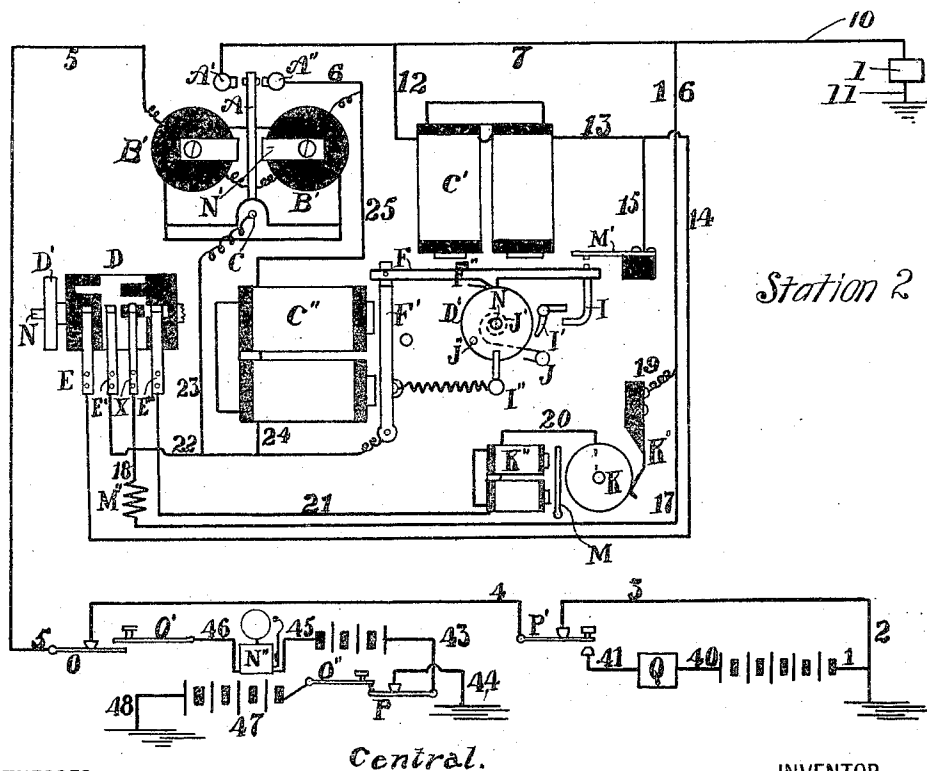


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ELECTRIC SIGNALING APPARATUS AND CIRCUITS.
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1,060,760.

Patented May 6, 1913.



WITNESSES:

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ELECTRIC SIGNALING APPARATUS AND CIRCUITS.

1,060,760.

Specification of Letters Patent.

Patented May 6, 1913.

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To all whom it may concern:

Be it known that I, FELIX BENEDICT HERZOG, Ph. D., a citizen of the United States, and a resident of the city, county, and State of New York, have invented a new and useful Improvement in Electric Signaling Apparatus and Circuits, of which the following is a specification.

My invention relates to an organization in which apparatus is placed at a number of stations connected in series by less than as many wires as there are stations. Its object is to enable the central or controlling station at one point in the series to pick out or "individualize" any one of the other stations and to produce at these stations any desired results, including, for the sake of example, the ringing of an alarm, or the release of a latent signal transmitter or "teleseme," or the production of any desired effect.

The "teleseme" is the generic name of the signaling apparatus shown in numerous patents to me. In some cases this is operated by a motor normally held locked and released by a detent under control of a magnet brought into action from the releasing or receiving station. This form is the spring actuated form but in other instances the apparatus is not under stress of a motor spring but is directly driven as for instance by a step magnet. A patent showing an apparatus of the first form is 289,834, and one showing the second form is 292,115; another is shown in my Patent 696,140.

It consists further in adapting to apparatus constructed to perform the acts described responding or verifying apparatus, which will operate to echo back, as it were, to the controlling station whether the designed operation has been correctly performed, thus serving as a check upon mal-operation and defects due to the apparatus or the wires.

In the following description (and the drawing) K, K' and K'' will be considered as the elements of the device which it is intended to operate at such sub-station, and when it is desired to add to the system the verifying or checking feature, to which reference has been made, these elements K, K' and K'' will be considered as a latent signal transmitter adapted to send a signal which is recognizably different for each one of the stations. Such a form, for instance, is shown in said Patent 696,140, Figure 6, in

which such a station designating or "characteristic" signal is produced, in addition to the variable portion which may be set, at will, to produce any one of a number of different signals.

The figure represents the organization showing two of a number of similar individualizers placed in series on a single circuit, these being controlled from the central station, shown in the lower part of the drawing and marked "Central."

The apparatus here includes as elements the keys O', P', controlling currents of opposite polarity, the key O'' controlling a current of abnormal strength; Q an indicator of any suitable construction for receiving the signal from a transmitter or responder at the distant station; N'', a simple bell, acting as a detector to show whether the increased current is sufficiently strong.

Preliminary operation: When the central office operator wishes to call up a particular station, he presses key O', and the current passes from earth 44, key P, line 43 battery 45, bell N'', line 46, key-contacts O' and O, thence by line 5 to the apparatus at the nearest station; here it enters polarized relay B', the armature A of which makes normal contact with A'' and the current for the first moment passes through the armature of the relay, thence by wires 23, 22, to spring E' and contact-roller. This roller will reach the normal or resting position after its motor or step wheel will have rotated it one step beyond the position in which it is shown in the drawing. In this normal or resting position the direct or main line spring E' (which is at all times in contact with the metal contact surface of the roller) will be bridged to the spring X (which in the abnormal or working position illustrated in the drawing shows an insulated space brought to a position in which such bridging is prevented). This metallic piece is so arranged that at suitable points of revolution of the roller, it will successively connect the direct or main contact spring E' with the branch springs E, E'' and X, and thus successively control the separate functions performed by the respective branches 14, 21 and 17. From the spring X the current passes through the small resistance M'' to the line and out to next station by way of wire 17, 16 and 8, thence through a similar organization for each subsequent station and finally to a suit-

able return as indicated by the final ground at end of wire 11, or if the station selected should be the last upon the line the ground would of course be located thereat. But this current is of such polarity that it immediately attracts the relay armature from A'' to A', whereupon, the path of less resistance being broken at A'' and armature, the current will pass through magnet C'', relay armature, A, line and out to the next station, and, at each impulse through the magnet C'', this will control any suitable device, as the step-by-step wheel D' by means of the co-operating pawls and adjuncts. This wheel is connected with the contact roller D, (these parts being shown separately in order that the circuit connections may be more readily traced, connection being indicated by the spindle N). As the result of this organization, the central office, by pressing key O' a certain number of times may bring the roller D into any definite position. The contacts on the roller are so arranged with reference to the bridging of the contact springs pressing thereon, that at a given number of steps from zero, (this number differing for each of the stations in series) the roller will be brought into the position shown in the drawing.

Controlling operation: After having given the number of impulses required to bring any desired station-roller into this position, the central operator presses the key P', thus changing the polarity of the current and causing the relay-armature to again make contact with A'', whereupon the current passes to spring E' and spring E'', operative magnet K'' of teleseme, and the line—this releases the teleseme, and the signal composed of a number of makes and breaks, which of course, do not affect the polarized armature, will be received on the indicator Q. After passing through the teleseme, by way of its magnet K'', its wheel K and its spring, K', the current will pass up branch 16, out to the next station, taking the same course therein as in station 2, excepting that, as in no other station are the roller contacts in the same position, the current will at this station pass through the resistance M'' instead of through the teleseme or other individual apparatus thereat as referred to below.

Restoring operation: When it is desired to return the commutating rollers to zero, the key O' is pressed a number of times, thus actuating the magnet C'' and by it the roller until the latter is stopped by a pin I'' engaging with the pin J'' carried by the roller. At this point the branch spring E arranged to coöperate only with the unison contact, (shown over this spring in the drawing) having the same relative position on each roller, is bridged into circuit, and X and E'' the two other branch springs

are cut out; and when this is done and central key P' is pressed, the current will actuate the relay armature once more, and passing through the magnet C' will cause this to attract resetting armature F, thus disengaging the clicks from the ratchet and permitting the roller to return to zero by stress of spiral spring J on the step-by-step wheel. But immediately before the clicks are disengaged, the armature F makes contact with spring M' in the following circuit (5, B', 6, A'', A, 23, armatures F', F'', spring M', 15, 13, magnet C' and out as before), thus, by offering an alternative path to the current, preventing a break in the circuit through the roller as this returns to zero; and, further, to prevent this return movement from short-circuiting the magnet C', the resistance M'' is placed where shown.

Summary: Normal position at substation; relay armature at A''; spring E' on roller at all times, spring X bridged to it; other springs free; key O' (weak+current) attracts polarized armature A and this breaks polarized shunt at A'' and steps the roller which is actuated by the motor magnet C'' forward one step for each closure through motor branch leading from X, M'', 17, 16, and out. At prearranged step (for instance sixth) key P' (strong—current) closes short circuit around motor magnet C'' preventing its subsequent operation and at this point the theretofore closed branch through spring X is broken and spring E'' has substituted for the same, and connected into action the working branch 21 upon which teleseme, or any other mechanism which is to be thus actuated or controlled, is located. Unison is provided as a preliminary to restoration by again using key O' (weak+current) again shunting in motor magnet C'' and causing a sufficient number of steps to complete its cycle or a greater number to allow for accidental failures whereupon spring E throws into circuit restoration branch 14 and magnet C' (but not actuating the latter); restoration is effected by an impulse on key P' (strong—) again closing short circuit around motor magnet C'' and energizing restoration magnet C', freeing the clicks on motor and permitting its spiral spring to restore it; continuity of circuit during this recoil of motor (which would reopen circuit at spring E before completion of return, and thus would prevent restoration magnet from completing its work) is secured by branch through 15, M', F'', F', 23 and armature A of polarized relay.

The following conclusions are to be noted among others that will occur (to the expert who examines) as incidental to the operation of the organization described.

1. As many stations as desired may be successively operated either to produce the

operation of their local devices or to produce the respective return in verification signals.

2. The successive controls over the responding or verification transmitters may be made to produce such verifications or not according to the type of such verification apparatus *i. e.* it being assumed that it is in all cases of the latent signal type. The production or non production of such a response will depend upon whether or not the teleseme in a given controlled station has been locally "set" or arranged to respond or not.

3. Such response may include in addition to the verification such further variable signals as may be within the selective range of the transmitter.

It has been stated that the purpose of this general switching mechanism is to enable an operator at another station to produce at the station at which the switching apparatus is located, desired effects other than those of ringing an alarm or the release of a teleseme, and for the production of such effects, as indeed for the operation of some types of alarm or teleseme or the operation of the modified form of the station switch which was illustrated in the specification as originally filed herein as a species of the broad invention, an increased strength of the same polarity of current as supplied by battery 45 is needed. Key O'', battery 47 and ground 48 shew how this may be added where needed without interfering with the rest of the arrangements. When this is to be brought into use both of the keys O' and O'' must be depressed. When the operator at the central station is not operating the keys O' and P' to release and receive a signal from an outlying station the circuit from the outlying stations is completed through the central station through the switch contact O wire 4 key P' wire 3 bell P'' and wire 2 to ground. Hence attention of the central operator can be called through the bell P'' from an outlying point by throwing current on to the line.

What I claim is:

1. Circuit connections passing through a series of stations, and comprising less than as many wires as there are stations; means at the controlled stations, whereby apparatus at any one of these may be selected at will for operation from one station of the series; signal transmitting elements at such selected station; devices at the controlling station and operating to control the action of the signal transmitting elements at the selected station without affecting the action of these elements at other stations; together with devices at the controlling station responsive to the action of the transmitting elements at the selected station; the whole coöperating to produce the transmission at

a selected station only after it has been selected, and its reception at the selecting station.

2. In a system comprising several individualizable stations, the combination at two or more of these, of the individualizer elements with electrically controllable responding signal-transmitting elements, together with connecting devices organized to control the signal transmission through the individualizer.

3. In a system comprising several individualizable stations, the combination at two or more of these, of the individualizer elements with electrically controllable responding signal-transmitting elements, together with connecting devices organized to control the signal transmission through the individualizer and at a predetermined stage of its operation.

4. In a system comprising several individualizable stations, the combination at two or more of these, of the individualizer elements with electrically controllable responding signal-transmitting elements, together with connecting devices organized to control the signal transmission through the individualizer, the signal transmitter including a circuit controller adapted to send a location-indicating signal; and, at a controlling station, a receiver adapted to respond to the operated transmitter whereby the responding signal verifies the selection of the proper station.

5. In a system comprising a main controlling and several individualizable stations in series the combination at each of two or more of these stations of the individualizer elements with electrically controllable responding signal transmitting elements together with connecting devices organized to control the signal transmissions through the individualizer the said responding signal transmitting elements, together with connecting devices organized to control the signal transmission through the individualizer, the said responding signal transmitting elements being constructed and adapted to be set to be electrically controllable to transmit the signal for which it has been set, substantially as described.

6. Circuit connections passing through a series of stations and comprising wires fewer in number than the number of stations; and, at the stations, means whereby apparatus at any of these may be selected at will for operation from another station; signal transmitting elements at such selected station; devices at the controlling station and operating to control the action of the signal transmitting elements at the selected station without affecting the action of these elements at other stations; together with devices at the controlling station responsive to the action of the transmitting elements at

the selected station; the whole coöperating to produce the transmission at a selected station only after it has been selected, and its reception at the selecting station.

5 7. In combination with a suitable controlling means including a suitable current source, a circuit controlling device at one station and at a second station a mechanism controlled thereby and including a magnet
10 and adjunctive parts, constructed arranged and adapted to cause any desired one of three or more branches to be connected to the first station; a restoring magnet arranged and adapted to control the disconnection of such branch; and a third magnet
15 arranged and adapted to control the operation of both of these magnets.

8. In combination with a suitable controlling means including a suitable current
20 source a circuit or impulse controlling device at one station and at a second station a switching device controlled thereby and including a first switching or motor magnet and step device driven thereby, branches
25 adapted and arranged to be successively and one at a time brought into coöperation with the line from the first station, one of such branches including a magnetically controlled device; a second switching magnet brought
30 into action as a preliminary to the action of the motor magnet, a recoil device as a spring arranged and adapted to return the step device to zero and means including a third switching or restoring magnet where-
35 by this may be done at will from the first station.

9. In combination with a suitable controlling means including a suitable current source, a circuit controlling device at one station and at a second station a mechanism controlled thereby and including a magnet
40 and adjunctive parts, constructed arranged and adapted to cause any desired one of three or more branches to be connected to the first station; means, controlled from the first station for securing the disconnection
45 of such connected branch; and a relay magnet armature arranged and adapted to cut out the first magnet at will.

10. In combination with a suitable controlling means including a suitable current
50 source, a circuit controlling device at one station and at a second station a switching mechanism controlled thereby and including a magnet and adjunctive parts, constructed
55 arranged and adapted to cause any desired one of three or more branches to be connected to the first station; means, controlled from the first station for securing the disconnection of such connected branch; and
60 a relay magnet armature arranged and adapted to cut out the first magnet at will; together with a magnetically controlled signaling apparatus in one of the branches and mechanism at the first station for controlling the operation thereof and receiving
65 the signal therefrom.

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Witnesses:

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CHAS. E. ANDERSON.