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G. CRISSON ET AL

1,623,095

MULTIWAY CONNECTION

Filed Nov. 24, 1925

2 Sheets-Sheet 1

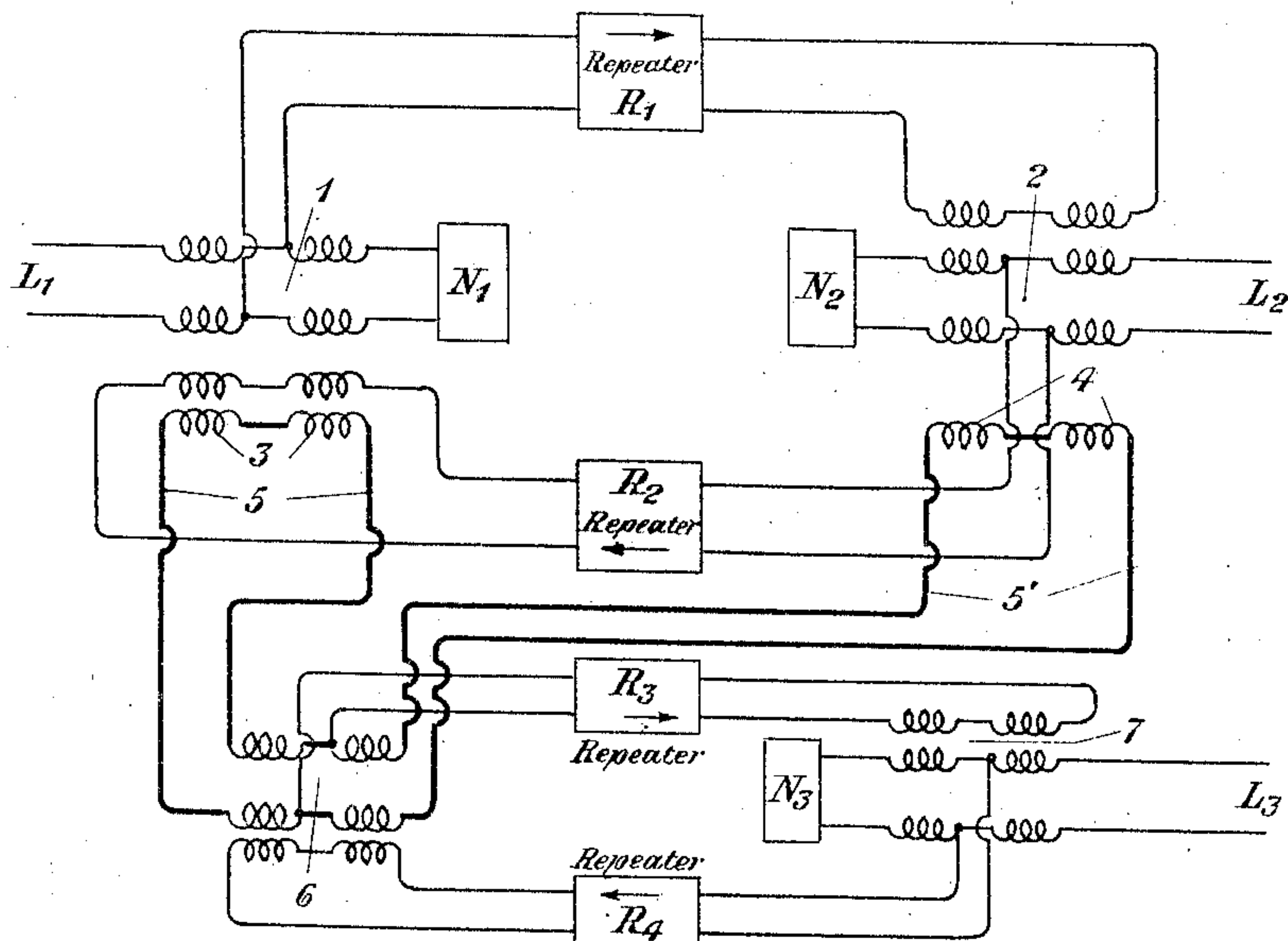


Fig. 1

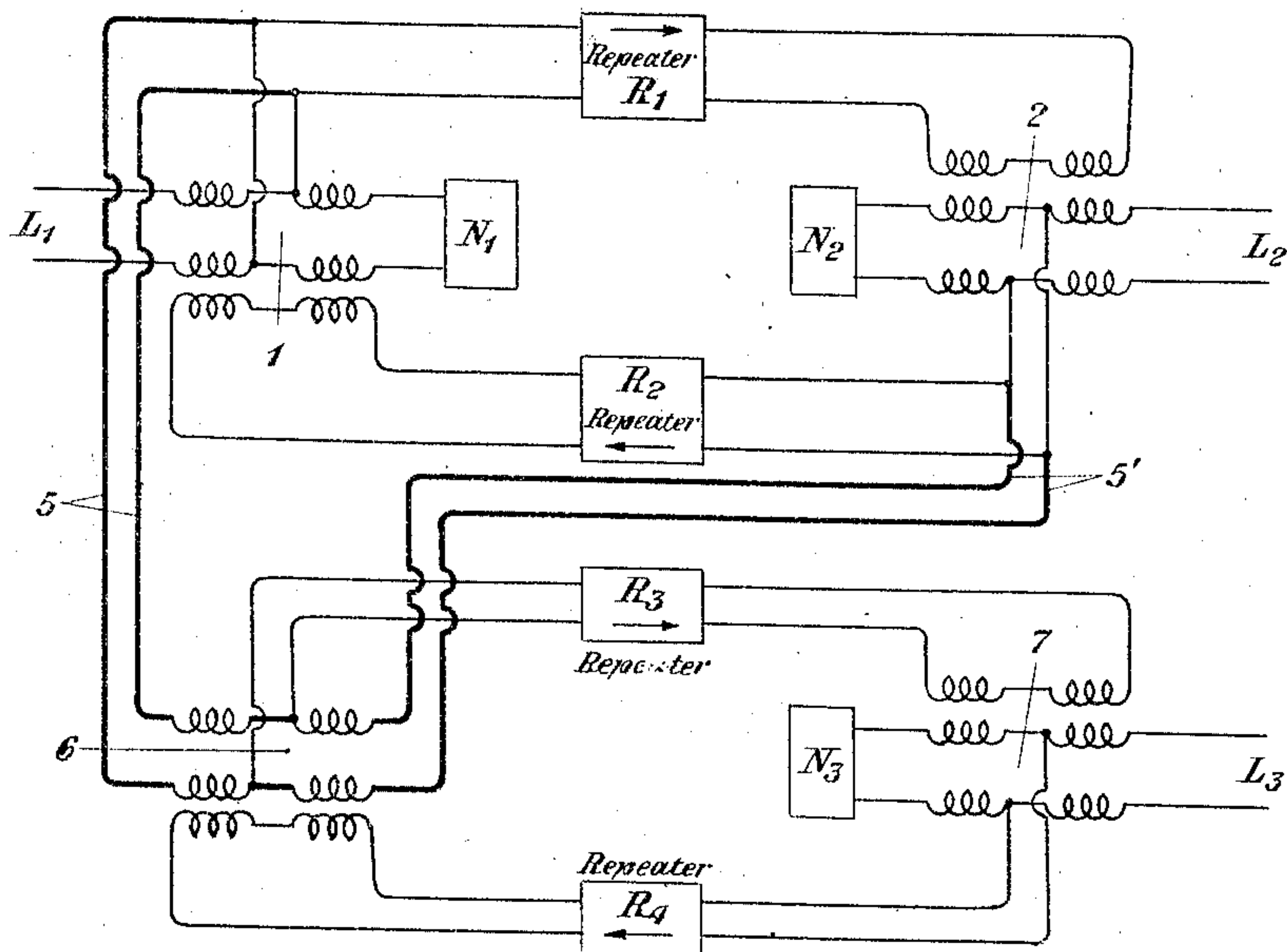


Fig. 2

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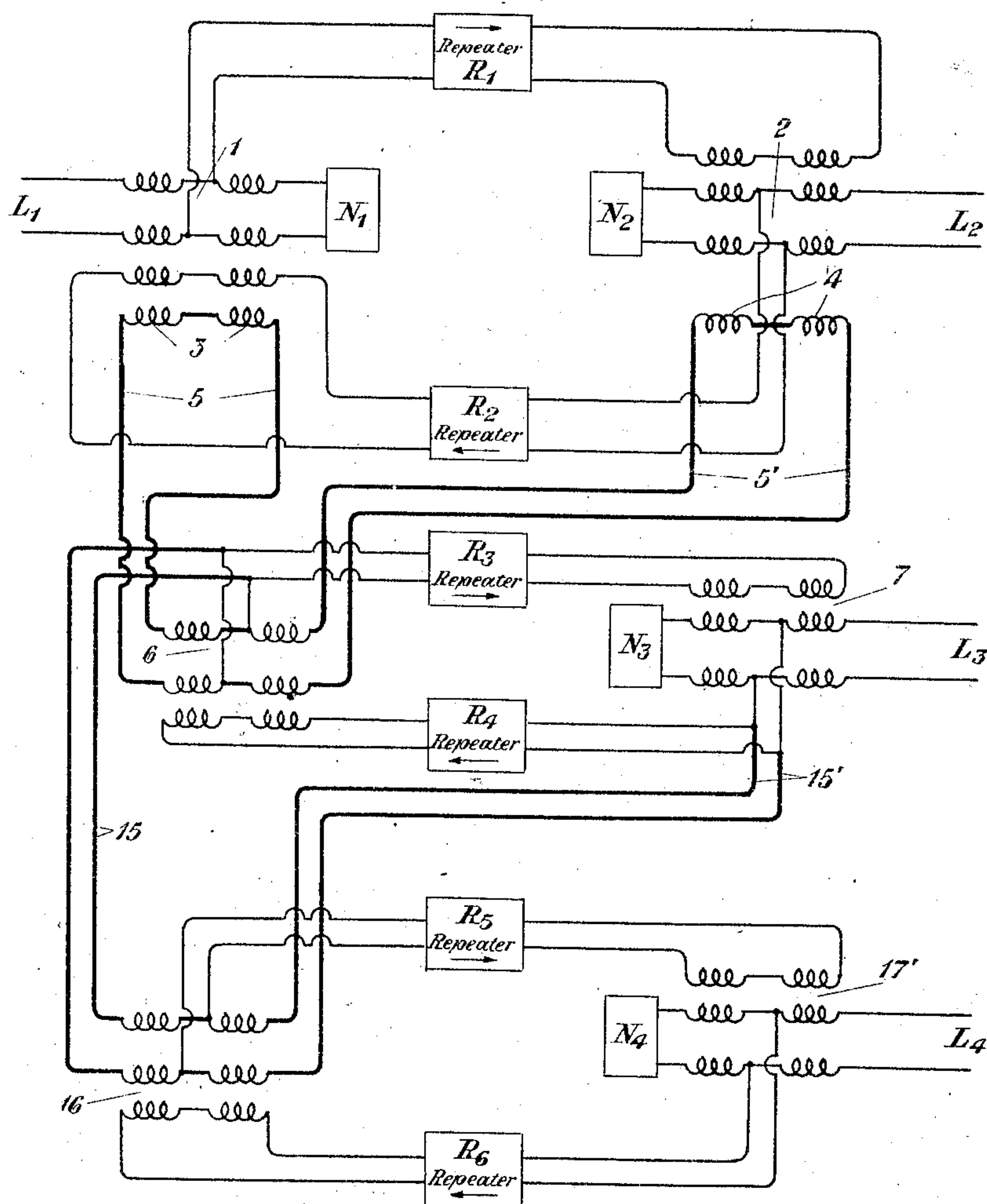


Fig. 3

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UNITED STATES PATENT OFFICE.

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MULTIWAY CONNECTION.

Application filed November 24, 1925. Serial No. 71,233.

This invention relates to improvements in arrangements for establishing a multi-way telephone connection between several stations.

It has been found that it is often desirable to set up a telephone connection between a number of stations, such as three or four stations, so that all of the stations may be in communication with each other at once. Such occasions, for example, arise quite frequently in leased wire systems, wire broadcasting, or in public address systems. Accordingly it is the primary object of this invention to provide apparatus and circuit arrangements whereby a multi-way connection may be set up between any desired number of stations. In the arrangements of the invention the lines from the stations to be interconnected are connected to repeater circuits and these repeater circuits are joined together in a novel manner by auxiliary, or looping, circuits so that all of the stations may intercommunicate with each other simultaneously. Other objects and features of the arrangements of the invention as well as the circuit details thereof will appear more fully from the description hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing in the Figures 1, 2 and 3 of which the invention is illustrated. Fig. 1 is a circuit diagram of arrangements for interconnecting three lines. Fig. 2 is a modified form of the invention wherein three lines may be interconnected. In Fig. 3 are illustrated arrangements whereby provision is made for the interconnection of a number of lines greater than three. Similar reference characters have been utilized to denote like parts in all of the figures of the drawing.

As has been pointed out the arrangements of the invention utilize repeater apparatus and repeater circuits for the establishment of the multi-way connection. The type of repeater utilized is one well known in the art and in telephone parlance is termed the "22 type" repeater. The repeater arrangement comprises two line sections balanced by networks. Hybrid coils having line and network windings are provided in each line section. Bridged across the midpoints of each of these hybrid coils is a circuit includ-

ing a one-way repeater element. The output of each repeater element is connected to windings of the hybrid coils. In accordance with the arrangements of the invention, if it is desired to establish a multi-way connection between three line sections, two of the line sections will be interconnected by a "22 type" repeater as indicated above. The third line section will be connected to a separate "22 type" repeater. This second "22 type" repeater, however, will have the line and network windings of one of its hybrid coils connected to an auxiliary, or loop, circuit. This loop circuit in turn will either be connected to monitoring coils of the hybrid coils of the first "22 type" repeater or may be bridged across the midpoints of the windings of the hybrid coils of the first "22 type" repeater.

In the circuit arrangement shown in Fig. 1 are shown two line sections L_1 and L_2 , balanced by the networks N_1 and N_2 . The hybrid coils, or three winding transformers, 1 and 2 are provided. Bridged across the midpoints of the hybrid coils are the repeater circuits which include the one-way repeater elements R_1 and R_2 . Such an arrangement constitutes a "22 type" repeater. A third line section L_3 is shown terminating in a second repeater. The hybrid coils 6 and 7 are provided as shown and associated therewith are the circuits for the one-way repeater R_3 and R_4 . The line and network windings of the hybrid coil 6, however, are connected to the loop circuit 5, 5'. This loop circuit terminates in the monitoring windings 3 and 4 which are inductively related to the windings of the hybrid coils 1 and 2, respectively. Under such conditions, communication may take place between all of the line sections at once. For example, speech coming in over line L_1 would be transmitted to line L_2 and vice versa in the usual manner through the "22 type" repeater circuit. The speech coming in over line L_2 would also be transmitted through repeater R_2 and thence through the winding 3 to the loop circuit 5, and thence through repeater R_3 and transformer 7 to line L_3 . Speech coming in over line L_1 would be transmitted through repeater R_1 and thence through the winding 4 to the loop circuit 5' and to line L_3 . Speech coming in over line L_3 would be transmitted

through repeater R_2 and thence over the loop circuits 5 and 5'. From the loop circuits 5 and 5' it would inductively be transmitted to both lines L_1 and L_2 .

5 In Fig. 2 are shown arrangements for interconnecting the three line sections L_1 , L_2 and L_3 which are substantially similar to those shown in Fig. 1 except that the loop
10 circuits 5 and 5', instead of being associated to lines L_1 and L_2 by the transformer windings 3 and 4 respectively, are directly connected to the midpoints of the line and network windings of the hybrid coils 1 and 2.
15 Under these conditions speech coming in from lines L_1 and L_2 will be directly applied to the loop circuits 5 and 5' instead of being transmitted through the repeaters R_1 and R_2 . As the arrangements are in other
20 respects substantially similar to those of Fig. 1, no further description thereof will be given.

In Fig. 3 is shown an arrangement whereby a greater number of lines than three may be interconnected, such, for example, as the
25 lines L_1 , L_2 , L_3 and L_4 . Lines L_1 and L_2 are interconnected by a "22 type" repeater in the usual manner. Line L_3 is connected to another "22 type" repeater which is joined by loop circuits 5 and 5' to the first "22 type"
30 repeater in a manner similar to that shown in Fig. 1. The line L_4 is connected to a third "22 type" repeater, which in turn is connected by loop circuits 15 and 15' to the second "22 type" repeater in the manner
35 shown in Fig. 2. Under these conditions it will be obvious that all of the lines will be in communication with each other at once. If desired, other additional lines might also be connected to the lines L_1 , L_2 , L_3 and L_4 by
40 providing additional "22 type" repeaters and connecting them to the last of the successive "22 type" repeaters by loop circuits either as shown in Figs. 1 or 2.

45 While the invention has been disclosed as embodied in certain specific arrangements which are deemed desirable, it is understood that it is capable of embodiment in many other widely varied forms without departing from the spirit of the invention as defined
50 by the appended claims.

What is claimed is:

1. A circuit for establishing a multi-way telephone connection between a plurality of
55 lines comprising two line sections interconnected by a repeater set, said repeater set comprising two one-way repeater circuits having their terminals connected to hybrid coils, a third line section connected to a second repeater set, said second repeater set
60 comprising two one-way repeater circuits

having their terminals connected to hybrid coils, and a loop circuit associated with the windings of both of the hybrid coils of said first repeater set and having included serially therein windings of one of the hybrid
65 coils of said second repeater set.

2. A circuit for establishing a multi-way telephone connection between a plurality of lines comprising two line sections interconnected by a repeater set, said repeater set
70 comprising two one-way repeater circuits having their terminals connected to hybrid coils, a third line section connected to a second repeater set, said second repeater set
75 comprising two one-way repeater circuits having their terminals connected to hybrid coils and a loop circuit inductively connected to the windings of both of the hybrid coils of said first repeater set and having included therein the line and network windings of one
80 of the hybrid coils of said second repeater set.

3. Two "22 type" repeater sets, and a loop circuit associated with the windings of both of the hybrid coils of the first "22 type" re-
85 peater set and having included serially therein windings of one of the hybrid coils of the second "22 type" repeater set.

4. A plurality of "22 type" repeater sets, a loop circuit associated with the windings of
90 both of the hybrid coils of the first of said "22 type" repeater sets and having included serially therein, windings of one of the hybrid coils of a second of said "22 type" repeater sets, and another loop circuit asso-
95 ciated with windings of both of the hybrid coils of the second of said "22 type" repeater sets and having included serially therein windings of one of the hybrid coils of a third of said "22 type" repeater sets.
100

5. A circuit for establishing a multi-way telephone connection between a plurality of lines comprising two line sections interconnected by a repeater set, said repeater set
105 comprising two one-way repeater circuits having their terminals connected to hybrid coils, a third line section connected to a one-way repeater circuit, a transformer associated with the output of said last mentioned repeater circuit, and a loop circuit associated
110 with the windings of both of the hybrid coils of said first mentioned repeater set and having included serially therein windings of said transformer.

In testimony whereof, we have signed our
115 names to this specification this 23rd day of November, 1925.

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