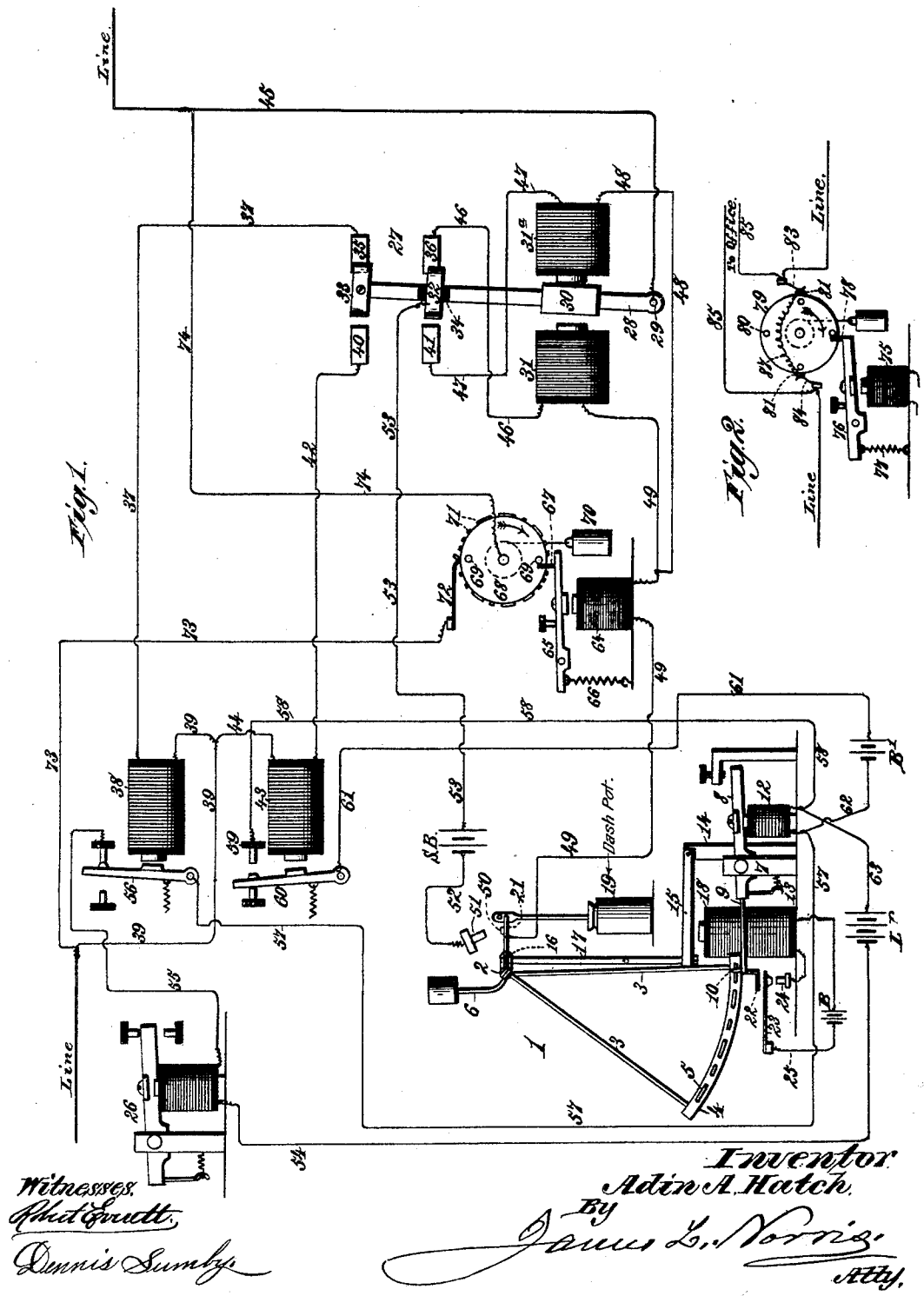
(No Model.)

A. A. HATCH.

ELECTRICAL SIGNALING APPARATUS.

No. 435,893. Patented Sept. 2, 1890.



UNITED STATES PATENT OFFICE.

ADIN A. HATCH, OF KANSAS CITY, MISSOURI, ASSIGNOR TO BENJAMIN F. JONES, EDWARD L. MARTIN, AND ALFRED W. JONES, ALL OF SAME PLACE.

ELECTRICAL SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 435,893, dated September 2, 1890.

Application filed November 20, 1889. Serial No. 330,948. (No model.)

To all whom it may concern:

Be it known that I, ADIN A. HATCH, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Attachments for Electrical Signaling Apparatus, of which the following is a specification.

My invention relates particularly to electrical apparatus the object of which is to automatically cut out of circuit any one of a series of individual signal-receiving instruments located on a telegraphic or analogous electrical signaling-line.

Its further object is to combine with apparatus of this type a responding signaling device located at each receiving-station which shall automatically signal back to other stations an indication that the apparatus has been cut out or the signal correctly received.

I accomplish these objects by the use of the apparatus hereinafter described, but particularly pointed out in the claims which follow this specification.

In order that my invention may be clearly understood, reference is had to the accompanying drawings in connection with the following specification, which is a clear and exact description of the manner of making and using the apparatus hereinafter claimed.

Figure 1 is a diagrammatic view showing one apparatus complete at one station. Fig. 2 is a modified form of the cut-out mechanism proper.

In the drawings, Fig. 1, the line is shown as entering and departing from a single apparatus, it being understood that at outlying stations and at the station shown there are supposed to be transmitters of any preferred form—such, for instance, as Morse keys—and that a main-line transmitting-battery is located on some point on the line; or that the signaling-transmitters which operate the apparatus to be hereinafter described may be of the well-known type shown in my prior patent, No. 403,104, granted on the 14th day of May, 1889, it being understood that the transmitters shall adapt themselves to the receiving apparatus which controls the cut-out mechanism. Fig. 1 represents such a receiving apparatus, and is not in substance materially unlike the receiver disclosed in the aforesaid patent. I will first describe so much of this receiver as is necessary to convey a clear understanding of its operation in connection with my present improved apparatus.

2 represents a pivoted arm, carrying a curved sector 4 through the agency of sustaining-arms 3 3. On this curved sector is arranged a series of wire loops or eyes 5, in substantially the same manner disclosed in the aforesaid patent.

Above the pivoted sustaining-rod 2 is a weighted arm 6 for advancing the sector, and attached to a short arm 21 at the point 16 is joined a lever 17, loosely secured at its lower end to the armature-lever 15, pivoted to an upright standard 14 in the magnetic field of a restoring-magnet 18. The outer end of the arm 21 has secured to it a dash-rod adapted to play in a dash-pot 19, and this arm contacts an electrical contact-point 51 when the sector 4 is held in its extreme right-hand position under the agency of weight 6.

Secured to the frame-work of the machine is a pair of standards 7, supporting a pivoted armature-lever 8 in the magnetic field of a magnet 12, said armature-lever having a retractile spring 13 for holding it in its extreme upward position, and carrying at one end a rod 9, which is provided with a detent-hook 10, adapted to drop into the loops or eyes 5 as the sector 4 advances, if the prearranged order of dots and dashes be followed in the act of transmitting a signal, and otherwise to fall between said loops when the circuit of magnet 12 is broken and to carry the projecting end 22 into mechanical contact with spring 23, secured to the frame of the machine, and having an electrical point on its free end adapted to contact with a fixed contact 24, thereby closing the local circuit of the battery B through wire 25 and restoring magnet 18, whether this be at the completion of a signal or at any intervening point, in substantially the same manner as is disclosed in a pending application filed by me in the United States Patent Office on the 6th day of January, 1890, Serial No. 335,970. In the aforesaid application I have fully disclosed

and claimed the arrangement of a local circuit not unlike that herein described, embracing battery B, wire 25, magnet 18, spring 23, and contact 24, operated and controlled by an armature-lever carrying a detent-hook adapted to control the movements of the sector 4. I have also disclosed and claimed in said application a series of shunt-circuits for regulating the operation of the magnets 18 and 12. These shunt-circuits are not shown in the present application, because it is not deemed necessary to uselessly encumber the drawings with features which are not especially subservient to the complete operation of the apparatus.

Referring now to Fig. 1 and to the parts in detail thereof, 38 is the main-line relay adapted to control the operation of a local sounder 26. 43 is a substitute relay adapted to cut out the main-line relay with the help of the switch 28, controlled by switch-magnets 31 and 31ª. 64 is a responding-magnet adapted to control the responding-signal. L B is the local-sounder battery, and B′ is a local battery, the function of which is to actuate the magnet 12 and again place the relay 38 in the main-line circuit when it is desired to place the operator at that station in connection with the distant stations.

The several circuits controlling the relays 38 43 and the switch-magnets 31 31ª with the signaling-magnet 12, restoring-magnet 18, and the responding signaling-magnet 64, are indicated by various numbers, as will appear in connection with a description of the operation of the apparatus, which I will now proceed to give. Suppose it is desired to cut out the sounder 26 from some distant station in order that the operator at this station may not hear the message that is to be sent over the line. In this condition of affairs the circuit of the main-line battery (not shown) is closed as follows: By line-wire through wire 39, relay 38, wire 37, contact-point 35, contact 33, switch-lever 28, pivot 29, wire 45, and out to the succeeding stations on the line. The operator at the station from which the message is to be transmitted then causes the particular combination of dots and dashes or of dots, as disclosed in my prior patent and pending application above referred to, to be sent over the line. The armature-lever 56, therefore, of relay 38 opens and closes the circuit of local battery L B in this prearranged sequence of impulses through wire 55, sounder 26, wire 54, wire 63, magnet 12, and wire 57, and the armature-lever 8 therefore is vibrated in accordance with this prearranged order of impulses, and the hook or catch 10 permits the sector 4 to step forward step by step in the loops or eyes 5 until the last loop is reached, when the circuit is left open a brief space of time, sufficient to allow a temporary closure of local batteries S B through the wire 52, contact-points 50 and 51, wire 49, magnet 64, wire 49, switch-magnet 31, wire 46, contact 36, contact 32, insulated from switch-lever 28 by an insulating-block 34, and finally by wire 53 to the other pole of the battery. This causes the armature 30 to tilt the switch-lever 28 in the opposite position, thereby bringing the contact-plates 32 and 33 into contact with the plates 41 and 40, said switch-lever passing its center of gravity before the circuit is broken between 35 and 36, so as to fall by its own weight and make a sure contact with plates 40 and 41. The main-line circuit through relay 38 and wire 37 is thus broken between the contact-plates 33 and 35, and the switch-magnet 31 has its circuit broken between the plates 32 and 36, while a new circuit is formed for the switch-magnet 31ª between the plates 32 and 41, as will be described later, and a new path is made for the main-line circuit by wire 39, wire 44, relay 43, wire 42, contact-plate 40, contact-plate 33, switch-lever 28, pivot 29, and wire 45 out to line. It will thus be seen that inasmuch as relay 38 is absolutely cut out its local sounder is also ineffective. Of course the relay 43, being in the main-line circuit, will receive the signals which would ordinarily come through its companion relay 38, and such signals might be read by an observer by watching armature 60 or its local magnet 12 in the circuit of local battery B′ and circuit-wires 58 and 61; but ordinarily these two magnets should be concealed and their armatures deadened, so that no indication can be had of the signals passing through them. It is of course obvious that any preferred means may be utilized for accomplishing this end.

When it is desired to restore the relay 38, and hence its sounder 26, to their normal conditions, the operator at the distant station, who has previously cut them out, simply causes a repetition of the character signaled to be transmitted over the line, whereupon the relay 43, acting through its armature 60, contact-point 59, and wires 58 and 61, local battery B′, and signal-controlling magnet 12 will cause the swinging sector 4 to close the circuit of battery S B at the completion of its swing, as before, at the points 50 and 51 through the magnets 64 and the opposite switch-magnet 31ª, whereupon the switch-lever 28 will be restored to its former condition. Every time the circuit of battery S B is closed through either of the switch-magnets 31 or 31ª it is also closed through the magnet 64, as I have heretofore indicated, thereby causing its armature-lever 65 to be drawn down, and thereby counteracting the effects of the retractile spring 66, and releasing the detent 67 from its bearing against one of the pins 69 in the signal-wheel 68, on the face of which is placed in Morse characters a prearranged signal in duplicate, so that during each half-revolution of said signal-wheel the resistance of the main-line circuit is varied a definite number of times through the wire 73, brush 72, and signal wheel and wire 74, thereby indicating to the operator who first cut out this station that he had accom-

plished that result, and in a similar manner, after he had again restored it to normal condition, a like announcement to that effect. It will be seen of course that this signal-wheel 68 cannot actually interrupt the main-line circuit, inasmuch as said circuit is always closed through either one or the other of the relays 38 or 43; but inasmuch as the brush 72 is only in contact with the metallic contact-plates 71 of the signal when said contact-plates pass under said brush the resistance of the line is lowered an amount equal to the difference between the low-resistance paths 73 74 and that due to the relays 38 or 43, so that if the transmitting operator is provided with a listening-telephone he can readily detect the back signal when sent in.

In Fig. 2 I have shown a modified form of switch apparatus designed to take the place of switch 28 and its magnets 31 and 31ª, with their necessary connections. In this instance the magnet 75 is in the circuit 49 53 of the local battery S B, and its armature-lever held in its upper position by the spring 77 acts through the detent 78 to withhold the circuit-changing disk 79 from rotation until said detent is drawn forward under the influence of a current from battery S B, when the contact-points 50 and 51 are closed, as hereinbefore described. When this takes place, the disk 79 is caused to rotate one-quarter of a revolution, and at each alternate fourth of its revolution the conductor 87 joins the metallic plates 81 and is brought electrically in circuit with contact-springs 83 and 84, thereby affording a shunt-circuit for the main-line current through the conductor 87, the relay 38 being located in the office-wire 85. An inspection of this figure will reveal the fact that at each quarter of a revolution of the disk 79 the main-line current is automatically thrown first through the office-instruments and then cut out.

I do not limit myself to the specific construction and arrangement of parts herein disclosed for automatically cutting out outlying subscribers or users, nor to the special form of signaling apparatus designed for controlling such outlying apparatus, as I believe I am broadly entitled to claim mechanism for automatically cutting out any one of a series of outlying stations at will, so as to exclude the operator at such station from a knowledge of that which is transpiring over the line. I believe it is also new with me to combine, broadly, mechanism for automatically cutting out and cutting in individual stations and with automatic return-signal mechanism, and I desire it understood that my claims are directed, broadly, to mechanism for accomplishing these functions.

I am aware that return electrical signal devices for indicating the correct transmission and reception of a signal to outlying stations are broadly old in the art, and I make no claim to such devices *per se*.

I am also aware that secret-call devices are old by which any one of a series of outlying operators may be called, to the exclusion of all the other operators having receiving-instruments in the same circuit; but I am not aware that an automatic individual cut-out apparatus has ever yet been devised whereby any operator may cut out or cut in any other operator's receiving-instruments at will, and I believe myself broadly entitled to generic claims for mechanism adapted to serve these ends.

I believe it is also, broadly, new with me to combine an individual signal-receiving instrument which responds only to one of a number of prearranged signals with an automatic return-signal adapted to warn an operator at a distant station that the signal which he has transmitted has been received at the particular station for which it was destined, and to the exclusion of any knowledge of the fact by any other operator than the one intended.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an electrical signal system, a signal-receiving relay located normally in the main line and having local circuit-connections with a local signaling-instrument, in combination with an individual automatic cut-out device located in a local circuit controlled by the same relay and responsive only to a prearranged signal, substantially as described.

2. In an electrical signal system, a receiving-instrument, such as a Morse relay, in combination with a local signaling-instrument controlled by the relay, and an individual automatic electro-magnetic cut-out apparatus having circuit-connections, substantially as described, whereby the relay is automatically cut in or out of circuit for a prearranged signal, substantially as described.

3. In a signal system, a signal-receiver located normally in the main line, an individual signal apparatus responsive only to a special or prearranged signal, an electro-magnetic switch and circuit-connections between the signal receiver, the individual signal apparatus, and the electro-magnetic switch, whereby the signal receiver may be placed in and out of the signal-line circuit at the will of a distant operator, substantially as described.

4. In an individual signal system, a pair of electro-magnetic relays, one of which is normally in the main-line circuit and the other disconnected therefrom, an individual signal-receiving apparatus responsive only to a prearranged signal, an electro-magnetic switch device, and circuit-connections between the individual signal apparatus, the switch device, and the relays, whereby one of said relays is cut out of and the other cut into the main-line circuit, and vice versa, at the will of a distant operator, substantially as described.

5. In a signal system, an electro-magnetic relay normally in the main-line circuit, an individual signal-receiver responsive only to a

prearranged call, and an electro-magnetic switch device with circuit-connections, whereby said relay may be cut out on transmitting said prearranged signal.

6. In an electrical signal system, a signal-receiver, in combination with an automatic return-signal transmitter located in a normally-open shunt around the signal-receiver and a single source of electrical energy which supplies current for both the direct and return signals, substantially as described.

7. In an electrical signal system, a signal-receiving instrument, and an individual call apparatus responsive only to a particular signal, in combination with an automatic mechanically-actuated return-signal transmitter located in a shunt around the individual call apparatus and adapted to indicate that the call has been received, substantially as described.

8. In an electrical signal system, a signal-receiving instrument, an individual call apparatus responsive only to a particular signal, an automatic switch device controlled by the individual call apparatus, and an automatic mechanically-actuated return signal device located in the shunt around the individual call apparatus, substantially as described.

9. In an electrical signal system, a pair of relays, an individual call device, a switch apparatus and a return-signal located in the shunt around the relays, and electrical circuit-connections whereby the relays are alternately cut in and out of the main-line circuit and the fact indicated to a distant operator, substantially as described.

10. An individual signal-receiver responsive only to a particular or special call, in combination with an automatic mechanically-actuated return-signal transmitter located in a shunt around the signal-receiver and local-circuit connections, the whole being arranged for indicating that the signal has been correctly received, substantially as described.

11. An individual signal-receiver provided with mechanism for advancing it step by step to the completion of its phase, in combination with an automatic mechanically-actuated return-signal transmitter located in the shunt around the signal-receiver, having circuit connections with the individual receiving apparatus and the main line, substantially as described, whereby a distant operator is advised of the fact that the special signal has been correctly received, substantially as described.

12. An individual signal-receiver having means of advancing it to the completion of its phase for special signal only, with additional means for restoring it to normal condition either at the end of the phase on the completion of the signal or at any intermediate point if the signal be varied, in combination with an automatic mechanically-actuated return-signal transmitter located in a shunt around the signal-receiver, having electrical connections with the individual apparatus for sending in the return-signal only when the individual signal has been received, substantially as described.

13. An individual signal-receiver having electro-magnetic means for advancing it to the completion of the signal, additional electro-magnetic means for restoring it to normal position, in combination with an automatic mechanically-actuated return-signal transmitter located in a shunt around the signal-receiver, having local-circuit connections with the individual signal-receiver for sending in a return-signal only after the individual signal has been completed, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

A. A. HATCH.

Witnesses:

PERCY B. HILLS,

JAMES A. RUTHERFORD.