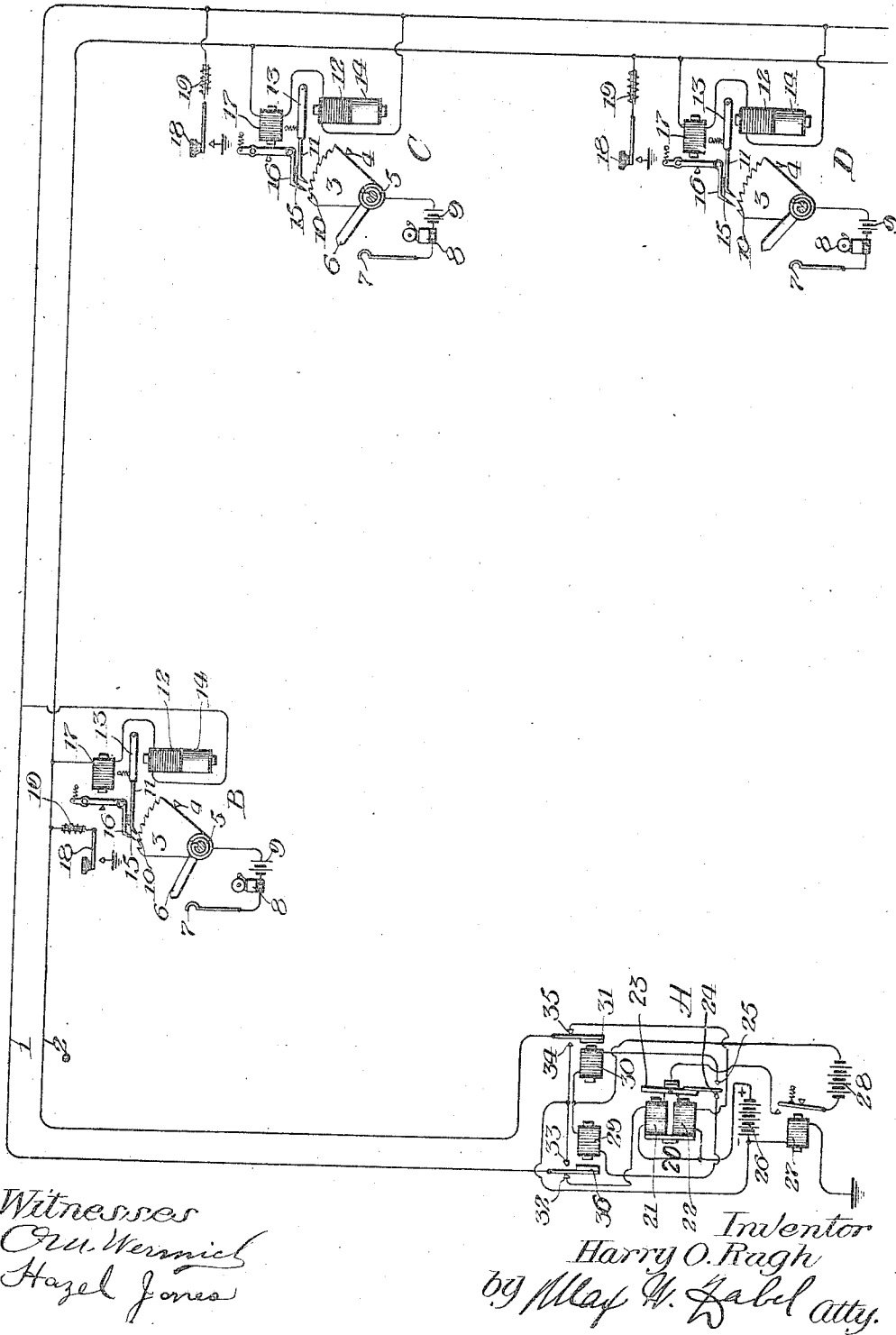


H. O. RUGH.
 SIGNALING SYSTEM.
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1,051,271.

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UNITED STATES PATENT OFFICE.

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SIGNALING SYSTEM.

1,051,271.

Specification of Letters Patent.

Patented Jan. 21, 1913.

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To all whom it may concern:

Be it known that I, HARRY O. RUGH, a citizen of the United States, residing at Sandwich, in the county of Dekalb and State of Illinois, 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 more particularly to that character of signaling systems in which a plurality of stations are associated with the same line circuit, and in which each station in addition to having signal receiving means is provided with signal sending appliances to call any of the other stations selectively. In such a system under consideration, means are provided at a central location which can be actuated from the substations in such a manner as to project the proper signaling currents onto the line to call any desired station. These means may be operated from either station. In the embodiment shown, it is immaterial whether these signal sending means are located at a central station or at any other station, but I will refer in this description to these devices as being placed at a central station, although as stated they may be arranged anywhere along the circuit. I will also designate the stations which have the signal receiving devices and the means for causing the operation of the signal sending devices as substations although one may be a so-called central station and the others the substations.

My improvements relate to a system of the character described and their object is to arrange these central signal sending devices in such a way that the actuating means at each substation may be connected to either one of the line wires and secure the same result. The advantage of this will be apparent when it is remembered that signaling circuits or other similar circuits are frequently transposed or enter an office through a cable, and it is therefore frequently difficult to distinguish between the two conductors of a circuit, and it represents a great saving of time during the installation and clearing of trouble if such a distinction need not be made.

I will describe my invention more in detail by reference to the accompanying draw-

ing, in which I set forth a system of the character described having novel substation signal receiving apparatus and also having my improved central station or signal current controlling means.

The improved system irrespective of my central station apparatus is made the subject matter of a separate application Serial No. 594,159, filed Nov. 25, 1910, but as suitable substation apparatus must be described in connection with my central station apparatus, I will describe not only the improvements claimed herein but the entire system.

In the drawing I show two line wires 1 and 2 as uniting a central station A and substations B, C and D. At each of the substations I employ a step-by-step element 3 normally resting against a stop 4, to which stop it is impelled by the spring 5. The element 3 carries a pointer 6 which when in electrical association with the contact spring 7 closes circuit through a signal 8 and battery 9 to operate said signal. The element 3 is provided with teeth 10 and may be stepped up to any desired angular position, different angular positions corresponding to different stations. The element 3 is designed to be moved step-by-step and when, for instance, the arm 6 passes a spring 7 in its movement to a station having a greater number of impulses, such momentary contact between the elements 6 and 7 is of such short duration as not to operatively actuate the preferably slow acting bell 8.

A locking pawl 11 controlled by a slow acting magnet 12 is brought into engagement with the teeth of the element 3 when the first impulse is sent over the line wires, which preferably is a long impulse and thereafter the succeeding impulses which are of short duration and sufficient in number to call the pre-determined station have such a short time interval between them that the slow acting magnet 12 does not release its armature 13 until the sending of impulses ceases entirely. This slow acting feature of the magnet 12 is brought about by a copper or other metallic shell 14 acting in the nature of a short circuited secondary winding. The locking pawl 11 by means of the insulation 15 controls the step-up pawl 16 which is actuated by the magnet 17. When the locking pawl 11 is out of engagement with the element 3, it also removes the pawl 16 and allows the spring 5 to restore the element 3

to its position against the stop 4. When, however the first impulse begins, the pawl 11 enters engagement with the teeth of the element 3, the pawl 16 also enters said teeth and is in condition to angularly move said element 3 in accordance with impulses received through the magnet 17.

It will be seen that but one character of current is necessary, namely impulses of one polarity not only to step-up the element but also to release it. By reason of this I am enabled to provide central station appliances of a suitable character which need have but one signal sending circuit closing element under the control of the substations. In order to provide these impulses, the central station apparatus set forth at station A is associated with the line circuit and this central station apparatus is operated to send a predetermined number of impulses by keys 18 provided at each substation which serve to ground a line conductor preferably through the interposition of suitable resistance or impedance 19.

In accordance with the central station apparatus it is immaterial whether line conductor 1 or line conductor 2 is grounded.

The system thus far described is the system of my said co-pending application and I have described it herein as being as simple a form as I know of at the present time for use in connection with my signal sending station apparatus, which signal sending station apparatus is so arranged that the operating keys 18 at the substations which are used to call any other station may be connected to either line wire 1 and 2. It is the object of my invention to so arrange the signal sending apparatus that such a connection of the keys 18 is possible. This improved signal sending apparatus comprises an electromagnet 20 having two coils 21 and 22 and an armature 23 associated with two contact points 24 and 25. One terminal of each of the magnets 21 and 22 is connected with the positive pole of a battery 26 whose negative pole is connected through a relay 27 to earth. Now, when the keys 18 are depressed, for instance, the key 18 of substation B, magnet 22 is actuated to close circuit between the armature 23 and the contact point 24. When the key 18 of station C is operated, magnet 21 is actuated to close circuit through the armature 23 and the contact point 25. The armature 23 remains in either one position or the other until the key 18 of the other line wire is actuated. At the same time that either of the magnets 21 and 22 is actuated, relay 27 is actuated to close circuit through a battery 28 and either one or the other of two relays 29 or 30. If the armature 23 engages the contact point 24, then magnet 29 is actuated and if the actuation is brought about over the line wire 1 the armature 23 engages con-

tact point 25 and relay 30 is energized. The magnets 29 and 30 have armatures 36 and 31 respectively, the armature 36 being associated with contact points 32 and 33 and the armature 31 being associated with contact points 34 and 35.

The contact points 33 and 34 are preferably connected together with the negative terminal of the battery 26. One terminal of the magnet 21 connects to the contact point 32 and one terminal of the magnet 22 connects to the contact point 35. Now, when button 18 of station B is depressed, circuit is completed from the ground, through lever 18, line wire 2, armature 31, contact point 35, magnet 22, battery 26, relay 27 to ground. The armature 23 then occupies the position against the contact point 24. Energization of the relay 27 closes circuit through magnet 29 and battery 28 on account of the armature 23 and contact 24, thereby attracting armature 30 and connecting line wire 1 with the negative terminal of the battery 26. The positive terminal of said battery 26 in the meantime is connected to the line wire 2 through the magnet 22. Thus an impulse is sent over the line wires when key 18 of station B is depressed. When key 18 of station C is depressed, magnet 21 is energized and the armature 23 reversed so that the relay 30 is actuated in accordance with the actuations of the lever 18. It thus makes no difference which line wire is used for the substation signal sending purposes.

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

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A system of the character described having a plurality of stations united by a metallic line circuit, selective signal receiving devices at each station associated with said circuit, signal sending devices also associated with said circuit, and means at each station for controlling said sending devices, said sending devices including means to render said sending devices controllable over either line wire of said circuit.

2. A system of the character described having a plurality of stations united by a metallic line circuit, selective signal receiving devices at each station associated with said circuit, a signal sending device also associated with said circuit and controllable over either line wire of said circuit, and means at each station for controlling said sending device.

3. A system of the character described having a plurality of stations united by a metallic line circuit, step-by-step signal receiving devices at each station associated

with said circuit, signal sending devices also associated with said circuit, and means at each station for controlling said sending devices, said sending devices including means to render said sending devices controllable over either line wire of said circuit.

4. A system of the character described having a plurality of stations united by a metallic line circuit, step-by-step signal receiving devices at each station associated with said circuit, a signal sending device also associated with said circuit, and controllable over either line wire of said circuit, and means at each station for controlling said sending device.

5. A system of the character described having a plurality of stations united by a metallic line circuit, selective signal receiving devices at each station associated with said circuit, signal sending devices also associated with said circuit, means at each station for controlling said sending devices, said sending devices including means to render said sending devices controllable over either line wire of said circuit, said last aforesaid means including a relay controlled over both line wires.

6. A system of the character described having a plurality of stations united by a metallic line circuit, step-by-step signal receiving devices at each station associated with said circuit, signal sending devices also associated with said circuit, means at each station for controlling said sending devices, said sending devices including means to render said sending devices controllable over either line wire of said circuit, said last aforesaid means including a relay controlled over both line wires.

7. A system of the character described having a plurality of stations united by a metallic line circuit, selective signal receiving devices at each station associated with said circuit, signal sending devices also associated with said circuit, means at each station for operating said sending devices, said sending devices including means to render said sending devices controllable over either line wire of said circuit, said last aforesaid means including a relay controlled over both line wires and a supplemental relay.

8. A system of the character described having a plurality of stations united by a metallic line circuit, step-by-step signal receiving devices at each station associated with said circuit, signal sending devices also associated with said circuit, means at each station for controlling said sending devices, said sending devices including

means to render said sending devices controllable over either line wire of said circuit, said last aforesaid means including a relay controlled over both line wires and a supplemental relay.

9. A system of the character described having a plurality of stations united by a line circuit, selective signal receiving devices at each station associated with said circuit, signal sending relays also associated with said circuit, means at each station for controlling the signal sending operation, and means to render effective the control of said first aforesaid means whether said first named means is connected with one line wire of said circuit or the other.

10. A system of the character described having a plurality of stations united by a line circuit, selective signal receiving devices at each station associated with said circuit, signal sending relays also associated with said circuit, means at each station for controlling the signal sending operation, and means to render the control of said first aforesaid means effective whether said first means is connected with one line wire of said circuit or the other, said last aforesaid means including a relay associated with both line wires and a relay to govern said sending relays.

11. A system of the character described having a plurality of stations united by a line circuit, step-by-step signal receiving devices at each station associated with said circuit, signal sending relays also associated with said circuit, means at each station for controlling the signal sending operation, and means to render the control of said first aforesaid means effective whether said first means is connected with one line wire of said circuit or the other.

12. A system of the character described having a plurality of stations united by a line circuit, selective signal receiving devices at each station associated with said circuit, signal sending apparatus also associated with said circuit, means at each station for controlling the signal sending operation, and means to render effective the control of said first aforesaid means whether said first aforesaid means is connected with one line wire of said circuit or the other.

In witness whereof, I hereunto subscribe my name this 21st day of November, A. D. 1910.

HARRY O. RUGH.

Witnesses:

OTTO M. WERMICH,
HAZEL JONES.