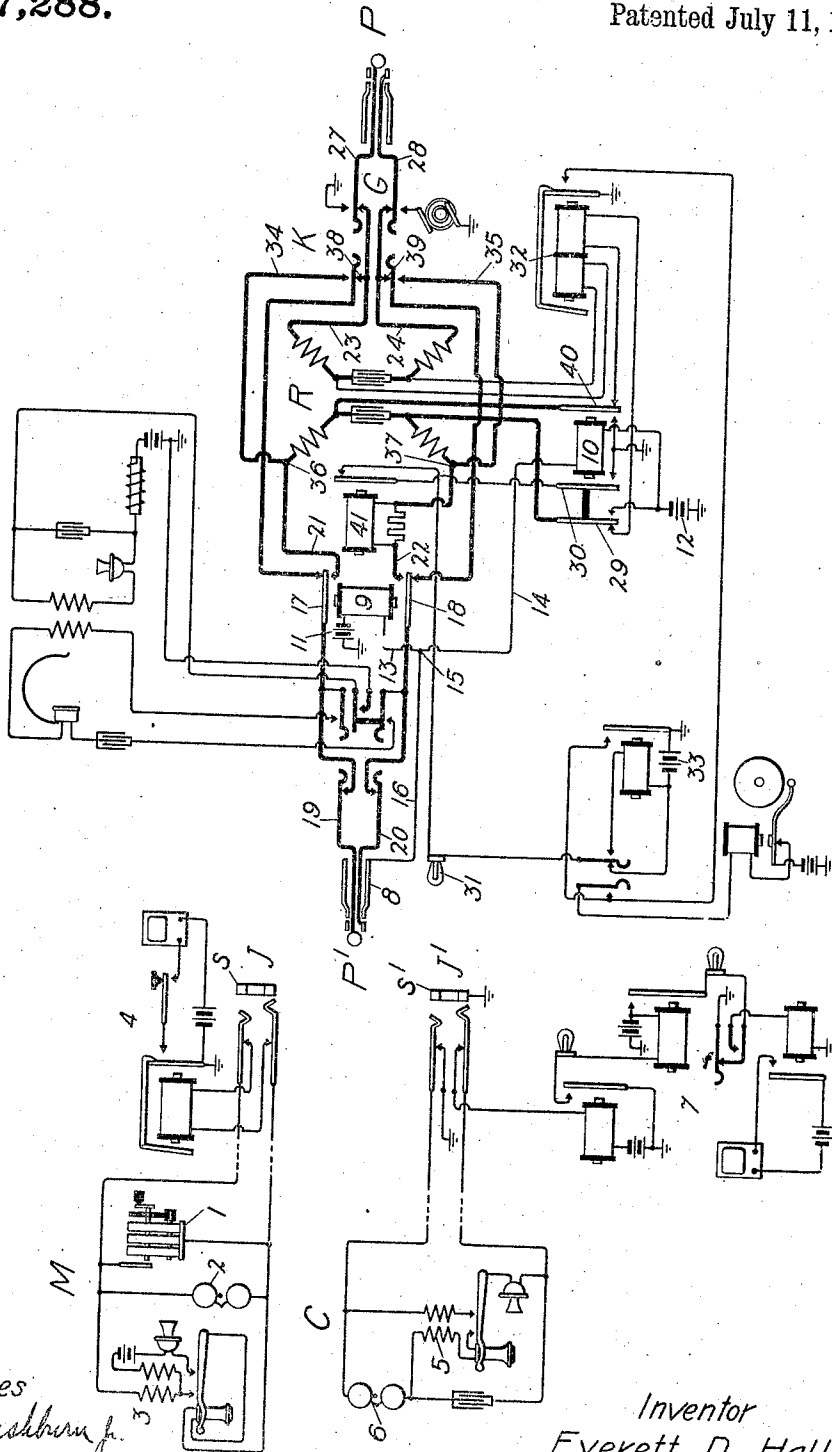


E. D. HALL.
 CONNECTING CIRCUIT FOR TELEPHONE EXCHANGES.
 APPLICATION FILED DEC. 8, 1910.

997,288.

Patented July 11, 1911



Witnesses
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UNITED STATES PATENT OFFICE.

EVERETT D. HALL, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY,
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CONNECTING-CIRCUIT FOR TELEPHONE-EXCHANGES.

997,288.

Specification of Letters Patent. Patented July 11, 1911.

Application filed December 8, 1910. Serial No. 596,371.

To all whom it may concern:

Be it known that I, EVERETT D. HALL, citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Connecting-Circuits for Telephone-Exchanges, of which the following is a full, clear, concise, and exact description.

10 This invention relates to telephone exchange systems wherein different types of telephone lines terminate upon the same section of the board, and therefore require connecting circuits which automatically adapt themselves to the character of the lines they interconnect.

15 When a magneto or through connection is set up, such connecting circuits usually are clear of all apparatus and a continuous conductive path is provided between the interconnected stations. However, the diverse nature of certain interconnected magneto lines frequently demands the conductive separation of the connecting circuit to eliminate noise, for instance in the event one is metallic and the other grounded.

20 The object of this invention is the provision of an efficient connecting circuit of the type set forth which shall include manually-operable means for conductively separating the connecting circuit and uniting the same through inductive apparatus for the transference of voice currents, the ability of the connecting circuit thereafter to adapt itself to the next connection involving said inductive apparatus, and an associated battery, not being affected by the position of said manual means.

25 In accordance with this invention, the inclusion of the inductive means is independently controlled by a manual key and by automatic electromagnetic mechanism, the latter operating invariably upon connection with a particular character of line, to introduce said inductive means with an associated battery into the talking circuit irrespective of the prior manipulation of said manual key.

30 More specifically, a manual key is associated with the cord circuit adapted when actuated to conductively disconnect the cord circuit and inductively unite the same through a repeating coil, and relays are provided in a strand of one of the plugs adapted to operate upon connection with the

grounded sleeve of a common battery line to include said repeating coil and an associated battery in circuit, common battery supervisory signaling apparatus being simultaneously substituted for the corresponding magneto signaling apparatus normally associated with the connecting circuit.

35 Referring to the drawing, which is a diagram illustrating the invention, M represents a magneto substation, having the usual magneto generator 1, bell 2, telephonic apparatus 3, connected up in a well known manner and terminating at the central office in a springjack J with which is associated the usual line signal and night alarm apparatus 4 adapted to be actuated by the operation of the magneto generator 1 to attract the attention of the operator.

40 C represents a common battery substation having telephonic apparatus 5 and bell 6 also connected in a well known manner, terminating at the central office in a springjack J' similar to springjack J except that the sleeve s' thereof is grounded while the sleeve s of jack J is left open. Line signal and night alarm apparatus 7 is associated with springjack J', the connections whereof are readily apparent.

45 The connecting circuit is arranged normally for magneto connections and terminates in plugs P, P', plug P being invariably associated with magneto lines, while plug P' is adapted to connect with lines of either type and therefore has connected in its sleeve strand 8 the electromagnetic means which renders the cord circuit elastic. This electromagnetic means may comprise two relays 9, 10, relay 9 being connected with battery 11 and relay 10 with battery 12, the conductors 13, 14 leading respectively from the other ends of their windings, uniting at 15, and continuing by conductor 16 to sleeve 8 of plug P', the circuit of these relays being completed by said sleeve to the grounded sleeve s' of the common battery line C when plug P' is connected with its jack J'. The relay 9 when operated attracts its armatures 17, 18, transferring the tip and ring strands 19, 20 to conductors 21, 22 which are united through one side of a repeating coil R, the other winding whereof is united with the conductors 23, 24, connected through a ringing key G with the tip and ring strands 27, 28 respectively of the plug P. The relay 10 when energized attracts its armatures 29, 30, 110

40, bridging the talking battery 12 across the circuit, and substituting the common battery signal 31 and battery 33 whose circuit is controlled by a relay 41 in the talking circuit, 5 for the magneto signal 32, this signal having two windings one conductively in circuit with each side of the cord circuit to serve a pair of connected magneto subscribers.

In interconnecting magneto lines it is frequently found that the connection is unbalanced and therefore noisy, for instance, in interconnecting a metallic magneto line with a grounded magneto line, the ground on the latter introducing a disturbing or 15 unbalancing influence upon the metallic line. It is desirable in such cases that the lines be conductively separated. In the drawings the key K is adapted to perform this function by separating the line conductively and 20 uniting it inductively through the repeating coil R. This key is shown in its normal or inoperative position. When thrown, it opens at contacts 38, 39 the normal through conductive path and continues the circuit 25 instead by way of conductors 34, 35 connected at 36, 37 with opposite sides of the left-hand winding of repeating coil R, whose other winding may be permanently associated with the plug P without exercising an appreciable shunting effect on 30 through conductive connections, due to its high self-induction and the fact that the circuit of the companion winding is open during such connections.

It is apparent that not only is the operator freed from the necessity of selecting the proper connecting circuit, but is enabled thereafter, at her discretion, to conductively separate the same and inductively 40 unite the sections through a repeating coil, the subsequent inclusion in the cord circuit of this same repeating coil, and in addition a talking battery, by the relays 9, 10 not being interfered with by the prior actuation 45 or non-actuation of the key K.

It will be understood that while for convenience of description separate batteries are illustrated, they may be and in practice are one and the same.

50 I claim:

1. In a telephone exchange, the combination with a connecting circuit for uniting lines of different character, of inductive means, manual and electromagnetic means 55 independently governing the inclusion of said inductive means, said electromagnetic means operating invariably to control the inclusion of said inductive means when said connecting circuit is united with a predetermined character of line regardless of the condition of said manual means.

2. In a telephone exchange, the combination with a connecting circuit adapted for uniting magneto and common battery lines, of inductive means and its associated battery, manual and electromagnetic means independently controlling the inclusion of said inductive means, said electromagnetic means operating invariably to include said inductive means and said battery in the connecting circuit when the same is united with a common battery line, irrespective of the condition of said manual means.

3. In a telephone exchange, the combination with a connecting circuit adapted for uniting common battery and magneto lines, magneto supervisory signaling apparatus normally associated with said connecting circuit, a repeating coil, battery and common battery supervisory signaling apparatus, a manual key adapted to conductively separate said connecting circuit and unite the same through said repeating coil, and electromagnets adapted to operate when connection is made to a common battery line to invariably include said repeating coil and battery in said connecting circuit irrespective of the position of said manual key, and to substitute said common battery supervisory signaling apparatus for said magneto signaling apparatus.

4. In a telephone exchange, the combination with magneto and common battery lines terminating thereat, a grounded test terminal associated with each of said common battery lines, a connecting circuit for uniting said lines terminating in a three-conductor plug, a pair of relays and a battery connected with one strand of said plug, said strand closing a circuit to ground when 100 connected with one of said grounded terminals, a repeating coil included in said connecting circuit by one of said relays, and a supervisory signal and a battery for talking purposes included by said other relay. 105

5. In a telephone exchange, the combination with test terminals of different electrical characteristics, a switch having a conductor adapted to connect with said test terminals, a pair of relays in said conductor 110 governed by the electrical condition of said test terminals, a repeating coil controlled by one relay, and a battery for talking purposes and common battery supervisory signal apparatus controlled by said other relay. 115

In witness whereof, I, hereunto subscribe my name this 7th day of December A. D., 1910.

EVERETT D. HALL.

Witnesses:

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