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REPEATING MECHANISM FOR TELEGRAPH CIRCUITS.

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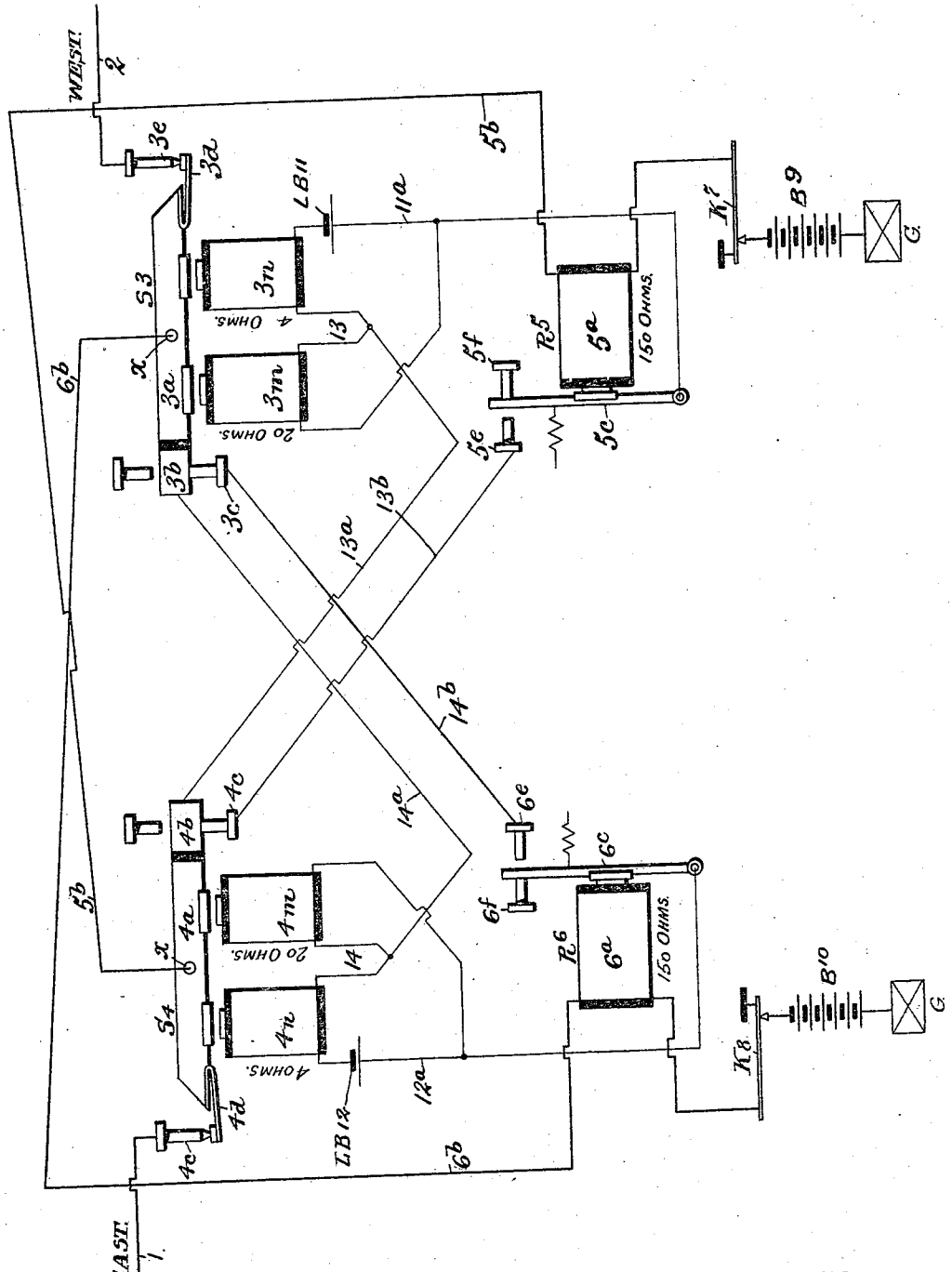

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REPEATING MECHANISM FOR TELEGRAPH-CIRCUITS.

950,047. Specification of Letters Patent. Patented Feb. 22, 1910.

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To all whom it may concern:

Be it known that I, JAMES GRANT KERR, residing at London, in the Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Repeating Mechanism for Telegraph-Circuits, of which the following is a specification.

My invention relates to certain new and useful improvements in repeating mechanism for telegraph circuits, and it primarily has for its object to provide a self-adjusting sounder and repeater of a simple and effective construction which will quickly and effectively serve its intended purposes.

Generically, the invention resides in providing an extra local magnet connected in series with the battery and regular local magnet of the sounder and arranged to operate on the opposite end of the sounder bar from that upon which the regular sounder magnet operates (the pivot being between).

The invention also resides in the provision of circuit closing contacts operated by the sounder, one in advance of the other one set of contacts controlling the extra magnet of another sounder while the other contacts control a main line repeating circuit.

Each relay and repeating station embodies two main relays and their keys in the main line circuit, a local circuit from the relay to a respective sounder, the local circuit for one sounder including a pair of contacts on the opposite sounder and including its own main and extra sounder magnets, the other sounder contacts being cross-connected in the main lines.

More specifically my invention resides in those novel details or arrangement of operative parts and circuit, all of which will be first described in detail and then be specifically pointed out in the appended claims, reference being had to the accompanying drawing, in which the figure is a diagrammatic representation of my invention.

Referring now to the accompanying drawing in which like numerals and letters of reference indicate like parts in the figure, 1 designates the "east" line and 2 the "west" line, while S^3 designates the sounder that is actuated when impulses occur in the "east" line, and S^4 the sounder for the "west" line:

The relay R^5 has its magnet 5^a connected in series with the "east" line 1 through a wire 5^b, while the relay R^6 has its magnet 6^a connected in series with the "west" line 2 through a wire 6^b. The relay R^5 in the "east" line controls the sounder S^3 that repeats into the "west" line, while the relay R^6 controls the sounder S^4 that repeats into the "east" line. The relay R^5 is grounded through a key K^7 and main battery B^9 while the relay R^6 is also grounded through a key K^8 and a main battery B^{10}. Each relay R^5 and R^6 is provided with an armature 5^c—6^c respectively, that is spring held against a back stop 5^e—6^e respectively, while the forward movement of the armatures 5^c—6^c are respectively limited by front stops 5^f—6^f, as shown in the drawing. The back stop of each relay R^5—R^6 is in my invention, utilized as a contact point in the respective local circuits.

The sounder bars 3^a—4^a of the respective sounders S^3—S^4 are each provided with an insulated contact segment 3^b—4^b to coöperate with a fixed contact 3^c—4^c respectively, while on the other end beyond the pivot x, the bars 3^a—4^a are provided with a flexible or resilient contact 3^d—4^d respectively, to cooperate with the fixed contact 3^e—4^e to which the "west" and "east" wires 2 and 1 are respectively connected.

The contact 3^d is electrically connected by a wire 6^b to the magnet 6^a of the relay R^6 while the contact 4^d is connected through a wire 5^b with the magnet 5^a of the relay R^5. Each sounder S^3—S^4 also includes the regular operating magnet 3^m—4^m respectively and an auxiliary magnet 3^n—4^n of lesser convolutions and resistance than the principal magnets 3^m—4^m. The magnets 3^m—3^n and 4^m—4^n are respectively connected in series with one another and with a respective local battery LB^{11} and LB^{12}. One terminal of the local battery LB^{11} is also connected through a wire 11^a to the armature 5^c of the relay R^5 while the terminal of the local battery LB^{12} is connected through wire 12^a of the armature 6^c of the relay R^6.

The fixed back stop 5^e of the relay R^5 is connected through a wire 13^b to the fixed stop 4^c of the opposite sounder S^4, while the fixed stop 6^e of the relay R^6 is also cross-connected by wire 14^b to the fixed stop 3^c of the sounder S^3.

The connection 13 between the magnets 3^m—3^n of the sounder S^3 is connected by a

wire 13^a to the contact 4^b on the sounder bar 4^a of the sounder S^4, while the connection 14 between the magnets 4^m—4^n of the sounder S^4 is connected through a wire 14^a with the contact 3^b of the bar 3^a of the sounder S^3. Thus it will be seen that when contacts 4^b—4^c, 5^e—5^c are closed, the magnets 3^m—3^n of the sounder S^3 will be thrown into parallel and since the extra magnet 3^n is of less convolutions and is of lesser resistance than the magnets 3^n when this action takes place the battery is short-circuited through the extra magnet and entirely away from the regular magnet as the current instead of going through the regular magnet goes through the short-circuit via contacts 4^b—4^c—5^e—5^c, hence the regular magnet has lost its power and has none to be overcome—this is a case where the extra magnet does not overcome the regular magnet. When, however, the action is reversed by the opening of the contacts the regular magnet then does have to overcome the magnetism in the extra magnet as the regular magnet can only get current via the extra magnet. In other words, the extra magnet has current in greater or less degree flowing through it all the time.

By reason of the provision of the contacts 3^d—4^d the main line circuits are opened after the local circuits of the different circuits are opened, and conversely such local circuits are closed after the closing of the main line circuits when the normal positions of the sounder bars are resumed.

Assume the operator at the end of the "east" line run opens his key, breaking the "east" line circuit, (or if key K^7 is opened) the relay magnet 5^a of the relay R^5 will be deënergized, thus releasing its armature 5^c to engage the back stop contact 5^e and close its local circuit from local battery LB^{11}, to armature 5^c, to contact 5^e, through wire 13^b, across contacts 4^c—4^b, through wire 13^a and magnet 3^n, back to battery LB^{11}, thus short-circuiting battery through magnet 3^n and practically deënergizing magnet 3^m, (it being understood magnet 3^m is of greater resistance than magnet 3^n having more convolutions of wire) thus overcoming the action of the magnet 3^m and rocking bar 3^a until the local circuit of the relay R^6 is opened at contacts 3^b—3^c and the "west" line circuit is opened at contacts 3^d—3^e. The opening of the local circuit of the relay R^6 occurs at contacts 3^b—3^c before the main line "west" is opened at contacts 3^d—3^e to prevent the sounder S^4 from operating when the relay R^6 in the "west" line circuit "drops" its armature 6^c against the back stop contact 6^e.

Upon the closing of the "east" line circuit again by the operator, the relay R^5 is again energized to attract its armature and open its local circuit, thus relieving the short circuit of local battery LB^{11} through magnet 3^n and allowing the local battery LB^{11} to again send current through the magnets 3^m—3^n in series and since the magnet 3^m has more convolutions than magnet 3^n, it will overcome the action of the magnet 3^n and attract the bar 3^a to rock it in an opposite direction to first close the circuit in the main line "west" (to energize relay R^6 to first open contacts 6^c–6^e) and then closing the local circuit of the relay R^6 at contacts 3^b—3^c again. When the "west" line is opened and closed a corresponding operation of the sounder S^4 and relay R^6 takes place.

Suitable switches (not shown) may be provided to cut out the breaking points when desirable, to operate the two lines independently, as will be well understood by those skilled in the art to which the invention appertains.

It will also be noted that by providing the main and auxiliary sounder magnets in series with one another they become self-regulated, that is to say, the sounder bar is balanced when not under the influence of either magnet any variation in the battery strength will not affect the operation of the sounder, since should the battery current become weaker and weaker the current in the main and auxiliary magnets will each be reduced without affecting their relative magnetic value.

From the foregoing description taken in connection with the accompanying drawing, it is thought the complete construction, operation and advantages of my invention will be readily understood by those skilled in the art to which the invention appertains.

What I claim is:—

1. A sounder and repeating mechanism comprising in combination with the "east" and "west" lines, of a sounder for each line, each sounder including a pivoted sounder bar, and a pair of magnets therefor, each sounder having make and break contacts in series with its respective line, a relay for each "east" and "west" line having one terminal of its magnet connected to the line and the other terminal grounded, a local circuit for each relay through its corresponding sounder magnets, said magnets of each sounder operating one of each set on the sounder bar on one side of its pivot and the other of the set operating on the sounder bar at the other side of its pivot, means controlled by one sounder for making and breaking the local circuit of the other sounder at times, each of said local circuits including a source of electrical energy common to both sounder magnets.

2. In a telegraph sounder and repeater, a pair of main line circuits, a relay and a source of electric energy connected in each of said main line circuits, a local circuit including a source of electric energy for each

of said local relays, a sounder for each circuit, said sounders each having a pair of magnets connecting in the respective local circuit, and a source of energy common to both of said magnets, and means carried by one sounder for controlling the local circuit of the opposite sounder and relay, and means controlled by one sounder for repeating into the opposite line.

3. In a sounder and repeater, a pair of main line circuits, each including a source of electric energy, an operating key and a relay, the operating magnet of which being connected in said main line circuit, a local circuit including a source of electric energy for each of said relays, a sounder having a main and an auxiliary operating magnet connected in series with each of said local circuit source of electric energy to hold the sounder bar normally in one position, and means controlled by one sounder for disturbing the magnetic relation of the main and auxiliary magnets of the other sounder at times.

4. In a sounder and repeater, a pair of main line circuits, each including a source of electric energy, an operating key and a relay, the operating magnet of each being connected in said main line circuit, a local circuit including a source of electric energy for each of said relays, a sounder having a main and an auxiliary operating magnet connected in series with its respective local circuit source of electric energy to hold the sounder bar normally in one position, means controlled by one sounder for disturbing the magnetic relation of the main and auxiliary magnets of the other sounder at times, and means controlled by each sounder for making and breaking one of said main line circuits.

5. In a sounder and repeater, a pair of main line circuits, each including a source of electric energy, an operating key and a relay, the operating magnet of which being connected in said main line circuit, a local circuit including a source of electric energy for each of said relays, a sounder having a main and an auxiliary operating magnet connected in series with its respective local circuit source of electric energy to hold the sounder bar normally in one position, means controlled by one sounder for disturbing the magnetic relation of the main and auxiliary magnets of the other sounder at times, and means controlled by each sounder for making and breaking one of said main line circuits after the local circuit controlled by said sounder has been disturbed thereby.

6. In a sounder and repeating mechanism, in combination with the armature of the local sounder and the main electro-magnet thereof, of a supplemental electro-magnet, a local battery common to both the main and supplemental electro-magnets and a breaking point included in a circuit, which breaking point opens before the circuit of the main line is broken.

7. In a repeating mechanism for telegraphs, the combination of a main line relay armature with a closing contact point on its back stop, a local sounder, a supplemental local magnet on said local sounder for the purpose of actuating the sounder bar thereby opening its local and main line breaking points, said sounder having local and main line breaking points said supplemental local magnet being operatively opposed to the main sounder magnet.

8. In a repeating mechanism, a pair of main line circuits, a relay for each of said circuits having its magnet connected in the respective circuit, a sounder for each circuit having a main and an auxiliary magnet operating normally in opposition to one another on the sounder bar, one of said magnets being of sufficient strength to normally overcome the other one, a local circuit including a source of electric energy connected with said relay and said magnets, all being arranged whereby when the local circuit is closed by the relay the relative action of the main and auxiliary magnets will be reversed, substantially as shown and described.

9. In a repeating mechanism, a pair of main line circuits, a relay for each of said circuits having its magnet connected in the respective circuit, a sounder for each circuit having a main and an auxiliary magnet, operating normally in opposition to one another on the sounder bar, one of said magnets being of sufficient strength to normally overcome the other one, a local circuit including a source of electric energy connected with said relay and said magnets, all being arranged whereby when the local circuit is closed by the relay the relative action of the main and auxiliary magnets will be reversed, and means for preventing such reversal at times.

10. In a repeating mechanism, a pair of main line circuits, a relay for each of said circuits having its magnet connected in the respective circuit, a sounder for each circuit having a main and an auxiliary magnet operating normally in opposition to one another on the sounder bar, one of said magnets being of sufficient strength to normally overcome the other one, a local circuit including a source of electric energy connected with said relay and said magnets, all being arranged whereby when the local circuit is closed by the relay the relative action of the main and auxiliary magnets will be reversed, and means controlled by one sounder for opening the local circuit of the other sounder before it is closed by its relay at times.

11. In a repeating mechanism for telegraphs, a pair of main line circuits, a relay for each of said circuits having its magnet

connected in the respective circuit, a sounder for each of said circuits having a main and an auxiliary magnet operating normally in opposition to one another on the sounder bar, one of said magnets being of sufficient strength to normally overcome the other one, a local circuit including a source of electric energy connected with said relay and said magnets, all being arranged whereby when the local circuit is closed by the relay the relative action of the main and auxiliary magnets will be reversed, and means controlled by one sounder for first opening the local circuit of the other sounder and then opening the opposite main line circuit to de-energize the relay of such opposite circuit.

JAMES GRANT KERR.

Witnesses:
URBAN A. BUCHNER,
M. L. MORTIMER.