A. GOLDSTEIN.
ELECTRICAL SIGNALING SYSTEM.
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966,824. Patented Aug. 9, 1910.

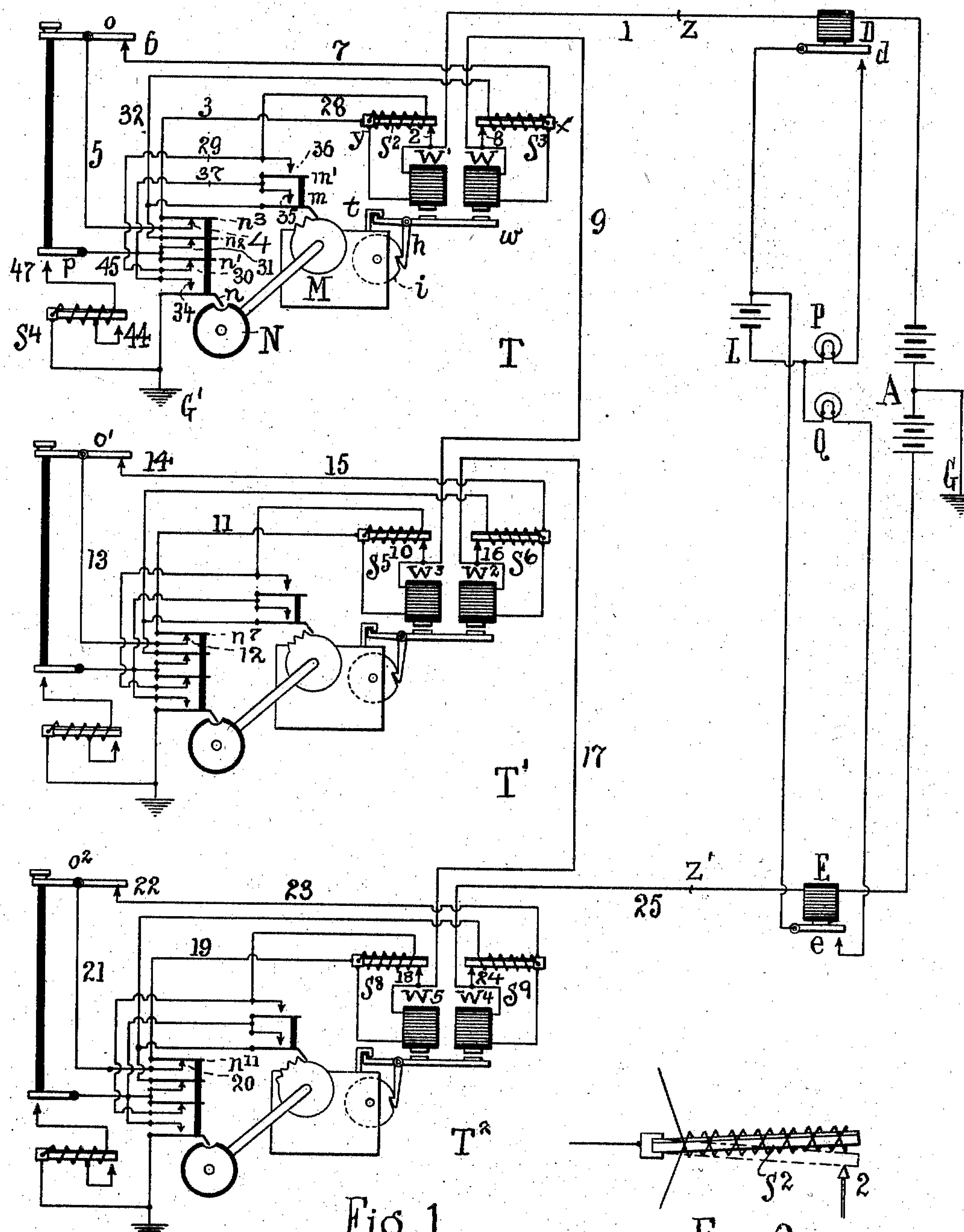

Fig. 1.

Fig. 2.

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ELECTRICAL SIGNALING SYSTEM.

966,824. Specification of Letters Patent. Patented Aug. 9, 1910.

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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 Electrical Signaling Systems, of which the following is a specification.

The invention is a central energy electrical signaling system, in which successive code signals may continue to be sent from a plurality of transmitters, notwithstanding an abnormal disturbance—such as a break—in the electrical conditions of the circuit, and in which the transmitters are timed and their operation rendered successive by electrical means: the said means here comprising thermostatic switches heated and so controlled by the current on the circuit.

In the accompanying drawing—Figure 1 is an electrical diagram, showing my invention by conventional symbols. Fig. 2 is a side elevation of one of the thermostatic switches.

Similar numbers and letters of reference indicate like parts.

Located at the receiving station is a source A of current, here shown as a split battery, which is grounded at G. At three distant stations are the transmitters T, T′, T^2, the line conductor between the stations being shown at 1 and 25. At the receiving station are the magnets D, E respectively interposed in line conductors 1, 25 and each controlling a local circuit from battery L to the glow lamps P, Q, so that when either magnet vibrates its switch lever *d* or *e* to open or close its local circuit, the signals will be translated by said lamps.

The metallic circuit proceeds as follows: From source A to magnet D, line wire 1, to transmitter T and therein to contact 2, heat switch arm S^2, wire 3, switch n^3, contact 4, wire 5, switch *o*, contact 6, wire 7, heat switch arm S^3, contact 8 and thence by wire 9, to transmitter T′, and therein to contact 10, heat switch arm S^5, wire 11, switch n^7, contact 12, wire 13, switch *o′*, contact 14, wire 15, heat switch arm S^6, contact 16 and thence by wire 17 to transmitter T^2, and therein to contact 18, heat switch arm S^8, wire 19, switch n^{11}, contact 20, wire 21, switch o^2, contact 22, wire 23, heat switch arm S^9, contact 24 to line wire 25, magnet E to source A.

The transmitter T is constructed and operates as follows: When either or both of the magnets W or W′ are energized, the hinged armature *w* is attracted, thus releasing the pallet tail *t* of the usual clock-work mechanism which rotates code wheel M, and withdrawing the detent *h* from the notch in the rim of the winding drum *i* of said mechanism. As soon as the winding drum has completed one revolution synchronously with code wheel M, the detent *h* again engages with said notch. The same result is produced through magnets W^2, W^3 of transmitter T′, and through magnets W^4, W^5 of transmitter T^2.

In order that the transmitters T, T′, T^2 may send in their signals successively, no matter in what order they may be operated, or whether they be operated simultaneously or otherwise, the following construction is provided: Magnet W is in a shunt having terminals at contact point 8, and junction *x*. Magnet W′ is in a shunt having terminals at contact point 2, and junction *y*. Under normal conditions, as already described, contacts 8 and 2 are closed and magnets W and W′ are short-circuited, and accordingly deenergized. The hinged armature *w* then being retracted, the pallet tail *t* is locked, and the detent *h* engages in the notch of winding drum *i*. When, however, the lever *o* is depressed, circuit being opened at point 6 proceeds as follows: from wire 1 to contact 2, heat switch arm S^2, coil on said arm, wire 28, wire 29, contact 30, switch *n′*, contact 31, switch n^2, wire 32, coil of heat switch S^3, heat switch arm S^3, contact 8 and wire 9, as before. The coils on heat switch arms S^2, S^3 now become heated by the current, thus producing unequal expansion of the thermostatic arms within them, and causing said arms to bend sufficiently to open circuit at contacts 2 and 8. This enables current to pass to the magnet shunts, thus energizing magnets W, W′ and, causing in the manner already described, the release of code wheel M which, rotating in the usual way, sends signals over the line.

It is to be observed that code wheel M sends impulses by intermittently closing the circuit, and under normal operating conditions, this circuit is closed to ground G′.

After magnets W, W′ have been energized, as above described, the circuit proceeds as follows: from wire 1, through magnet W′ to junction y, coil of heat switch S^2, wire 28, wire 29, contact 30, switch n', contact 31, switch n^2, wire 32, coil of heat switch S^3, junction x, magnet W to wire 9.

On the shaft of wheel M is a cam N having an insulating ring on its periphery. On this ring the bent over end of switch arm n bears while said wheel and cam are in rotation. In this way the arm n is raised together with arms n', n^2, n^3, which are connected to arm n by intermediate bars of insulating material, thus opening circuit at contacts 30, 31 and 4, and closing circuit to ground G′ at contact 34. When this is done the code wheel M controls the circuit to ground G′, by operating switch arms m, m', connected by a bar of insulating material, to open and close contacts 35 and 36 which, by wire 37, contact 34 and switch n, connect to ground G′.

In order to prevent a premature restoring of switch o to its original position, closing a short-circuit by wires 5 and 7 around the transmitter T, the switch n^3 is provided, which opens contact 4 in series with wire 5.

The construction of transmitters T′ and T^2 is the same as that of transmitter T, with which they are connected in series in the metallic circuit. The heat switches S^2, S^3 of transmitters T, S^5, S^6 of transmitter T′ and S^8, S^9 of transmitter T^2, are to be constructed so that the switch arms in each transmitter will operate at a different time—as for example, first, in transmitter T, second, in transmitter T′ and third, in transmitter T^2—when their coils are heated simultaneously. This may be accomplished in a variety of known ways, as by proportioning the resistances of the coils, or the cross sectional area or by selection of materials of the thermostatic elements, or by varying the normal pressures of the contacts—as 2 and 8—in the several transmitters against the arms.

Assume now that the transmitter T be operated, the transmitters T′, T^2 will not operate, because the low resistance circuit to ground G′ is only closed momentarily by switch m, and current then does not pass for a long enough period of time to the coils of the heat switches of transmitters T′, T^2 to operate said switches.

So far I have described the operation of the system on normal circuit. I will now assume that a disturbance occurs in the electrical conditions on the line, say a break. If said break, say at Z, occurs on wire 1, then there will be two leads formed from the source A: namely (1) to magnet D, wire 1 to break; and (2) to magnet E, wire 25, contact 24, heat switch arm S^9, wire 23, contact 22, switch o^2, wire 21, contact 20, switch n^{11}, wire 19, heat switch arm S^8, contact 18, by wire 17 to transmitter T′ and therein contact 16, switch arm S^6, wire 15, contact 14, switch o', wire 13, contact 12, switch n^7, wire 11, heat switch arm S^5, contact 10, by wire 9 to transmitter T and therein contact 8, switch arm S^3, wire 7, contact 6, switch arm o, wire 5, contact 4, switch n^3, wire 3, heat switch arm S^2, contact 2, and wire 1 to break. If, on the other hand, the break occurs in wire 25, say at Z′, again there will be two leads formed from source A: namely (1) to magnet D, wire 1 and so through the transmitters T, T′, T^2 but in the reverse direction to the second lead above described, to break Z′; and (2) to magnet E, wire 25 to break Z′. It will be obvious that in either case, in order to operate any one of the transmitters, a ground must be provided at that transmitter. I will assume that the break is in wire 25 at Z′, and that it is desired to operate transmitter T. The switch o is opened at contact 6, as already described, but because of the break nothing can happen unless a current path to ground is established. This I do by the following means. Connected to switch o by a bar of insulating material is a switch p which connects with wire 1 by way of wire 45, switch n', contact 30, wire 29, wire 28, coil of heat switch, heat switch arm S^2, and contact 2. In the path of switch p is a contact 47 which connects with ground G′ through the coil of heat switch S^4. Hence when switch o opens circuit at contact 6, it closes circuit at 47 and so connects wire 1 with ground.

The coil of heat switch S^4 is made of very high resistance as compared to the coil of heat switch S^2—say 20,000 ohms to 20 ohms—so that although the two coils are in series, S^4 only is heated. When heated, the thermostatic arm inclosed in said coil establishes contact with point 44 which is connected with the coil of S^4. This short-circuits the greater part of the resistance offered by said coil, so that the increased current now passing through the coil of S^2 is sufficient to heat the switch arm therein and cause said arm to open the shunt around magnet W′ at point 2, thus energizing said magnet and setting the code wheel M in operation in the manner already described. The reason for making the coil of heat switch S^4 of very high resistance is to prevent signals sent from the other transmitters from being cut off from the receiving station, as would happen if the ground provided for transmitter T were of low resistance.

I claim:

1. The combination of a source of current, a metallic circuit, a plurality of transmitters in series therein, a plurality of translating devices controlled by said transmitters, means operated by an abnormal disturbance of electrical conditions on the

circuit for establishing two current leads, one of said leads including a translating device and two or more transmitters, and means for controlling said included transmitters to operate successively.

2. The combination of a source of current, a metallic circuit, a plurality of transmitters in series therein, a plurality of translating devices controlled by said transmitters, means operated by an abnormal disturbance of electrical conditions on the circuit for establishing two current leads, one of said leads including a translating device and two or more transmitters, means for controlling said included transmitters to operate successively, and means for preventing mutual interference of the current impulses respectively sent by said transmitters.

3. The combination of a source of current, a metallic circuit, a plurality of transmitters in series therein, thermostatic circuit closers associated with each transmitter and controlling the same, the said thermostatic circuit closers being relatively timed to cause said transmitters to operate successively, and translating devices controlled by said transmitters.

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

ALBERT GOLDSTEIN.

Witnesses:

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