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SIGNAL TELEGRAPH.

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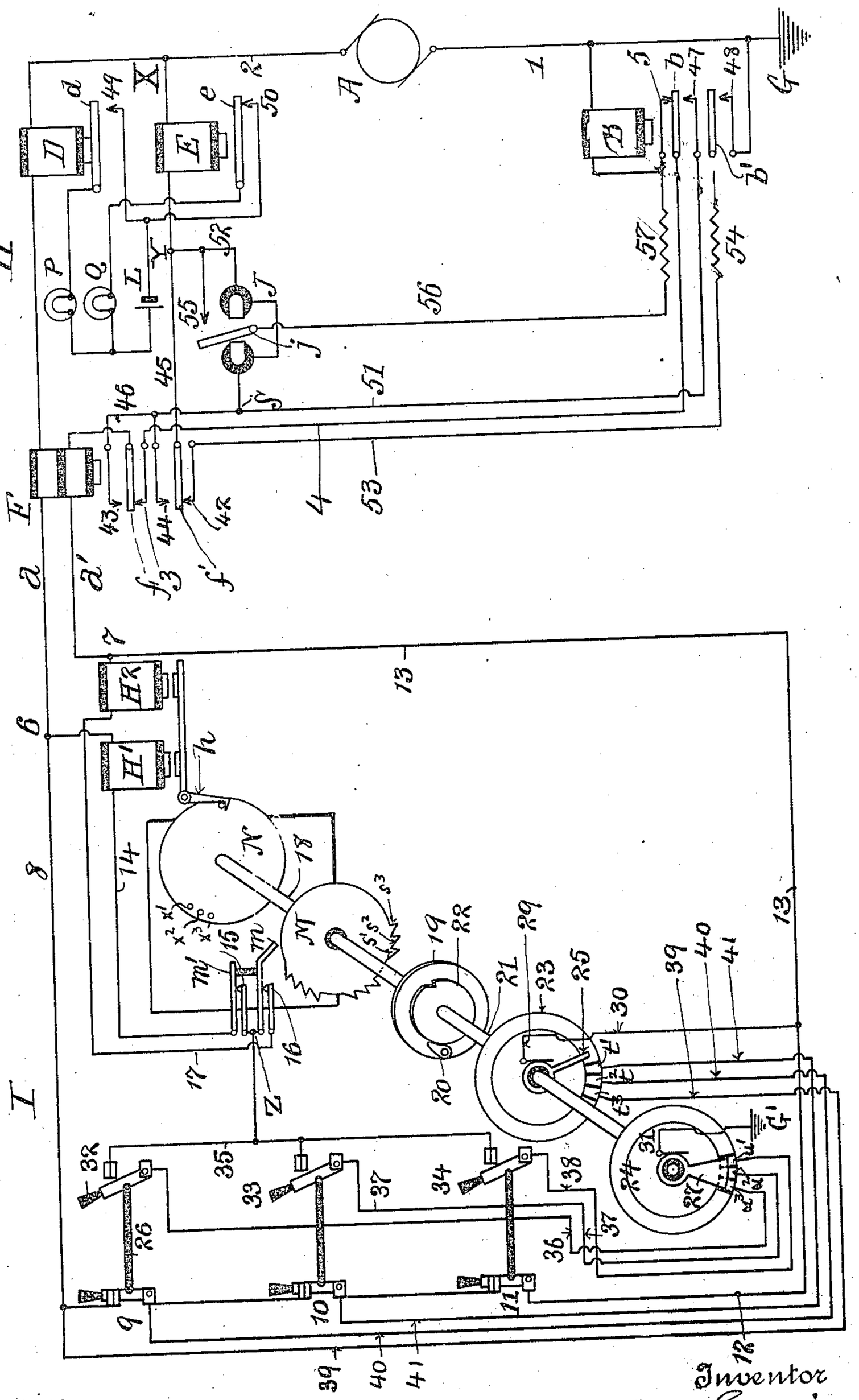

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SIGNAL-TELEGRAPH.

981,997. Specification of Letters Patent. Patented Jan. 17, 1911.

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To all whom it may concern:

Be it known that I, ALBERT GOLDSTEIN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Signal-Telegraphs, of which the following is a specification.

The invention relates to signal telegraphs. It has for its object to permit signals being sent from a plurality of sub-stations, as, for example, different floors of a building, by the use of a single code wheel common to all, and controlled by the throwing of a simple switch lever at each floor, so that at the receiving station the translating device will indicate not only the building or main station, but also the sub-station or floor in that building at which the signal originates. The invention is also constructed as that neither the accidental failure of the ground connection at the main transmitting station, or the occurrence of a break or a ground on either member of the metallic line circuit, will prevent the transmission and reception of said signals.

The accompanying drawing is an electrical diagram, illustrating my invention.

I is the transmitting station, II, the receiving station, and a and a' members of the line circuit connecting said stations. At the receiving station is disposed a source A of current, here represented as a dynamo, which connects to ground G by the wire 1. The main metallic circuit proceeds from non-grounded pole of source A, by wire 2 to magnet D, which is normally energized, to one coil of neutral magnet F, line member a, and thence to the devices at the transmitting station I, which will be described hereafter: and thence by line member a' to the other coil of magnet F, to switch f controlled by said magnet, contact 3, wire 4, switch b controlled by magnet B, which is normally energized, contact 5, to magnet B, to wire 1 and grounded pole of source A.

At the transmitting station there is a short circuit around the apparatus from junction point 6 on line member a to point 7 on line member a', as follows: from point 6, by wire 8, through the hand switches 9, 10, 11 in series, by wire 12, wire 13 and point 7. Also in shunt between points 6 and 7 are the magnets H′ and H², the circuit proceeding as follows: from point 6 to magnet H′, wire 14, switch arm m', contact 15, switch arm m, which is connected to switch arm m' by a rod of insulating material, to contact 16, wire 17, magnet H² and point 7.

The bent end of switch arm m bears upon the periphery of the code wheel M which is rotated by any suitable clock-work or other mechanism. On the rim of the code wheel are suitable projections for causing the switches m, m' to break circuit at the contacts 15, 16, and thus to transmit some definite signal. As here shown, the wheel M sends a signal 4—3 followed by either 1, 2, or 3 taps in accordance with the conditions now to be described.

On the end of code wheel shaft 18 is a disk 19 which carries the pawl 20. In line with shaft 18 is a shaft 21 having at its end and facing the disk 19 a notched disk 22. Hence when the pawl 20 engages with the notch in disk 22, motion will be transmitted from shaft 18 to shaft 21. The shaft 21 passes through and turns freely in two fixed commutator disks 23 and 24. Fast on said shaft, but insulated therefrom is an arm 25 which moves over and makes contact with any one of the mutually insulated segments t', t^2, t^3 on disk 23. Also fast on shaft 21, but insulated therefrom is another arm 27 which moves over and makes contact simultaneously with all of the mutually insulated segments u', u^2, u^3 on disk 24. Arm 25 is connected by a wiping brush 29 and wire 30 to wire 13. Arm 27 is connected by wiping brush 31 to ground G′.

To the junction point Z between contact 15 and switch m, three hand switches 32, 33, 34 are connected by wire 35. The switches 32, 33, 34 are respectively connected to the switches 9, 10, 11, so that the opening of one switch of each pair, as 10, 33, closes the switch joined thereto. One way of accomplishing this is by connecting the switch levers by bars 26 of insulating material. Any other suitable way may be substituted. The levers of switches 32, 33, 34 are connected by wires 36, 37, 38 to the segments u^3, u^2, u' respectively. The contact plates of switches 9, 10, 11 are connected by wires 39, 40 and 41 to the segments t^3, t^2, t', respectively.

The operation of the apparatus is as follows: I will assume, for example, that the pairs of hand levers 9, 32—10, 33 and 11, 34, are located at different sub-stations of a main station, such as different floors of a

building. By operating any one of these levers, a signal may be sent to the receiving station which, according as it indicates 4—3—1 or 4—3—2 or 4—3—3, shows by 4—3 the location of the building, and by the following figure, the first, second or third floor as the place in that building at which the signal originates. The mechanism for rotating the code wheel M is normally prevented from operating by means of a hook on one arm h of the pivoted bell-crank armature of magnets H′, H² engaging with a pin on the face of a disk N. I will further assume that the lever of switch 33 is operated to close said switch, and consequently open switch 10. The closing of switch 33 establishes connection to ground from junction 6 as follows: from magnet H′ to wire 14, switch m', contact 15, junction Z, wire 35, switch 33, wire 37, commutator segment u^2, arm 27, brush 31 to ground G′.

The opening of switch 10 breaks the short circuit, already described, from junction point 6, to junction point 7, around magnets H′, H². Magnet H′ being energized, lifts the armature h, swinging its hook outwardly and so releasing said hook from the pin on disk N. Code wheel M then rotates. The effect of establishing ground to G′, as above described, unbalances neutral magnet F which, in attracting its armature, moves switches f, f' to open circuit at contacts 3 and 42, and close circuit at contacts 43 and 44. Two current leads then exist from the non-grounded pole of source A as follows: (1) By wire 2, to magnet D, one coil of magnet F, line member a, junction 6, to magnet H′ and so to ground G′, as already described. (2) By wire 2, to junction X, magnet E, junction Y wire 45, switch f', contact 44, wire 46, contact 43, switch f, other coil of magnet F, line member a', junction 7, magnet H², wire 17, contact 16, switch m, junction Z, wire 35, switch 33, wire 37, commutator segment u^2, arm 27, brush 31 to ground G′. The opening of circuit at contact 3 causes magnet B to fail, causing its switches b and b' to open circuit at 5, and close circuit at 47 and 48. The rotation of code wheel M sends impulses over both of the current leads above traced, and hence both magnets D and E are operated to cause their switch levers d and e to make and break circuit at contacts 49, 50, which points are in local circuit with a battery L and lamps P, Q. The signals transmitted by the code wheel M are, therefore, translated by said lamps.

I will now describe the operation of the apparatus to indicate the sub-station or floor (as 1, 2 or 3) from which the alarm is sent. As already pointed out, the rim of the code wheel M has four projections and then three projections, so that it will always send the signal 4—3 which may indicate the building for example. Following the three projections above noted are three other projections s', s^2, s^3. The placing of the pawl 20 on disk 19 is to be such that said pawl does not engage in the notch of disk 22 until after the wheel M has sent the signal 4—3, and just before it would begin to send the succeeding signals due to the projections s', s^2, s^3. At this time of engagement of pawl 20, the projections s', s^2, s^3 on wheel M and u', u^2, u^3 on disk 24 are in such relative position as that when the arm m rises over projection s', the arm 27 on disk 24 leaves segment u'. The same operation, if permitted, takes place with respect to the projection s^2 and s^3 and segments u^2 and u^3. The projection s' on the code wheel M breaks the circuit at m to produce the first tap following 4—3; said circuit still proceeding from junction Z to wire 35, switch 33, (supposed to be closed) wire 37, to segment u^2, arm 27, brush 31 to ground G′. The projection s^2 on the code wheel then breaks circuit at m to produce the second tap, but, by this time, arm 27 on disk 24 has moved out of contact with segment u^2, so opening the circuit to ground G′. Therefore when switch 33 is closed, only two signal taps are produced following the signal 4—3; and if the switch 33 be located on the second floor of the building (as previously supposed) then the received signal 4—3—2 will indicate that the signal has originated on said second floor. It will be obvious that in like manner, if the switch 34 be closed then the signal 4—3—1 will be sent in, or if the switch 32 be closed, the signal 4—3—3 will be transmitted, so that in each case the last tap or group of taps in the signal shows the particular sub-station or floor from which the signal originates. The opening of the circuit to ground G′ causes the neutral magnet F again to become balanced, with the result that its switches f, f' break circuit at 43 and 44, and close circuit at 3 and 42. Two current leads from the non-grounded pole of the source A then proceed as follows: (1) From source A, to junction point X, through magnet E, to junction point Y. (2) From source A, to junction point X, to magnet D, one coil of magnet F, line member a, to junction 6, wire 8, switch 9, wire 40, segment t^2, arm 25 in contact with said segment, brush 29, wire 30, wire 13, to junction 7, line member a', other coil of magnet F, switch f, contact 3, wire 4, switch b, contact 47, wire 51, junction point S, polarized magnet J, wire 52, to junction point Y. Then from junction Y by wire 45, switch f', contact 42, wire 53, resistance 54, switch b', contact 48, by wire 1 to grounded pole of source A. Magnet J then being energized by a reversed current, swings its switch lever j to contact 55. Circuit is then established from non-grounded pole of source A, magnet E, junc-

tion Y, to wire 52, contact 55, switch *j*, wire 56, resistance 57, magnet B, and wire 1 to grounded pole of source A. Magnet B then becomes energized, closing circuit again at 5 and opening circuit at 47, 48, thus restoring the metallic circuit to its original and normal condition.

On the inner side of disk N are three pins x', x^2, x^3 in position to be engaged by the hook on armature *h*. The location of these pins with reference to the projections s', s^2, s^3 on wheel M is such that the armature hook *h* automatically engages pin x' after projection s' has moved out of contact with switch *m*, and similarly it engages pins x^2, x^3 after projections s^2 and s^3 respectively have moved out of contact with switch *m*. But said hook is disengaged from said pins by the action of magnet H′ or H², and said magnets are again energized through the ground connection by way of switch 33 after s' has passed switch *m*. The disengagement of said hook then occurs; but, after s^2 has passed switch *m*, then the ground connection is broken, and consequently the hook remains in engagement with pin x^2, so stopping the rotation of the code wheel M.

The foregoing describes the normal operation of the apparatus which continues as long as the ground connection to G′ remains unimpaired, but should that ground connection become accidentally broken, then the apparatus would fail, without giving any indication of said impairment. I will now describe how this is provided for. Referring to the fixed disk 23 in which the shaft 21 rotates, and the arm 25 carried by said shaft which, as already explained, moves over and makes successive contact with the commutator segments t', t^2, t^3, it is to be observed that said segments are in such relative position with respect to the projections s', s^2, s^3 on wheel M as that when the arm *m* leaves projection s', the arm 25 moves upon segment t', and when the arm *m* leaves in succession projections s^2 and s^3, the arm 25 moves successively upon segments t^2, t^3. The operation then, in event of accidental break of the ground connection from brush 31 to G′, is as follows—the switch 33, on the supposed second floor of the building, being assumed, as before, to be closed, and the switch 10 consequently opened. The closing of switch 33 does nothing because of the absence of the ground connection. The opening of switch 10, however, removes the shunt previously described, as normally existing around magnets H′ and H² and between junction points 6 and 7. Magnets H′ and H² being then energized by the current in the normal metallic circuit, release the code wheel M and the signal 4—3 is sent over the metallic circuit by the code wheel operating switches *m*, *m′* to break circuit simultaneously at contacts 16 and 15. Magnet D alone responds to the signal which is translated by lamp P. When the arm 25 on disk 23 reaches segment t^2, two taps then having been sent by code wheel M, then the short circuit around magnets H′, H² between junction points 6 and 7 is reëstablished, as follows: from junction 6, by wire 8, switch 9, wire 40, segment t^2, brush 25, brush 29, wire 30, wire 13 to junction 7. Magnets H and H′ then fail, and the armature *h* remains in engagement with pin x^2 on disk N. In case of a break in line member *a*, magnet H′ will not be energized when the code wheel M is operated, and similarly in case of a break in line member *a′*, magnet H² will not be energized. The conditions are then as follows:

I. Break in line member *a*. Normally energized, magnet B fails, opening circuit at 5 and closing circuit at 47 and 48. Two current leads then exist; (1) from source A to magnet D, one coil of magnet F, to break. (2) From source A to junction X, magnet E, wire 52, polarized magnet J, wire 51, contact 47, switch *b*, wire 4, contact 3, switch *f*, other coil of magnet F, line member *a′* to junction 7, magnet H², wire 17, contact 16, switch *m*, junction Z, and so to ground G′, when any one of the switches 32, 33, 34 is closed. In this case, magnet H² releases the code wheel M, and magnet E receives the signal and transmits it to lamp Q.

II. Break in line member *a′*. Magnet B fails as before. Two current leads then exist; (1) from source A, to magnet E, wire 52, polarized magnet J, wire 51, contact 47, switch *b*, wire 4, contact 3, switch *f*, one coil of magnet F to break. (2) From source A, to junction X, magnet D, other coil of magnet F, line member *a*, to junction 6, to magnet H′, wire 14, switch *m′*, contact 15, junction Z, and so to ground G′, when any one of the switches 32, 33, 34 is closed. In this case, magnet H′ releases the code wheel M, and magnet D receives the signal and transmits it to lamp P.

In the case of an accidental ground on either line member *a* or *a′*, neutral magnet F becomes unbalanced and causes switches *f* and *f′* to open circuit at 3 and 42, and to close the same at 43 and 44.

I. Ground on line member *a*. Two leads exist from the source A; (1) from source A, to magnet D, one coil of magnet F, to accidental ground on line member *a*. (2) From source A, to junction X, magnet E, wire 45, switch *f′*, contact 44, wire 46, contact 43, switch *f*, other coil of magnet F, line member *a′*, junction 7, wire 13, wire 12, switches 11, 10, 9, wire 8, junction 6 to accidental ground on line member *a*. When any switch 32, 33, 34 is closed, only magnet H² is energized to release the code wheel M. Signals will then be received by magnet E and translated by lamp Q.

II. Ground on line member a'. Two leads exist from source A; (1) from source A, to magnet E, wire 45, switch f', contact 44, wire 46, contact 43, switch f, one coil of magnet F, to accidental ground on line member a'. (2) From source A, to junction X, magnet D, other coil of magnet F, line member a, junction 6, wire 8, switches 9, 10, 11, wire 12, wire 13, to accidental ground on member a'. When any switch 32, 33, 34 is closed, only magnet H' is energized to release the code wheel M. Signals will then be received by magnet D and translated by lamp P.

It is to be noted that my invention is here embodied in a central energy electrical signaling system, in which the sole source of current is located at the central or receiving station: thus avoiding the use of local batteries at the transmitting station.

I claim:

1. A central energy electrical signaling system comprising a line circuit, and, at the central station, a signal translating means and a source of current; and at the transmitting station a transmitter constructed to send a succession of current impulses to line, a single device at the transmitting station for regulating the number of said impulses, and controlling devices respectively controlling said regulating device to cause the transmission of predetermined and different numbers of impulses in an arbitrary order.

2. In combination with a line circuit and signal translating means, a transmitter constructed to send a succession of current impulses to line, means for regulating the number of said impulses, means for mechanically releasing said transmitter, mechanically operated controlling devices severally and electrically controlling said regulating means to cause the transmission of a predetermined number of impulses, and mechanically operated controlling devices severally and electrically controlling said releasing means.

3. In combination with a line circuit and signal translating means, a transmitter constructed to send a succession of current impulses to line, means for regulating the number of said impulses, means for mechanically releasing said transmitter, and a plurality of connected pairs of mechanically operated controlling devices, each of said pairs electrically controlling said releasing means and said regulating means to cause the transmission of a predetermined number of impulses.

4. In combination with a line circuit and signal translating means, a rotary transmitter constructed to send a succession of current impulses to line, a plurality of connections to ground from said transmitter, contacts in said connections, means actuated by said transmitter for successively separating said contacts, and a mechanically controlled switch interposed in each of said connections between said transmitter and said contacts.

5. In combination with a metallic line circuit and signal translating means, a grounded source of current, a rotary transmitter constructed to send a succession of current impulses to line, a plurality of connections to ground from said transmitter, contacts in said connections, means actuated by said transmitter for successively separating said contacts, and a mechanically controlled switch interposed in each of said connections between said transmitter and said contacts.

6. In combination with a line circuit and signal translating means, a rotary transmitter constructed to send a succession of current impulses to line, a plurality of connections to ground from said transmitter, contacts in said connections, means actuated by said transmitter for successively separating said contacts, a mechanically controlled switch interposed in each of said connections between said transmitter and said contacts, and means controlled by said transmitter for mechanically arresting the rotation of the same upon the breaking of circuit from said transmitter to ground.

7. In combination with a line circuit, a grounded source of current and signal translating means, a rotary code wheel, an arm rotating synchronously therewith and connected to ground, contacts traversed by said arm, and mechanically controlled switches respectively in circuit with said contacts.

8. In combination with a line circuit and signal translating means, a rotary code wheel, mechanism for arresting the rotation of said wheel, a magnet controlling said mechanism, an arm rotated synchronously with said wheel and connected to said magnet, contacts traversed by said arm, and mechanically controlled switches in circuit with said magnet and said contacts.

9. In combination with a metallic circuit, a grounded source of current, a rotary signal transmitter interposed between said circuit and ground, and signal translating means, a shunt including a series of normally closed mechanically operable switches, a second shunt including contacts controlled by said transmitter to cause current impulses on the line, a magnet energized on the opening of any one of said switches, and mechanism for releasing said transmitter controlled by said magnet.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALBERT GOLDSTEIN.

Witnesses:
GERTRUDE T. PORTER,
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