J. A. HULIT.

SELECTIVE SIGNALING SYSTEM.

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1,157,396.

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Fig. 2

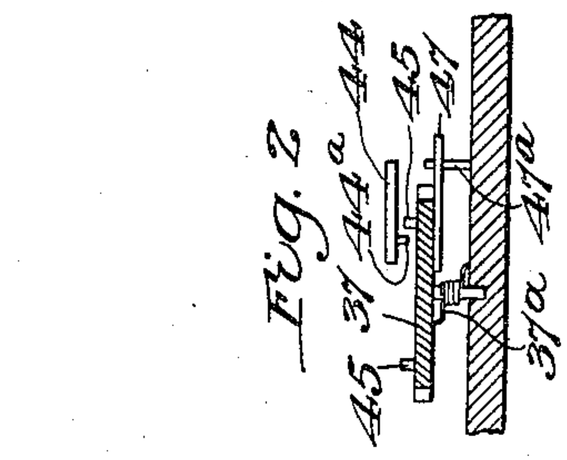

Fig. 1

WITNESSES

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SELECTIVE SIGNALING SYSTEM.

1,157,396. Specification of Letters Patent. Patented Oct. 19, 1915.

Application filed October 3, 1912. Serial No. 723,725.

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 a new and useful Improvement in Selective Signaling Systems, of which the following is a specification.

My invention relates to selective signaling systems, and more particularly to systems which are employed in connection with railway signals, in which systems it is necessary to selectively signal one of a large number of stations along the line.

It relates particularly to that type of system in which a code signal is employed, which signal consists of a plurality of series of impulses and the transmission of these impulses over the circuit operates the selectors at various of the substations, so as to close the circuit of the desired substation signal.

My invention is in the nature of an improvement on my co-pending applications Serial Nos. 655,946, filed October 21, 1911, 684,114, filed March 16, 1912, and 723,726, filed October 3, 1912.

Among the objects of my invention are to improve the general operation of such systems, and especially to provide means whereby the various station selectors are operated by impulses of one polarity, and whereby said selectors can be released either by a prolonged pause in these impulses, or by an impulse of reverse polarity. With this arrangement the selector can be released by means of this reverse impulse, or will be automatically released if for any reason a call is interrupted before it is completed.

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

Figure 1 represents a diagrammatic circuit arrangement showing one manner in which my system may be employed. Fig. 2 is a sectional end view of the wheel 37 with certain parts removed.

Referring to Fig. 1 there is shown a line circuit comprising the conductors 31 and 32 to which there are connected a main or despatching station A and one local station A′. It is contemplated that a plurality of local stations similar to the station A′ be connected to the line, but since these stations are all similar it is not thought necessary to show more than one. The main station A comprises a telephone instrument T and a calling mechanism. This calling mechanism may be of any suitable character and I have represented one herein only diagrammatically. This calling mechanism comprises a rotatable wiper 33 which makes one complete revolution for each operation of the calling mechanism. This wiper may be controlled in a manner similar to that of the impulse wheel in the well-known district telegraph boxes. During its revolution the wiper 33 rubs over and makes contact with a plurality of contact points, by means of which impulses are transmitted through one or the other of a pair of relays 34 and 35, which relays in turn operate to connect battery B with the lines 31 and 32. The contacts 2 to 11, inclusive, are normally connected with the relay 34 through contacts of a plurality of sets of springs X. By means of these springs any desired ones of the contacts 2 to 11, inclusive, may be disconnected from the relay 34 and connected with the relay 35. The springs X may be in the form of ordinary keys, which may be operated manually or they may be controlled automatically by a finger hole dial or other mechanism associated with the calling device. In my co-pending application, Serial No. 684,114, filed March 16, 1912, I have shown a calling mechanism of this type in which the springs X are selectively controlled by a finger hole dial. Associated with the calling mechanism there are two keys K and K′ through the medium of which the connections of the relays 34 and 35 with the contact points may be shifted in a manner which will be explained hereinafter. The relays 34 and 35 are so arranged that they may send impulses of different polarities over the line—that is, the relay 34, when energized, connects the plus terminal of the battery with the line 31 and the negative terminal with the line 32. The relay 35, when energized, connects the plus terminal to the line 32 and the negative terminal to the line 31.

Each of the local or way stations comprises a selective signaling apparatus and a telephone T′ which is bridged across the line through the condenser 36. This apparatus

or selector comprises essentially a ratchet wheel 37, stepping magnet 38 and a release magnet 39. The ratchet wheel 37 is adapted, when advanced a certain number of steps, to close the circuit of one or the other of the bells 40 or 41. The stepping and release magnets 38 and 39 are polarized magnets, so that they respond to impulses of current in one direction only. The armature 42 of the magnet 39, when in its normal or retracted position, disengages the holding pawl 43 from the ratchet wheel. The ratchet wheel 37 is provided with a spring 37ª which is adapted to return the said wheel to its normal position against stop 47ª as soon as the holding pawl is disengaged. Near the periphery of the ratchet wheel 37 are placed a number of pins 45. When the ratchet wheel is in certain positions, these pins come into the path of the pin 44ª of the armature 42 and prevent it from falling back far enough to disconnect the pawl 43 from the ratchet wheel. The relation of these pins in their normal position is shown in Fig. 2. In order to allow the pins 45 to pass the finger 44ª during the return of the ratchet wheel 37 to normal position, the arm 44 is preferably positioned outside the plane of the ends of the pins 45 and is provided at its end with the pin 44ª which projects into said plane and which, when the armature 42 is in its normal position, lies entirely inside the circle of rotation of the pins 45. The magnet 39, in addition to being a polarized magnet, is also a slow acting magnet—that is, a magnet which is slow to deënergize after its energizing circuit has been broken. This slow action may be obtained by securing a ring of copper 55 or other conducting material around the core.

In order to signal any station on the line the selector at that station must be operated to advance the wiper 47 into engagement with one or the other of the contacts 48 or 49 to close the circuit of one of the bells 40 or 41. Each of the selectors on the line is represented by a code number which is determined by the position of the pins 45 in the wheel 37. As herein shown, the code numbers would comprise three digits. The code number of the station A′ will be assumed to be 2—3—4. In order to call this number the operator at the main station operates the calling device so as to disconnect the contact points 4 and 8 from the relay 34 and connect them with the relay 35, and then causes the arm 33 to make one complete revolution. As the arm passes over the contact #1, an impulse of current is transmitted through the relay 34, which, upon energizing, bridges the battery B across the line, with its plus terminal connected to the conductor 31. The current which flows through the magnets 38 and 39 when the battery is connected to the line in this direction is of the proper polarity to attract the armatures of both magnets. The magnet 38, upon energizing, advances the ratchet wheel one step. The space between the #1 and the #2 contacts in the calling device is to permit the magnet 39 to deënergize before the wiper engages the contact #2. This magnet, upon deënergizing, withdraws the holding pawl 43 and permits the ratchet wheel to return to normal position. This preliminary step of the ratchet wheel and the subsequent release is to insure that all the ratchet wheels upon the line shall be returned to normal position before the impulses for the code number proper begin to be transmitted. As the wiper passes over the contacts 2 and 3, two impulses are transmitted through the relay 34, which relay in turn operates to transmit two impulses through the magnets 38 and 39. The magnet 38 then operates to advance the ratchet wheel two steps from its normal position. The magnet 39 being slow acting does not deënergize between these impulses, and consequently permits the holding pawl 43 to engage the ratchet wheel continuously. As the wiper 33 passes over the contact 4, an impulse is transmitted through the relay 35, which relay operates to bridge the battery B across the line, with its positive terminal connected to the conductor 32. The current which flows through the magnets 38 and 39 this time is therefore not in the proper direction to attract their armatures. In fact this current causes the magnet 39 to repel its armature. At the station A′, and, in fact, at all other stations that have for the first digit the number 2, the finger 44ª will find one of the pins 45 in its path at this time and the armature can not fall back far enough to withdraw the pawl 43 from the ratchet wheel. At all other stations, however, the armature 42 falls all the way back and releases the ratchet wheel to allow it to return to normal position. As the wiper 33 passes over the next three contacts 5, 6 and 7, the relay 34 operates to transmit three more impulses through the magnets 38 and 39 in the proper direction to progress the ratchet wheel three more steps. As the wiper passes over the next contact 8, the relay 35 is caused to transmit another impulse over the line in a direction which causes the magnet 39 to repel its armature 42. At the station A′ the finger 44ª finds another pin in its path at this time and does not allow the armature 42 to fall back far enough to disengage the holding pawl 43. This impulse will, however, cause the release of all the selectors on the line in which there is at this time no pin in the path of the finger 44ª. As the wiper passes over the next four contacts 9, 10, 11 and 12, four more impulses are transmitted over the line and the ratchet wheel at the station A′ is advanced four more steps and the wiper 47

is brought into contact with the contact point 48 to close the circuit of the bell 40.

In the above description it will be seen that at the end of each digit of the code number a release impulse is sent over the line, but that this release impulse is prevented from releasing the selector at the station which is being called by the coöperation of the pins 45 with the finger 44ª; and since the pins 45 of no two selectors on the line are in the same position, it will be evident that the calling of any code number will cause only the particular selector corresponding to that number to be advanced far enough to close its bell circuit. After the wiper 33 of the calling device passes off the contact 12, no more impulses are sent out to the line until the contact 24 is reached. During this time the line is without current and the magnets 39 of all the selectors deenergize. At each station, however, there is a pin in the wheel 37 which comes into the path of the finger 44ª when the wiper 47 is in engagement with the contact 48, and thus it will be seen that the deënergization of the magnet 39 at the station A′ will not release the selector, but will allow the bell circuit to remain closed. When the wiper 33 of the calling device passes over the contact 24, however, the circuit of the relay 34 is again closed, which transmits one impulse over the line, thereby causing the ratchet wheels of all the selectors to be advanced one more step. At the station A′ this step of the ratchet wheel moves the pin which was in the path of the finger 44ª out of its path so that when the magnet 39 deënergizes the armature 42 may fall back all the way to cause the holding pawl 43 to be withdrawn, whereupon the ratchet wheel returns to normal position and breaks the bell circuit. In this instance it will be seen that the length of time that the bell at the called station is rung is predetermined, and is determined by the time which it takes the wiper of the calling device to pass from the contact 12 to the contact 24. If it is desired to ring the bell for a longer period than this predetermined time, the key K is thrown so as to open the contact 50 before the call is made. The contact 50 being open, no impulse will be transmitted through the relay 34 as the wiper 33 passes over the contact 24, and therefore the selector will not be released. After the operator at the wav station answers, the selector may be released by the operator at the main office by restoring the key K to its normal position and then momentarily throwing it in the opposite direction to close the contact 51. The closure of this contact completes a circuit from battery B′ through the wiper 33, contact 25, contact 51 and the magnet 34 back to the battery B′. The relay 34 operates to transmit a momentary impulse over the line to advance the selector one step and then cause it to be released in the same manner as when the impulse was transmitted by the wiper 33 passing over the contact 24. If it is desired to ring the second bell 41 at the station called, the key K′ is thrown to open the contact 52 and close the contact 53 before the call is made. The closing of the contact 53 connects the two contacts 13 and 14 of the calling device with the relay 34, whereby two additional impulses will be transmitted to the selectors as the wiper 33 passes over these contacts. These two impulses carry the selector wiper 47 past the contact 48 and onto the contact 49. The opening of the contact 52 by the key K′ disconnects the relay 34 from the contact 24 of the impulse transmitter, so that the selector is not released as the wiper 33 passes over this contact. In order to release the selector when the bell 41 is ringing, the operator at the main station, after restoring the key K′, momentarily throws it in the other direction to close the contact 54, whereby the relay 34 is momentarily energized in the same manner as when the contact 51 is closed by the key K and causes the selector to be released.

It will thus be seen that I have devised an improved selecting system in which any one of a large number of stations can be selectively signaled, and in which provision is made for releasing the various selectors either by a reverse impulse, or by a prolonged pause in the impulses, such as would be caused by an interruption of the call before the same is completed.

While I have illustrated and described one embodiment of my invention, it will 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 line, a plurality of selectors on said line, means for operating said selectors by impulses of one polarity, means for releasing certain of said selectors by an impulse of reverse polarity, or by a prolonged pause between operating impulses, and means for preventing said reverse impulse or pause from releasing other of said selectors.

2. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors including an operating magnet and a slow acting release magnet, means for releasing said selectors upon deenergization of said release magnets, means for transmitting a plurality of groups of impulses through said operating and release magnets to thereby operate said selectors, each of said groups being separated by a prolonged pause to thereby permit the deënergization of said release magnet, and means in certain of said selectors for pre-

venting the deënergization of the release magnet from releasing that particular selector.

3. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors including a spring-controlled ratchet, an operating magnet and pawl for operating said ratchet, a holding pawl, a release magnet adapted upon energization to permit said holding pawl to come in contact with said ratchet to hold said ratchet in operated position, and means independent of said release magnet for maintaining said holding pawl in engagement with said ratchet when said ratchet has been advanced a certain predetermined number of steps.

4. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors including a spring-controlled ratchet, an operating magnet and pawl for operating said ratchet, a holding pawl, a release magnet adapted upon energization to permit said holding pawl to come in contact with said ratchet to hold said ratchet in operated position, and means independent of said release magnet for maintaining said holding pawl in engagement with said ratchet when said ratchet has been advanced a certain predetermined number of steps, said holding means being selectively arranged on the various selectors.

5. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors including an operating and release magnet bridged across said line, a spring-controlled ratchet wheel, a pawl controlled by said operating magnet for advancing said ratchet, a holding pawl normally disconnected from said ratchet and adapted to be brought into engagement therewith upon energization of said release magnet, and selectively-arranged means for maintaining said holding pawl in engagement with said ratchet independent of said release magnet.

6. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors comprising an operating magnet and a slow acting release magnet bridged across said line, a spring-controlled ratchet, a pawl controlled by said operating magnet for advancing said ratchet, a holding pawl controlled by said release magnet for holding said ratchet in advanced position, means for operating said selectors by a plurality of groups of impulses, said groups being separated by a prolonged pause sufficient to permit the deënergization of said release magnets, and selectively-arranged means on said selectors for holding said selectors in advanced position independent of said release magnets when said ratchets have been advanced certain predetermined distances.

7. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors comprising a polarized operating magnet and a release magnet, means for releasing said selectors upon deënergization of said release magnets, means for transmitting a plurality of groups of impulses through said operating and release magnets to thereby operate said selectors, each of said groups being separated by a prolonged pause to thereby permit the deënergization of said release magnet, and means in certain of said selectors for preventing the deënergization of the release magnet from releasing that particular selector.

8. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors including a spring-controlled ratchet, a polarized operating magnet and pawl for operating said ratchet, a holding pawl, a release magnet adapted upon energization to permit said holding pawl to come in contact with said ratchet to hold said ratchet in operated position, and means independent of said release magnet for maintaining said holding pawl in engagement with said ratchet when said ratchet has been advanced a certain predetermined number of steps.

9. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors including a spring-controlled ratchet, a polarized operating magnet and pawl for operating said ratchet, a holding pawl, a release magnet adapted upon energization to permit said holding pawl to come in contact with said ratchet to hold said ratchet in operated position, and means independent of said release magnet for maintaining said holding pawl in engagement with said ratchet when said ratchet has been advanced a certain predetermined number of steps, said holding means being selectively arranged on the various selectors.

10. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors including a polarized operating and release magnet bridged across said line, a spring-controlled ratchet wheel, a pawl controlled by said operating magnet for advancing said ratchet, a holding pawl normally out of engagement with said ratchet and adapted to be brought into engagement therewith upon energization of said release magnet, and selectively-arranged means for maintaining said holding pawl in engagement with said ratchet independent of said release magnet.

11. In a selective signaling system, a line, a plurality of selectors on said line, each of said selectors comprising a polarized operating magnet and a slow acting release magnet bridged across said line, a spring-controlled ratchet, a pawl controlled by said operating magnet for advancing said

ratchet, a holding pawl controlled by said release magnet for holding said ratchet in advanced position, means for operating said selectors by a plurality of groups of impulses, said groups being separated by a prolonged pause sufficient to permit the de-energization of said release magnets, and selectively-arranged means on said selectors for holding said selectors in advanced position independent of said release magnets when said ratchets have been advanced certain predetermined distances.

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

JOHN A. HULIT.

Witnesses:

ARTHUR J. RAY,

ALBERT ANDERSEN.