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SIGNALING SYSTEM.

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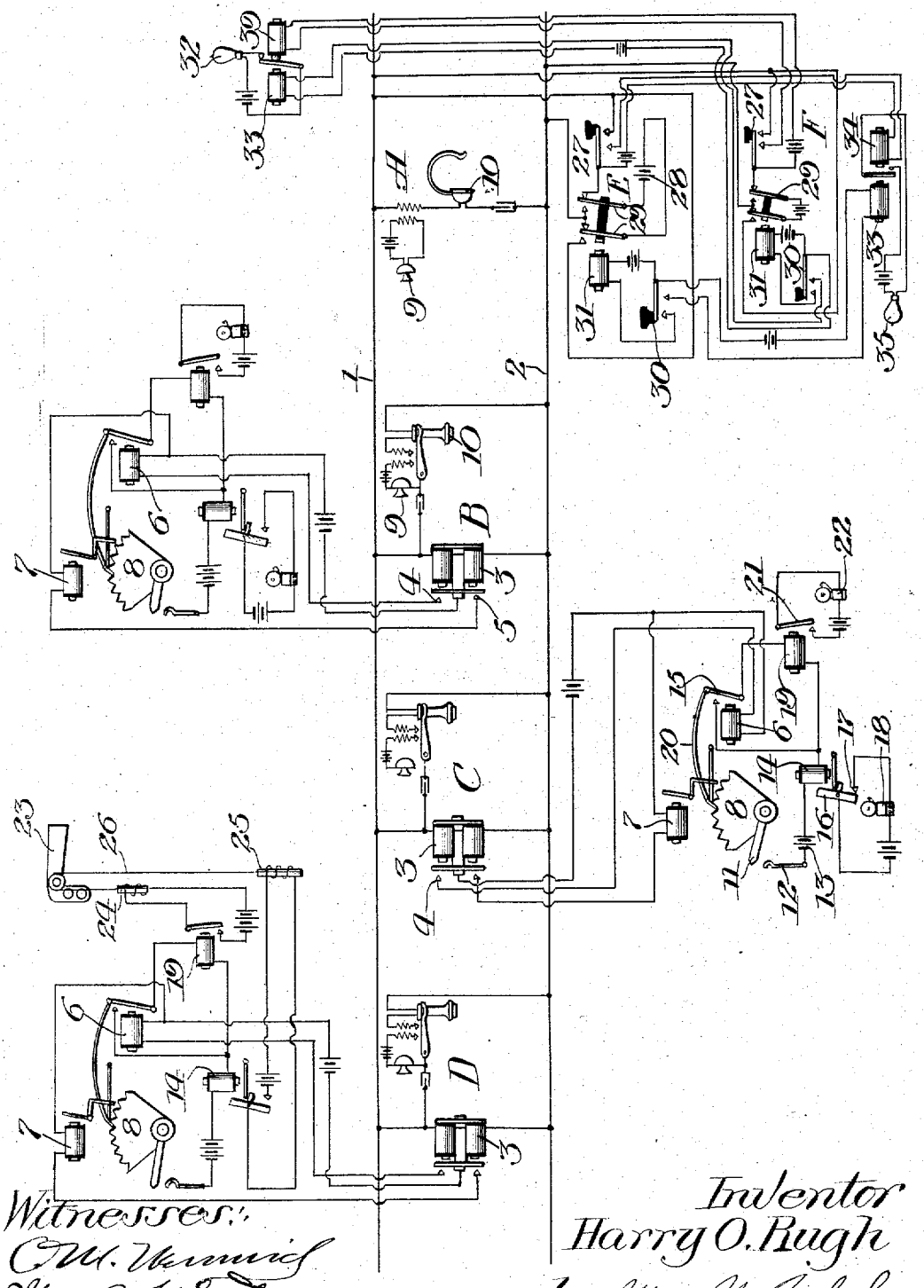


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# UNITED STATES PATENT OFFICE.

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## SIGNALING SYSTEM.

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*To all whom it may concern:*

Be it known that I, HARRY O. RUGH, 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 has for its object the provision of an improved selective signaling device with which it is possible, by the operation of each selective signaling device to likewise selectively call a plurality of signals under the control of each selective signaling device.

My invention further contemplates central station calling devices in duplicate, so that two separate operators, for instance, may use the same signaling circuit, and, by virtue of the selective signaling arrangement aforesaid, may call different operators at the same station, if desired.

I will explain my invention more in detail by reference to the accompanying drawing, which illustrates the same diagrammatically.

I have shown the central station A, and sub-stations B, C and D, united by two line conductors 1 and 2. Each sub-station has a polarized relay 3, which polarized relay, by virtue of its contacts 4 and 5, is adapted selectively to energize relays 6 and 7, as desired, to effect the step-by-step operation of an element 8. Means, to be described hereinafter, are provided at the central station for sending battery impulses of a certain polarity to actuate the relay 3 in a manner to operate the relay 6, and battery impulses of opposite polarity actuate the relay 3 to operate the relay 7, whereby to release the step-up mechanism. Each station is provided with a transmitter 9, and its associated receiver 10, connected in the ordinary manner. When the step-up element 8 is in its operative position, which positions have different angular relations in the different stations, its contact arm 11 engages the spring 12, which thereby closes the signaling circuit, including the battery 13, the relay 14, the armature 15 of relay 6, and its associated contact. If, when the step-up element 8 has completed the contact with the spring 12, the relay 6 is held in its closed position without, however, sending any further impulses, then the slow moving element 16, which is released when the armature of the relay 14 pulls up, finally engages contact element 17, and operates the local signal 18. The relay 14 is of very low resistance. Now, however, should the step-up element 8, when closing circuit through the spring 12, remain in that position without further impulses, but the armature 15 of the relay 6 be permitted to retract to its normal position, as shown in the drawing, then circuit is completed from the arm 11, spring 12, battery 13, low resistance relay 14, high resistance relay 19, armature 15, arm 20, element 8, back to the arm 11. A very high resistance relay 19 is now included in the circuit, and this high resistance relay will attract its armature 21, but not enough current flows through the low resistance relay 14 to permit it to attract its armature. Therefore, the local signal 22, under the control of the relay 19, will operate. From this, it will be apparent that if the element 8 is stepped up to its operative position, if the key at the central station which sends the impulses is held in its closed position when sending the last impulse, the signal 18 will operate, whereas, if the signal sending key, after sending the required number of impulses, is allowed to return to normal or its open circuit position, signal 22 will operate. Thus, I am enabled to selectively actuate signals 18 and 22 merely by holding the signal-sending key in its closed or open position, after it has sent the required number of impulses to place the step-up mechanism in its operative positon. Considering the signals 18 and 22, I may employ a semaphore 23 under the control of solenoids 24 and 25, which, by means of a string 26, draw it into its clear position or danger position, depending upon whether relay 14 or relay 19 is energized.

The apparatus at the central station which sends the impulses consists of the sending key 27, which sends current of the required polarity to step-up the element 8 from the battery 28, over line conductors 1 and 2, through the agency of the reversing springs 29. Current of opposite polarity is sent over the line wires 1 and 2, when the key 30 is depressed, which retracts the springs 29 by energizing the relay 31, thus reversing the polarity of the current. This reversal of the polarity operates the relay 7 to operate all the step-up elements and return them to

normal. As before explained, if the key 27, in sending impulses, is held in its closed position after having sent the required number of impulses, the signal 18 at the station called will operate, whereas, if said key is held in its open position after having sent the required number of impulses, signal 22 at the station will operate.

I have shown duplicate signal sending apparatus at the central station, as illustrated, so that two operators may use the line circuits 1 and 2, and in one form of my invention one operator might be limited to the call of signals 22 and the other operator might be limited to the call of signals 18, although, in emergency cases, it might be that an operator would wish to call either signal. In this case, of course, it is necessary to provide indications between the two operators to apprise one operator that the other is having the signaling system in use. I have designated the respective operators' positions as E and F, respectively, and I associate with the operator E a signal 32, which is operated by relays 33 and 34, which relays 33 and 34 are respectively under the control of keys 30 and 27. Vice versa, the signal 35 for the operator F is under the control of the keys 30 and 27 of the apparatus under the control of the operator E. Thus, the operator at E knows when the operator at F is using the calling devices; for when the operator F depresses the key 27, relay 34 operates to close the circuit through the lamp 32, and this circuit remains closed until the operator F actuates the key 30, which releases the signal-sending mechanism, at the same time releasing the signal 32 by actuating the relay 33.

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 claim as new and desire to secure by Letters Patent is:

1. A signaling system comprising a signal sending station and a plurality of signal-receiving stations, united by a line circuit, a step-by-step signal-controlling device at each signal-receiving station, different positions of said step-by-step devices corresponding respectively to operative positions for the different signal-receiving stations, a plurality of signal controlling means at each signal-receiving station under the control of said step-by-step devices, and switching instrumentalities at the signal-sending station whereby with a given operative position of a step-by-step device, either signal controlling means may be selectively operated.

2. A signaling system comprising a signal-sending station and a plurality of signal-receiving stations, united by a line circuit, a step-by-step signal-controlling device at each signal-receiving station, different positions of said step-by-step devices corresponding respectively to operative positions for the different signal-receiving stations, signaling means capable of giving unlike indications at each signal-receiving station under the control of said step-by-step devices, and switching instrumentalities at the signal-sending station whereby with a given operative position of a step-by-step device its associated signaling means may be selectively operated to give either of the unlike indications aforesaid.

3. In a signaling system, a central station, and sub-stations each having a signal-receiving device consisting of a circuit-closing element, and signaling means whose operative actuation is controlled by said element, and switching devices at the central station for operating said circuit-closing element and with a given position of said circuit closing element operating said signaling means in either of a plurality of different ways.

4. In a signaling system, a central station, and sub-stations each having a signal-receiving device consisting of a circuit-closing element and signaling means capable of giving unlike indications, whose operative actuations is controlled by said element, and switching devices at the central station for operating said circuit closing element and causing a selective actuation of said signaling means to give either of the unlike indications aforesaid with a given position of said circuit-closing element.

5. A step-by-step device having under its control selective signaling means, in combination with switching means at a central station to operate said signaling means in either of a plurality of different ways with a given operative position of said step-by-step device.

6. A signal-controlling element at a substation having under its control selective signaling means, in combination with switching means at a central station to operate said signaling means in either of a plurality of different ways with a given operative position of said element and to place said controlling element in its operative position.

7. A signaling system having a central station and sub-stations, a step-by-step element at each sub-station, a plurality of signal-controlling means under the control of each step-by-step element, and switching means at the central station to cause an operation of either signal-controlling means with a given operative position of said step-by-step element.

8. A signaling system having a central station and sub-stations, a step-by-step element at each sub-station, a plurality of signal-controlling means under the control of each step-by-step element, and switching

means at the central station to step up said element, and with a given operative position of said element, to select for operation any desired signal-controlling means aforesaid.

9. A signaling system having a central station and sub-stations, a step-by-step element at each sub-station, selective signal-controlling means under the control of each element, switching means at the central station to step-up said element to its desired operative position, and reactive means whereby when the central station switching means are held in one circuit controlling position after operating the step-by-step element to its operative position, the selective signal-controlling means are operated in a given manner, and when said switching means are held in a different circuit-controlling position after stepping up said element to its operative position the selective signal-controlling means are operated in a different manner.

10. A signaling system having a central station and sub-stations, a step-by-step element at each sub-station, a plurality of signal-controlling means under the control of said element, an impulse-sending mechanism at the central station to step-up said element to its operative position, and reactive means whereby when the impulse-sending mechanism after stepping up said element to its operative position is held in its impulse-sending position a signal controlling means is operated, and when said mechanism after stepping said element to its operative position is held in its normal or non-impulse-sending position a different signal-controlling means is operated.

11. A signaling system having a central station and sub-stations, a step-by-step element at each sub-station, a plurality of signal-controlling relays under the control of said element, an impulse-sending mechanism at the central station to step-up said element to its operative position, and reactive means whereby when the impulse sending mechanism after stepping up said element to its operative position is held in its impulse sending position a signal-controlling relay is operated, and when said mechanism after stepping up said element to its operative position is held in its normal or non-impulse-sending position a different signal-controlling relay is operated.

12. A signaling system having a central station and sub-stations, a step-by-step element at each sub-station, a plurality of signal-controlling means under the control of said element, an impulse-sending mechanism at the central station to step up said element to its operative position, reactive means whereby when the impulse-sending mechanism after stepping up said element to its operative position is held in its impulse-sending position a signal-controlling means is operated, and when said mechanism after stepping up said element to its operative position is held in its normal or non-impulse-sending position a different signal-controlling means is operated, a duplicate impulse-sending mechanism, and automatic means whereby indications are given at one mechanism when the other mechanism is in use.

13. A signal-controlling device having under its control selective signaling means, in combination with switching means at a central station to operate said signaling means in either of two different ways, with a given operative position of said signal-controlling device.

14. A step-by-step signal-receiving device comprising a step-by-step element, a circuit changing device under the control thereof, a relay for moving said element to its operative position, a plurality of signal-controlling devices under the control of said element, and means controlled by said relay, circuit changing device and element operable to selectively actuate said signal-controlling devices with a given position of said step-by-step element.

15. A signaling system having a central station and a plurality of substations, means at the central station for selectively operating circuit-closing elements at the sub-stations, circuit-closing elements at the sub-stations, a plurality of signal-operating means under the control of said circuit-closing elements, and means at the central station for selectively operating the desired signal-controlling means with a given position of said circuit-closing elements.

16. A signaling system having a central station and sub-stations, step-by-step apparatus at each sub-station, a plurality of signal-controlling means under the control of said step-by-step apparatus, and switching devices at the central station to effect an operation of either signal-controlling means with a given operative position of said step-by-step apparatus.

17. A signal controlling element at a substation having under its control two signals, in combination with switching devices at a central station to operate either signal with a given position of said element, and to place said controlling element in its operative position.

18. A step-by-step signal-controlling element at a substation, having under its control two signals, in combination with switching devices at a central station to operate either signal with a given position of said element, and to place said controlling element in its operative position.

19. A signaling system having a central station and a plurality of substations, means at the central station for selectively operating step-by-step circuit-closing elements at

the substations, step-by-step circuit-closing elements at the sub-stations, a plurality of signal-operating means under the control of said circuit-closing elements, and means at the central station for selectively operating the desired signal-controlling means with a given position of said circuit-closing elements.

In witness whereof, I hereunto subscribe my name this 19th day of January A. D., 1909.

HARRY O. RUGH.

Witnesses:
MAX N. ZABEL,
O. M. WERNNIEL.