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A. GOLDSTEIN.

ALARM TELEGRAPH SYSTEM.

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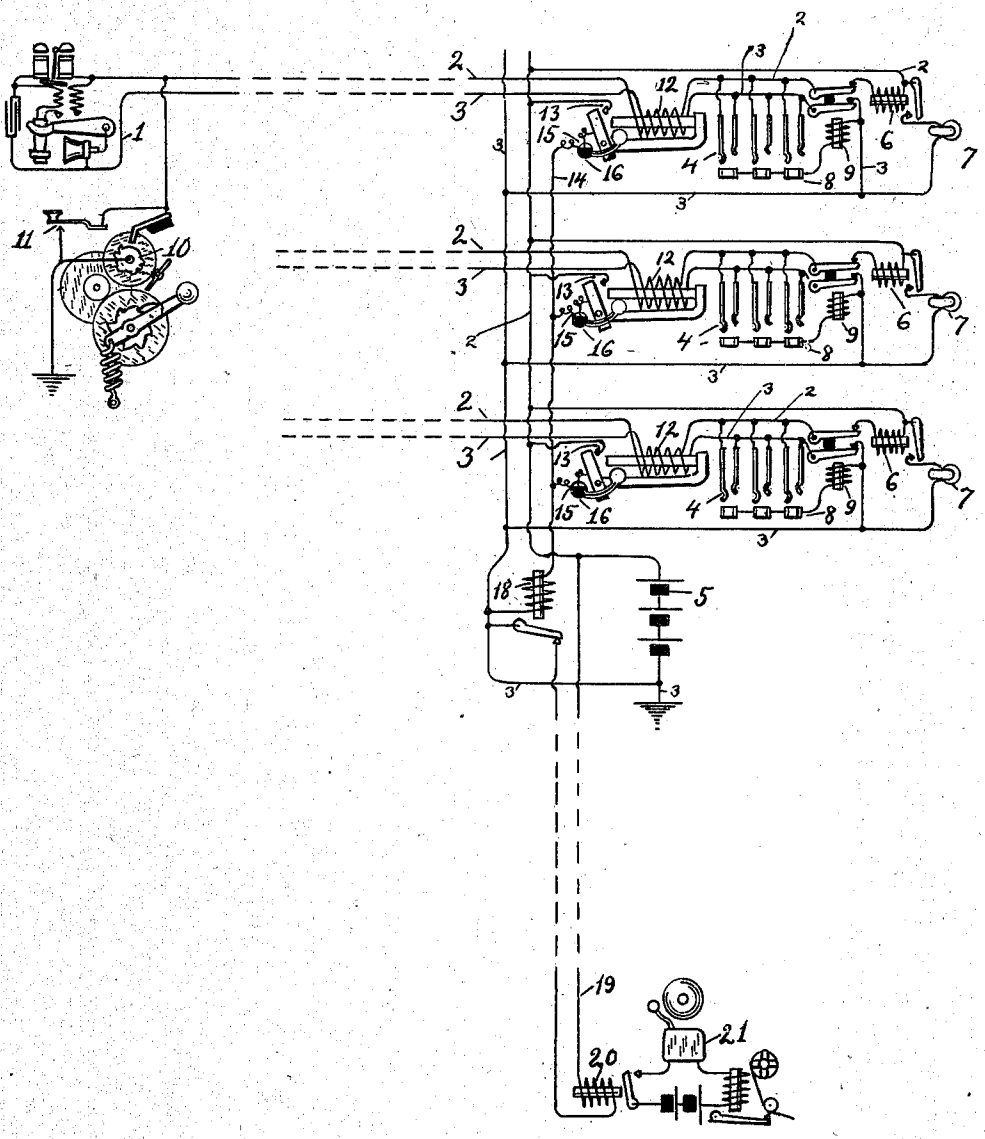
NO MODEL.



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UNITED STATES PATENT OFFICE.

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ALARM TELEGRAPH SYSTEM.

SPECIFICATION forming part of Letters Patent No. 723,199, dated March 17, 1903.

Application filed April 21, 1900. Serial No. 13,798. (No model.)

To all whom it may concern:

Be it known that I, ALBERT GOLDSTEIN, a citizen of the United States of America, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Alarm Telegraph Systems, of which the following is a specification.

This invention is an improvement in alarm telegraph systems wherein a number of primary alarm-transmitting circuits are connected through relays with a secondary alarm-transmitting circuit which transmits alarms from all the primary circuits. Such a system is especially applicable where it is practicable to utilize the wires of a telephone-exchange system for the transmission of alarm-signals. The primary circuits in the system as disclosed are normally open grounded circuits, which are branches from a common battery, though they might be supplied from separate batteries, and the alarm-signals are given by successive momentary closures on the primary circuits, which indicate distinctive numbers.

In such a system as defined above more than a momentary closure of any one of the primary circuits, such as would result from the accidental grounding of the wire, would prevent the transmission of an alarm-signal from any other primary circit, and the entire system would be disabled while the ground remained on the wire.

The object of this invention is to prevent the disablement of any one primary circuit from interfering with the normal transmission of alarm-signals by the other primary circuits. This is effected by a slow-acting cut-out switch operating in conjunction with the relay in each primary circuit. This switch by reason of its slow action is not operated by the normal momentary currents which are employed in sending alarms; but the abnormal operation of the relay by the presence of a current of longer duration, such as a continuous ground, causes the switch to operate and cuts off the control of the secondary alarm-transmitting circuit by the relay, so that this secondary circuit will be in a condition to receive signals from any of the primary circuits.

In the accompanying drawing, which forms a part of this specification, the figure shows the invention in the form of slow-acting mercury cut-out switches attached to the relay-armatures in an alarm telegraph system which is applied to a common-battery telephone-exchange system.

The system, as shown in the diagram, is a combined telephone-exchange and alarm system in which the telephone-lines are utilized for the transmission of alarm-signals from various points within a territory covered by the telephone-exchange system to an alarm-receiving headquarters by means of suitable local transmitting apparatus and repeating apparatus connected to the telephone-lines, but so constructed that they will not interfere with the telephone signaling or talking currents or the sets of the local telephone apparatus at the various points. The leads of the telephone-subscribers' circuits which come together in a telephone-exchange are used for the two distinct and independent classes of service of telephoning between telephone subscribers and transmitting signals to an alarm-receiving headquarters. This second service is by way of distinction termed an "alarm" service. The sets of apparatus at various points from which signals can be sent are termed sets of "local alarm-transmitting" apparatus, and the apparatus at the point to which the signals are sent is termed the "alarm-receiving" apparatus. These terms, however, are not intended to limit the claims to systems in which the signals are distinctly alarm-signals, since the system is equally applicable to the transmission of signals for any purpose.

In the system as illustrated the telephone-subscribers' sets 1, of which but one is shown, are connected to a common-battery telephone-exchange by the battery-leads 2 and grounded leads 3, which form the telephone-subscribers' circuits and connect the subscribers' sets with the open-terminal spring-jacks 4 and the grounded common battery 5. The battery-leads are connected through line-signal relays 6 to the live terminal of the common battery, and the grounded leads are connected to the grounded terminal of the common battery. The line-signal relays close circuits through line-signal lamps 7. In front of the spring-

jacks for each circuit are test-rings 8, which are connected through an exchange-cut-off relay 9 to the grounded terminal of the common battery. The insertion of the usual exchange cord-circuit plug in the jack of a telephone-subscriber's circuit connects the test-ring with the live terminal of the battery, and the cut-off relay shifts the connections of the grounded lead of the telephone-subscriber's circuit to ground through a repeating-coil in the cord-circuit and shifts the connections of the battery-lead of the telephone-subscriber's circuit in the battery through another repeating-coil in the cord-circuit, as described in United States Patent No. 647,588, dated April 17, 1900.

The alarm system and the manner in which the telephone-circuits are utilized for the transmission of alarm-signals will now be described.

At convenient points within the territory covered by the exchange are sets of local alarm-transmitting apparatus, each consisting either of a signaling-wheel 10 and mechanism for operating it manually or otherwise or a telegraph-key 11. Each of these is connected to the battery-lead of any telephone-subscriber's circuit which may be conveniently near and effects connection between the lead and the ground. The telephone-circuits to which such connections are made have in both leads at the exchange alarm-receiving relays 12, which are neutral relays, with the coils balanced in the two leads. All currents which are used in signaling and telephoning between telephone subscribers and the telephone-exchange course through both leads and both coils equally, but oppositely around the relay-core, thereby neutralizing each other, and hence do not affect the relay; but when a contact is made by the alarm-transmitting apparatus between the battery-lead of the telephone-circuit and the ground the common battery-current will flow through one coil only of the relay, and it will attract its armature. As, for instance, suppose a signal be sent in by key 11 or wheel 10 the circuit will be as follows: from ground to wire 2, one coil of relay 12, wire 2, line-relay 6, wires 2, battery 5, and ground. Each relay 12 controls contacts 13, which are in multiple in an alarm-transmitting circuit which includes wire 14, relay 18, part of wire 3, battery 5, and part of wire 2. The closure of the contact at any relay 12 therefore closes this alarm-transmitting circuit. In series with each relay-contact is a contact 15 of a slow-acting mercury cut-out switch 16, which is mounted on the relay-armature. This switch consists of two bulbs connected by a small tube and partly filled with mercury. The contact-wires are fused into the top of one of the bulbs. The bulbs are so mounted on the armature that when the armature is away from the relay-magnet the mercury will touch the ends of the contact-wires; but if the armature is drawn up and held for a sufficient length of time the mercury will flow slowly from the bulb containing the contacts into the other bulb and the contacts will be opened. Between the closure of the alarm-transmitting circuit at the relay-contact and the opening of this circuit by the mercury cut-out switch there is sufficient time to send an impulse such as is requisite in sending a signal. In event of any current coming onto a line 2, which would operate its alarm-repeating relay, and remaining on this mercury cut-out switch will operate and open that branch of the alarm-transmitting circuit which is through the relay-contact, so that signals received on other alarm-repeating relays 12 can be repeated on this alarm-transmitting circuit. The purpose of the cut-out switch is therefore to prevent the complete disabling of the entire alarm system through the individual disabling by the continuous grounding of or the presence of a foreign current in the live lead of any one of the telephone-circuits which is utilized for transmitting alarm-signals.

In the system shown the primary circuits are normally open circuits. The continued closure of any one causes the operation of its slow-acting switch; but the cut-out switch is equally applicable in connection with a system made up of normally closed primary circuits, in which case it would merely be necessary to substitute relays with contacts on the other sides of the armatures. In this case the cessation of current in one of the primary circuits would cause an abnormal operation of the relay and the operation of the cut-out switch. In the system shown the secondary circuit under immediate control of the relays is also a normally open circuit. The contacts controlled by the relays are in multiple in this circuit and a cut-out switch is in series with each circuit; but the cut-out switch is equally applicable in connection with a system wherein the secondary circuit is a normally closed circuit, in which case it would be necessary to put the relay-contacts in series and arrange the cut-out switches so that on operating they will bridge these contacts.

The alarm-transmitting circuit 14 operates the relay 18. This relay controls the closed circuit 19, which extends to the alarm-headquarters, and operates a relay 20, which controls the local circuit of the alarm-receiving apparatus 21.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a series of primary circuits, a local alarm-transmitting apparatus connected to each circuit, a relay in each circuit, a secondary alarm-transmitting circuit at the exchange which is controlled by any of the relays, a source of electricity, a slow-acting cut-out switch operating in conjunction with each relay to cut off the control of the secondary alarm-transmitting circuit by the relay whenever there is more than the

normal momentary operation of the relay, and an alarm-receiving apparatus which is operated from the alarm-transmitting circuit, substantially as described.

2. The combination of a series of primary circuits, a local alarm-transmitting apparatus connected to each circuit, a relay in each circuit, a secondary alarm-transmitting circuit at the exchange which is controlled by any of the relays, a source of electricity, a slow-acting cut-out switch operating in conjunction with each relay to cut off the control of the secondary alarm-transmitting circuit by the relay whenever there is more than the normal momentary operation of the relay, and automatically restoring the control of the relay upon the cessation of the trouble causing the abnormal operation of the relay, and an alarm-receiving apparatus which is operated from the alarm-transmitting circuit, substantially as described.

3. The combination of a series of primary circuits, a local alarm-transmitting apparatus connected to each circuit, a relay in each circuit, a secondary alarm-transmitting circuit at the exchange which is controlled by any of the relays, a source of electricity, a slow-acting mercury cut-out switch operating in conjunction with each relay to cut off the control of the secondary alarm-transmitting circuit by the relay whenever there is more than the normal momentary operation of the relay, and automatically restoring the control of the relay upon the cessation of the trouble causing the abnormal operation of the relay, and an alarm-receiving apparatus which is operated from the alarm-transmitting circuit, substantially as described.

4. The combination of sets of telephone apparatus, a telephone-exchange, telephone-circuits connecting the sets of telephone apparatus with the telephone-exchange, a local alarm-transmitting apparatus connected to one of the leads of each telephone-circuit, a relay in each telephone-circuit, the relays being at the exchange and responsive to currents controlled by the sets of local alarm-transmitting apparatus and not to the telephone signaling and talking currents, an alarm-transmitting circuit at the exchange which is controlled by any of the relays, a slow-acting cut-out switch operating in conjunction with each relay to cut off the control of the alarm-transmitting circuit by the relay whenever there is more than the normal momentary operation of the relay, and an alarm-receiving apparatus which is operated from the alarm-transmitting circuit, substantially as described.

5. The combination of sets of telephone apparatus, a telephone-exchange, telephone-circuits connecting the sets of telephone apparatus with the telephone-exchange, a local alarm-transmitting apparatus connected to one of the leads of each telephone-circuit, a relay in each telephone-circuit, the relays being at the exchange and responsive to currents controlled by the sets of local alarm-transmitting apparatus and not to the telephone signaling and talking currents, an alarm-transmitting circuit at the exchange which is controlled by any of the relays, a slow-acting cut-out switch operating in conjunction with each relay to cut off the control of the alarm-transmitting circuit by the relay whenever there is more than the normal momentary operation of the relay, and automatically restoring the control of the relay upon the cessation of the trouble causing the abnormal operation of the relay, and an alarm-receiving apparatus which is operated from the alarm-transmitting circuit, substantially as described.

6. The combination of sets of telephone apparatus, a telephone-exchange, telephone-circuits connecting the sets of telephone apparatus with the telephone-exchange, a local alarm-transmitting apparatus connected to one of the leads of each telephone-circuit, a relay in each telephone-circuit, the relays being at the exchange and responsive to currents controlled by the sets of local alarm-transmitting apparatus and not to the telephone signaling and talking currents, an alarm-transmitting circuit at the exchange which is controlled by any of the relays, a slow-acting mercury cut-out switch operating in conjunction with each relay to cut off the control of the alarm-transmitting circuit by the relay whenever there is more than the normal momentary operation of the relay, and an alarm-receiving apparatus which is operated from the alarm-transmitting circuit, substantially as described.

7. The combination of sets of telephone apparatus, a telephone-exchange, telephone-circuits connecting the sets of telephone apparatus with the telephone-exchange, a local alarm-transmitting apparatus connected to one of the leads of each telephone-circuit, a relay in each telephone-circuit, the relays being at the exchange and responsive to currents controlled by the sets of local alarm-transmitting apparatus and not to the telephone signaling and talking currents, an alarm-transmitting circuit at the exchange which is controlled by any of the relays, a slow-acting mercury cut-out switch operated by the armature of each relay to cut off the control of the alarm-transmitting circuit by the relay whenever there is more than the normal momentary operation of the relay, and automatically restoring the control of the relay upon the cessation of the trouble causing the abnormal operation of the relay, and an alarm-receiving apparatus which is operated from the alarm-transmitting circuit, substantially as described.

Signed by me in New York city, borough of Manhattan, on the 14th day of April, 1900.

ALBERT GOLDSTEIN.

Witnesses:
THOMAS EWING, Jr.,
SAMUEL W. BALCH.