

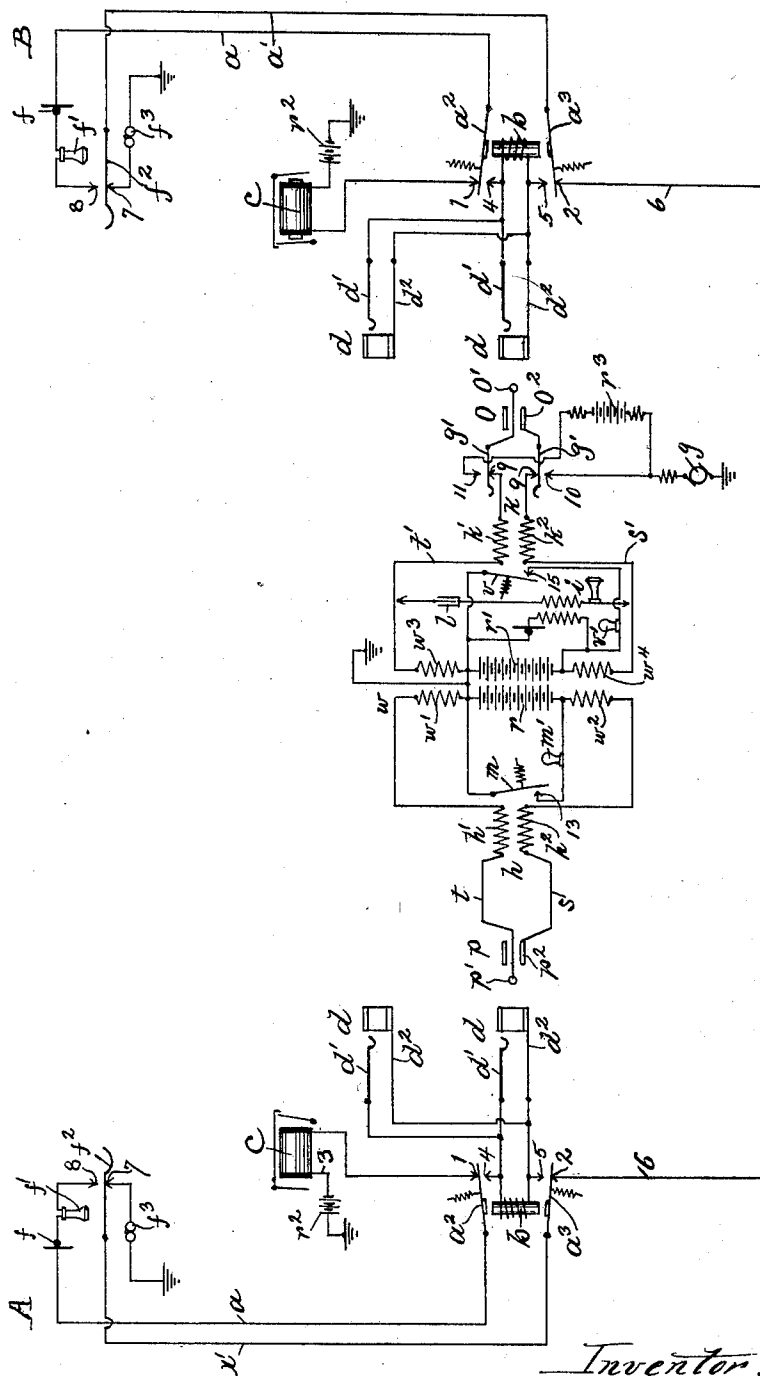
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K. B. MILLER.
CENTRAL ENERGY TELEPHONE SYSTEM.

APPLICATION FILED FEB. 4, 1901.

NO MODEL.



Witnesses:

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UNITED STATES PATENT OFFICE.

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CENTRAL-ENERGY TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 732,098, dated June 30, 1903.

Application filed February 4, 1901. Serial No. 45,930. (No model.)

To all whom it may concern:

Be it known that I, KEMPSTER B. MILLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Central-Energy Telephone Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to a central-energy telephone system, my object being to provide an improved or modified form of the telephone system shown in the reissue patent to Francis W. Dunbar, granted September 16, 1902, No. 12,031. In said patent above mentioned a telephone system is disclosed in which the connection-terminal of the telephone-line is normally disconnected from the limbs of the telephone-line extending to the substation, a relay being provided, adapted to be energized when connection is made with the line to connect the connection-terminal with the limbs of the telephone-line, which extend to the substation. Said relay also serves the additional function of disconnecting the individual indicator from the line when connection is made therewith. In said patent above mentioned a calling-generator is provided, associated with the usual ringing-key, which is adapted to open the circuit back of the generator to prevent the calling-currents from making a noise in the telephone of the calling subscriber. In said patent a charging source of electricity is provided at the central station adapted when connection is made with the line to send current over a portion of the talking-circuit to energize the relay above mentioned. The opening of the circuit back of the generator thus temporarily disconnects the charging source of electricity from circuit, and the relay would thus become unenergized and open the circuit through the called-subscriber's bell were not some means provided for temporarily energizing the relay during the time the charging source of electricity is disconnected therefrom. In said patent above mentioned the calling-generator is adapted to send current through the relay, and the re-

lay is specially constructed to keep its armature attracted when traversed by the alternating or non-continuous current usually employed for calling purposes.

It is the object of the present invention to provide means whereby the provision of a specially-constructed relay may be avoided and whereby any of the usual forms of continuous-current relay may be employed. To accomplish this result, I preferably provide means for temporarily connecting a source of continuous current with the relay during the time the ringing-key severs the strands of the cord connectors with which the charging source of electricity is normally connected. This source of electricity may be a separate and independent source, or it may be the charging source of electricity suitably connected to temporarily send current over another circuit during the time the cord connectors are severed by the ringing-key.

I have illustrated my invention in the accompanying drawing, which shows two subscribers' lines and the central-station apparatus for uniting the same.

The line of subscriber A extends in two limbs a a' at the central station, the limb a terminating in a spring a^2 and the limb a' in a spring a^3 . The spring a^2 normally engages contact 1, connected through individual annunciator c and conductor 3 to ground through the battery r^2 , while the contact 2 is connected with the conductor 6, which is common to a plurality of the lines. The springs a^2 and a^3 carry armatures resting, respectively, opposite the poles of a relay b , one end of said relay being connected with contact 4, with which spring a^2 is adapted to engage when the relay is energized, and also with the line-springs $d' d'$ upon the several spring-jacks d of the multiple switchboard. The opposite end of the winding of relay b is connected with contact 5, with which spring a^3 is adapted to engage, and also with the line-terminals $d^2 d^2$ of the spring-jacks.

The subscriber is provided at the substation with the usual microphone f , receiver f' , and switch-hook f^2 , the latter being adapted when the line is not in use to engage contact 7, which is connected through bell f^3 to

ground. When the telephone is removed from the hook, the hook engages contact 8, which is connected with the telephone transmitter and receiver. The apparatus and circuits of subscriber B (shown upon the right of the drawing) are the same as those provided in connection with subscriber A, and like characters have been employed to indicate like parts.

10 The answering-plug p is provided with a tip p' , connected with the tip-strand t , and with a sleeve p^2 , connected with the sleeve-strand s . The calling-plug o is provided with a tip o' , connected with the tip-strand t' , and
15 with a sleeve o^2 , connected with the sleeve-strand s' . The plugs and the strands connected therewith are united through a repeating-coil w , having windings w^1 w^2 connected between the strands t and s and windings w^3 and w^4 connected between the strands t' and s' . A battery r is interposed between the windings w^1 and w^2 and a battery r' between the windings w^3 and w^4 . One pole of each of the batteries is connected to ground.
20 In the strands t and s , respectively, are included the windings h^1 h^2 of a relay h , while in the strands t' and s' , respectively, the windings k^1 k^2 of a relay k are included. The windings of the relay are wound upon their
25 respective cores so that, due to the passage of the battery-current through the metallic talking-circuit, the current traversing the two windings of each relay will neutralize the core thereof, so that the relays will remain inert while the lines are connected for conversation. These relays in their individual capacity are disclosed and claimed in an application filed by me December 19, 1900, Serial No. 40,374.
30 Opposite the pole of relay h is mounted a spring m , which carries the armature of said relay, said spring being adapted when attracted to engage contact 13 to thereby close circuit of battery r through lamp m' . Likewise a spring v is mounted opposite the relay k and is adapted to engage contact 15 to close circuit of battery r' through lamp v' . The operator's telephone set i is adapted to be connected between the strands t' and s' and
35 a condenser l is included in circuit therewith. The calling-generator g , adapted to produce the usual alternating current, is grounded upon one side and is connected upon the other side with contact 10. A supplemental
40 source of electricity—as, for instance, a battery r^3 —is connected between contact 10 and contact 11. The springs g' g' of the ringing-key normally rest against contacts 9 9 and when depressed are adapted to respectively
45 engage contacts 10 and 11. When said springs g' g' engage the contacts 10 and 11, respectively, the generator g is connected between ground and the sleeve o^2 of the calling-plug, and the supplementary source of electricity
50 r^3 is connected between the tip o' and the sleeve o^2 of the calling-plug. When the ringing-key is depressed to disconnect the charg-

ing-battery from the terminals of the calling-plug, the supplementary battery r^3 is connected between the terminals of the calling-plug to temporarily energize the relay in a manner hereinafter more particularly described during the time the battery r' is removed from circuit.

If subscriber A desires to converse with subscriber B, he lifts his telephone-receiver from the hook, thereby closing together limbs a a' at the substation. The circuit of battery r^2 is thereby closed from ground over conductor 3, indicator c , limbs a and a' , conductor 6 to ground through the lines of the other subscribers, all of whose lines when not busy are connected with conductor 6. The individual annunciator c is thereby actuated to convey to the operator the signal for connection. The operator thereupon lifts answering-plug p and inserts the same in the spring-jack belonging to the line of subscriber A. The insertion of the plug closes the circuit of battery r through strand t , tip p' , line-spring d' , relay b , sleeve d^2 , sleeve p^2 , strand s back to the battery. The relay b is thus actuated, and springs a^2 and a^3 are moved out of engagement, respectively, with contacts 1 and 2 and into engagement, respectively, with contacts 4 and 5. The individual annunciator c is thus disconnected from the circuit, and the limbs of the telephone-line are connected with the line-terminals of the spring-jack. The circuit of battery r over the strands t and s and the limbs a and a' of the telephone-line is thus completed. The operator then bridges in her telephone set and learns that subscriber B is the subscriber called for, lifts calling-plug o and touches the tip o' thereof to the sleeve d^2 of the spring-jack belonging to the line of subscriber B. If the subscriber B is busy, she will hear a click in her telephone; otherwise she will hear no sound. If subscriber B is busy, the sleeves of the spring-jacks connected with his line will be charged to a difference of potential relative to earth or the central office common return. Upon touching the tip of the calling-plug to the sleeve of a busy line at any board a current will flow to ground or the common return and will cause a click in the operator's telephone.

Assuming that the operator finds the line of subscriber B to be disengaged, she inserts calling-plug into the spring-jack, thereby closing circuit of battery r' through relay b , belonging to subscriber B, to energize the same and connect the line-terminals with the limbs of the telephone-line belonging to subscriber B. The operator thereupon depresses ringing-key, thus sending current from ground through calling-generator g , sleeve o^2 , terminal d^2 , limb a' , through the bell f^3 to ground at the substation. Since the depressing of the ringing-key serves to open the strands t' and s' at the rear of the ringing-key, thus disconnecting the battery r' from the relay b , the relay would become unener-

gized and would disconnect the limbs $a a'$ from the spring-jack terminals were not some means provided for energizing the relay during the time the battery r' is removed from circuit; but the depressing of the ringing-key serves to connect the supplemental source or battery r^3 with the opposite terminals of the connecting-plug, and current from battery r^3 thence passes through contact 10, sleeve o^2 , sleeve d^2 , relay b , spring d' , tip o' , contact 11 back to the battery. The relay is thus energized during the time the ringing-key is depressed and the battery r' removed from circuit. When the ringing-key is moved to connect the battery r' with the circuit, the battery r^3 is disconnected therefrom and remains on open circuit until the ringing-key is again depressed. When subscriber B responds and lifts his telephone-receiver from the hook, the subscribers are connected for conversation. During conversation the battery r is connected in circuit with the strands t and s and the limbs $a a'$ of subscriber A, and the battery r' is connected in circuit with the strands t' and s' and limbs $a a'$ of subscriber B. Talking-currents passing over either circuit will be transmitted to the other circuit through the windings of the repeating-coil W.

I disclaim herein the matter claimed in the patent to Francis W. Dunbar for telephone-switchboards, dated November 12, 1901, No. 686,272.

Any other type of line-circuit employing a cut-off relay that is actuated over a portion of the talking-circuit may obviously employ the principles of my invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a telephone-line, of a charging source of continuous current, a relay adapted to be energized by said charging source when connection is made with the line, a calling-generator, a ringing-key adapted to connect said calling-generator with the line to call the wanted subscriber, and means actuated by said ringing-key for temporarily sending an energizing-current other than the ringing-current through said relay during the time the calling-generator is connected with the line, substantially as described.

2. The combination with a telephone-line, of a relay associated therewith, a cord connector for uniting said line with another telephone-line, a charging source of continuous current adapted to be connected with said cord connector to send current through said relay, a calling-generator adapted to produce a non-continuous current, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of said charging source through said relay, and means for temporarily sending a continuous current through said relay to energize the same during the time the calling-generator is in circuit, substantially as described.

3. The combination with a telephone-line, of a connection-terminal normally disconnected therefrom, a relay for connecting said connection-terminal with the line, a charging source of continuous current adapted to energize said relay, a calling-generator, a ringing-key adapted to connect said calling-generator with the line, and to open the circuit of said charging source through said relay, and means for temporarily sending a continuous current through said relay during the time the calling-generator is connected in circuit, substantially as described.

4. The combination with a telephone-line, of a relay associated therewith, a charging source of continuous current adapted to energize said relay, a calling-generator, a ringing-key for connecting said calling-generator in circuit and for opening the circuit of said charging source through said relay, and a supplemental source of continuous current adapted to be temporarily connected in circuit to energize said relay while the calling-generator is connected with the line, substantially as described.

5. The combination with a telephone-line, of a relay in a bridge between the two limbs of said line, a charging source of electricity adapted when connection is made with the line to energize said relay, a calling-generator, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of said charging source through said relay, and a supplemental source of continuous current adapted to be bridged between the limbs of said telephone-line by said ringing-key, substantially as described.

6. The combination with a telephone-line, of a charging source of continuous current to furnish current for talking, a magnet adapted to be energized by said charging source when connection is made with the line, a calling-generator adapted to be connected with the line to ring the wanted subscriber, said charging source being disconnected at said time, and means for temporarily sending a supplemental energizing-current through said magnet during the time the calling-generator is connected with the line, substantially as described.

7. The combination with a telephone-line, of a line-signal therefor, a relay for the line to render said signal inoperative during a connection, a cord connector for uniting said line with another telephone-line, a charging source of continuous current adapted to be connected with said cord connector to send current through said relay and to furnish current for talking, a calling-generator adapted to produce a non-continuous current, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of said charging source through said relay, and means for temporarily sending an energizing-current other than the ringing-current through the relay during the time the calling-generator is in circuit, substantially as described.

8. The combination with a telephone-line, of a connection-terminal normally operatively disconnected therefrom, a signal for the line, a magnet for connecting said connection-terminal with the line and for rendering said signal inoperative, a charging source of continuous current adapted to energize the magnet and to furnish current for talking, a calling-generator, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of said charging source through said magnet, and means for temporarily sending a supplemental energizing-current through said magnet during the time the calling-generator is connected in circuit, substantially as described.

9. The combination with a telephone-line, of a connection-terminal normally operatively disconnected therefrom, a line-signal normally connected therewith, a relay for connecting said connection-terminal with the line and for rendering said signal inoperative, a charging source of continuous current adapted to energize said relay, a calling-generator, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of said charging source, and means for temporarily sending an energizing-current through said relay from a source supplemental to the calling-generator during the time the calling-generator is connected in circuit, substantially as described.

10. The combination with a multiple-switch-board telephone-line, of a signal therefor, a magnet for the line to render said signal inoperative, a cord connector for uniting said line with another telephone-line, a charging source of continuous current adapted to be connected with said line to send current through said magnet during conversation over a circuit including a portion of the talking-circuit, said source also serving to furnish current over the line for talking purposes, supervisory apparatus associated with the cord connector and operated by current from said source, a calling-generator adapted to produce a non-continuous current, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of said charging-generator through said magnet, and means for temporarily sending a supplemental energizing-current through said magnet during the time the calling-generator is in circuit, substantially as described.

11. The combination with a multiple-switch-board telephone-line, of a connection-terminal normally operatively disconnected therefrom, a signal for the line normally connected therewith, a relay for connecting said connection-terminal with the line and for rendering said signal inoperative, a charging source of continuous current adapted to energize said relay over a circuit including a portion of the talking-circuit, said source also serving to furnish current over the line for talking purposes, a calling-generator adapted to produce a non-continuous current, a ringing-key

adapted to connect said calling-generator with the line and to open the circuit of said charging source, and means for temporarily sending a continuous current through said relay to energize the same during the time the calling-generator is in circuit, substantially as described.

12. The combination with a multiple-switch-board telephone-line, of a line-signal therefor, a magnet associated therewith to render said signal inoperative, a charging source of continuous current adapted to energize said magnet and also to furnish current for talking, a calling-generator, a ringing-key for connecting said calling-generator in circuit and for opening the circuit of said charging source through said magnet, and a supplemental source of continuous current adapted to be temporarily connected in circuit to energize said magnet while the calling-generator is connected with the line, substantially as described.

13. The combination with a telephone-line, of a connection-terminal normally operatively disconnected therefrom, a signal for the line, a relay associated with the line to connect said connection-terminal with the line and to render said signal inoperative, a charging source of continuous current adapted to energize said relay over a portion of the talking-circuit, said source also serving to furnish current for talking purposes, a calling-generator, a ringing-key for connecting said calling-generator in circuit and for opening the normal circuit of said charging source through said relay, and a supplemental source of current adapted to be temporarily connected in said circuit to energize said relay while the calling-generator is connected with the line, substantially as described.

14. The combination with a telephone-line, of a line-signal therefor, a relay in a bridge between the two limbs of said line, to render said signal inoperative, a charging source of electricity adapted when connection is made with the line to energize said relay over a portion of the talking-circuit, a calling-generator, a ringing-key adapted to connect said calling-generator with the line and to open circuit of said charging source through said relay, and a supplemental source of continuous current adapted to be bridged between the limbs of said telephone-line by said ringing-key, substantially as described.

15. The combination with a telephone-line, of a connection-terminal normally operatively disconnected therefrom, a signal for the line, a relay in a bridge between the two limbs of said line adapted to connect said connection-terminal with the line and to render said signal inoperative, a charging source of electricity adapted when connection is made with the line to energize said relay over a portion of the talking-circuit and to furnish current for talking purposes, a calling-generator, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of

said charging source through said relay, and a supplemental source of continuous current adapted to be bridged between the limbs of said telephone-line by said ringing-key to maintain said relay operated during the time the calling-generator is in circuit, substantially as described.

16. The combination with a telephone-line, of a calling-signal therefor, a relay in a bridge between the two limbs of said line to render said signal inoperative, a charging source of electricity adapted when connection is made with the line to energize said relay over a portion of the talking-circuit and to furnish current for talking, a calling-generator adapted to produce a non-continuous current, a ringing-key adapted to connect said calling-generator with the line and to open the circuit of said charging source through said relay, and means for temporarily sending a continuous current through said relay to energize the same during the time the calling-generator is in circuit, substantially as described.

17. The combination with a telephone-line, of a line-signal therefor, means to operate said signal by current from the central office when the subscriber takes up his telephone to make a call, a magnet at the central office connected with the talking-circuit and adapted when actuated to render said signal inoperative, said magnet-circuit including a portion of the talking-circuit, a ringing-generator adapted to be connected with the line to call the subscriber located thereon, and an additional source of current at the central office to furnish current for the operation of said magnet during ringing, substantially as described.

18. The combination with a telephone-line, of a line-signal therefor, a normally operatively disconnected connection-terminal, a relay to connect the said terminal and disconnect the said signal to render it inoperative, said relay being energized over a path including a portion of the talking-circuit, a ringing-generator to call the wanted subscriber, and a supplemental source of current at the central office to furnish current for the operation of said relay during ringing, substantially as described.

19. The combination with a telephone-line, of a line-signal therefor, a relay bridged across the talking-circuit and adapted when actuated to render the signal inoperative, a ringing-generator to call the wanted subscriber, and a supplemental source of current at the central office to furnish current for the operation of said relay during ringing, substantially as described.

20. In a telephone system, the combination with a multiple-switchboard telephone-line, of a line-signal therefor, said signal being operated by current from the central office when the subscriber is calling and the substation-transmitters being energized by current also from the central office during conversation, a magnet to render said line-signal inoperative during a connection by current over a portion

of the talking-circuit, a ringing-generator and a source of steady current connected with the line when calling the wanted subscriber, the current from said steady source serving to maintain said magnet operated during ringing and having a path completed over a portion of the ringing-generator circuit, substantially as described.

21. The combination with a telephone-line, of a signal therefor, a magnet to render said signal inoperative during a connection over a circuit including a portion of the talking-circuit, a battery and a ringing-generator connected with the said line by the operation of the ringing-key when calling the subscriber, the battery and ringing-generator having derived circuits, said generator being out of the common portion of said circuits and the said battery serving to maintain said magnet operated during ringing, substantially as described.

22. In a telephone-signaling system, a main-line circuit, a signal therefor at the central office, an electromagnet to render the signal inoperative during a connection, a non-continuous-current generator and a continuous-current generator associated together at the central station, a circuit-closer for connecting both to the said main-line circuit simultaneously and by the same operation, a bell at the substation responsive to non-continuous currents only and adapted to give a signal upon the operation of said circuit-closer, and said electromagnet being simultaneously operated by current from said continuous-current generator, substantially as described.

23. The combination with a main circuit, of a call-bell at the substation responsive to non-continuous ringing-currents, a non-continuous-current generator at the central station, a continuous-current generator associated therewith, a signal at the central station, an electromagnetic device connected with the talking-circuit to render said signal inoperative during a connection, and a compound circuit-closing device controlling the terminals of both said generators and their connections with the main circuit so that when operated to make said connections, the said device will be operated by the continuous current to prevent the operation of said signal by the ringing-current, substantially as described.

24. In a telephone system, the combination with a multiple-switchboard telephone-line, of a line-signal therefor, said signal being operated by current from the central office when the subscriber is calling and the substation-transmitters being likewise energized by current from the central office during conversation, a magnet to render said line-signal inoperative during a connection and during conversation by current also from the central office over a circuit including portion of the talking-circuit, a ringing-generator, and an additional source of current connected with the line in the act of calling the wanted

subscriber, the current from said additional source serving to maintain said magnet operated during ringing, substantially as described.

5 25. In a telephone system, the combination with a multiple-switchboard telephone-line, of a line-signal therefor, said signal being operated by current from the central office when the subscriber is calling and the substation-transmitters being likewise energized by current from the central office during conversation, a magnet to render said line-signal inoperative during a connection by current applied by the central office over a circuit including a portion of the talking-circuit, a ringing-generator and an additional source of current, and a ringing-key to simultaneously connect said generator and additional source with the called line when signaling the wanted subscriber, the current from said additional source serving to maintain said magnet operated while the ringing-generator current is sent out over the called line, substantially as described.

25 26. In a telephone system, the combination with a multiple-switchboard telephone-line, of a line-signal therefor, said signal being operated by current from the central office when the subscriber is calling and the substation-transmitters being likewise energized by current from the central office during conversation, a magnet to render said line-signal inoperative during a connection by current supplied by the central office and over a portion of the talking-circuit, a ringing-generator and a source of unidirectional current, a ringing-key to connect said generator and source with the called line when signaling a

wanted subscriber, the current from said unidirectional source serving to maintain said magnet operated during ringing, substantially as described.

27. The combination with a multiple-switchboard telephone-line, of a signal therefor, a magnet for the line to render said signal operative, a cord connector for uniting said line with a called telephone-line, a source of current included in the metallic line at the central station during conversation and arranged to send current through said magnet during the connection over a circuit including a portion of the talking-circuit, said source also serving to furnish current over the lines for talking purposes, supervisory apparatus associated with the cord connector and operated by current from said source, a calling-generator, a switching device to connect said calling-generator with the called line to signal the wanted subscriber, means to prevent said ringing-generator from disturbing the calling subscriber during ringing, and further means controlled by said switching device for sending a supplemental energizing-current other than the ringing-generator current through the magnet of the called line to maintain the same operated during the time the calling-generator is connected with the called line, substantially as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

KEMPSTER B. MILLER.

Witnesses:

M. R. ROCHFORD,
M. R. NYMAN.