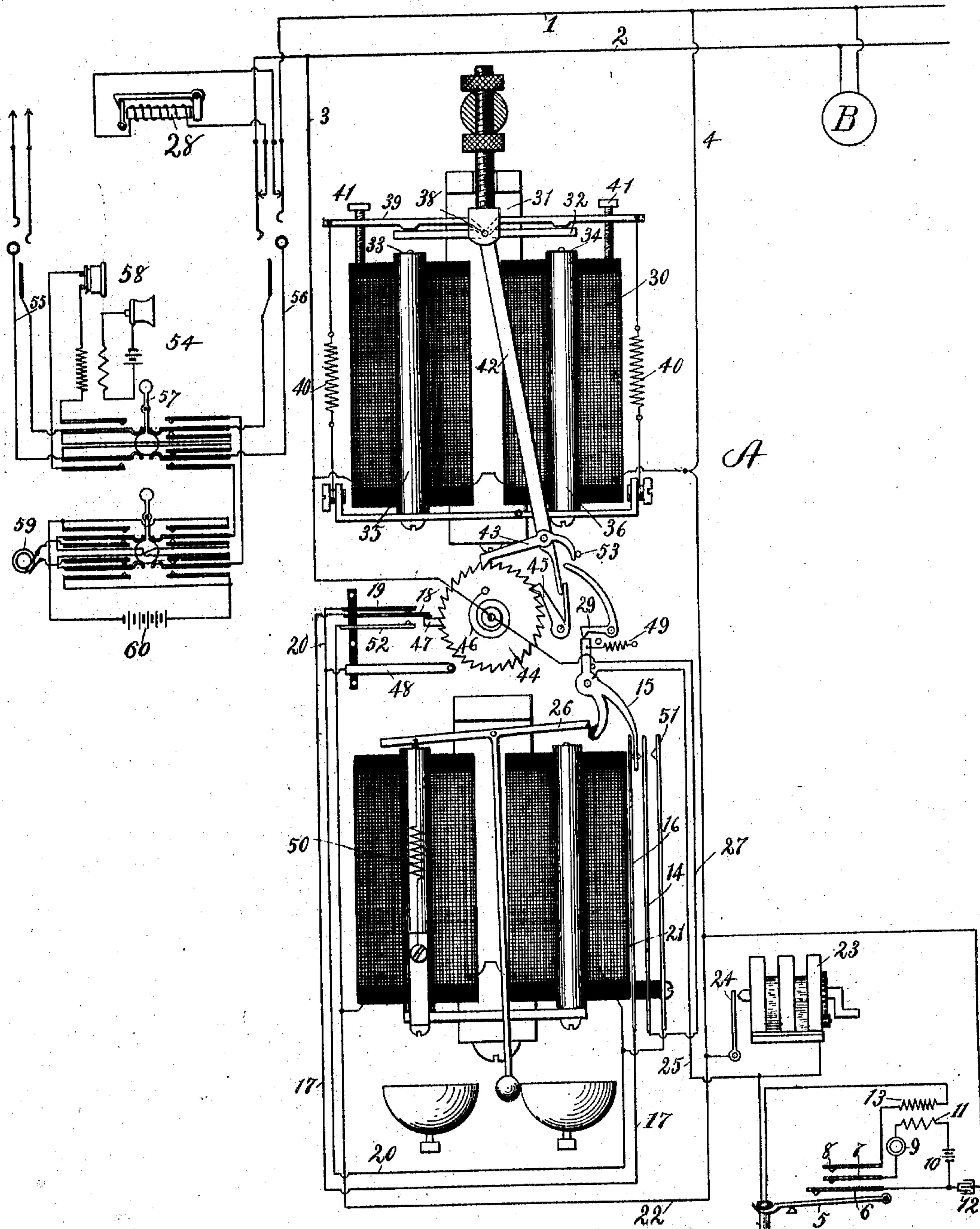


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E. A. BUELL.
PARTY TELEPHONE LINE.
APPLICATION FILED MAY 1, 1905.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD A. BUELL, OF DEKALB, ILLINOIS.

PARTY TELEPHONE-LINE.

No. 811,692.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed May 1, 1905. Serial No. 258,276.

To all whom it may concern:

Be it known that I, EDWARD A. BUELL, a citizen of Canada, residing at Dekalb, in the county of Dekalb and State of Illinois, have invented a certain new and useful Improvement in Party Telephone-Lines, 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 party telephone-line apparatus, and has for its object the provision of an improved system and apparatus whereby subscribers at the stations of a party-line are prevented from cutting in the apparatus at unselected stations when any other station or stations on the line have been selectively connected therewith. By means of my invention the party-line apparatus may be very greatly simplified, while all the results that are desirable in party-line practice may be accomplished, though I do not wish to be limited in all embodiments of my invention to apparatus accomplishing all of the results hereinafter to be set forth. By means of my invention not only may the subscribers at unselected stations be prevented from cutting their telephones and signaling generators into the line-circuit, but, if it is so desired, the apparatus at all stations may be placed in selected positions by the operator, so that the party-line may be used as an ordinary party-line, whereby the subscribers may not only signal the exchange, but whereby also they may signal each other without the aid of the operator.

It is another object of my invention to control the association of the telephonic apparatus at each subscriber's station with the telephone-line by means of the magnets of the signal-receiving devices or bells, thereby reducing the equipment and accomplishing certain advantages that will appear.

In practicing my invention I employ an electromagnet, preferably the ringing-magnet, a switch controlling the telephone-circuit at each station, a lever device operating the switch and operated by said electromagnet, a detent engaging the lever mechanism when operated to hold the same in the position to which it has been actuated, and a releasing device operated by another magnet for disengaging said detent from said lever mechanism when the apparatus is to be restored to its normal condition of use, whereby the switch controlling the telephone con-

nections is restored to its normal position, in which the telephone is disassociated from the line.

I will explain my invention more fully by reference to the accompanying drawing, showing the preferred embodiment thereof, so much of the exchange and line equipment being shown as is necessary to an understanding of my present invention.

The party telephone-line illustrated is a metallic line, though I do not wish to be limited to a metallic circuit. The line extends from an exchange in two limbs 1 2 to a plurality of substations on the party-line, the apparatus at station A being illustrated somewhat fully, the apparatus at station B and other stations being generally similar thereto.

Before describing the exchange equipment that I preferably employ the apparatus at station A will be set forth. This apparatus is placed in bridge of the party-line by means of bridging conductors 3 4, &c. At each station there is a switch-hook 5, in this instance electrically disconnected from the line at all times, though not necessarily so in all embodiments of my invention. When the receiver is in place upon its switch-hook, the contacts 6 7 8 are disconnected; but when the receiver is removed from its hook these contacts are all connected, whereby the local battery-circuit containing the transmitter 9, the battery 10, and the primary 11 is closed, the invention being, however, not limited to substation equipment including such local transmitter-circuits. One side of the line is at the same time connected by way of the conductor 4 with one terminal of the receiver, through condenser 12, the switches or contacts 8 7 6, and the secondary winding 13 of the induction-coil. The other terminal of the receiver is connected by way of the conductor 3 with the other side of the party-line, when the switch element 14 is connected with the lever 15 upon the operation of said lever.

The telephone-receiver has connections that may be traced as follows: from one terminal of the receiver to the lever 15, the spring or contact 16 normally engaged thereby, the conductor 17, the switch spring or contact 18, the switch spring or contact 19 normally engaged by the element 18, the conductor 20, the winding of the ringer or bell magnet 21, the conductor 22, to the condenser 12, the contacts 18 19 normally preventing the telephone from being operatively cut into circuit, these contacts closing a shunt about

the subscriber's telephone outfit when a station is unselected and when he removes his telephone-receiver from its hook, the selecting apparatus being at zero. Incoming signaling current is normally prevented from passing through the bell-magnet 21 when the apparatus is in an unselected condition, for the path for such incoming current would be interrupted at the normally separated elements 14 15. When a subscriber initiates a call, he operates his generator 23, which thereupon automatically closes an initial circuit that may be traced from the spring-contact 24 of the generator by way of the conductor 22 to the magnet 21, the conductor 20, the elements 18 19 normally in contact, the conductor 17, the contact 16, the lever 15, the conductor 25, to the remaining terminal of the generator 23. This is a local circuit that serves to operate the armature 26 of the magnet 21, which thereupon engages the lever 15 to move the same into connection with the contact 14, whereby the current of the generator no longer has a local circuit, but continues in its passage by way of the contact 14 and the conductor 27 and the conductor 3 to one side of the line, the other side of the line being connected with the terminal 24, whereby generator-current may be impressed upon the line to operate the line-signal 28 at the exchange. After having signaled the exchange the subscriber removes his receiver and includes his telephone outfit in bridge of the line by means of a bridge-circuit that may be traced from the conductor 3, the conductor 27, the contact 14, the lever 15, the conductor 25, the telephone outfit, and the conductor 4. As it is preferred to hold the armature 26 in a position in which it does not remain in engagement with the lever 15, I provide a detent 29, that is normally sustained by the lever 15 out of interlocking relation therewith, but is brought into interlocking relation with said lever when the lever is operated to prevent the return of the lever until said detent is removed, as will be set forth.

I have thus described the way in which a subscriber upon the party-line may impress signaling-current thereon when he desires to signal the operator and how the said subscriber has his telephone outfit cut and maintained in circuit relation with the line, which description will enable a more ready understanding of the main features of my invention now more fully to appear.

At each station there is provided a polarized magnet 30, the permanent magnet 31 of which polarizes the armature 32 and the poles 33 34, desirably forming integral parts of the cores 35 36, mechanically and magnetically connected with the permanent magnet. The windings about the cores 35 36 are disposed as in an ordinary magneto-bell, so that when the current is impressed upon the

winding in one direction the armature is moved in one direction and when the current is impressed upon said winding in an opposite direction the armature is moved in an opposite direction, the two halves of the winding 30 (one-half about the core 35 and the other half about the core 36) being oppositely wound for this purpose. The armature 32 is mounted upon a shaft 38, and independently-moving abutment-plates 39 are also mounted to rotate upon the same shaft, springs 40 serving yieldingly to maintain said abutment-plates in the positions shown, the armature rotating against one or the other of the abutment-plates and the force of its spring 40. Adjustable stops 41 limit the extent to which the plates 39 may be moved by the armature 32. An arm 42 is mounted upon the armature 32 and carries a pawl 43, that is employed for moving the ratchet-wheel 44 step by step in a counter-clockwise direction, a dog 45 preventing premature return of the wheel 44 by the spring 46. Each wheel 44 carries or operates a contact or brush 47, that constitutes a ringing contact that is brought by the step-by-step movement of the wheel 44 into connection with another ringing contact 48. The contacts 47 48 are spaced varying distances apart at the different stations, so that each station requires its wheel 44 to be moved a number of steps differing from the number of steps required at each of the stations for selectively effecting the connection thereat of the elements 47 48. The current is impressed upon the line at the exchange for the purpose of thus stepping the wheels 44 to select a station or stations, the number of pulsations or steps corresponding to the distance between the elements 47 48 of the called subscriber whose bell is to be operated.

Having brought the elements 47 48 at the station to be selected together, the operator impresses ringing-current upon the line, which finds circuit through the bell-magnet 21 from the telephone-line by way of the conductor 3, the contacts 47 48 at the selected station, the conductor 20, the winding of bell-magnet 21, and the conductors 22 4. The armature 26 in its first clockwise movement that thus ensues engages a portion of the lever structure 15 to move said lever into electrical connection with the contact 14, there partially to establish the telephonic circuit of the selected subscriber, this telephonic circuit being completed when the called-subscriber's receiver is removed from its switch-hook. In order that the lever 15 may be maintained in this position during the time the subscriber is to have telephonic connection with the line, the detent 29 drops behind the lever to secure the new relation between the elements 14 15. The armature 26 may continue to operate, notwithstanding the lever mechanism 15, as long as calling-current is impressed

upon the line. When the station is idle, and in order to permit the subscriber to signal over the line, the contacts 15 16 are maintained together by the spring 49. A spring 5 50 is preferably employed to maintain the armature 26 out of engagement with the lever device 15, as indicated. When selecting-current is impressed upon the line, the posts 47 at all stations are removed from mechanical 10 engagement with the springs 18, (these posts never being electrically connected with said springs,) so that generator-circuits at all substations, except the called-subscriber's station, are open, whereby none but the called 15 subscriber may impress signaling-current upon the line. The called subscriber is thus enabled to send clearing-out signaling-current to the operator. The detent 29 is placed behind the lever 15 only at a selected station, 20 and in order that the selected subscriber may impress clearing-out signaling-current upon the line whether or not the elements 47 48 are in engagement I provide a supplemental contact 51, that is brought into engagement 25 with the contact 14 at the selected station through the agency of the lever 15 when moved by the armature 26, connection for which generator 23 is established with the line when said generator is operated at said 30 elements 51 14. As the levers 15 at unselected stations are maintained in their normal positions, the subscribers' telephonic connections with the line are maintained open at the unselected stations at the elements 15 14, 35 so that the subscribers at such unselected stations cannot listen in or in any manner interfere with conversation carried on over the line. To eliminate the possibility of the subscribers hearing because of leakage of the 40 voice-currents, I also provide at each station a supplemental contact 52, with which the spring 18 engages when said spring is mechanically separated from the post 47, whereby all of the telephonic outfit at each unselected 45 subscriber's station is short-circuited. The generator at each unselected station is also short-circuited by this same means. It should be stated that the generators 23 are incapable of furnishing current of sufficient 50 strength to operate the magnet 30; nor is the signaling-current furnished from the central office sufficiently strong to operate said magnet, the magnet 30 being preferably of high resistance with respect to the magnet 21.

55 I have thus described how subscribers upon a party-line may be selected and how the apparatus at unselected subscribers' stations may be dissociated from the line to prevent the subscribers thereat from interfering with the proper use of the line, and I will now describe the releasing mechanism by which all of the apparatus at the different stations may be restored to their normal positions.

60 Releasing-current is impressed by the operator upon the line, which current has a di-

rection opposite to the selecting-current previously impressed upon the line, the releasing-current effecting the counter-clockwise rotation of the armature 32, whereby the tail of the pawl 43 strikes the pin 53 to remove 70 said pawl from the wheel 44, the lower end of the arm 42 at the same time engaging the tail of the dog 45 to disengage said dog from the wheel 44, whereupon the spring 46 will restore the wheel 44 to its initial position, where- 75 in the post 47 mechanically (but not electrically) engages the spring 18 to bring said spring into engagement with the contact 19 and remove the same from engagement with the contact 52. This operation occurs at all 80 stations. At the selected station the lower end of the arm 42 engages an extension of the detent 29 to remove said detent from engagement with the lever 15, permitting the spring 49 to restore said lever to its initial position. 85

If it is desired to have the party-line and the apparatus of the substations thereon so related that the subscribers may communicate with each other, the operator may place the elements 47 48 at each station successively 90 in electrical connection, whereby the generators 23, the bell-magnets 21, and the telephone outfits at the different stations are so related to the line and the telephonic apparatus that the subscribers may signal and com- 95 municate with each other without the aid of the operator. In accomplishing this result the operator first selects station No. 1, at which the distance between the elements 47 48 is the least, and then rings the bell of said 100 substation to move the lever 15 and permit the detent 29 to fall behind the same, so as to secure normal connection between the contacts 51 and 14. The operator then places the contacts 47 48 at the next station in con- 105 nection and rings the bell at this station to bring the elements 51 and 14 at said latter station into connection, and so on throughout the series of stations or throughout as many of such stations which are to have the capac- 110 ity of intercommunicating without further aid of the operator, for it will be seen that at each station where the elements 14 and 51 are connected by the mechanism specified the subscriber thereat may receive signaling- 115 current from another station or from the exchange.

In the apparatus shown the subscribers normally having their contacts 51 and 14 in engagement are adapted to connect their 120 telephone outfits with the line without further aid of the operator. In this way a party-line may normally connect two or more subscribers who have the capacity of communicating with each other without further aid of 125 the operator, while the rest of the subscribers may require coöperation of the operator. It is apparent that for the purpose of securing this normal relation of subscribers' stations with the line the elements 47 48 thereat need 130

only be in contact as long as it is required to operate the bell thereat to secure this normal relation, for, as a matter of fact, in the embodiment of the invention indicated as each station is thus placed in normal connection with the line the contacts 47 48 at the station previously normally related to the line are disconnected.

It is always well for the operator before selecting a subscriber to send releasing-current over the line to make sure that all of the detents 29 and levers 15 are in their normal positions, for prior to such selection some subscriber may have wantonly operated his generator 23 just enough to move the armature 26, and thereby insure the association of his telephone outfit with the line and without operating the line-indicator.

Any suitable telephone-exchange equipment may be employed for carrying out the operations above described. I have shown a well-known cord-circuit equipment 54, having an answering-plug 55, a connecting-plug 56, and an operator's key 57, which key when its wedge is moved to the left serves to associate the operator's telephone outfit 58 with the line and when moved to the right serves either to connect the source of alternating or other source of signaling-current 59 or the battery 60 with the line. The battery 60 is employed for the purpose of sending selecting-current or releasing-current over the line, the wedge of the master-key 61 when moved to the left serving so to connect the battery 60 that it will send selecting-current over the line and when moved to the right will reverse the connection of said battery with the line to send releasing-current thereover. When the signaling-current is directed over the line, the master-key is in its central position.

While the lever 15 is mechanically operated by the bell, the generator 23 when operated is the agency that causes the bell to actuate said lever, and I do not, therefore, wish to be limited in all embodiments of the invention to the direct control of the lever 15 by the bell mechanism.

While I prefer the precise mechanism 15 and 29 and their associate parts for preventing operative association between the telephones and the signaling-generators with the line at unselected stations, I do not wish to be limited thereto.

While element 15 is adapted to form parts of electrical circuits, as herein shown, I do not wish to be limited to this function for this element.

It is obvious that many changes may be made without departing from the spirit of my invention, and I do not, therefore, wish to be limited to the precise construction, arrangement, and circuits herein shown; but,

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

1. A telephone-exchange system, including a party-line extending from a plurality of subscribers' stations to an exchange, each of said subscribers' stations having a signal bell or receiver, a signaling-generator, switching apparatus for controlling the association of the signaling-generator and signal-receiver with the line, selective mechanism governing the said switching apparatus and serving, when in an unselected condition, to effect dissociation between the signal-receiver and signaling-generator and the line, and, when in a selected position, to bring about the association of said signal-receiver and signaling-generator with the line, and apparatus at the exchange for operating the selective mechanism at the different stations, whereby the switching apparatus at the different stations may be operated to place the signal-receivers and signaling-generators thereat in connection with the line.

2. A telephone-exchange system, including a party-line extending from a plurality of subscribers' stations to an exchange, each of said subscribers' stations having a signal bell or receiver, a signaling-generator, switching apparatus for controlling the association of the signaling-generator, signal-receiver and telephone with the line, selective mechanism governing the said switching apparatus and serving, when in an unselected condition, to effect dissociation between the signal-receiver, the signaling-generator, the telephone, and the line, and, when in a selected position, to bring about the association of said signal-receiver, signaling-generator and telephone with the line, and apparatus at the exchange for operating the selective mechanism at the different stations, whereby the switching apparatus at the different stations may be operated to place the signal-receivers, signaling-generators and telephones thereat in connection with the line.

3. A telephone-exchange system, including a party-line extending from a plurality of subscribers' stations to an exchange, each of said subscribers' stations having a signaling-generator, a signal bell or receiver, switching apparatus for controlling the association of the signaling-generator and telephone with the line, selective mechanism governing the said switching apparatus and serving, when in an unselected condition, to effect dissociation between the signaling-generator the telephone, and the line, and, when in a selected position, to bring about the association of said signaling-generator and telephone with the line, and apparatus at the exchange for operating the selective mechanism at the different stations, whereby the switching apparatus at the different stations may be operated to place the signaling-generators and telephones thereat in connection with the line.

4. A telephone-line, having a plurality of

subscribers' stations thereon to constitute the same a party-line, each subscriber's station including a signal-receiver, a signaling-generator normally in operative relation therewith, and switching apparatus governing the association of the signal-receiver and telephone thereat with the line and operated by the signal-receiver.

5. A telephone-line, having a plurality of subscribers' stations thereon to constitute the same a party-line, each subscriber's station including a signal-receiver, a signaling-generator normally in operative relation therewith, and switching apparatus governing the association of the signal-receiver thereat with the line and operated by the signal-receiver.

6. A telephone-line, having a plurality of subscribers' stations thereon to constitute the same a party-line, selective mechanism at each station, a signal bell or receiver and switching apparatus at each station governing the association of the signal-receiver thereat with the line and governed by the signal-receiver, and apparatus at the exchange for operating the selective mechanisms at the different stations.

7. A telephone-line, having a plurality of subscribers' stations thereon to constitute the same a party-line, selective mechanism at each station, a signal bell or receiver and switching apparatus at each station governing the association of the signal-receiver and telephone thereat with the line and governed by the signal-receiver, and apparatus at the exchange for operating the selective mechanisms at the different stations.

8. A subscriber's station equipment, including a signal-receiver, a signaling-generator normally in operative relation with the signal-receiver, and switching mechanism operated by the signal-receiver and serving to control the association of the telephone and signaling-generator with the line.

9. A subscriber's station equipment, including a signal-receiver, a signaling-generator normally in operative relation with the signal-receiver, and switching mechanism operated by the signal-receiver and serving to control the association of the signal-receiver with the line.

10. A subscriber's station equipment, including a signal-receiver, a signaling-generator normally in operative relation with the signal-receiver, and switching mechanism operated by the signal-receiver and serving to control the association of the telephone, signal-receiver and generator with the line.

11. A subscriber's station equipment, including a signal-receiver, a signaling-generator normally in operative relation with the signal-receiver, and switching mechanism operated by the signal-receiver and serving to control the association of the telephone and signal-receiver with the line.

12. A subscriber's station equipment, including a signal-receiver, a signaling-generator normally in operative relation with the signal-receiver, and switching mechanism operated by the signal-receiver and serving to control the association of the signal-receiver and generator with the line.

13. A subscriber's station equipment, including a signal-receiver, a signaling-generator, and switching mechanism operated by the signaling-generator and serving to control the association of the telephone and signaling-generator with the line.

14. A subscriber's station equipment, including a signal-receiver, a signaling-generator, and switching mechanism operated by the signaling-generator and serving to control the association of the signal-receiver with the line.

15. A subscriber's station equipment, including a signal-receiver, a signaling-generator, and switching mechanism operated by the signaling-generator and serving to control the association of the telephone with the line.

16. A subscriber's station equipment, including a signal-receiver, a signaling-generator, and switching mechanism operated by the signaling-generator and serving to control the association of the telephone, signal-receiver and generator with the line.

17. A subscriber's station equipment, including a signal-receiver, a signaling-generator, and switching mechanism operated by the signaling-generator and serving to control the association of the telephone and signal-receiver with the line.

18. A subscriber's station equipment, including a signal-receiver, a signaling-generator, and switching mechanism operated by the signaling-generator and serving to control the association of the signal-receiver and generator with the line.

19. Substation apparatus for party telephone-lines including switching mechanism, a detent for holding the switching mechanism in the position to which it has been actuated, and electromagnetic mechanism including a signal-receiver for the substation, and serving to operate the said switching mechanism, to permit the detent to engage the same and for releasing the detent from connection with the said switching mechanism.

20. Substation apparatus for party telephone-lines, switching mechanism, a detent for holding the switching mechanism in the position to which it has been actuated, and electromagnetic mechanism for releasing the detent from connection with the switching mechanism, including a signal-receiver, which receiver serves to operate the switching mechanism, to permit the detent to engage the same.

21. A telephone-exchange system, including a party-line extending from a plurality of

subscribers' stations to an exchange, each of
said subscribers' stations having a signal bell
or receiver, a signaling-generator, switching
apparatus for controlling the association of
5 the signaling-generator and signal-receiver
with the line, selective mechanism governing
the said switching apparatus and serving,
when in an unselected condition, to effect
dissociation between the signaling-generator
10 and the line, and, when in a selected position,
to bring about the association of said signal-
ing-generator with the line, and apparatus

at the exchange for operating the selective
mechanism at the different stations, whereby
the switching apparatus at the different sta- 15
tions may be operated to place the signaling-
generators thereat in connection with the
line.

In witness whereof I hereunto subscribe
my name this 25th day of April, A. D. 1905. 20
EDWARD A. BUELL.

Witnesses:

G. L. CRAGG,
LEON STROH.