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R. D. PARKER

TELEGRAPH CIRCUITS

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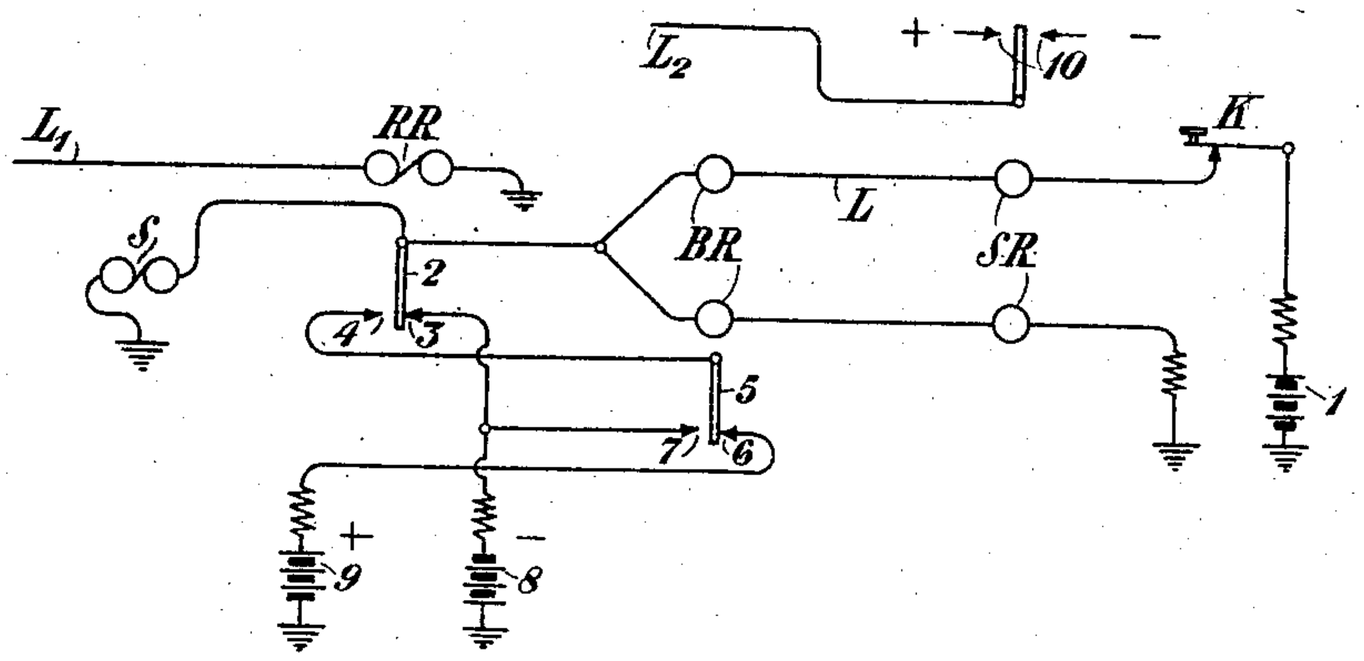

Fig. 1

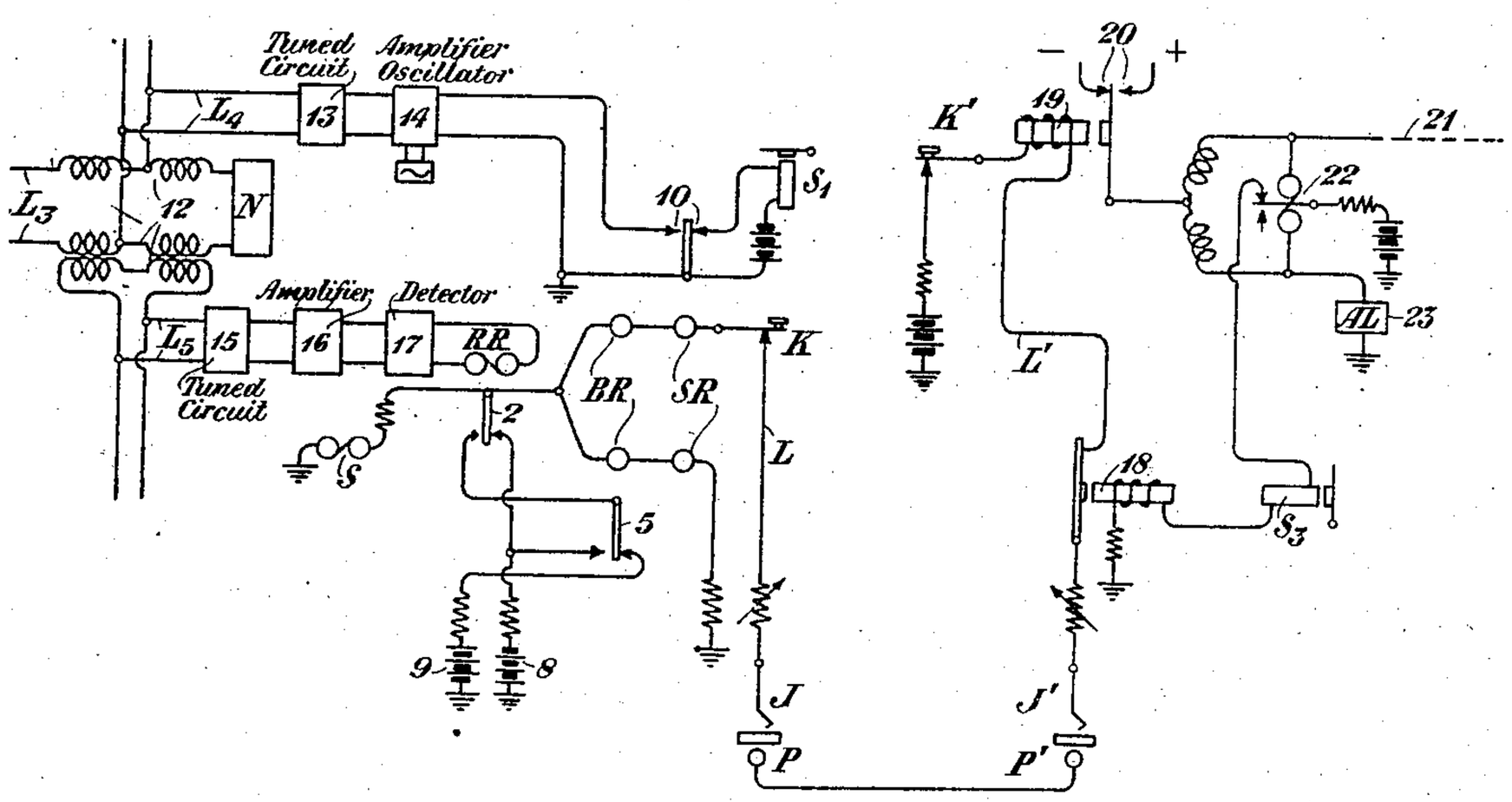

Fig. 2

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UNITED STATES PATENT OFFICE.

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TELEGRAPH CIRCUITS.

Application filed January 19, 1924. Serial No. 687,369.

This invention relates to telegraph circuits and particularly to "breaking" arrangements for such circuits.

In telegraph systems, such as duplex systems, it is often desirable for an operator at one station to "break" in on the line or to interrupt the operator who may be sending from a distant station in order to obtain control of the circuit. It is in general the object of the invention to provide improved arrangements for this purpose by providing at a telegraph station arrangements whereby like battery polarities are connected to both marking and spacing contacts of the receiving relay by the operation of a relay in series with, and operating simultaneously with, the sending relay under the control of the loop circuit, thus rendering the incoming signals to the receiving relay ineffectual to the local circuit and allowing a spacing signal to be sent to the sending operator, which connects like battery polarities to both ends of his loop circuit and interrupts his sending. It is understood that the invention embodying the above stated principles is applicable to many and widely different types of telegraph lines.

The invention may be more fully understood from the following description together with the accompanying drawing in the Figures 1 and 2 of which the invention is illustrated. In Fig. 1 is shown a schematic arrangement of a telegraph station embodying the invention, while in Fig. 2 is shown in detail the arrangements of the invention as embodied in a repeating station interconnecting a carrier telegraph line and a bridge polar duplex line of a well known type.

In Fig. 1 is shown a telegraph station at which is a line L_1 over which signals coming in from a distant station may be received and a line L_2 over which signals may be transmitted to a distant station. In the line L_1 is the polar receiving relay RR which in response to the incoming signals will move its armature 2 between the contacts 3 and 4, which in turn are connected to the positive and negative, or spacing and marking, batteries 9 and 8 respectively. The operation of armature 2 between these contacts will in response to the incoming signals, cause the local polar sounder S to operate in accordance with said signals. Associated with the armature of the receiving relay is a local loop circuit L which includes the windings of a polar break relay BR and a polar sending relay SR, a key K, and a battery 1. The operation of key K will operate the sending relay which will connect its armature to either the marking or spacing contacts of the pole changer apparatus 10 to transmit signals to the distant station over line L_2. The windings of the break relay and sending relay are in balanced relation with respect to the armature of the receiving relay and with the loop L closed will normally not be affected by the action of said armature. If the break relay BR of this invention were not provided in the loop circuit L and the operator should open the key K to break the distant operator while signals were being received by relay RR, it will be seen that the sending relay SR would be operated by these incoming signals, as reversals of current from the armature of the receiving relay would flow through the lower winding of the sending relay SR to ground. This might cause a retransmission of signals back to the sending operator over line L_2 for a period of time dependent on the length of the circuit. In other words a chattering or disturbance might take place on the line which would prevent a clean and effectual break from taking place. It is to obviate this difficulty that the break relay BR of this invention is provided. Accordingly the windings of the polar break relay BR are inserted in series in the loop circuit with the windings of the polar sending relay SR. Accordingly, the break and sending relays operate simultaneously under control of the loop circuit. The spacing receiving battery 9 is connected to the marking contact 6 of the break relay and the armature 5 of the break relay is connected to spacing contact 4 of the receiving relay. The marking receiving battery 8 is connected to both the marking contact 3 of the receiving relay and the spacing contact 7 of the break relay. If the operator now opens his key K to break, the armature of the break relay moves to its spacing contact 7. This connects battery 8 to both contacts of the receiving relay, or in other words, connects like battery polarities to both of the

contacts of said relay. This polarity will be such that the relay SR will send a spacing signal over the line L_2 to the distant operator to release his relay and sounder and interrupt his sending. Under such conditions, namely with like battery polarities connected to both contacts of the receiving relay, any action of said relay in response to the incoming signals will have no effect on the windings of the break and sending relays in the loop circuit which might otherwise be affected thereby when the loop was opened by the key K. Accordingly, no retransmission of signals or chattering disturbance will result on line L_2 and a clean and effectual break signal may be sent to the distant operator.

In order to illustrate one of the many types of telegraph circuits in which the arrangements of the invention might be utilized, there is shown in Fig. 2 a station embodying the invention and interconnecting a carrier telegraph circuit and a bridge polar duplex circuit. Similar reference characters have been utilized to denote like parts in both figures. The carrier telegraph line L_3 terminates at the station in the hybrid coil 12 and the balancing network N, with which are associated the outgoing line L_4 and the incoming line L_5. The outgoing line L_4 would include a tuned circuit 13, an amplifier oscillator 14, and the armature and contacts 10 of the sending relay SR. The incoming circuit L_5 might include the tuned circuit 15, the amplifier 16, the detector 17, and the polar receiving relay RR. The sending relay SR is included in a loop circuit L which also includes the key K and the break relay BR. The break relay and sending relay arrangements are similar to those shown in Fig. 1, and the contacts of the break relay BR and the reeciving relay RR are arranged with respect to each other, as in Fig. 1, so that operation of the break relay will connect battery of the same polarity to both contacts of the receiving relay RR. The loop circuit L may be connected to the loop L′ by jacks and plugs J, P, J′, P′. In the loop L′ would be the relay 19 controlling the pole changer 20. A key K′ might also be included in the loop circuit L′. The pole changer 20 would send impulses over the circuit 21 to a distance station. Bridged across circuit 21 which would terminate in artificial line 23 would be the polar relay 22 which would be operated by the subscriber at the distant station. The polar relay 22 in response to signals coming in over line 21 would break the normally closed circuit including the sounder S_3 and the control relay 18. This releasing of the control relay would open at its armature and contact the loop circuit LL′ and might thus control the sending relay SR. As the operation of the breaking arrangements of the invention would be substantially the same in this circuit as heretofore described, and as the detailed operation of the circuits shown is well known in the art, no further description thereof will be given.

While the invention has been illustrated in certain specific forms and circuits which are deemed desirable, it is understood that it is capable of embodiment in many and widely varied forms and types of telegraph circuits without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A telegraph system comprising a receiving relay, an armature therefore, contacts associated with said armature, sources of potential of opposite polarity normally connected to said contacts, a loop circuit connected to said armature, a relay in said loop circuit, and means controlled by said relay for connecting said contacts to a single one of said sources of potential.

2. A telegraph system comprising a receiving relay, an armature therefore, contacts associated with said armature, means for applying positive and negative potentials to said contacts, a loop circuit, relay means in said loop circuit, and means controlled by said relay means for applying similar potentials to said contacts.

3. A telegraph system comprising a receiving relay, an armature therefore, contacts associated with said armature, sources of potential of opposite polarity, a loop circuit associated with said armature, a relay in said loop circuit, an armature and contacts for said relay, and means for connecting said sources of potential with said first mentioned contacts over said second mentioned armature and contacts.

4. A telegraph system comprising a receiving relay, an armature therefore, marking and spacing contacts associated with said armature, a loop circuit connected to said armature, a break relay in said loop circuit, an armature therefore, marking and spacing contacts for said break relay armature, a marking battery and a spacing battery of opposite polarity to said marking battery, means for connecting the marking contact of said receiving relay directly to said marking battery, means for connecting the marking contact of said break relay directly to said spacing battery, means for connecting the spacing contact of said receiving relay to the armature of said break relay, and means for connecting the spacing contact of said break relay directly to said marking battery.

5. A telegraph system comprising a receiving relay, an armature therefore, contacts associated with said armature, means for applying opposite potentials to said contacts, a loop circuit including a polar sending relay and a polar break relay each having two

windings, means for connecting said loop circuit to said receiving relay armature in such a manner with respect to said relay windings that when the loop circuit is closed said relays will be unaffected by potentials from said receiving relay armature, and means controlled by said break relay when said loop circuit is opened for applying similar potentials to said receiving relay armature.

In testimony whereof, I have signed my name to this specification this 16th day of January, 1924.

RALZEMOND D. PARKER.