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ELECTRICAL SIGNALING SYSTEM.

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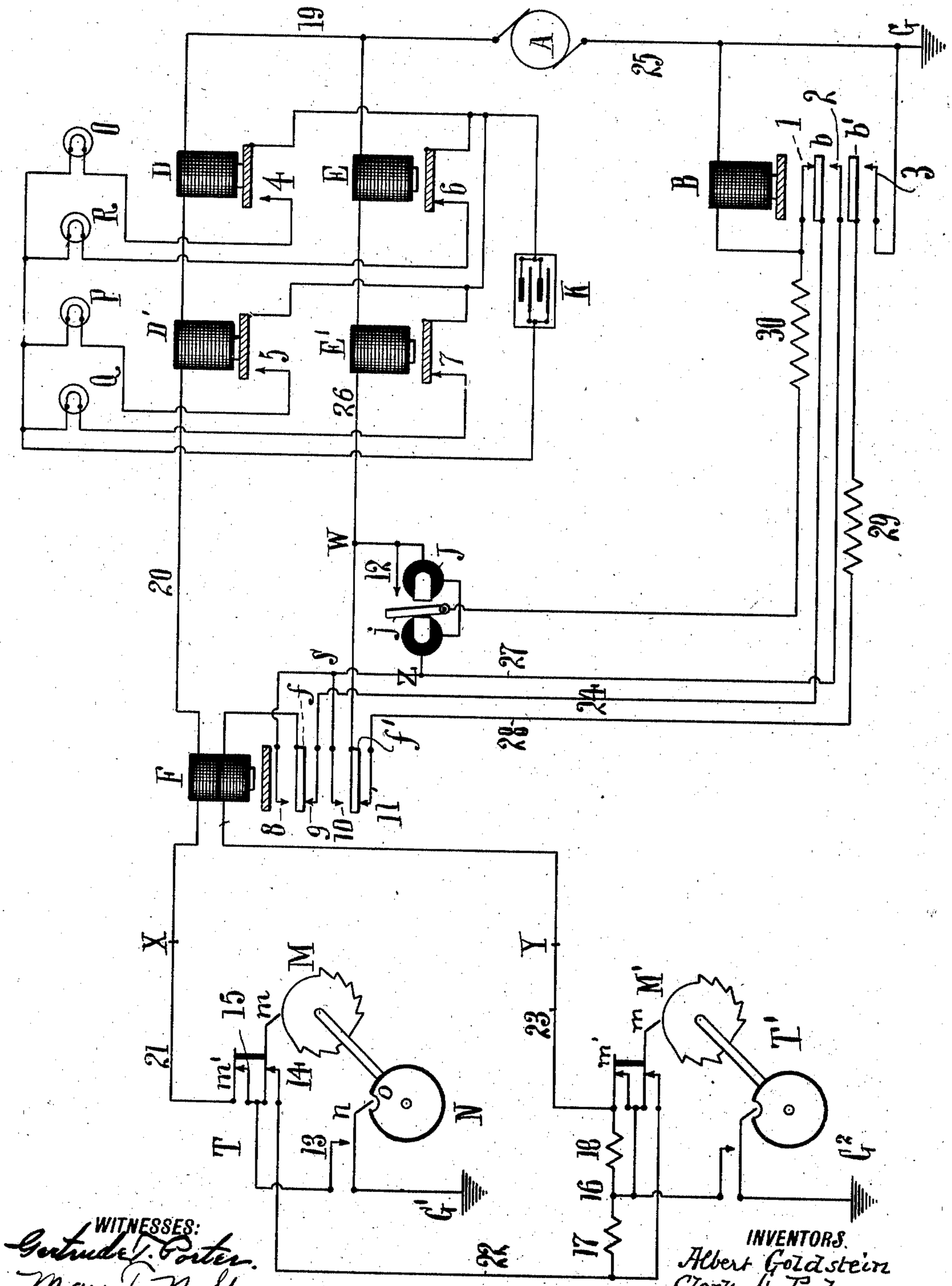

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ELECTRICAL SIGNALING SYSTEM.

966,822. Specification of Letters Patent. Patented Aug. 9, 1910.

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To all whom it may concern:

Be it known that we, ALBERT GOLDSTEIN and CLARK H. POOL, citizens 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 Electrical Signaling Systems, of which the following is a specification.

The invention relates to an electrical signaling system constructed so that an abnormal disturbance of electrical conditions upon the circuit shall remedy itself by causing devices to be automatically actuated to restore the working efficiency of the system.

The invention consists in the means whereby after the effect of said disturbance has been neutralized and upon the subsequent removal or repair thereof, the original electrical conditions of the circuit become automatically restored; and second, in the means whereby at a receiving station successions of different current impulses transmitted over a line may be selectively indicated.

The accompanying drawing is an electrical diagram wherein the various parts of the apparatus are conventionally and symbolically shown.

The source A of current which is grounded at G may be any source, and is here represented by the conventional symbol of a dynamo.

We will first describe the principal devices associated in the circuit. Magnet B controls through its armature two switch arms b, b'. Arm b opens and closes circuit at the contacts 1 and 2. Arm b' opens and closes circuit at the contact 3. Magnet B is normally energized by the small current on the circuit, so that its armature is attracted, thus closing circuit at 1 and breaking circuit at 2 and 3.

Magnets D, D′, E, E′ control the translating mechanism at the central or home station. Magnets D′ and E′ are to be made relatively weaker than magnets D and E. Hence, if two sets of impulses, one stronger than the other, be successively transmitted, all of the magnets D, E, D′, E′ will be capable of responding to the stronger set of impulses, but only D′, E′ will respond to the weaker set. Magnet D through its pivoted switch lever opens and closes circuit at contact 4, and magnets D′, E, E′ by similar means open and close circuit at contacts 5, 6, 7. Magnets D and D′ are normally energized.

Magnet F is a neutral wound relay. When both of its coils are energized, it does not act. Through its armature it controls two switch arms f, f'. The arm f opens and closes circuit at contact points 8, 9, and the arm f' opens and closes circuit at contact points 10, 11.

At J is shown a polarized magnet, the pivoted arm j of which opens and closes circuit at contact point 12.

The transmitting mechanism.—Two transmitters T, T′ connected in series are here shown. Each comprises a code wheel M having on its shaft a cam N having a rim of insulating material, against which rim bears a brush n which, at the contact point 13, opens and closes circuit to ground G′. When the wheel M is at rest, the bent over end of brush n enters a notch o in cam N and so opens circuit to ground. The brush m which bears against code wheel M opens and closes circuit at 14, and the brush m' connected to and actuated by brush m opens and closes circuit at 15. Contact points 14, 15 are connected to contact point 13. The transmitter T′ is bridged at 16 by a connection containing resistances 17, 18, which connection is also connected to ground at G^2. The impulses transmitted by transmitter T will vary from zero to maximum strength of current. By reason of the bridged resistances, however, the impulses transmitted by transmitter T′ will be of narrow range and hence weaker. The impulses from T will therefore operate all four magnets D, D′, E, E′, while those from T′ will operate only magnets D′, E′. In this way two sets of signals may be transmitted to the home or central station, and will there be selected and cause to operate different translating or indicating means.

The metallic circuit proceeds as follows: from dynamo A, by wire 19 to magnets D, D′, wire 20, one coil of magnet F, wire 21, brushes m, m' of transmitter T, wire 22, brushes m, m' of transmitter T′, by wire 23 to the other coil of F, switch arm f, contact 9, wire 24, switch arm b, contact 1, magnet B, and by wire 25 back to dynamo. The wires 21, 23 may be the line conductor between the transmitting and receiving stations. Assume transmitter T to be operated by rotating its wheel M by any suitable

means. Magnets D, D′, E, E′ will all respond and will open and close their contacts 4, 5, 6, 7. These contacts and the switch arms controlled by said magnets are in local circuit with source K of current (here shown as a storage battery) and with glow lamps O, P, Q, R as the receiving station. If, on the other hand, transmitter T′ be operated, the weaker current will affect only magnets D′ and E′, and hence only the lamps P and Q will translate the signals.

When an abnormal disturbance occurs in the electrical conditions on the circuit, the operation is as follows: Assume a break to occur at the point X on wire 21. This de-energizes magnets B, D, D′. Two leads then proceed from source A as follows: (1) from the non-grounded pole, by wire 19 to D, D′, wire 20, one coil of F to the break at X; (2) from the non-grounded pole, by wire 19 to magnets E, E′, by wire 26, junction point W through the coils of polarized magnet J, junction Z, wire 27, contact point 2, switch arm *b*, wire 24, contact 9, switch arm *f*, one coil of magnet F, by wire 23 to transmitter T′, and by wire 22 to transmitter T, the circuit being completed to grounds G′, G² when closed by wheels M, M′.

Assume a break to occur at the point Y on wire 23. Magnets B, D, D′ are deënergized as before. Two leads then proceed from source A as follows: (1) from source A, by wire 19, to magnets D, D′ by wire 20, one coil of magnet F, by wire 21 to transmitters T, T′ and grounds G′, G²; (2) from the non-grounded pole, by wire 19 to magnets E, E′, by wire 26, junction point W through the coils of polarized magnet J, junction Z, wire 27, contact point 2, switch arm *b*, wire 24, contact 9, switch arm *f*, one coil of magnet F, by wire 23 to break at point Y.

In the case of an abnormal ground, the operation is as follows: Assume said ground to occur at the point X on wire 21. Two leads then proceed from source A as follows: (1) by wire 19 through magnets D, D′, by wire 20 to one coil of magnet F, to abnormal ground at X. Magnet F being energized attracts its armature. (2) by wire 19 through magnets E, E′ to switch arm *f*′, contact 10, junction S, point 8, switch arm *f*, other coil of F, wire 23 and transmitters T′, T to abnormal ground at X until the transmitters are set in operation to close circuit to grounds G′, G². Assume said abnormal ground to occur at the point Y on wire 23. Two leads then proceed from source A as follows: (1) by wire 19 through magnets D, D′, by wire 20 to one coil of magnet F, wire 21, transmitters T, T′ to abnormal ground at Y until the transmitters are set in operation to close circuit to grounds G′, G². Magnet F being energized attracts its armature. (2) by wire 19 through magnets E, E′ to switch arm *f*′, contact 10, junction S, point 8, switch arm *f*, other coil of F, by wire 23 to abnormal ground at Y.

It will be obvious, (1) that under normal operation two leads are formed which terminate either at ground G′ or G², or if both transmitters operate simultaneously, at both grounds. When the abnormal ground or break occurs then one of those leads becomes inoperative, while the other conveys the signals: (2) that when the disturbance occurs on one side of the transmitters, as at X, the magnets E, E′ are brought into operation, while when it occurs on the other side, as at Y, the magnets D, D′ are operated. The magnets E, E′ are respectively in circuit with the local battery K and the lamps Q, R. Hence when transmitted signals are received by magnets D, D′, the same are translated by the lamps O, P, and when received by magnets E, E′ they are in like manner translated by lamps Q, R.

We will now describe the means for automatically restoring the metallic circuit after the disturbance has been physically removed. We construct a shunt from the point W on wire 26 around to the grounded pole of the dynamo, the circuit proceeding from point W to switch arm *f*′, contact point 11, wire 28, resistance 29, switch arm *b*′, contact 3, and wire 25 to dynamo. Assuming the disturbance to be a break, this shunt provides a path for the current after the break has been physically repaired, the whole circuit then being from the non-grounded pole of the dynamo, through magnets D, D′, one coil of F, wire 21, transmitters T, T′, wire 23, other coil of F, switch arm *f*, point 9, wire 24, switch arm *b*, point 2, wire 27, to junction Z through polarized magnet J to junction W, switch arm *f*′, point 11, wire 28, resistance 29, switch arm *b*′, contact 3 and wire 25 to dynamo. The current in magnet J is thus reversed—being from Z to W instead of from W to Z. The switch lever *j* is thus swung to close contact at 12. Circuit then proceeds from dynamo through E, E′ to W, to switch lever *j*, to resistance 30, to magnet B and so by wire 25 to grounded pole of dynamo. Magnet B then attracts its armature to close circuit at 1 and open circuit at 2 and 3, when the switch arm *j* swings back and the normal metallic circuit as first traced is reëstablished.

The object of the resistance 29 is to insure sufficient current to the coil of magnet F, which is connected to the grounded pole of source A, after a break has occurred in wire 21. Otherwise so much current would pass over the shunt from W around to the grounded pole of dynamo A that a proper operation of said magnet might not be obtained. The necessity of this operation of magnet F is to close circuit at *f*′ and 10, and open same at 11. Opening circuit at 11 prevents the current on the shunt from impair-

ing the operation of magnets E and E′ when actuated by the transmitters. Closing circuit at 10 short-circuits permanent magnet J which, by decreasing the resistance, improves the operation of magnets E and E′, and also prevents the current from W to Z from demagnetizing said magnet.

The object of resistance 30 is to diminish the energizing current through magnet B, so as to prevent a magnetic lag sufficient to cause the armature to stick after the circuit is broken or grounded. In like manner the magnet F is also to be so constructed as to keep the circuit closed through the leads when the grounded transmitter or transmitters are operating. If, for any reason, the ground G′ or G² is disconnected, then the transmitters T, T′ make and break the metallic circuit, and in that way operate the translating mechanism. The interruptions are to be made sufficiently short so as not to permit the magnet B to fail, or said magnet may be constructed in any suitable way so as to keep the metallic circuit closed.

We claim:

1. The combination of a source of current, a metallic circuit normally energized thereby, a transmitter, a translating device, means actuated by an abnormal disturbance of electrical conditions on the circuit for automatically neutralizing the effect of said disturbance upon the operation of said translating device by said transmitter, and means automatically operating on the removal of said disturbance to restore the normal electrical conditions on said circuit.

2. The combination of a source of current, a metallic circuit normally energized thereby, a plurality of translating devices, means operated by an abnormal disturbance of electrical conditions on the circuit for establishing current leads respectively including said translating devices, a transmitter operating through one of said leads to actuate the translating device therein, and means automatically operating on the removal of said disturbance to disestablish said leads and restore the normal electrical conditions on said circuit.

3. The combination of a source of current, a metallic circuit normally energized thereby, two sets of selective translating devices, means operated by an abnormal disturbance of electrical conditions on the circuit for establishing current leads each including a set of said translating devices, and transmitters respectively sending successions of different current impulses operating through one of said leads to actuate the selective translating devices therein.

4. The combination of a source of current, a metallic circuit normally energized thereby, means for transmitting a plurality of successions of different current impulses, means for selectively translating said successions, and means actuated by an abnormal disturbance of electrical conditions on the circuit for automatically neutralizing the effect of said disturbance upon the operation of said selective translating means by said transmitting means.

In testimony whereof we have affixed our signatures in presence of two witnesses.

ALBERT GOLDSTEIN.
CLARK H. POOL.

Witnesses:
GERTRUDE T. PORTER,
MAY T. MCGARRY.