No. 649,077. Patented May 8, 1900.

C. E. SCRIBNER.

STATION APPLIANCE FOR TELEPHONE TOLL LINES.

(Application filed May 21, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

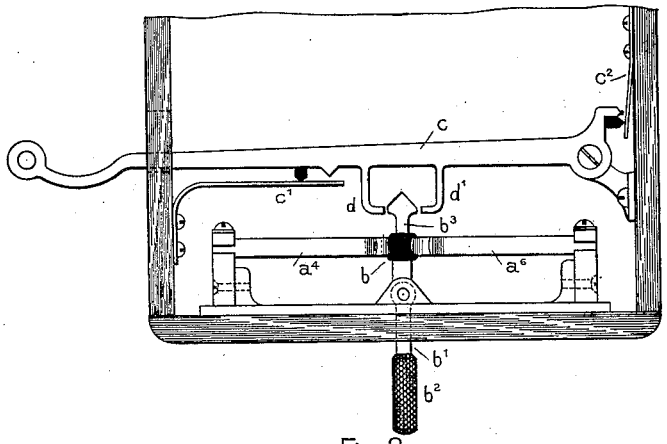


Fig. 2

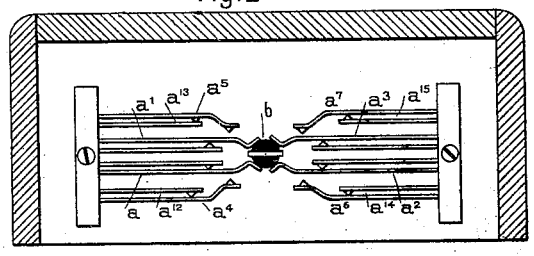
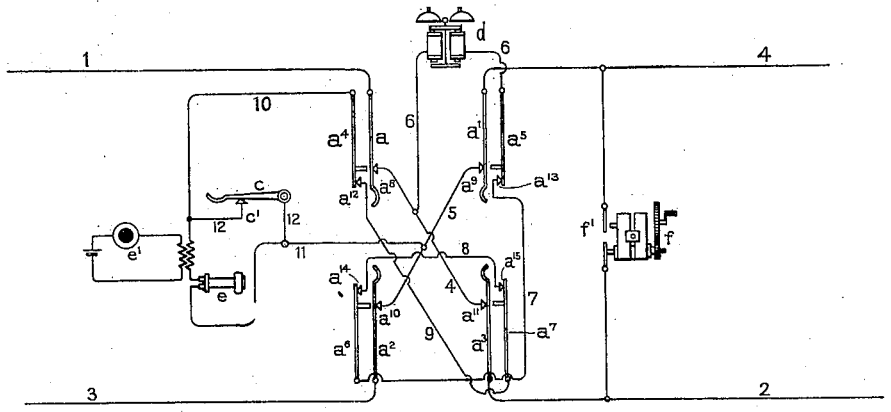


Fig. 3



Witnesses:

D. McDarner

Margaret Heavener

Inventor:

Charles E. Scribner,

by Baldwin Bros. his Attys

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Fig.4

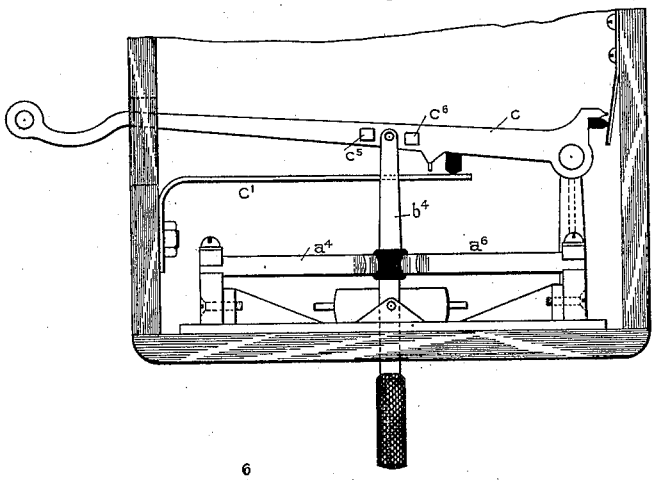


Fig.5

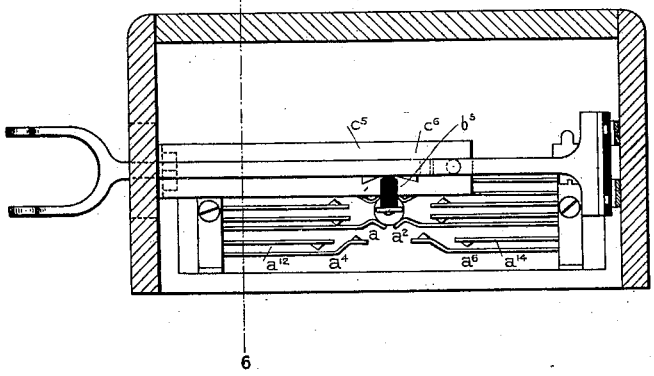
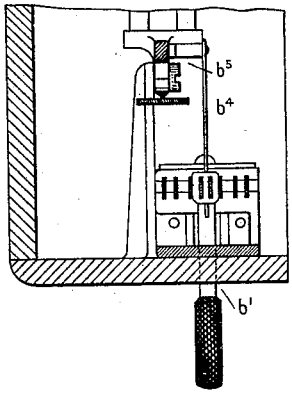


Fig.6



Witnesses:

L. M. C. Danner

Margaret Heavener.

Inventor:

Charles E. Scribner,

by Burton & Brown

his Attys

UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

STATION APPLIANCE FOR TELEPHONE TOLL-LINES.

SPECIFICATION forming part of Letters Patent No. 649,077, dated May 8, 1900.

Application filed May 21, 1898. Serial No. 681,283. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, 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 Station Appliances for Telephone Toll-Lines, (Case No. 467,) of which the following is a full, clear, concise, and exact description.

This invention concerns the nature and operation of apparatus at stations of telephone toll-lines.

It consists in a switch and circuit connections therewith for severing the through-line passing a station to permit the use simultaneously of different portions of the line between different stations, with means for ascertaining when the line is in use and for automatically restoring the continuity of the line at any station when its use at the same station is finished.

It has been a common practice in the art of telephony to provide at each station of a toll-line intermediate of the extreme stations a switch, commonly designated as a "secrecy" switch, for severing the toll-line, closing one portion of the line through a telephone and the other through a bell at the station, and in some cases means have been provided for automatically restoring the switch to its normal condition to disconnect the telephone and complete the break in the line through the agency of suitable mechanism when the telephone was replaced on its switch after use. A further feature allied to the present invention consisted in a switch at each station for bringing the station-telephone into a bridge of the line-circuit, together with a high resistance, whereby the condition of the line as respects use or disuse might be ascertained without interfering with conversation.

The present invention consists in an improvement and simplification of the earlier appliances and in their application to the so-called "bridging" system of toll-lines and station apparatus.

As respects its principal features the invention comprises the combination, with a through metallic circuit and a station-bell at each station thereof in a bridge of the circuit, of a telephone in circuit with the bell and means for short-circuiting the telephone when it is not in use, of a switching appliance capable of assuming three positions, in one of which it is adapted to sever the telephone-line, closing the line-circuit in one direction through the telephone and in the other direction through the bell, in another position of performing a similar function with reversed connections, and in a third position of completing the line, connecting the bell with the through-circuit, of secondary switch-contacts for disconnecting the telephone from the circuit of the bell when it is in use for conversation, and a telephone-switch and mechanism actuated by it to restore the switch to its third position, wherein the line-circuit is complete through the station when the telephone is placed on its switch.

The attached drawings are illustrative of the invention.

Figure 1 of the drawings is a side elevation of one form of line-switch such as constitutes a feature of my invention, together with the telephone-switch. Fig. 2 is a plan of the same. Fig. 3 represents in a simplified way the apparatus and the circuits thereof at a single intermediate station of a metallic-circuit toll-line. Fig. 4 is a side elevation of a different form of switch. Fig. 5 is a plan of this form; and Fig. 6 is a central section of the same, taken on line 6 6 of Fig. 5.

The line-switch shown in Figs. 1 and 2 comprises four pairs of switch-springs a a', a^2 a^3, a^4 a^5, and a^6 a^7, normal resting-anvils a^8 a^9, a^{10} a^{11}, a^{12} a^{13}, and a^{14} a^{15} for these respective springs, and other contact-pieces by which the springs a and a^4, a' and a^5, a^2 and a^6, and a^3 and a^7 become connected together when moved to be separated from their resting-anvils. The springs a a' and a^2 a^3 have curved extremities presented to each other and lying in proximity to a movable double-faced wedge or cylinder b, of insulating material. This cylinder b is carried on a switch-lever b', which has a handle b^2 projecting through the case of the telephone instrument, the lever being pivoted in a suitable framework carrying the parts of the switch. A movement of the handle b^2 in one direction thrusts the wedge b between springs a and a', whereby these switch-springs are raised from

their normal resting-anvils and are thrust outward against the springs a^4 and a^5, raising these latter from their anvils a^{12} and a^{13}. Similarly a movement of the lever in the opposite direction will bring the wedge b between the springs a^2 and a^3, whereby these will be raised from their resting-anvils, will be connected with the springs a^6 and a^7, respectively, and the latter will be raised from their anvils. An extension b^3 of the switch-lever is brought into position to register with a catch on the lever c of the telephone-switch. This last-mentioned switch is of usual and well-known construction, consisting of the pivoted lever c, with a hook formed on its free extremity, projecting outside the case for supporting the receiving-telephone, an impelling-spring c' therefor tending to raise the lever, with a switch-spring c^2, which becomes crossed with the lever when the latter is permitted to rise.

In associating the line-switch with this telephone-switch two hook-shaped projections d and d' are fixed to the lever c, with a small space between their presented extremities. The extension b^3 of the switch-lever b' is wedge-shaped and enters the space between these projecting parts d and d'. The space between these points is of sufficient width to permit the lever b' to be thrust to either side when the telephone-switch c is in its upper position. The adjustment is such, however, that when the switch is moved from that position to its lower position the projection d or d' will be forced against the corresponding inclined surface of the extension b^3 and will move the switch-lever b' to its normal position intermediate of the switch-springs. While the lever of the telephone-switch is in its lowest position, the lever b' cannot be moved in either direction. Obviously the springs a a' and a^2 a^3 should be so adjusted with relation to the wedge b that the latter may be retained between the extremities of either pair of springs between which it has been thrust. This is an adjustment usual in switches well known in the art.

The line-switch shown in Figs. 4, 5, and 6 is similar in function to that just described, but is different in operation in that the lever of the line-switch is held in either of its extreme positions, in which it may be placed by a catch controlled by the telephone-switch, being released when the telephone is replaced on the hook. In this form of switch the lever b' carries a flat spring b^4, from which a stud b^5 projects at its upper extremity. The lever c of the telephone-switch carries two catches c^5 c^6 in position to engage this stud b^5. The switch-springs of the line-switch are in this instance so adjusted that they tend to return the switch b to its normal position between the springs. When the lever b' is moved in either direction to change the connections of the line-circuit, the stud b^5 rides over the catch c^5 or c^6 and engages it, whereby the switch is held in position to maintain the changed line-circuits until the telephone is replaced on the telephone-switch. Then the catch c^5 or c^6 is carried below the line of pressure of the stud b^5 and passes out of engagement with it, and the line-switch is permitted to return to its normal condition.

In Fig. 3 the apparatus above described is shown associated with a metallic-circuit toll-line 1 2 3 4, whose extremities are supposed to extend to other toll-stations. The line conductor 1 from one direction is connected with spring a of the line-switch, while the normal continuation 2 of the same conductor is connected with spring a^3. Similarly one portion of line conductor 3, forming the other side of the circuit, is connected with spring a^2 and the other portion with spring a'. The contact-anvil a^8 is united by a wire 4 with the anvil a^{11} and the anvil a^9 by wire 5 with the anvil a^{10}. The spring a^5 is connected to wire 4 by a conductor 6, which includes the polarized call-bell d. The normal resting-anvil a^{13} of spring a^5 is united by wire 7 with the spring a^6, whose resting-contact a^{14} is connected through wire 8 with anvil a^{15}. The spring a^7, bearing on the latter, is connected through wire 9 with anvil a^{12}, and the spring a^4, bearing on the latter, forms one terminal of the substation-telephones e e', whose other terminals are led by wire 11 to the wire 5. The switch-lever and its contact-spring c' control the continuity of a short circuit 12 about the telephones. The switch-spring c^2 constitutes the closing-switch for the usual local circuit of the transmitting-telephone e'. A generator f is connected in a normally-open bridge 13 of the line-circuit with a circuit-closer f', which is actuated in the operation of the generator. The conductors of the line-circuit are normally continuous through the line-switch at its intermediate station, the circuit being by way of line-wire 1, conductor 4, line-wire 2, and from line-wire 3 through wire 5 to line-wire 4. Across this circuit a bridge exists, including the call-bell d, which starts from the wire 4, includes the wires 6 7 8 9 10 12 11, and finally reaches the wire 5. The telephone e may be said to be included in this circuit; but it is normally shunted by the conductor 12, closed at the switch-contacts of the telephone-switch c.

When a user of the telephone at the station here represented takes the telephone e from its switch, the shunt 12 about the telephone is broken; but the bell d, of high impedance and resistance, remains in circuit in the bridge with the telephone. Hence if the line be in use for telephonic communication no perceptible interference with the telephonic currents will be produced by closing the circuit through the telephone such as would disturb conversation. Sufficient current will be shunted through the receiving-telephone, however, to enable the user of telephone e to determine whether the line is already occupied. If the line be free, a call-signal is sent in the usual way by means of the call-gener-

ator *f*. Then the user of the telephone throws the handle b^2 of the line-switch into one or the other of its extreme positions, according to the station with which he wishes to communicate, the action of the switch being to sever the through-line and connect the portion from one direction with the telephone and from the other direction with the bell, leaving the latter portion free for use between other stations. Thus if the lever of the line-switch be moved to bring the wedge *b* between the springs *a* and *a'* the line conductors 1 and 3 from one direction will become connected together through wires 10, 11, and 5, which are brought into electrical connection through the agency of springs *a* and a^4 and spring a^2 and contact a^{10}, respectively. The telephone *e* is thus found in the circuit of line-wires 1 and 3, and since the short circuit 12 about this instrument is broken the telephone may be used for conversation. The connection of the telephone with the conductors, including the call-bell *d*, is broken, being interrupted at the now open contact-anvils a^{12} and a^9, from which the springs a^4 and *a'* are raised. The bell is brought into circuit between line-wires 2 4 by way of conductors 2, 4, and 6, these conductors being united at the contacts a^3 a^{11} and a^5 *a'*. Thus the user of the telephone at the toll-station may converse with a person at any station connected with the portion 1 3 of the toll-line, and simultaneously conversation may be carried on between any two stations located on the portion 2 4 of the line. A call-signal sent from any station on the latter portion of the line will ring the bell *d*, so that access may be had to the station where the telephone is in use.

In using the telephone in connection with the portion 2 4 of the line the lever is moved to thrust the wedge *b* between the springs a^2 a^3. The circuit will then be complete from conductor 2 by way of springs a^3 a^7, wire 9, contacts a^{12} a^4, wires 10, 11, and 5, and contacts a^9 *a'* to the line-wire 4. A circuit will be formed through the bell from line-conductor 1 through contacts *a* a^9, wires 4 and 6, contacts a^5 a^{13}, wire 7, and contacts a^6 a^2 to the line-wire 3.

The lever of the line-switch will remain in either position in which it may be placed while the telephone is in use. When the telephone is replaced on its switch, the lever will be returned to its normal position, in which the wedge lies intermediate of the switch-springs, whereby the line-circuit will be restored to its normal condition, complete through the station, the bell and telephone being in a bridge of the circuit.

The invention is defined in the following claims:

1. The combination with line conductors of a multiple-station line, a bridge of the line, a telephone and a call-bell included serially in the bridge, and a line-switch and circuit connections therefor adapted to sever the bridge and the line conductors and connect the terminals of the telephone with one of said severed portions of the line and the bell with the other portion, as described.

2. The combination with a line conductor of a multiple-station telephone-line, of a bridge of the line-circuit, a telephone and a call-bell included serially in the bridge, and a line-switch, adapted to sever the line conductor and to break the connection between the telephone and the bell and connect the telephone with one of said severed portions of the line conductor and the bell with the other portion, as described.

3. The combination with the line conductors of a multiple-station telephone-line, of a telephone and a bell, one terminal of the telephone being connected with one of the line conductors, and one terminal of the bell being connected with the other line conductor, a line-switch normally connecting the remaining terminal of the telephone with the remaining terminal of the bell, switch-contacts of the said switch adapted to sever the line conductor, and alternate contacts of the switch-lever adapted to connect the terminal of the telephone with one extremity of the line conductor and the terminal of the bell with the other extremity thereof, when the said terminals of the telephone and bell are disconnected from each other, as described.

4. The combination with the line conductors of a multiple-station telephone-line, of the switch-springs *a* and a^3, with their resting-anvils and the conductor 4, normally maintaining the continuity of one line conductor, the switch-springs *a'* and a^2, with their resting-anvils and the wire 5 normally maintaining the continuity of the other line conductor, the normal bridge conductor between the wires 4 and 5, and the call-bell and telephone included therein, the contact-spring a^4 forming a terminal of the telephone, the contact-spring a^5 forming a terminal of the bell, means for operating the springs *a a'* and the springs a^2 a^3, respectively, and means actuated in the use of the key for severing the connection between the telephone and the bell, substantially as described.

5. The combination with the line conductors of a multiple-station telephone-line, of the switch-springs *a* and a^3, with their resting-anvils and the conductor 4, normally maintaining the continuity of one line conductor, the switch-springs *a'* and a^2, with their resting-anvils and the wire 5 normally maintaining the continuity of the other line conductor, the normal bridge conductor between the wires 4 and 5, and the call-bell and telephone included therein, the contact-spring a^4 forming a terminal of the telephone, the contact-spring a^5 forming a terminal of the bell, means for operating the springs *a a'* and the springs a^2 a^3 respectively, and means actuated in the use of the key for severing the connection

between the telephone and the bell, a telephone-switch, and a short circuit of the telephone normally closed thereby, as described.

6. The combination with the line conductors of a multiple-station telephone-line, a normal bridge of the line, a call-bell, and a telephone, of a line-switch comprising two groups of switch-springs and an operating-lever for actuating either group of switch-springs, having a position intermediate of the switch-springs, said switch being adapted to sever the conductors of the line and connect the telephone with the severed terminals of one portion of the line and the bell with the severed terminals of the other portion, means for retaining the switch-lever in position to actuate either pair of springs, a telephone-switch, and a device controlled thereby for rendering said means inoperative; whereby the switch may be placed in position to connect the telephone with one portion of the line and the bell with the other portion, while the telephone is in use, but said switch is returned to its normal position when the telephone is replaced on its switch, as described.

7. The combination with the line conductors 1, 2, and 3, 4, of the switch-springs a a^3, a^2 and a', respectively, forming the terminals thereof, the resting-anvils of the springs and the wires 4 and 5 uniting the anvils in pairs, the normal resting-anvils for the switch-springs a^4 and a^7 and a^6 a^5, the normal bridge between wires 4 and 5, the call-bell and the telephone included serially therein, the circuit between the telephone and the bell being closed through the switch-springs a^4 a^7 a^6 and a^5 with their anvils serially, and means for actuating either pair of switch-springs a a' or a^2 a^3, substantially as described.

In witness whereof I hereunto subscribe my name this 2d day of April, A. D. 1898.

CHARLES E. SCRIBNER.

Witnesses:
ELLA EDLER,
MYRTA F. GREEN.