contacts and interruptions in the circuit necessary to send in the signal.

If the ratchet-wheel H and break-wheel I should be stopped at any time during the forward movement while the pawl *m* rests upon the periphery of the ratchet-wheel H, the said ratchet-wheel would be retained by the engagement of the pawl with the smaller notches or serrations in its periphery, and would prevent the spring-motor from returning the ratchet-wheel and break-wheel to their original position. By this construction I insure the sending in to the central office of complete signals only.

The contact-spring K is secured to a block, L, of insulating material, supported by the motor-frame; and to the same block, but disconnected from the spring K, is attached a contact-spring, M, which communicates electrically with the electro-magnet N, and is supported in the path of a pin, *t*, projecting from the rear face of the break-wheel I. The pin *t* and the spring M are located relative to the notch V in the break-wheel I, so that the circuit will be completed through the break-wheel I, pin *t*, spring M, and magnet N, back to the binding-post *q* through the wire *u*, while the spring K is passing over the notch V in the break-wheel I, and before the spring K touches the contact-surface *w* of the said break-wheel, upon which the circuit is finally closed after sending a signal. This diversion of the current through the magnet N by the means already described draws down its armature O, moving its lever P against the tension of a retractile spring, R, and brings a pin, S, carried by the armature-lever, against the vibratory arm *h* of the escapement, arresting the movement of the spring-motor. The circuit remains closed through the magnet N, and the spring-motor is prevented from further action until an attendant at the central office momentarily opens the circuit, when the armature O of the magnet N will be released and the motor will be permitted to complete the return of the ratchet-wheel H and break-wheel I, when the noise of the escapement will serve to notify the sender of the signal that his signal has been received at the central office.

As an additional means of making the return-signal audible, a bell-hammer, T, is attached to the shaft of the armature-lever P, in position to strike a bell, U, secured to the back of the call-box. Upon the front *c* of the casing A, and underneath the crank J, is formed

a dial, upon which are indicated in appropriate characters the various calls capable of being made by the call-box, and in the rim *b* of the casing are formed holes *a'*, opposite the names of the various calls, for receiving a pin, *b'*, for limiting the movement of the crank when it is turned back preparatory to sending a signal.

Should any mistake be made in turning the crank J—that is, should it be turned so far that on its return to the point of starting, after being released by the operator, it would give the wrong signal—the signaling apparatus may be cut out of the line-circuit by moving a switch-arm, *c'*, pivoted on the binding-post *r*, so that it will touch an ear, *d'*, projecting from the binding-post *q*, so that the current will traverse the switch-arm, while the crank J is allowed to move back without sending a signal.

I have explained one way of operating the contact-spring, and of preventing the sending of false signals; but it is obvious that the same results may be accomplished by means of clutches and cams in lieu of the pawl and mutilated ratchet-wheel. Therefore I do not limit or confine my invention to the exact form herein shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the break-wheel of a signal-box, of a mutilated ratchet-wheel and a pawl engaging therewith for preventing the return of the break-wheel to the point of starting, except from the beginning of a complete signal, when the pawl is reversed and the ratchet-wheel allowed to escape, as described.

2. In an electrical signaling apparatus, the combination, with the break-wheel and spring contacting therewith, of a notched wheel having deep and shallow notches and pawl-lever operated thereby, as specified, whereby the contact-spring is lifted from the contact-wheel by the engagement of the notched wheel with the pawl-lever when the said wheel is turned preparatory to sending a signal.

3. In an electrical signaling apparatus, a break-wheel for sending a series of signals, a ratchet-wheel provided with two sets of notches, one deep set corresponding to the beginning of each signal represented by the break-wheel, a pawl-lever capable of engaging the shallow notches of ratchet-wheel and of being turned by the deep notches of the ratchet-wheel, and a contact-spring touching the break-wheel and capable of being lifted therefrom by the eccentric-pawl lever when the pawl falls into a deep notch, all combined and operating as specified.

4. In an electrical signaling apparatus, the combination, with the escapement, of an electro-magnet in a normally-open branch and a break-wheel provided with a pin to close said branch on reaching a fixed point of its revolution, thus energizing the magnet stopping the signaling mechanism, as specified.

5. The combination, with the break-wheel I and escapement of the spring-motor, of the pin *t*, contact-spring M, electro-magnet N, and the electrical connections whereby an electric current may be sent through the said magnet while the current in the signaling-circuit is broken by the break-wheel, as specified.

6. In electrical signaling apparatus, the combination, with the crank J and casing A, having formed in it holes *a'*, opposite the names of the calls, of a pin, *b'*, placed in any one of the said holes, as may be required, for limiting the motion of the said crank, as specified.

7. The combination, with the arbor C, of the stop-pin *k*, stop-arm *l*, pivoted to the motor-frame, and two pins for limiting the motion of the stop-arm, as described.

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