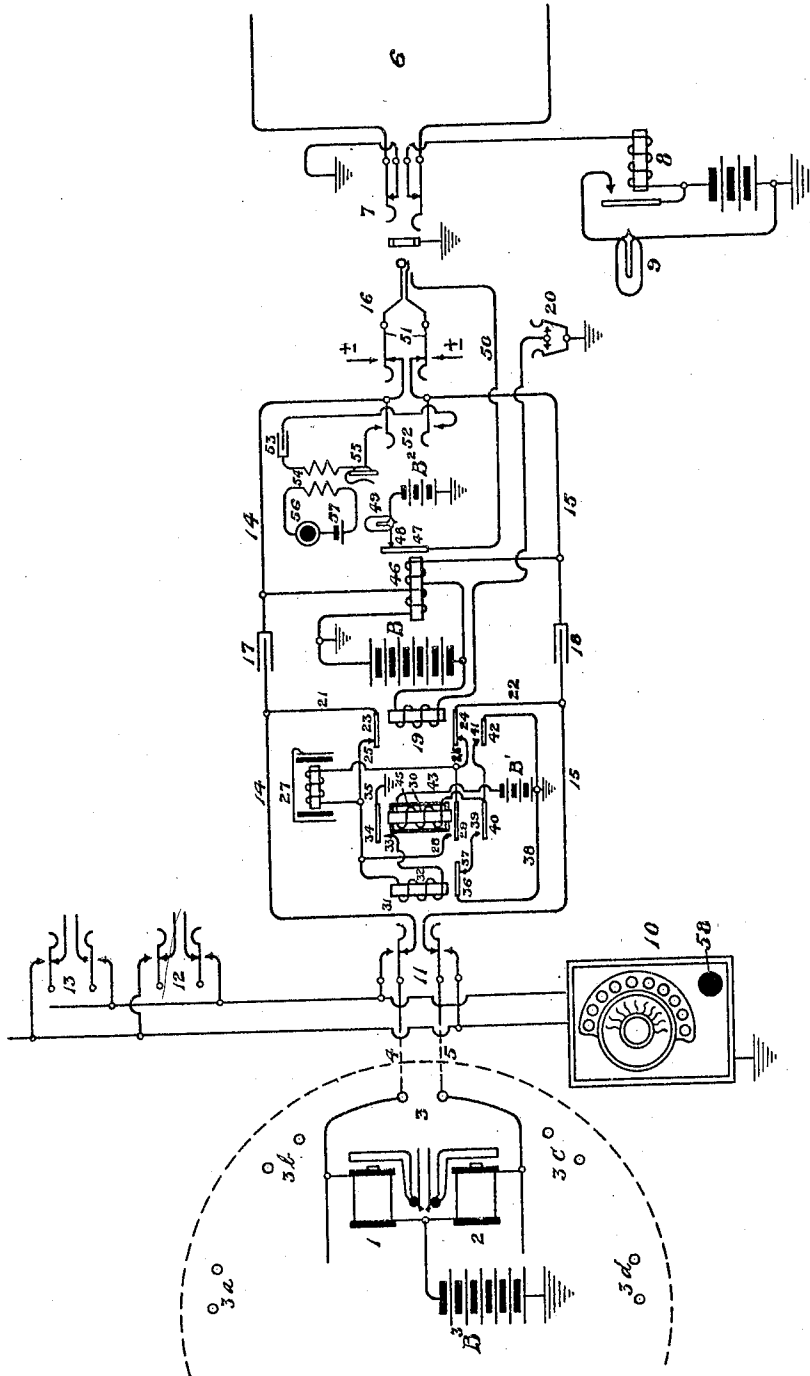


No. 878,265.

PATENTED FEB. 4, 1908.

C. S. WINSTON.
AUTOMATIC TRUNKING SYSTEM.
APPLICATION FILED JAN. 2, 1907.



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AUTOMATIC TRUNKING SYSTEM.

No. 878,265.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed January 2, 1907. Serial No. 350,335.

To all whom it may concern:

Be it known that I, CHARLES S. WINSTON, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Automatic Trunking Systems, of which the following is a specification.

My invention relates to telephonic circuits adapted to be used in completing connections between automatic and manual exchanges, and between manual and automatic exchanges, whereby the subscribers of the automatic and manual exchanges will be mutually enabled to connect and talk, one with the other.

The object of my invention is to simplify the circuits and apparatus for such connections, and in connection therewith to arrange means for disconnecting or restoring the apparatus of the automatic exchange without additional effort on the part of the manual trunk operator, and at the same time to make such an arrangement that the trunk connecting plug can be changed from one jack to another without disconnecting or restoring the apparatus of the automatic exchange.

My invention is illustrated in the accompanying drawing, which shows the two relays 1 and 2 at the automatic exchange connected with the trunk line 3, which extends in limbs 4 and 5 to the manual exchange, where it terminates in a cord circuit adapted to be directly connected with the subscribers' lines of the manual exchange. The automatic exchange itself is to be understood to be conventionally shown and other trunks, 3^a, 3^b, 3^c and 3^d may also be similarly provided. It is to be understood that the portion of this cord circuit to the right of the condensers may be of any form to correspond or to actuate in connection with the lines of the exchange, which may be of any form, the line 6, here shown, being of the common battery type terminating in the cut-off jack 7, and having the line relay 8 normally connected in series with the line to control the circuit of the line signal 9. The manual end of the trunk line is provided with the calling device 10, which is arranged through keys 11, 12, 13, etc., to be connected with all of the trunks associated with a particular operator's position, by which arrangement one calling device is sufficient for any number of trunks.

The manual end of the trunk circuit extends from the key 11 in two limbs 14 and 15 to the connecting plug 16, such limbs having their continuity intercepted by the condensers 17 and 18. The relay 19 has its circuit controlled by the plug-seat-switch 20, here shown in the position which it assumes when the plug is seated therein. Conductors 21 and 22 extend from the conductors 14 and 15, upon the end of the trunk which connects to the automatic exchange, to the springs 23 and 24 of the relay 19, these springs being normally in connection respectively with contacts 25 and 26, which connect with the two terminals of the drop 27, and also with the normally open contacts 28 and 29 of the slow acting relay 30. Contact 25 of relay 19 is also connected with the coil of relay 31, the other terminal of this coil being connected through conductor 32 with the normally open contacts 33 and 34 of relay 30, the latter contact being connected with ground through the conductor 35.

Relay 31 controls the normally closed contacts 36 and 37, contact 36 being connected with ground conductor 38, and contact 37 being connected with the normally open contact 39 of relay 30. The spring 40 of relay 30 is connected with the coil of such relay, and also with the normally open contacts 41 and 42 of relay 19, contact 42 being connected with ground. The other terminal of relay 30 is connected by conductor 43 with live pole of battery. This relay is provided with the copper shell 45 in order to make it retain its magnetism after the current has been severed from its coil, and therefore to cause its contacts to be held in their abnormal position for a short period after the current through the coil has been interrupted.

The cord circuit as here shown is provided on the right of the condensers with the relay 46 having two coils, one connected between the live pole of battery and the talking strand 15, and the other between the ground pole of battery and the talking strand 14. This relay serves to control the contact springs 47 and 48 which are normally in the closed circuit of the supervisory signal 49, the circuit of this signal being completed when a connection is made with a subscriber's line through the conductor 50 and the sleeve contact of the plug and jack. The usual ringing key 51 is provided with series-contacts such that ringing current may be connected with

the called line only, and the listening key 52 is connected in the usual way with the conductors 14 and 15 such that the operator's set may be bridged across the talking circuit. This operator's set consists of the condenser 53, repeating coil 54, receiver 55, and the primary circuit containing the transmitter 56 and battery 57. It is to be understood, however, that any other operator's set may be substituted in place of the one here shown, and that the main battery B may be used for furnishing talking current if so desired.

In the operation of the system, supposing the first call to originate in the automatic exchange, the calling subscriber will be automatically connected with the lines 4 and 5 of the trunk 3, this trunk being given a number in the automatic exchange, such that it may be connected with by the operation of the mechanism at any substation of the automatic system. After the connection is thus established signaling current will be sent upon the trunk line the same as it would be upon any subscriber's line of the automatic system. This signaling current will pass over conductors 4, 14 and 21 through the normal contacts 23 and 25 of relay 19, and through the coil of the drop 27, normal contacts 26 and 24 of relay 19, conductors 22, 15 and 5 back to the source at the automatic exchange. This will throw the drop 27 and indicate to the trunk operator that a connection has been made with the trunk at the automatic exchange. The trunk operator now throws her listening key 52 and inquires the desired number of the automatic subscriber. The operator may in the meantime lift her plug 16 from the plug-seat-switch 20 and close the circuit of relay 19, but her failure to do this will not affect the conversational condition of the trunk for the reason that the drop 27 is given sufficient importance not to materially interfere with the conversation if it is allowed to remain bridged across the line.

When the trunk operator lifts her plug 16 from the plug-seat-switch 20 the circuit of the relay 19 is closed from the live pole of battery B to ground through the plug-seat-switch. This actuates the springs of relay 19, opening the contacts 23 and 25, and 24 and 26, and closing the contacts 41 and 42. These latter contacts close the circuit of relay 30 from battery B' through conductor 43, the coil of the relay and contacts 41 and 42 to ground. Relay 30 is thereby actuated and its springs move to close the contacts 33 and 34, 28 and 29, and 39 and 40. The closing of contacts 28 and 29 places a shunt about the coil of the drop 27. The closing of contacts 33 and 34 connects ground with one terminal of the relay 31, the other terminal being now open at contacts 23 and 25, 24 and 26. The closing of contacts 39 and 40 closes a locking circuit for relay 30 through the normal contacts

36 and 37 of relay 31 such that relay 19 may now fall back without opening the circuit of relay 30. The trunk operator now inserts her plug 16 and calls the desired subscriber's line by throwing her ringing key 51. The insertion of this plug closes the circuit of the supervisory lamp 49 from battery B² through signal 49, contacts 48 and 47 of relay 46, conductor 50 and the sleeve contacts of the plug and jack to ground. When the subscriber answers, relay 46 is actuated and contacts 47 and 48 are separated to sever the circuit of the signal 49. When the conversation is completed and the signal 49 is again displayed by the called subscriber hanging up his receiver the plug is removed from jack 7 and allowed to assume its normal position in the plug-seat-switch 20, and thus to break the circuit of relay 19. The springs of this relay falling back close a circuit between conductors 14 and 15 through contacts 23 and 25, and 24 and 26, respectively, the closed contacts 28 and 29 of relay 30, in the latter instance, and through the coil of relay 31, conductor 32, contacts 33 and 34, and conductor 35 to ground. Thus, a ground connection is placed upon each of the limbs of the trunk line and current flows from battery B² through the coils of relays 1 and 2 in the automatic exchange over both limbs of the trunk line, through the coil of relay 31, and contacts 33 and 34 of relay 30 to ground. Current in this path actuates relays 1 and 2 in the automatic exchange to restore the mechanism and also actuates relay 31 and thereby opens the locking circuit of relay 30 at the contacts 36 and 37. Relay 30, thus having its circuit severed, will fall back and sever the ground connection with the limbs of the trunk at contacts 33 and 34, but this relay 30 being provided with the copper shell 45 will not actuate for an appreciable length of time after the circuit of its coil has been severed, and therefore will maintain the ground connection upon the limbs of the trunk an ample time for the restoring mechanism at the automatic exchange to have completely operated. This trunk circuit being adapted for reciprocal operation the call may arise at the manual exchange, in which case the line signal 9 will be displayed in the usual way, and the operator will insert her plug 16 and inquire the number of the desired automatic subscriber. Having determined the desired number the operator throws her key 11 and operates the dial of the calling device 10 in the same manner as would an ordinary subscriber of the automatic exchange, and thereby places the trunk line in connection with the desired subscriber. The button 58 is then pressed and the automatic subscriber is signaled in the manner provided in the automatic exchange. The connection now being complete the disconnect is accomplished in the same manner

as though the call arose in the automatic exchange.

It will be seen that by the use of the plug-seat-switch, whereby the restoring circuit is not closed until the plug is released from the trunk operator's end, that should the trunk operator make an error in connecting with the line desired by the automatic subscriber that the plug may be removed from the jacks and inserted into another jack without restoring the automatic mechanism. The relay 19 could be made to operate at the time the plug 16 is inserted in a jack, but this would be objectionable for the reason above stated. It is to be understood that batteries B, B' and B² may be, and in practice are, one, and that B³ may be this same battery, but in practice is usually separate and located at an exchange some distance from the manual exchange.

While many features of this system have been here described in detail, it is to be understood that I do not wish to be unduly limited thereto, it being very possible to use certain features of this invention with other forms of automatic exchanges than the one here shown, and with automatic exchanges which require a different connection for restoring than does this one without departing from the spirit or scope of this invention.

What I claim as new and desire to secure by Letters Patent is:

1. In a telephone system, the combination with automatic and manual subscribers' lines terminating in their respective offices, of a trunk circuit for connecting the lines of the two systems for conversation extending between the offices and terminating at the manual exchange in a cord and plug, and means to maintain a ground connection on both limbs of the telephone line for a short duration of time when the conversation has been terminated, substantially as described.

2. In a telephone system, the combination with automatic and manual subscribers' lines terminating in their respective offices, of a trunk circuit for connecting the lines of the two systems for conversation extending between the offices and terminating in the manual exchange in a cord and plug, and means to make and maintain a restoring connection with the trunk line for a short duration of time when the conversation has been terminated, substantially as described.

3. In a telephone system, the combination with automatic and manual subscribers' lines terminating in their respective offices, of a trunk circuit for connecting the lines of the two systems for conversation extending between the offices and terminating in the manual exchange in a cord and plug, and means for maintaining a connection with the trunk when the conversation has been terminated, the control of such means permitting the removal of the plug from the manual subscribers's line without the actuation of such means, substantially as described.

4. In a telephone system, the combination with automatic and manual subscribers' lines, of a trunk circuit for connecting such lines for conversation, a plug and a terminal for one end of said trunk line, a seat switch for said plug, and means operated by the actuation of said plug-seat-switch for maintaining a connection with the trunk line for a short duration of time after the plug-seat-switch has been actuated, substantially as described.

5. In a telephone system, the combination with automatic and manual subscribers' lines, of a trunk circuit for connecting such lines for conversation, a plug and a terminal for one end of said trunk line, a seat switch for said plug, and means for maintaining a ground connection on both limbs of the trunk line for a short duration of time after the plug-seat-switch has been actuated, substantially as described.

6. In a telephone system, the combination with automatic and manual subscribers' lines terminating at their respective switchboards, of a trunk circuit for connecting the lines of the two systems for conversation terminating at the manual switchboard in a cord and plug, and means at the manual exchange for altering the circuit of the trunk when the conversation has been terminated, whereby the automatic switching mechanism at the automatic exchange is restored to its normal condition, substantially as described.

Signed by me at Chicago, county of Cook, and State of Illinois, in the presence of two witnesses.

CHARLES S. WINSTON.

Witnesses:

CLIFFORD C. BRADBURY,
EDITH F. GRIER.

It is hereby certified that in Letters Patent No. 878,265, granted February 4, 1908, upon the application of Charles S. Winston, of Chicago, Illinois, for an improvement in "Automatic Trunking Systems," an error appears in the printed specification requiring correction, as follows: In line 42, page 2, the word "importance" should read *impedance*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of March, A. P. 1908.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.