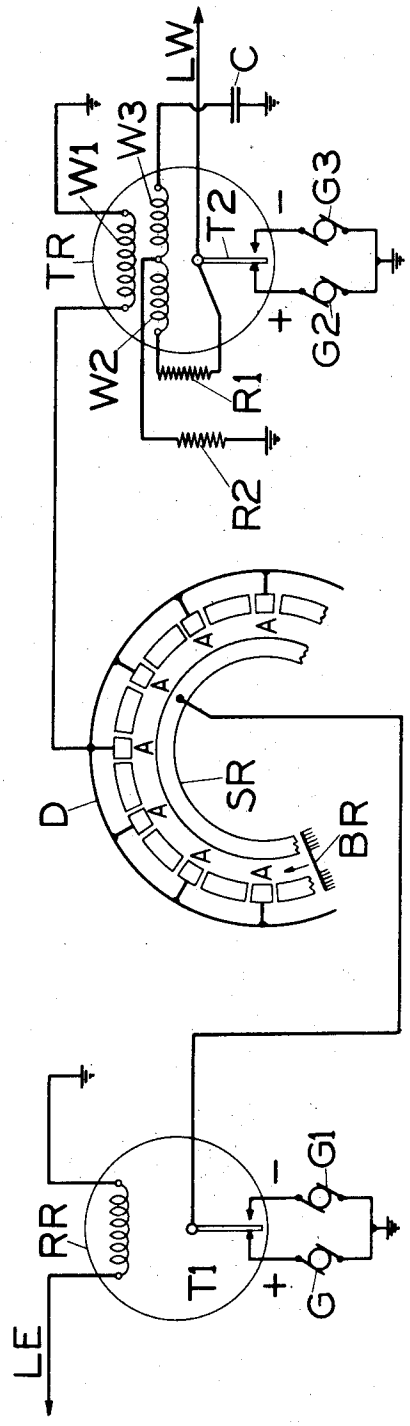
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A. F. CONNERY

RELAY SYSTEM

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Alder F. Connery INVENTOR

BY

Wm. J. Herdman ATTORNEY

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ALDER F. CONNERY, OF JAMAICA, NEW YORK, ASSIGNOR TO POSTAL TELEGRAPH-CABLE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF CONNECTICUT.

RELAY SYSTEM.

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My invention relates in general to relay systems as used in telegraph systems and pertains specifically to a novel type of polar or polarized relay and associated circuits and apparatus, particularly adapted to function efficiently in systems utilizing operating impulses of short duration.

The principal objects contemplated by my invention comprise producing a relay system in which the tongue or armature is firmly held against a selected contact during periods of no current in the operating windings and in which weak or momentary operating impulses are compensated to effect positive operation of the tongue.

I accomplish these and other features which will hereinafter be pointed out and discussed by providing additional windings and associated circuits and apparatus as shown in the drawing accompanying and forming a part of this specification. In the drawing I have illustrated diagrammatically one embodiment of my invention in conjunction with a regenerative telegraph repeater.

Referring now to the drawing, the operating winding of the receiving relay RR is operatively connected to a line LE and ground. Current supply of opposite polarities is provided by the grounded generators G and G^1 as shown. The tongue T^1 of the relay is connected to the continuous contact bar SR of a distributor D, the contacts A of which are connected together and to ground through the operating winding W^1 of the transmitting relay TR. The apparatus described is a diagrammatic representation of the essentials of a regenerative repeater utilizing polarized relays of the Wheatstone type and in which, as the brush BR traverses the contacts A in synchronism with the signals received over line LE, the tongue T^1 of relay RR is momentarily connected through the contacts A to the operating winding W^1 of relay TR, to transmit current impulses from G or G^1 to relay TR.

In such systems of repeaters only a small portion of the received signal is augmented and retransmitted. The duration of the impulses is determined by the size of the segments A and preferably these are made as small as possible in order that badly distorted received signals may be successfully repeated. Such organizations as the above are common in the art, and it is not considered necessary to further discuss them here. It is obvious that the use of such extremely short impulses while being advantageous in reconstructing badly distorted received signals, may, due to the short duration thereof, fail to properly operate the transmitting relay. If the relay is adjusted to respond readily and reliably to such impulses the holding bias may be insufficient to keep the tongue in positive contact with its contact points at moments when no current is traversing the operating winding. To overcome this defect I provide additional windings W^2 and W^3 on relay TR one terminal of each of which is connected to ground through a resistance R^2. The remaining extremity of winding W^2 is connected through a resistance R^1 with the tongue T^2 of the relay, while the remaining terminal of winding W^3 is connected through condenser C to ground. Thus when T^2 is resting against its positive contact a small current will flow from G^2 through R^1, W^2 and to ground through R^2. The windings are so connected that this steady flow through W^2 will be in such direction as to hold T^2 firmly against the positive contact and thus while being small in value due to the resistance offered by R^1 and R^2 will be sufficient to prevent the tongue from being jarred away from its contact. No current will flow through W^3, but obviously condenser C will be maintained in a charged condition due to the potential of generator G^2. When a short current impulse to operate the relay passes through W^1 it will cause the tongue T^2 to move away from its positive contact and when T^2 breaks contact the current through R^1 and W^2 which was opposing the motion of the tongue will cease to flow and the condenser C will discharge through W^3 and R^2 to ground to assist the operating impulse through W^1 in bringing the tongue T^2 over against the negative contact. When the tongue touches the negative contact there will be a rush of current through W^3 to charge condenser C in the opposite direction or polarity to its previous charge, and this rush of current will tend to hold T^2 against its contact to prevent chattering and insure a positive contact. After condenser C has become charged to the full potential supplied by generator G^2 there will continue a small current flow from G^2 through T^2, R^1, W^2 and R^2 to ground and this steady current of small value will main-

tain the tongue T^2 firmly against the negative contact. When the direction of the operating impulse through W^1 is such as to kick the tongue T^2 from the negative contact the action just described will again take place except that obviously the direction of current flow in the auxiliary windings will be reversed.

This auxiliary holding and accelerating relay system just described makes it unnecessary for the impulse through the operating winding W^1 to move the tongue all the way from one contact to the other. The impulse W^1 may be only sufficient to initiate the movement and the current through the auxiliary windings complete the work of carrying the tongue across the gap, and thereafter hold it firmly in contact.

It is obvious that the application of this invention is not limited to use as a transmitting relay in connection with regenerative repeaters. It may be used anywhere it is found necessary to efficiently and reliably operate a relay by impulses of very short duration.

What I claim is:

1. In a relay system, a relay provided with a tongue, contacts therefore and an operating winding, a pair of windings independent of said operating winding, means for utilizing one of said windings to hold said tongue against either of said contacts and means for utilizing the other of said windings to assist said operating winding in moving said tongue from one contact to the other.

2. A relay system comprising in combination, a polar relay provided with a tongue, contacts therefore, and an operating winding, an auxiliary winding independent of said operating winding, means for utilizing a portion of said auxiliary winding to hold said tongue against either of said contacts and means for utilizing another portion of said auxiliary winding to assist said operating winding in moving said tongue from one contact to another.

3. A relay system comprising in combination, a relay provided with a tongue, contacts and an operating winding, means for holding said tongue against either of said contacts, after contact has been made therewith, and means operative, after contact between said tongue and a contact is broken, to assist said operating winding in moving said tongue from one contact to another.

4. A relay system comprising in combination a polar relay provided with a tongue, contacts therefor and an operating winding, a pair of windings independent of said operating winding, means for utilizing one of said independent windings for holding said tongue against either of said contacts and means for utilizing the other of said independent windings to assist said operating winding in moving said tongue from one contact to another after the impulse in said operating winding has operated to break contact between said tongue and a contact.

5. A relay system comprising in combination, a relay provided with a tongue, contacts therefor and an operating winding, means for holding said tongue in contact with either of said contacts after contact has been made therewith, and means operative at the instant contact is made between the tongue and a contact, to insure positive contact, and operative after contact is broken to assist said operating winding in moving said tongue from one contact to another.

6. A relay system comprising in combination, a relay provided with contacts and an operating winding, means for holding said tongue in positive contact with either of said contacts at periods of no current in said operating winding and means operative at the instant contact is made between said tongue and a contact to insure positive contact and operative after contact is broken between said tongue and a contact to assist said operating winding in moving said tongue from one contact to another.

ALDER F. CONNERY.