J. A. HULIT.

SELECTIVE SIGNALING SYSTEM.

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1,192,064.

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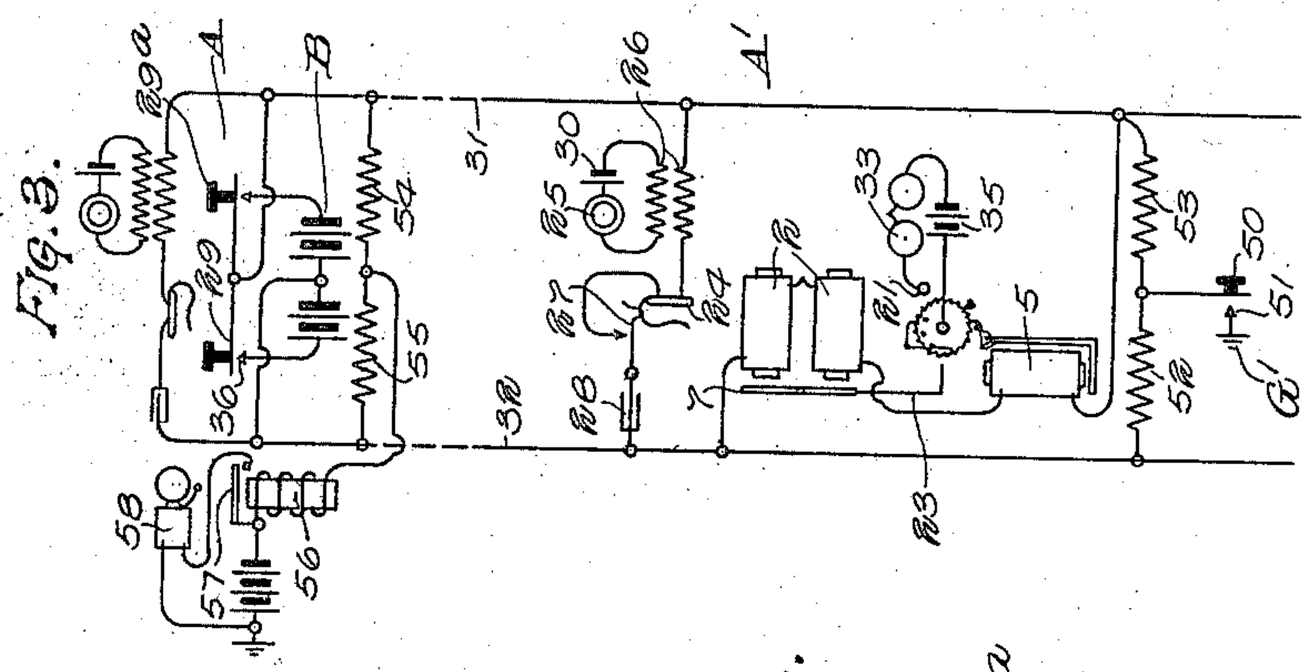

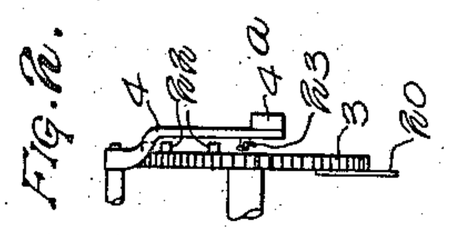

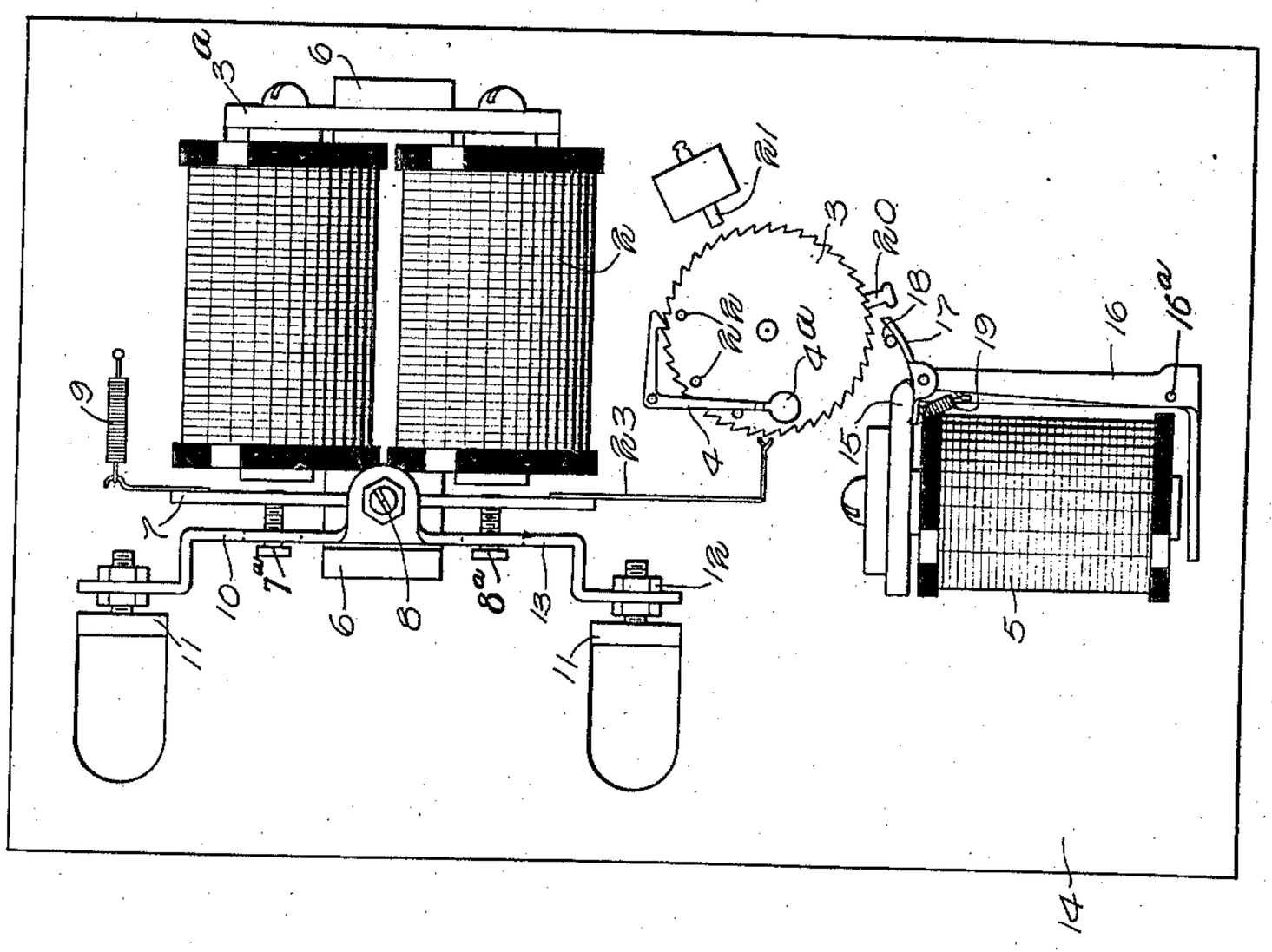

WITNESSES

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SELECTIVE SIGNALING SYSTEM.

1,192,064. Specification of Letters Patent. Patented July 25, 1916.

Application filed October 3, 1912. Serial No. 723,726.

To all whom it may concern:

Be it known that I, JOHN A. HULIT, a citizen of the United States of America, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Selective Signaling Systems, of which the following is a specification.

My invention relates to selective signaling systems, and particularly those systems which are employed for railway telephone train-despatching.

It relates to that type of system in which a plurality of selectors are located on the line at the various stations, and a plurality of series of impulses are transmitted over the line so as to variously operate these selectors, so that the signal at the desired station is operated.

Among the specific objects are to provide a selector which may be operated by impulses of either polarity, but released by an impulse of a single polarity.

A further object of my invention is to provide improved means by which a substation operator can signal the central operator without in any way interfering with the operating impulses.

These and various other objects of my invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of the selector embodying the principles of my invention. Fig. 2 is a detail side view of the ratchet wheel 3, showing its relation to the holding pawl 4. Fig. 3 represents the circuit of the signaling system.

As illustrated, the selector, which is mounted on a suitable base plate 14, comprises among other details a polarized electromagnet comprising the two coils 2 which are securely mounted on a plate 3^a, together with the upper end of the permanent magnet 6, which, of course, is magnetically connected to the cores of said magnet 2. The magnet 2 is provided with an armature 7 pivoted at 8. Attached to one end of said armature is a spring 9 to return said armature to its normal position. Inserted through the armature 7 are two residual screws 7^a and 8^a for the purpose of regulating the air gap between the cores of the magnet and said armature. Secured to the brackets 11 by means of threaded clamping nuts is the support 13, to which is pivoted the armature 7. The electromagnet 5 is provided with an armature 16 pivoted at 16^a to the heel-piece 15 on the end of which is a pawl 17 which is arranged to engage with the ratchet wheel 3 when the armature is attracted by the energization of the magnet 5. At 18 there is a pin which prevents the pawl from engaging with the ratchet wheel against the tension of the spring 19 when the armature is in normal position.

To the under side of the ratchet wheel 3 is attached a projection 20 which is arranged to make contact with a terminal 21 at a given time, so as to close a bell circuit, shown to better advantage in Fig. 2. Attached also to the ratchet wheel 3 are three pins 22 which are there to prevent the release of the selector in a manner that will be explained later. The holding pawl 4 is provided to hold the ratchet wheel 3 in its rotated position.

Having given a general description of the mechanism, I will now trace the circuits and describe how an operator at station A may signal station A′.

A system of the kind herein shown consists of a main or sending station A and a plurality of local stations connected in multiple, one of which local stations is shown at A′ in Fig. 3. As shown herein, the despatching station A has a local battery telephone and a calling mechanism. Any suitable calling device may be used and I have represented the calling device by push buttons 29 and 29^a, whereby the circuit may be opened and closed to send impulses over the line. The local office telephone comprises the usual receiver 24, transmitter 25, induction coil 26, battery 30 and condenser 28. The main battery B is also provided for operating the selectors at the local stations. Each of the local stations comprises, as described herein, a selecting switch and telephone instrument. In order to signal any station its selector must be operated to close the circuit of the bells 33 by the projection 20 coming in contact with one terminal 21 of said bells, the other terminal being connected to the ratchet wheel 3 through a local battery 35. Assuming that the code number of the station required is 1—3—4, the operator at the sending station depresses the button 29 once and then releases it to close and open the circuit through the mag-

nets 2 and 5, which are bridged across the line in series. This circuit extends from the positive side of battery B, conductor 32, through the magnets 2 and 5, conductor 31, contact 36 to negative battery. The current flowing in this direction attracts the armature 7 of the magnet 2 in such manner as to force the arm 23, attached to said armature, away from the ratchet wheel 3. At the same time the magnet 5 energizes to rotate the ratchet wheel 3 one step. The operator now presses the button 29ª momentarily to send one impulse through the magnet 2 in the opposite direction. The flow of current being changed, the armature 7 is attracted to the other core of the magnet 2, and at the same time the magnet 5 energizes again to rotate the ratchet wheel 3 one step. By this time one of the pins 22 on the ratchet wheel has been placed in the path of the crutch arrangement at the end of the arm 23, which is flexible, and they engage. The reason for this will be explained later. The operator now depresses the button 29 three times, thus energizing the magnet 2 so as to throw the arm 23 away from the ratchet wheel 3 and energize the magnet 5 to rotate said wheel three steps. The button 29ª is now pressed once and released to send one impulse through the magnets 2 and 5 in the opposite direction. This operation, as in the previous one, advances the ratchet wheel 3 one more step and attracts the side of the armature 7 to which is attached the arm 23, bringing it into contact with the second pin 22. The push button 29 is now pressed four times and following that the push button 29ª is pressed once, which will bring the third pin 22 into contact with the arm 23. In addition to this, the projection 20 has been rotated around to make contact with the terminal 21, to which is attached the bell circuit. In this way the operator at the local station 134 is signaled. The selectors at each of the local stations are arranged with the pins 22 in accordance with the code numbers assigned to said station. The selectors of all the local stations are operated while impulses are being sent over the line, but those other than the one required are automatically released; for the pins 22 being arranged, as just stated, in accordance with the code number called, in the case of the selectors not required, instead of the arm 23 coming into contact with the pins 22 each time the button 29ª is pressed, there will be at least once when the said arm will miss one of the pins 22 and push against the pawl 4 to disengage it from the ratchet wheel 3. When the button 29ª is released, the magnets 5 and 2 deënergize. The magnet 5, upon deenergizing, immediately withdraws the pawl 17 from the ratchet wheel 3, while the magnet 2, upon deënergizing, permits the holding pawl 4 to drop back into engagement with the ratchet wheel 3. The pawl 4, however, is so balanced as to return to its normal position slowly. There will, therefore, be a short interval of time between the disengagement of the pawl 17 from the ratchet wheel and the restoration of the holding pawl 4. During this time the ratchet wheel will be returned to its normal position by a suitable spring (not shown). After the bell at the substation A′ has been rung a sufficient length of time, or after the signal has been answered, the circuit of said bell is broken by the operator at the main station A by pressing the button 29ª to send an impulse over the line in a direction to attract the side of the armature 7 of the magnet 2 that has attached to it the flexible arm 23 and to energize the magnet 5. Upon the magnet 5 energizing, the ratchet wheel 3 is stepped around once, moving the pin 22 out from the reach of the arm 23, which effects the release of the switch in a manner heretofore explained. Should an operator at one of the local stations wish to signal the operator at the main despatching station, communication is sent over the simplex circuit, illustrated in Fig. 3, by pressing the push button 50, thus closing a circuit from ground G′ through the contact 51, impedance coils 53 and 52 (where the current is divided), conductors 31 and 32, coils 54 and 55 and the relay 56 to battery. Upon the energization of the relay 56 its armature 57 is attracted to close the circuit through the bell 58 to battery.

While I have illustrated and described one specific embodiment of my invention, it is to be understood that I do not wish to be limited to the exact construction shown and described.

What I claim as my invention is:—

1. In a selective signaling system, a selector having means responsive to impulses of one polarity to advance it, said means also responsive to impulses of another polarity, means responding to impulses of but one polarity to release it, and means arranged to at times render said releasing means inoperative.

2. In a selective signaling system, a selector having a neutral operating magnet, a polarized release magnet, means for transmitting a plurality of impulses of one polarity over two sides of a line circuit in series to operate said operating magnet to advance said selector, and means for transmitting an impulse of the opposite polarity over said line circuit to operate said operating magnet to advance said selector and to operate said release magnet.

3. In a selective signaling system, a line circuit, a plurality of selectors, means for transmitting a plurality of impulses of one polarity over said line circuit to advance said selectors, and means for transmitting

an impulse of the reverse polarity over said line circuit to advance certain of said selectors and to release other of said selectors.

4. In a selective signaling system, a line circuit, a plurality of selectors, means for transmitting a plurality of impulses of one polarity over said line circuit to advance said selectors, means for transmitting an impulse of the reverse polarity over said line circuit to advance certain of said selectors and to release other of said selectors, and selective means for determining which selectors are released by said reverse impulse.

5. In a selective signaling system, a line circuit, a plurality of selectors connected to said circuit, an operating and a release magnet for each of said selectors, means for operating said operating magnets to advance said selectors by impulses of either polarity, means for operating said release magnets to release the selectors by an impulse of but one polarity, and selective means for determining which selectors are advanced and which released by said last-mentioned impulse.

6. In a selective signaling system, a line circuit, a plurality of selectors connected to said circuit, an operating and a release magnet for each of said selectors, means for operating said operating magnets to advance said selectors by impulses of either polarity, means for operating said release magnets to release the selectors by an impulse of but one polarity, and selective means dependent upon the number of operating impulses in the previous series for determining which selectors are advanced and which selectors are released by said single impulse.

7. In a selective signaling system, a selector provided with a ratchet wheel, an operating pawl controlled by an electromagnet for advancing said ratchet, a holding pawl for holding said ratchet advanced, a release magnet for disengaging said holding pawl to permit said ratchet to return to normal position, and selective means for preventing said release magnet from releasing said holding pawl.

8. In a selective signaling system, a line circuit, a plurality of selectors connected to said line, each of said selectors comprising a ratchet wheel, a pawl controlled by an operating magnet for advancing said ratchet, a holding pawl for holding said ratchet in advanced position, a release magnet for disengaging said pawl from said ratchet to permit the respective ratchet to return to normal position, means for operating said selectors by a series of impulses of one polarity transmitted over said line circuit, and selective means for releasing certain of said selectors and advancing other of said selectors by an impulse of the opposite polarity, the selectors being released being dependent upon the number of impulses in said first operating series.

9. In a selective signaling system, a line circuit, a plurality of selectors connected to said line, each of said selectors comprising a ratchet wheel, a pawl controlled by an operating magnet for advancing said ratchet, a holding pawl for holding said ratchet in advanced position, a release magnet for disengaging said pawl from said ratchet to permit the respective ratchet to return to normal position, means for operating said selectors by a series of impulses of one polarity transmitted over said line circuit, and selective means for releasing certain of said selectors and advancing other of said selectors by an impulse of the opposite polarity.

10. In a signaling system, a line, an automatic switch for said line, said switch provided with operating devices to establish a circuit comprising an operating magnet, releasing mechanism for restoring the switch comprising a release magnet, impulse sending means for sending impulses of one polarity and impulses of another polarity over the line, said operating magnet responsive to impulses of either polarity for operating the switch and said release magnet responsive to impulses of only one polarity to restore the switch.

11. In a signaling system, a line, an automatic switch associated with said line for controlling a circuit, said switch provided with operating means comprising an operating magnet for operating the switch, said switch comprising also releasing mechanism comprising a release magnet for restoring the switch after operation, means for transmitting a plurality of impulses of one polarity over said line, followed by an impulse of reverse polarity, said operating magnet responsive to all of said impulses to operate the switch, and said release magnet responsive only to the impulses of reverse polarity to restore the switch.

12. In a signaling system, a line, an automatic switch for said line, means for operating said switch comprising an operating magnet, means for releasing said switch comprising a release magnet, said operating and release magnets bridged across the line in series impulse-sending means for transmitting impulses over said line of one polarity and for transmitting impulses over said line of another polarity, said operating means being responsive to impulses of either polarity to operate the switch, said release magnet being responsive to impulses of but one polarity to release the switch.

13. In a signaling system, a line, a selector switch for said line, means for operating said switch comprising an operating magnet, means for releasing said switch comprising a release magnet, said operating and release magnets bridged across the line

in series, said operating magnet being responsive to impulses of either polarity to operate the switch, and said release magnet being responsive to impulses of but one polarity to release the switch, and means for periodically rendering said releasing means non-responsive to said last impulse to release the switch.

14. In a signaling system, a line, a plurality of stations for said line, an automatic switch at each station, another station, impulse transmitting means at said other station for transmitting impulses over two sides of the line in series, each of said switches provided with electromagnetic means for selectively signaling the station therefor, means for releasing said automatic switch, means arranged to at times render said releasing means inoperative, a signal at the impulse transmitting station associated with said line, and means at each station for operating the signal at the transmitting station without affecting the other signals on the line.

15. In a signaling system, a line, a plurality of stations on said line, an automatic switch at each station, an impulse sending station, means for operating said switch by impulses transmitted over two sides of the line in series from said impulse sending station, means for releasing said automatic switch, means to at times render said releasing means inoperative, a pair of resistances bridged across the line at the impulse sending station, a signal connected from a point in said bridge between said resistances to ground, a battery included in said connection, resistances bridged across the line in each one of said switches, and a connection from the mid-point of each of said bridges at each of said switches to ground, a circuit closer in each of said bridges for closing an independent circuit through said signal for operating the same without affecting any signal at any other station.

16. In a signaling system, a line, an automatic switch for said line provided with electromagnetic operating means, impulse sending means associated with said line for sending impulses first of one polarity and then impulses of another polarity, said first means responsive to the impulses of either polarity to operate the switch, said switch provided also with electromagnetic releasing mechanism responsive to but one polarity to release the switch, and means for at times rendering said releasing means non responsive to said last impulses to release the switch.

Signed by me at Chicago, Cook county, Illinois, this 24th day of September, 1912.

JOHN A. HULIT.

Witnesses:
ARTHUR J. RAY,
ALBERT ANDERSON.