

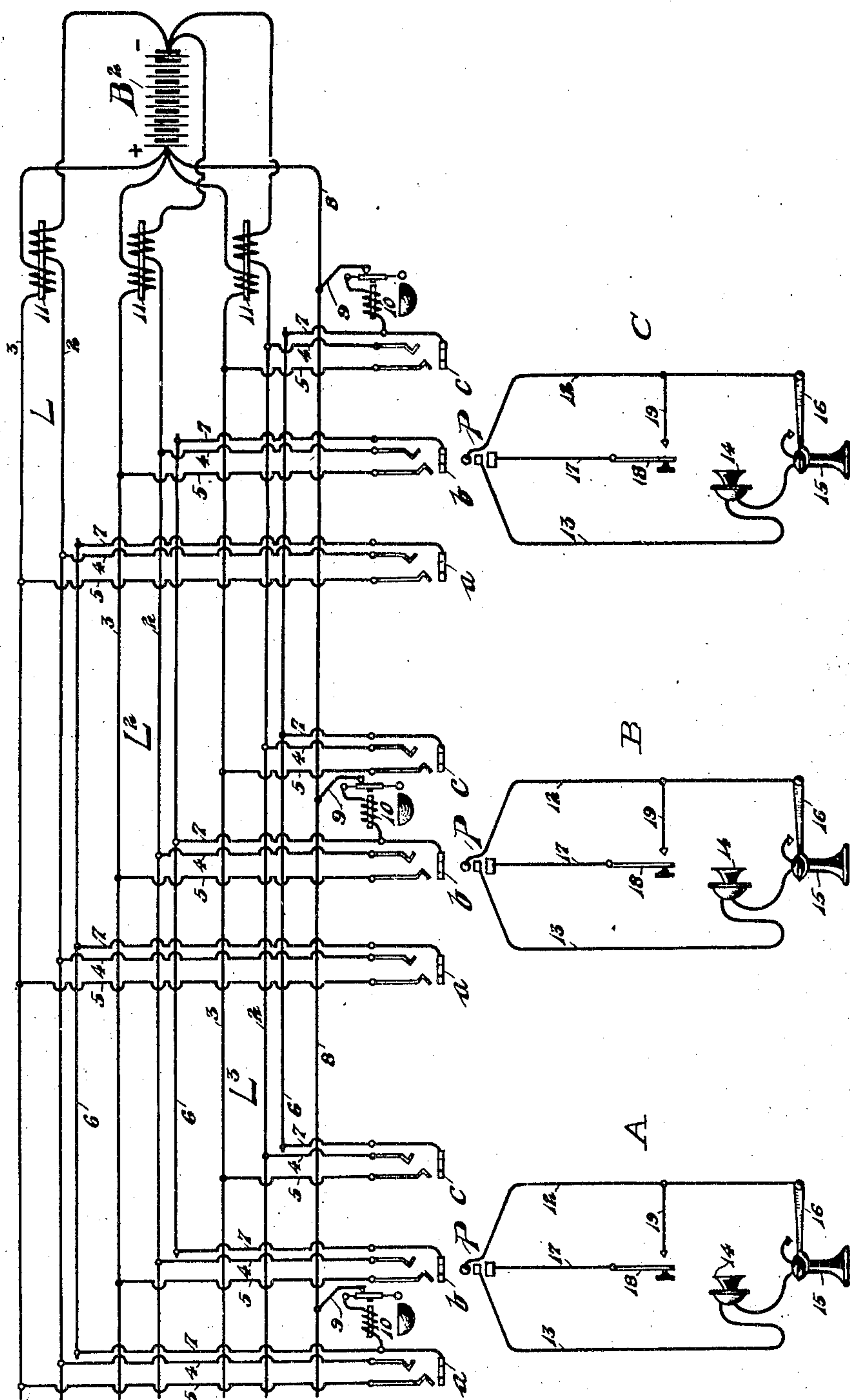
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W. W. DEAN.

INTERCOMMUNICATING TELEPHONE SYSTEM.

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Witnesses.

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To all whom it may concern.

Be it known that I, WILLIAM W. DEAN, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Intercommunicating Telephone Systems, of which the following is a specification.

My invention relates to intercommunicating telephone systems, my object being to provide a system in which a single source of current suffices for all of the lines and for all of the purposes of signaling and talking and in which the number of wires leading to each substation, as well as the apparatus at each substation, is greatly reduced.

A further object is to provide a subscriber's talking instrument that is independent of the remainder of the subscriber's apparatus, so that it may be readily moved about without hindrance from connecting-cords.

In my arrangement it is also unnecessary for the subscriber to normally insert his connecting device into any particular home jack or connection terminal when through talking or to do any act other than to hang up his receiver, whereby errors are avoided and the lines are always in condition for both signaling and talking.

With these objects in view and such others as may hereinafter appear, my invention comprises the various features hereinafter described, and particularly pointed out in the appended claims, reference being had to the accompanying drawing, in which the figure is a diagram representing the system as applied to three subscribers' stations.

L, L², and L³ indicate individual subscribers' circuits, extending in two limbs 2 and 3 from the common battery B² to each substation connected with the system. At each substation branches 4 and 5 extend from the line conductors 2 and 3, respectively, to the tip and sleeve contacts of spring-jacks, one for each line at each subscriber's station.

Only three stations A, B, and C are shown in the diagram, and accordingly at each station are located the spring-jacks *a*, *b*, and *c*, connected, respectively, with the lines L, L², and L³. The rings of the jacks of each line are connected together through a conductor 6 individual to each line, having branch con-

ductors 7 leading to said rings. A common battery-lead 8 for the purpose of signaling extends from the positive pole of the battery throughout the series of stations and at each station is connected by means of a branch conductor 9 with one terminal of a simple vibrating electromagnetic bell 10, whose other terminal is joined to the ring of the jack belonging to the line of that station. For example, at station A said bell is connected between the common conductor and the ring of the jack *a*. At the station B the bell 10 is connected between said common conductor 8 and the ring of jack *b*, while at station C the bell is similarly connected between said common lead and the ring of the jack *c*. Suitable impedance-coils 11 are connected in each line and serve, as hereinafter explained, to prevent the passage of the voice-currents while permitting the passage of the battery-current to operate the substation-transmitters.

Each subscriber is provided with a talking set, including a plug P, having tip, sleeve, and ring contacts adapted to register with the corresponding contacts of the spring-jacks when inserted therein, said tip and sleeve contacts being connected by the strands 12 and 13 of a flexible cord with the talking instruments, which include a transmitter 14 and a receiver 15, adapted to be included in series between said strands when the receiver is removed from the switch-hook 16. The ring-contact is likewise joined by means of the strand 17 of the cord with a key or push-button 18, which when depressed connects with a conductor 19, connected with said tip-strand 12.

In the operation of the system when a party at one station desires to talk with a party at another station he inserts the plug P of his talking set into the one of the plurality of jacks at his station that is connected with the line that is wanted. He then depresses key 18, which effects the operation of the bell at the wanted station. To trace these steps in detail, let it be assumed that subscriber A wishes to communicate with subscriber C. Subscriber A accordingly inserts the plug P into the jack *c* at his station and depresses the key 18. As before stated, the corresponding contacts of the plug and jack are now in

engagement, so that the operation of the key 18 serves to connect together the tip and ring contacts of the jack. This closes a circuit, which may be traced from the substation A over the tip-conductor 2 of the line L^3 to the negative pole of the battery B^2 , and thence over the common wire 8 from the positive pole of said battery through branch 9 and the bell 10 at the substation C, the conductor 7 at station C, individual wire 6 of line L^3 , and branch 7 at station A, the connection between these two conductors being completed by the key 18. The closure of these circuits operates the vibrating bell 10 at station C, and the subscriber C upon hearing the signal inserts the plug P of his set, if it is not already inserted, in the home jack c and takes up his receiver 15, which places the parties in communication. As is evident, the talking set at both these stations are now connected in parallel with the line L^3 , and therefore with the battery B^2 , so that the latter supplies current to both for the operation of the transmitters, while at the same time the voice-currents are prevented from being short-circuited through the battery B^2 by means of the retardation-coil 11 in the line, so that the rapidly-varying voice-currents are confined to the metallic-circuit path between the two stations and consisting of the line conductors 2 and 3, the branches 4 and 5 at each substation, and the branches 12 and 13 of the talking sets at the two substations,

At the termination of the conversation the receivers are returned to the hooks and the talking-circuit as well as the battery-circuits are opened. The plug at the station A would ordinarily be withdrawn, and it may be inserted in the home jack a at said station, so that the instrument is at all times ready to communicate with a calling subscriber without the necessity of first inserting the plug. Likewise at the station C the plug P may be allowed to remain in the jack c . When said plugs are in the jacks, the connections are unchanged from that already described, so that a call may be received in the regular manner. If any subscriber should forget to withdraw his plug from the jack of another line, it would not interrupt communication on that line in any manner, since the conditions are unchanged; neither would it prevent the operation of his own bell from some other substation. In other words, the plug P may be entirely disconnected from any of the jacks or may be allowed to remain in any of the jacks and the system is not thrown out of working condition. It is apparent that the closing together of the tip and ring contacts of the jack b at station A would operate the bell 10 at the station B. Likewise from either of the other stations the call-bells may be operated at the remaining stations of the line. Each line is thus provided with a metallic circuit for talking and all common re-

turns are avoided except for the purpose of signaling, to which there is no objection. Cross-talk is thus avoided in this system.

The wires are preferably formed into a single cable, which extends to each substation of the system, said cable consisting of three wires for each line and one common wire. Of course if the battery B^2 is placed at any distance from the first substation the wire 6 would not need to extend throughout the length of the cable—that is, from the battery to the first jack. Any number of stations may be connected with the line.

The talking instruments are usually embodied in the ordinary desk-stand type, but may be made in the form of a wall set or any other desired arrangement.

Having thus described my invention, what I claim is—

1. In an intercommunicating system, the combination with a single source of current for both talking and signaling, of three conductors for each substation consisting of an individual metallic circuit and an individual signaling-wire extending throughout the system, and means at each substation for calling and talking with any other party connected with the system, substantially as described.

2. In an intercommunicating system, a plurality of lines, the combination with a common battery, of a separate metallic talking-circuit for each line, an individual signaling-wire for each line, and a common signaling-wire for all of the lines, substantially as described.

3. In an intercommunicating system, the combination with a central source to furnish current for talking purposes, of spring-jacks for each line at each substation of the system, a subscriber's talking apparatus including a connecting-plug adapted to be inserted in any of the spring-jacks of the lines, said subscriber's talking apparatus being adapted to be entirely disconnected from the line-circuit, and means for receiving a call at any of the stations whether or not the apparatus at such station is thus disconnected, substantially as described.

4. In an intercommunicating telephone system, the combination with a common current source, of an individual line for each station and an individual signaling-wire for each station, a common signaling-wire for all of the stations, the signaling device of each station being connected between said common wire and the individual wire of that station, substantially as described.

5. In an intercommunicating telephone system, the combination with a common source of current, of a line conductor forming part of the talking-circuit of each substation connected with one pole of said source, a common signaling-conductor connected with the opposite pole of said source, a signaling device at each substation connected between

said common signaling-wire and an individual signaling-wire, and means at each substation to close said line conductor and said individual signaling-wire together whereby the signaling device at any station may be operated at will, substantially as described.

6. In an intercommunicating system, the combination with individual lines consisting of two line conductors, of a common signaling-conductor and an individual signaling-conductor, a calling-signal at each substation, a common current source for talking, and means for operating the calling-signal at any station by current from said source over one of the talking-conductors and said individual and common signaling-conductors, substantially as described.

7. In an intercommunicating system, the combination with individual lines extending throughout the system, each line consisting of two limbs, each limb being separated from the other lines by a device opaque to voice-currents, of means when any two parties are talking whereby they are connected in parallel with the same line conductors, a common source of current for signaling and talking, and means for furnishing signaling-current over one of the limbs of said telephone-line, and a conductor not adapted to form a portion of the talking-circuit, substantially as described.

8. In an intercommunicating system, the combination with a central source of current to furnish current for talking, of spring-jacks for each line at each substation of the system, a subscriber's talking apparatus including a connecting-plug adapted to be inserted in any of the jacks of the lines, said subscriber's talking apparatus being entirely disconnected from the line-circuit, and a call-receiving instrument at each station permanently associated with the line, whereby any station may be signaled whether or not said apparatus is thus disconnected, substantially as described.

9. In an intercommunicating system, the combination with a plurality of metallic talking-lines extending throughout the system, of an individual signaling-wire associated with each of said lines, a common signaling-wire for all of said lines, and a call-receiving instrument at each station permanently connected between said common signaling-wire and the individual signaling-wire of said station, substantially as described.

10. In an intercommunicating system, the combination with a central source of current to furnish current for talking, of a plurality of metallic talking-lines extending throughout the system, an impedance-coil between said source of current and each of said metallic talking-lines, an individual signaling-wire associated with each of said lines, a common signaling-wire for all of said lines, and a call-receiving instrument at each station permanently connected between said common signaling-wires and the individual signaling-wire of said station, substantially as described.

11. In an intercommunicating system, the combination with a plurality of metallic talking-lines extending throughout the system, of an individual signaling-wire associated with each of said lines, a common signaling-wire for all of said lines, a call-receiving instrument at each station permanently connected between said common signaling-wire and the individual signaling-wire of said station, and a subscriber's telephone set at each station adapted to be entirely disconnected from the lines without interfering with the operation of said call-receiving instrument, substantially as described.

Signed by me at Chicago, county of Cook, State of Illinois, this 12th day of June, 1903.

WILLIAM W. DEAN.

Witnesses:

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