O. T. LADEMAN.

SIGNALING SYSTEM.

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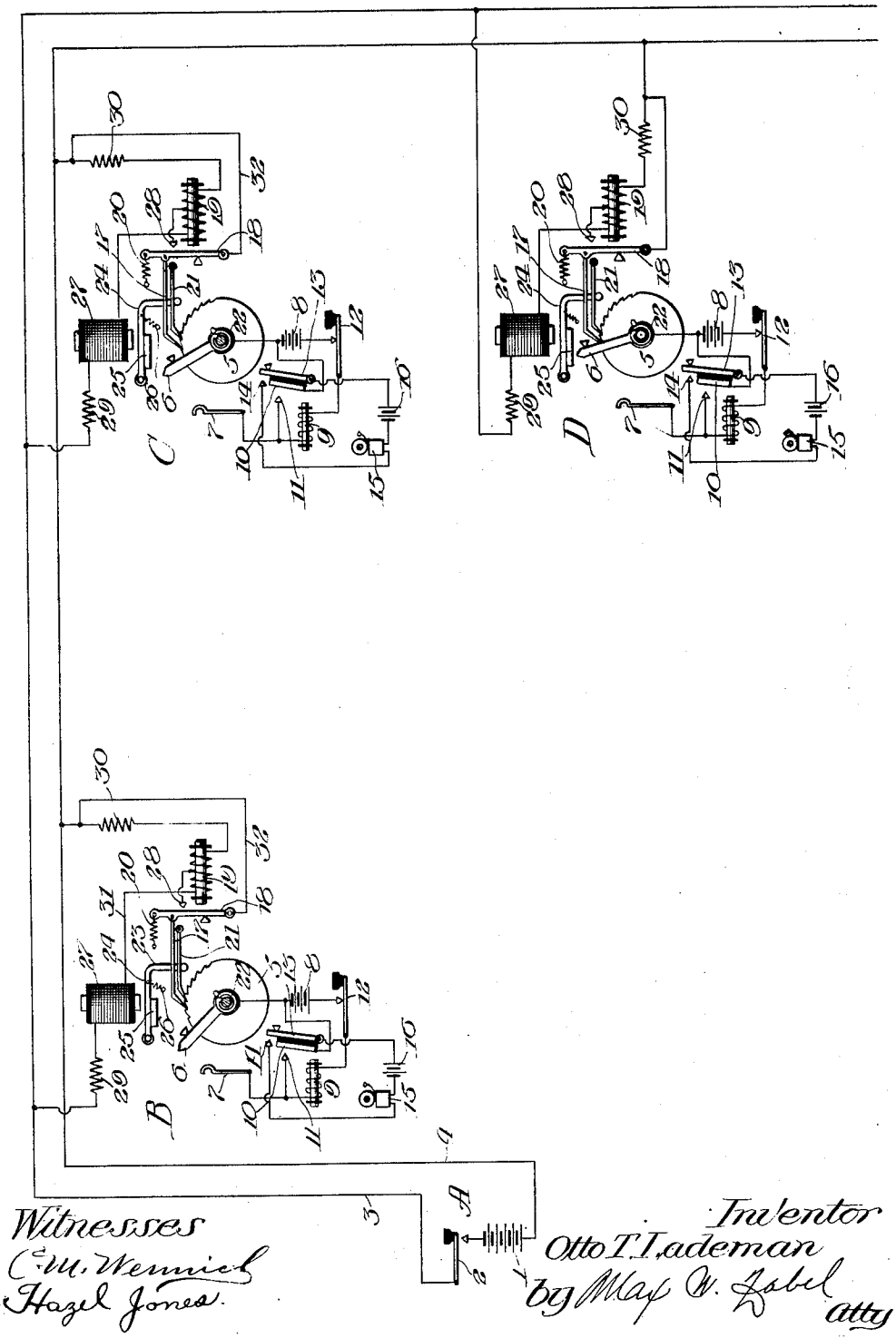

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SIGNALING SYSTEM.

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To all whom it may concern:

Be it known that I, OTTO T. LADEMAN, citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Signaling Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to signaling systems and has for its object the provision of an improved step-by-step selector system which is of particular utility along railroad lines in connection with railway telephone despatching systems. Various features of my invention however, are applicable for use for systems other than step-by-step, and I do not limit my invention herein exclusively to such application.

Generally speaking my invention comprises impulse mechanism at each station and signal sending devices at the central station which are so arranged that the central station can selectively call any substation.

In the preferred form of the invention, I use impulse mechanism which controls a local signal, which impulse mechanism has a step-up and a release magnet preferably serially included in a bridge of the line circuit, the release magnet being of such character that its armature will not operate when short impulses are impressed on the line wires, but will operate with a long impulse.

The various details and constructional features will be more clearly understood by reference to the accompanying drawing illustrating one embodiment thereof in connection with which, I will now give a detail description of this form of my invention.

I show four stations, a central station A, and substations B, C, and D. At the central station I show a battery 1 and an impulse sending key 2 which are connected to the line wires 3 and 4 as shown, which line wires unite all of the stations together. At each substation I have an impulse or step-by-step wheel 5 carrying a pointer 6, which pointer is adapted when the step-up wheel has been rotated the correct angular distance to engage a spring 7.

When contact is closed with the spring 7, the battery 8 is connected to the relay 9 which thereupon attracts its armature 10 to close circuit with a contact point 11 so that the battery 8 is permanently locked in circuit with the relay 9 until a spring key 12 is momentarily opened to break this circuit when the armature 10 again falls back. The armature 10 carries a further armature 13 which makes contact with a contact point 14 thereby closing circuit through a local signal 15 and a battery 16. The relay 9 is somewhat sluggish on account of the weight of these armatures and will not respond to momentary impulses such as occur when the arm 6 travels past the spring 7 which occurs when a station requiring a greater number of impulses is being called. The contact between the elements 6 and 7 must have a greater time duration than this momentary passage aforesaid. When the relay 9 however, is actuated the bell 15 begins to operate and continues to operate until the local operator actuates the button 12, the bell operating until the button 12 is actuated even though the contact between the elements 6 and 7 is broken. To actuate the step-up wheel 5, I have an actuating pawl 17 controlled by an armature 18 of the step-up magnet 19. A spring 20 restores the armature 18 and it is this reverse movement of the armature which actuates the wheel 5 after each impulse through the magnet 19. A locking pawl 21 is provided which prevents rotation of the wheel 5 under the influence of the spring 22 unless the pawls are released from engagement with the wheel 5 by the movement of the arm 23 controlled by the armature 24. The armature 24 has a weight 25 so that it is sluggish in its action, and a spring 26 to restore it to normal. The armature 25 is controlled by the release magnet 27. A contact 28 adapted to be engaged by the armature 18 when attracted by the magnet 19 is connected to an intermediate portion of the winding of the magnet 19. A resistance element 29 is connected between the line wire 3 and one terminal of the magnet 27. A resistance element 30 is connected between the line wire 4 and one terminal of the magnet 19. The remaining terminals of the magnets 19 and 27 are connected together by the conductor 31. It will thus be seen that normally the two windings of the magnets 19 and 27, and the two resistances 29 and 30 are serially included in a bridge across the conductors 3 and 4. A further conductor 32 connects the armature 18 with the line wire 4.

The theory of operation of the device is that the normal impulses sent from battery 1 flow through both the magnets 19 and 27, but on account of the high resistance of the local bridge circuit only the magnet 19 operates. It will be seen however that each impulse causes a momentary closure of the circuit between the elements 18 and 28, thus short circuiting part of this circuit and allowing a greater flow of current through the magnet 27. On account of the sluggish action of its armature however, this magnet does not respond unless the circuit between elements 18 and 28 is closed for a longer time than occurs during these momentary impulses. It will be seen that the required impulses can be sent to step-up any wheel 5 to its required position to call any desired station, during the sending of which impulses the magnet 27 remains inert. If for instance station C is to be called the number of impulses are sent which step the element 5 into position so that arm 6 closes circuit with spring 7. If the key 2 is then left open a longer time than is normally required between impulses, the slow acting magnet 9 has time to operate and signals the bell 15. If it is then required to release the step-by-step elements the key 2 is depressed and held depressed a longer length of time than is required for the impulses, and this will operate the release magnets 27, and thus release all of the devices 5 and permit them to fall back to their normal zero position. It will be seen that after a given station has been called, that is, by permitting the key 2 to remain open, additional or succeeding stations can be called by sending additional impulses. It will be understood of course that this last impulse need not be a longer one unless it is desired at the same time to have this last impulse act as a release impulse. Merely sending the required number of short impulses and then keeping the central station signal sending device on open circuit will keep the contacts 6 and 7 together to allow the relay 9 to operate. This is of great advantage in calling, with a progressive movement of the impulse mechanisms, succeeding stations. Thus to call station 6 for instance would require six short impulses; then to call station 9 would require three additional short impulses and so on, all of the selectors moving progressively forward so long as no long impulse is sent. The first long impulse restores all to normal. In causing this selective operation of the magnets 19 and 27, I find that the following arrangement of resistances has been satisfactory although of course, I do not limit myself to such arrangement of resistances. This arrangement of resistances contemplates 2,000 ohms of resistance in each of the coils 29 and 30, a resistance of 1,600 ohms in the magnet 27, and a resistance of 4,500 ohms in the winding of the magnet 19, the intermediate position of said winding to which the contact 28 is connected, dividing said winding so that the left hand section has 1,500 ohms and the right hand section 3,000 ohms.

While I have herein shown and particularly described the preferred embodiment of my invention, I do not limit myself to the precise construction and arrangement as herein set forth, but

Having thus described my invention what I desire to secure by Letters Patent is:

1. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a step-by-step mechanism, a signal under the control thereof, a step-up magnet, a release magnet, and means controlled by said step-up magnet for decreasing the resistance in circuit of said release magnet upon operation of said step-up magnet.

2. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each station comprising a signal circuit controlling element, a signal under the control thereof, a step-up magnet to operatively actuate said element, a release magnet, and means controlled by said step-up magnet for decreasing the resistance in circuit of said release magnet upon operation of said first aforesaid magnet.

3. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a step-by-step mechanism, a signal under the control thereof, a step-up magnet, a release magnet, said magnets being connected in series in bridge of the said circuit, and means controlled by said step-up magnet for decreasing the resistance in circuit of said release magnet upon operation of said step-up magnet.

4. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a signal circuit controlling element, a signal under the control thereof, a step-up magnet to operatively actuate said element, a release magnet, said magnets being connected in series in bridge of the said circuit, and means controlled by said step-up magnet for decreasing the resistance in circuit of said re-

lease magnet upon operation of said first aforesaid magnet.

5. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a step-by-step mechanism, a signal under the control thereof, a step-up magnet, a release magnet, a locking pawl normally engaging said step-by-step mechanism controlled by said release magnet, said magnets being connected in series in a bridge of the said circuit and operatively energizable with the same character of current, and means for decreasing the resistance in circuit of said release magnet upon each operation of said step-up magnet.

6. A signaling system having a central station and substations united by a common circuit, means at the central station for impressing signal sending current on said circuit, and selective signal receiving means at each substation comprising a signal circuit closing element, a signal under the control thereof, an operating magnet for said element, a slow acting release magnet for same, and holding means for said element normally engaging same and controlled by said release magnet, said magnets being connected serially and associated with said circuit.

7. A signaling system having a central station and substations united by a common circuit, means at the central station for impressing signal sending current on said circuit, and selective signal receiving means at each substation comprising a signal circuit controlling element, a signal under the control thereof, an operating magnet for said element, a slow acting release magnet for same, and a holding pawl for said element normally engaging same and controlled by said release magnet, said magnets being connected serially and associated with said circuit.

8. A signaling system having a central station and substations united by a common circuit, means at the central station for impressing signal sending current on said circuit, and selective signal receiving means at each substation comprising a step-by-step element, a signal under the control thereof, an operating magnet for said element, a slow acting release magnet for same, and holding means for said element normally engaging same and controlled by said release magnet, said magnets being connected serially and associated with said circuit.

9. A signaling system having a central station and substations united by a common circuit, means at the central station for impressing signal sending current on said circuit, and selective signal receiving means at each substation comprising a step-by-step element, a signal under the control thereof, an operating magnet for said element, a slow acting release magnet for same, and a holding pawl for said element normally engaging same and controlled by said release magnet, said magnets being connected serially and associated with said circuit.

10. A signaling system having a central station and substations united by a common line circuit, means at the signal sending station for impressing signal sending current on the line circuit, and selective signal receiving means at each substation comprising a step-by-step mechanism, a signal under the control thereof, a step-up magnet, a release magnet, and means for increasing the flow of current through said release magnet upon each operation of said step-up magnet.

11. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each station comprising a signal circuit controlling element, a signal under the control thereof, a magnet to operatively actuate said element, a release magnet, and means for increasing the flow of current through said release magnet upon each operation of said first aforesaid magnet.

12. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a step-by-step mechanism, a signal under the control thereof, a step-up magnet, a release magnet, said magnets being connected in series in bridge of the said circuit, and means for increasing the flow of current through said release magnet upon each operation of said step-up magnet.

13. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a signal circuit closing element, a signal under the control thereof, a magnet to operatively actuate said element, a release magnet, said magnets being connected in series in bridge of the said circuit, and means for increasing the flow of current through said release magnet upon each operation of said first aforesaid magnet.

14. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a step-by-step mechanism, a signal under the con-

trol thereof, a step up magnet, a release magnet, and means controlled by said step up magnet for decreasing the resistance in circuit of said release magnet upon each operation of said step up magnet.

15. A signaling system having a central station and substations united by a common circuit, means at the signal sending station for impressing signal sending current on the said circuit, and selective signal receiving means at each substation comprising a step-by-step mechanism, a signal under the control thereof, a step-up magnet, a release magnet, and means at each substation for decreasing the effective opposition to current flow in circuit of said release magnet after completion of the signal setting operation of said step up magnet.

16. A signaling system having a central station and substations united by a common circuit, means at the central station for impressing signal sending current on said circuit, and selective signal receiving means at each substation comprising a step-by-step element, a signal under the control thereof, an operating magnet for said element, a slow acting release magnet for same, and holding means for said element normally engaging same and controlled by said release magnet, said magnets being associated with the same circuit and conjointly receiving all impulses.

In witness whereof, I hereunto subscribe my name this 22nd day of July A. D., 1910.

OTTO T. LADEMAN.

Witnesses:

MAX W. ZABEL,

HAZEL JONES.