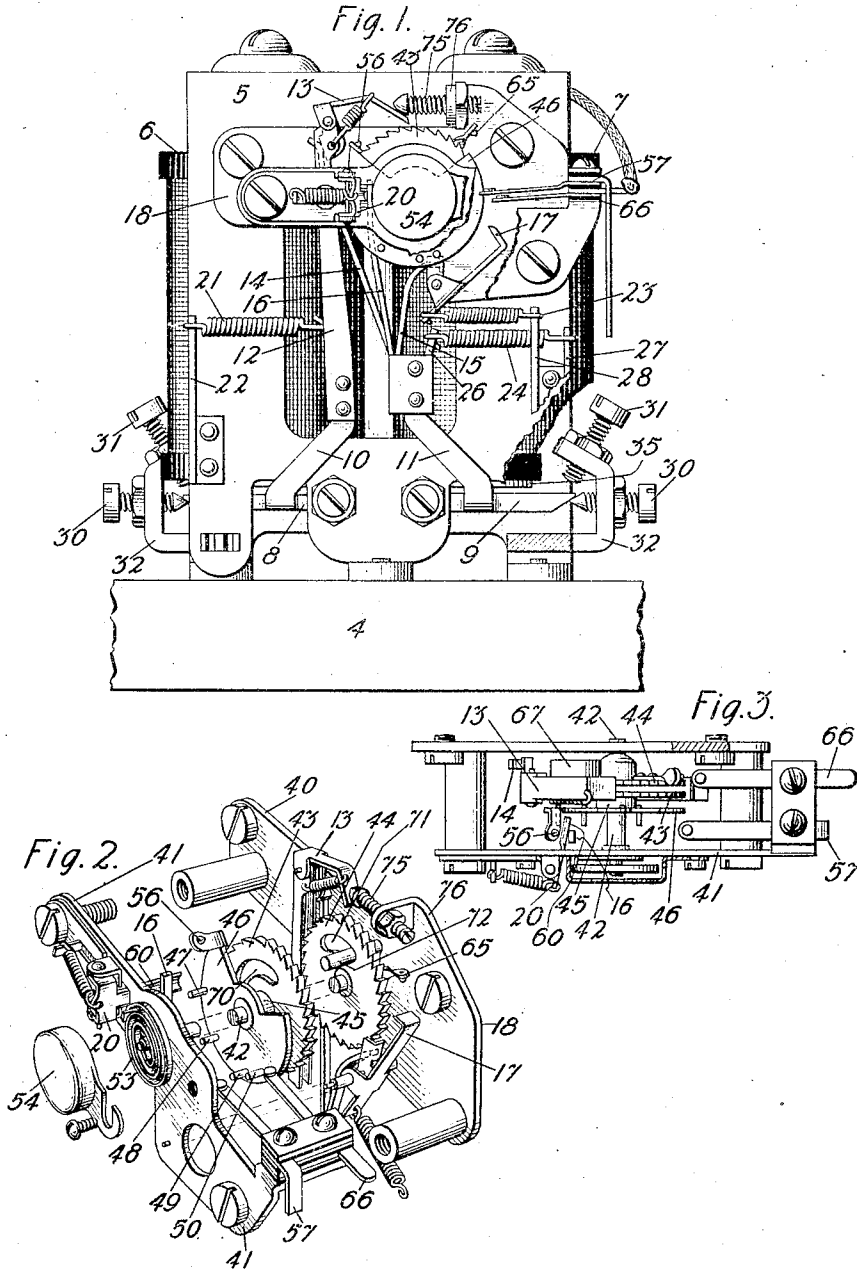


R. N. HILL.
SELECTIVE SIGNALING DEVICE.
APPLICATION FILED AUG. 7, 1912.

1,126,009.

Patented Jan. 26, 1915.

2 SHEETS-SHEET 1.



Witnesses:
Ella Edler
Walter F. Hoffman

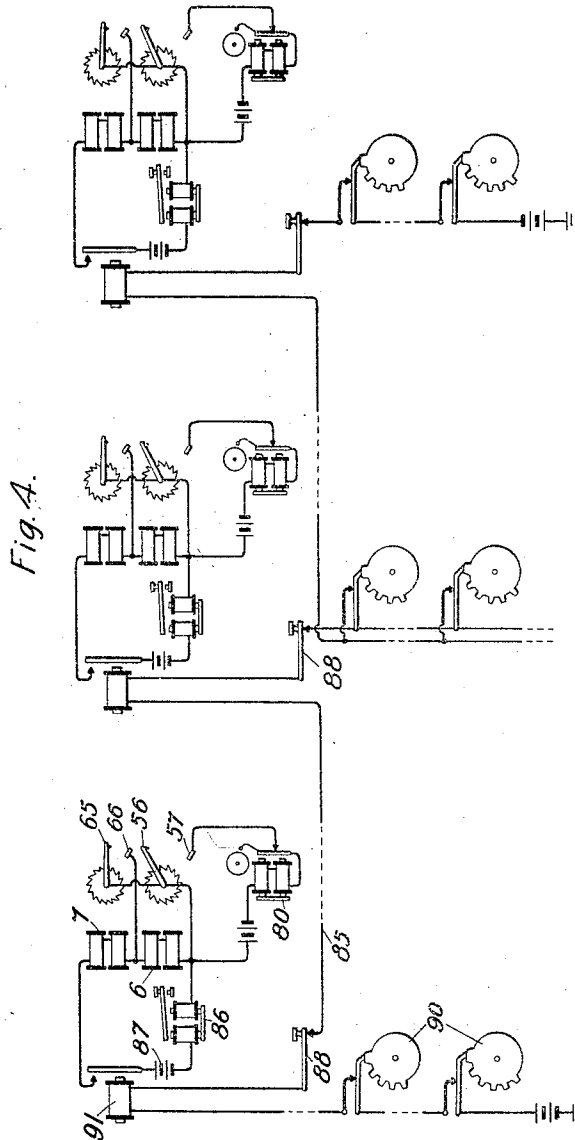
Inventor:
Ralph N. Hill.
by John E. Roberts
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UNITED STATES PATENT OFFICE.

RALPH N. HILL, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF ILLINOIS.

SELECTIVE SIGNALING DEVICE.

1,126,009.

Specification of Letters Patent.

Patented Jan. 26, 1915.

Application filed August 7, 1912. Serial No. 712,735.

To all whom it may concern:

Be it known that I, RALPH N. HILL, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Selective Signaling Devices, of which the following is a full, clear, concise, and exact description.

This invention relates to selective signaling devices, and more particularly to a step-by-step selective device adapted in response to a certain predetermined character and combination of current impulses to close a signaling circuit.

The object of this invention is to provide a selective device of this character which may be connected with a line over which impulses of various characters are being continuously sent, such, for example, as a telegraph line, and which will not be selectively operated by any of the various combinations, which are necessary in the transmission of a day's messages and calls telegraphically.

In a selective signaling device embodying this invention there is provided a pair of actuating magnets comprising the stepping and holding magnets respectively of a ratchet wheel carrying a contact closing device.

One of the features of this invention relates to a novel means provided for controlling the advancement of the circuit closing ratchet wheel and consists in the provision of holding means under the direct control of one of the magnets rendered effective only in certain positions of the advance movement of the ratchet wheel.

Another feature of this invention relates to a novel means for preventing the advancement of the ratchet wheel through more than a portion of its complete movement under a succession of rapidly recurrent impulses or impulses differing in character from those in the particular combination for operating the device and for saving unnecessary drain upon the operating battery and consists in the provision of an auxiliary member adapted in a certain position to close contacts which short circuit the stepping magnet and render the operation of the selector impossible.

Other features of the invention are the details of construction and combination of parts as will hereinafter more fully appear.

In the drawings illustrating this invention,—Figure 1 is a view in side elevation with parts broken away of a selective device embodying this invention; Fig. 2 is a detail view of the circuit closing mechanism; Fig. 3 is a plan view of the circuit closing mechanism; and Fig. 4 is a diagrammatic view of the apparatus and a circuit with which it may be used.

Referring now to the drawings, and particularly Fig. 1, the numeral 4 designates a base to which is secured an inverted U-shape frame 5 having suspended therein two electromagnets 6 and 7 hereinafter referred to as the stepping and holding magnet respectively. Pivotally supported beneath the magnets 6 and 7 are armatures 8 and 9 carrying integrally formed arms 10 and 11 extending at right angles to the armatures and along the side of the frame 5. Mounted upon the arm 10 is an extension 12 carrying at its upper end a pivotally mounted spring-pressed pawl 13. Upon the arm 11 are mounted a plurality of arms 14, 15 and 16, the arm 14 being normally in engagement with a tail piece of the pawl 13, and the arm 15 being normally in engagement with the tail piece of a pawl 17 pivotally mounted upon an auxiliary frame 18 carried by the main frame 5. The arm 16 extends upwardly into engagement with a pivotally mounted spring-pressed pawl 20 also carried by the auxiliary frame 18 for the purpose hereinafter set forth. The armature 8 is normally retained in its inoperative position by means of a spring 21 secured at one end to the extension 12 and at its other end to an adjustable arm 22. Springs 24 and 23 connected at their inner ends with an arm 26 and the pawl 17 respectively are connected at their outer ends to adjustable members 27 and 28 respectively secured to the frame 5. The adjustment of each of the armatures 8 and 9 is determined by locking set screws 30 and 31 carried by supports 32—32 secured to the members of the frame 5. As shown, the set screw 30 is in position to engage a beveled portion on the lower face of the corresponding armature while the set screw 31 engages the upper face of its corresponding armature. The magnet 7 is made slow acting by means of a copper sleeve 35 inclosing the core thereof. The auxiliary frame 18 consisting of the side members 40 and 41 is mounted upon the side

of the frame 5 and has mounted between its members a rotatable shaft 42 carrying ratchet wheels 43 and 44, in position to be engaged by the pawls 13 and 17 hereinafter designated as the stepping and holding pawls respectively. The ratchet wheel 43 is carried by a sleeve 45 secured to the shaft 42, and there is supported upon the same sleeve as the ratchet wheel 43, a contact carrying device 46 consisting of a segment of a disk and having mounted on one face and near the periphery thereof, projections or pins 47, 48, 49 and 50. Secured to the outer end of the shaft 42 is a coil spring 53 adapted to return said shaft to its normal position. A protecting cover 54 is provided with means for securing it to the frame member 41 in position to cover the spring 53. The contact point 56 carried by the contact device 46 is arranged so that the rotation of the ratchet wheel 43 through a given arc will bring said contact point 56 into engagement with a contact spring 57 carried by the frame 18. As shown more clearly in Figs. 2 and 3 the spring-pressed pawl 20 is pivotally mounted upon the outer face of the frame member 41 and has a concave portion 60 projecting through an opening in said frame member 41 into position where it may be brought into engagement with the pins 47, 48, 49 and 50 of the contact device 46. The ratchet wheel 44 is loosely mounted upon the shaft 42 and carries a contact spring 65 in position to engage a contact spring 66 mounted adjacent to the contact spring 57 but insulated therefrom. The hub of the ratchet wheel 44 carries a weight 67 for the purpose of returning said ratchet wheel to normal position. Both of the ratchet wheels 43 and 44 are provided with concentrically arranged slots 70 and 71 through which project a pin 72 secured at one end of the frame member 40 for the purpose of limiting the movement of said wheels 43 and 44. An adjusting screw 75 carried in a projection 76 of the frame member 40 engages the stepping pawl 13 to control its engagement with the ratchet wheels. The closure of the contacts 56 and 57 completes a circuit for a signaling device 80 as shown on Fig. 4 of the drawing, while the closure of the contacts 65 and 66 closes a short circuit of the stepping magnet 6, thus preventing the operation of the selecting device after these latter contacts are closed.

Referring now to the operation of the device, it will be assumed that the particular combination to which the selector responds after closing the signaling contacts 56 and 57 is three short impulses, a pause during which the circuit is opened succeeded by four short impulses, a second pause during which the circuit is open succeeded by four more short impulses, another pause

during which time the circuit is open succeeded by two short impulses and a fourth pause during which time the circuit is open succeeded by three more impulses. The holding and stepping magnets being connected in series, the first impulse through these magnets will pull up both armatures, the operation of the armature 9 releasing the stepping and holding pawls 13 and 17, and the operation of the armature 8 carrying the stepping pawl into engagement with the teeth of the ratchet wheels 43 and 44 to advance them one step. The operation of the armature 9 will also move the arm 16 to press the pawl 20 outwardly a sufficient distance to be out of the path of movement of the projections or pins 47, 48, 49 and 50, said pawl being in its normal position sufficiently close to the shaft 42 to be out of the path of the movement of said projections or pins. The holding magnet 7 being a slow acting magnet, the space between succeeding impulses will be insufficient to permit it to drop back, so that the retaining pawl 17 will be constantly in engagement with the ratchet wheels 43 and 44 except when the circuit is open for a sufficient length of time to permit said armature 9 to return to normal position. This being the case, the two succeeding impulses will advance the ratchet wheels two steps farther and if the circuit is open at this time for a sufficient length of time to permit the release of the holding magnet armature, the concave portion of the pawl 20 being released by the arm 60 will move into engagement with the first projection or pin 47 of the contact device 46, thus holding this contact device and with it the ratchet wheel 43 in the position to which it is advanced by the first series of impulses. The holding pawl 17, however, is withdrawn from engagement with the ratchet wheels 43 and 44 and the ratchet wheel 44 will return to normal position by reason of the weight 67. In a like manner the next four impulses of the combination will advance the ratchet wheel 43 and contact device 46 to position whereby the release of the holding magnet will bring the pawl 20 into engagement with the projection or pin 48, again permitting the ratchet wheel 44 to return to its normal position. This operation will be continued until the pawl 20 has successively engaged each of the pins or projections 47, 48, 49 and 50 of the contact device 46 whereupon the succeeding impulses will move the contact point 56 into engagement with the contact spring 57 thus completing the circuit for the signal 80. It will be noted that the pawl 20 when in either of its extreme positions is out of the path of movement of the projections or pins 47, 48, 49 and 50, thus permitting the ratchet wheel 43 to return to normal position when the circuit is

opening occurs at any except the one determined by the positions of the pins in the contact device 46. If now, however, a succession of quick impulses continued for a number of times be sent over the line and through the selector magnets, these impulses will act to step both the ratchet wheels 43 and 44 around, until the contacts 65 and 67 controlled by the ratchet wheel 44 are closed. When this occurs the stepping magnet of the selector is short circuited and will not obtain sufficient current to operate, thus effectually preventing the closing of the signaling contacts by means of a succession of rapidly occurring impulses. This feature is not only important in that it prevents false signaling or operation of the selector, but it also saves current drain upon the battery inasmuch as it has been found in practice that the ordinary Morse operator in sending messages seldom holds his key open a sufficient length of time to permit the falling off of the armature 9 of the slow acting holding magnet 7 of this device.

Referring more specifically to Fig. 4 in which the device of this invention is illustrated in connection with an ordinary telegraph line 85 it will be noted that the electromagnets 6 and 7 are connected in series with a sounder 86 and a local battery 87 adapted to be closed through the front contact of an ordinary Morse relay 91 in series with the line 85. Telegraph keys 88, 88 are also connected in the line 85 for operating the Morse relay 91. At each of the stations at which is located a selector, there are provided impulse transmitting devices 90 for sending the necessary combination of current impulses for closing the contacts 56 and 57 of the selector and operating the signal 80.

I claim:

1. In a selective signaling device, a step-by-step circuit closing device, means tending to return said circuit closing device to normal position, stepping and holding magnets adapted when energized to advance said circuit closing device to a predetermined position in response to current impulses, and means operated in the deenergization of said magnets to retain said circuit closing device in its advanced position.

2. In a selective signaling device, a step-by-step circuit closing device, stepping and holding pawls for advancing said circuit closing device to a predetermined position, stepping and holding magnets for controlling the operation of said stepping and holding pawls, and means controlled by said holding magnet in its release to retain said circuit closing device in its advanced position.

3. In a selective signaling device, a rotatable ratchet wheel, stepping and holding pawls therefor, stepping and holding mag-

nets for said pawls adapted when energized to cause said pawls to engage said ratchet wheel, a contact carrying device movable with said ratchet wheel, and means controlled by said holding magnet for controlling the advancement of said contact carrying device.

4. In a selective signaling device, a rotatable ratchet wheel, stepping and holding pawls therefor, stepping and holding magnets for said pawls adapted when energized to cause said pawls to engage said ratchet wheel, a contact carrying segment movable with said ratchet wheel and a retaining device controlled by said holding magnet for controlling the advancement of said segment.

5. In a selective signaling device, a rotatable ratchet wheel, stepping and holding pawls therefor, stepping and holding magnets for controlling said pawls, a contact carrying segment movable with said ratchet wheel, projections carried by said segment, a holding device normally out of the path of movement of said projections, and operative connections between said holding device and said holding magnet for controlling the engagement of said holding device with said projections.

6. In a selective signaling device, a rotatable ratchet wheel, stepping and holding pawls therefor, stepping and holding magnets for said pawls, a contact carrying device movable with said ratchet wheel, projections carried by said contact carrying device, and a holding device for said contact carrying device movable under control of said holding magnet in a path at right angles to the path of movement of said projections and adapted in its movements to engage predetermined ones of said projections.

7. In a selective signaling device a rotatable ratchet wheel, stepping and holding pawls therefor, stepping and holding magnets for said pawls, a contact carrying device movable with said ratchet wheel, projections carried by said contact carrying device, a spring pressed pivotal holding device located adjacent said contact carrying device and normally out of the path of movement of said projections, and means controlled by the armature of said holding magnet upon the release thereof for bringing the said holding device into engagement with the projections on said contact carrying device at predetermined positions thereof.

8. In a selective signaling device, electromagnets, a rotatable ratchet wheel, a signaling circuit, means operated by said magnets in response to a predetermined combination of current impulses for advancing said ratchet wheel a predetermined distance, a contact-carrying device moved by said ratchet wheel to close said signaling circuit, a disabling circuit for one of said magnets, contacts for said disabling circuit, and

means operated by said electromagnets in response to current impulses differing in character from the first-mentioned impulses for closing the contacts of said disabling circuit.

9. In a selective signaling device, electromagnets, a ratchet wheel, a signaling circuit, means operated by said magnets in response to a predetermined combination of current impulses for advancing said ratchet wheel a predetermined distance, a contact-carrying device moved by said ratchet wheel to close said signaling circuit, a second ratchet wheel moved to a predetermined position by said electromagnets in response to impulses differing in character from the first-mentioned impulses, and contacts closed by said second ratchet wheel.

10. In a selective signaling device, two separately operated circuit-closing devices, circuits controlled thereby, and electromagnetic operating means common to both said circuit closing devices and responsive to differing combinations of current impulses for operating said circuit-closing devices to close their respective circuits.

11. In a selective signaling device a pair of independently operable circuit closing devices, advancing and holding means common to said circuit closing devices, and electromagnetic means for controlling said advancing and holding means, said circuit closing devices being operated by said electromagnetic means in response to current impulses of respectively different characters.

12. In a selective signaling device, a pair of ratchet wheels, stepping and holding pawls common to said ratchet wheels, electromagnetic controlling means for said pawls, and circuit closing devices carried by said ratchet wheels and operable independ-

ently of each other by said electromagnetic means in response to different combinations of current impulses.

13. In a selective signaling device, a rotatable ratchet wheel, stepping and holding pawls therefor, stepping and holding magnets for controlling said pawls, a contact carrying device movable with said ratchet wheel, means operated by said holding magnet for controlling the advancement of said contact carrying device to circuit closing position, a second ratchet wheel operated by said pawls independently of the controlling means of the contact device, and a second contact device carried by said second ratchet wheel.

14. In a selective signaling device, a shaft, two ratchet wheels mounted upon said shaft, stepping and holding pawls common to said ratchet wheels, electromagnetic controlling means for said pawls for advancing said ratchet wheels in response to predetermined current impulses, circuit-closing contacts controlled by said ratchet wheels, and means whereby the contacts controlled by one of said ratchet wheels are closed by the operation of said electromagnetic controlling devices in response to predetermined current impulses through said electromagnets, and the contacts controlled by the other of said ratchet wheels are closed by the operation of said electromagnetic controlling means in response to current impulses of a character differing from that required to close the said first-mentioned contacts.

In witness whereof, I hereunto subscribe my name this 6th day of August, A. D. 1912.

RALPH N. HILL.

Witnesses:

WALTER F. HOFFMAN,
ELLA EDLER.