

UNITED STATES PATENT OFFICE.

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TELEPHONE-EXCHANGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 574,255, dated December 29, 1896.

Application filed May 25, 1896. Serial No. 592,905. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. MCBERTY, a citizen of the United States, residing at Downer's Grove, in the county of Du Page and State of Illinois, have invented a certain new and useful Improvement in Telephone-Exchange Apparatus, (Case No. 41,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention is an appliance for signaling to substations of telephone-lines.

It is designed to facilitate the work of a switchboard-operator in establishing connection between lines by permitting her to send a call to either or both of two subscribers automatically in the process of making the connection.

It consists in the combination, with the spring-jack constituting the terminal of the subscriber's line, of a stud connected with one pole of a grounded generator placed very near the spring-jack, and a plug having a shoulder on its sleeve adapted to make contact with the stud. This apparatus is associated with a metallic-circuit telephone-line, one of whose line conductors is connected with the thimble of the spring-jack and the other with a contact-spring of the jack, a signal-bell in the ground branch of the line, and a telephone-switch adapted to bring the telephone at the substation into the metallic line-circuit.

In addition to the foregoing appliances I provide, to enable the operator to signal to either of two connected substations, a switch and a conductor uniting the sleeves of the plugs adapted to interrupt their connection while the ringing-current is being sent.

When used in connection with the common call-wire extending to each of the substations and connected with a telephone at which an operator is constantly listening at the central office, I provide, further, the usual key at the substation for looping a subscriber's telephone into connection with the call-wire. In operating a system of this type the subscriber requiring a connection introduces his telephone into the call-wire circuit and, addressing the listening operator, announces the number of his line and gives also the number of

the line with which he desires connection. The operator thereupon inserts one plug of a pair into the spring-jack of the calling-line and the other plug of the same pair into the spring-jack of the line called for, at the same time pressing the latter plug into the spring-jack, preferably against the opposition of a spring located therein. The shoulder of the plug is thus thrust against the stud constituting the terminal of the generator adjacent to the spring-jack, whereby a current is permitted to flow out through the sleeve of the plug to the thimble of the spring-jack, thence to the corresponding line conductor, thence through the bell at the substation to earth, the substation-telephone at that station being still in its normal position on the switch-hook.

In such systems it is frequent for the calling subscriber to replace his telephone upon its hook after giving his order and to await the establishment of the connection. Hence in one form of the invention I have so arranged the circuits that when the operator thrusts the calling-plug of the pair into the spring-jack of the subscriber called for the generator-current finds circuit back through the plug-circuit to the line of the calling subscriber and causes the bell at his substation also to ring, notifying him of the completion of the connection. If, however, the operator should desire that the latter bell should not be operated, she will depress the switch-key in the plug-circuit, thereby interrupting the connection between the sleeves of the two plugs and preventing current from reaching the line of the calling subscriber.

The accompanying figures are illustrative of my invention.

Of the drawings, Figure 1 shows a complete system organized according to the invention, while Fig. 2 represents a peculiar plug-circuit for use in one form of the invention.

In Fig. 1 two subscribers' stations A and B are indicated. Each of these stations is equipped with a receiving-telephone a , a transmitting-telephone a' , a signal-bell a^2 , a telephone-switch a^3 , and a key a^4 for looping the substation-telephone into the call-wire circuit. The lever of the switch is connected with one conductor 1 of the metallic line-cir-

cuit. The lower or normal contact-point of the switch constitutes the terminal of a ground connection 2, which includes the bell a^2 . The upper contact of the telephone-switch forms the terminal of the circuit 3, which includes the telephones and constitutes the other line conductor. The key a^1 is adapted to interrupt the conductor 3 and to connect the terminals of the telephones in a grounded call-wire circuit 4. At the central office the line conductors terminate in the contact-pieces of a spring-jack e , the line conductor 1 being connected with the thimble b^1 of the jack, and the conductor 3 being connected with the spring b^2 or other contact-piece of the jack. This spring-jack has also an additional contact-piece b^3 in the form of a metallic stud adjacent to the thimble b , but insulated from it and projecting a little beyond the face of the thimble. This stud constitutes a normally open terminal of a conductor 5 connected with one pole of a grounded generator c of calling-current at the central office.

The call-wire 4 is connected to earth through the listening operator's telephone d .

Plugs e and e' , assembled in pairs, are provided for the use of the operator in establishing connection between different lines. Each plug comprises a central or tip conductor f , adapted to make connection with the line-spring b^2 of the spring-jack, and a sleeve f' , constructed to register with the thimble b of the jack. The sleeve f' has formed on it a shoulder of such diameter that when the plug is inserted fully into the spring-jack it makes contact with the stud b^3 near the thimble of the jack. The insulation on the tip of the plug is formed in a well-known way, so that the plug when free to move in the spring-jack is thrust backward by the pressure of spring b^2 on the inclined surface of the insulation until the spring rests on a tip of the plug, at which time the shoulder on the sleeve of the plug is withdrawn from contact with the stud b^3 .

The tip of plug e is united with the sleeve of plug e' by conductor 6 of the plug-circuit, while the sleeve of plug e is united with the tip of plug e' by another conductor 7.

In the operation of this system the subscriber, as at station A, wishing to communicate with the subscriber at another station depresses the key a^1 and addresses his order to the listening operator at telephone d , giving the number of his own line and that of the line with which he desires connection. The operator will insert plug e into the spring-jack b of line to station A, and then will place the other plug e' of the pair in the spring-jack of line to station B, pressing the latter plug into the spring-jack until the shoulder on the sleeve of the plug makes contact with the stud b^3 . When that connection is established, a calling-current finds circuit from generator c , through conductor 5, to stud b^3 , thence to the sleeve of plug e' , thence to the thimble of the spring-jack over line

conductor 1 to the station, thence through the conductor 2, including the bell a^2 at that station, to earth. The bell a^2 is thus operated, giving the signal to the subscriber. It will be observed that the generator is connected with the conductor 7, which extends to plug e also. Hence the generator-current has a path through the conductor 7 to the tip of plug e , thence through line conductor 3 to the station A. If the telephone be removed from its hook, the path will be complete to and through line conductor 1 to conductor 6 of the plug-circuit to conductor 3 of line to station B; but the circuit will be found open at the latter station, the telephone being on its switch-hook. Hence no current will flow through the circuit thus formed. If the subscriber at station A should have replaced his telephone on its switch-hook, the line conductor 3 will be open at that substation. Hence if it should be necessary for the operator to ring the bell at station A she would do this in the present instance by thrusting plug e into the spring-jack of the corresponding line.

In the modified form shown in Fig. 2 the like contact-pieces of the two plugs are connected together through conductors 6 and 7. In the latter conductor is interposed a key g , adapted to interrupt the conductor. In using this device in place of that shown in Fig. 1 the operator by inserting plug e' fully into the spring-jack of line to station B would permit a current to flow through the line conductors 1 of both lines. Hence if both substation-telephones were on their switches the bells at both stations would be operated. However, if the operator desires to prevent the ringing of the bell at the calling-station A she would press the key g associated with the plug e' , whereby the circuit back to station A would be broken and the whole generator-current would be compelled to pass to station B alone. This key g has therefore substantially the same function as the transposed connection of the conductors 6 and 7 with the plugs in Fig. 1 in connection with the telephone-switch at the calling-station, serving to interrupt the return-circuit somewhat in the same manner that the key g does in Fig. 2.

I am aware of the existence of Patent No. 300,143, of June 10, 1884, to Charles E. Scribner, covering, broadly, a device wherein the thrusting in of a plug automatically sends a generator-current to the substation of the subscriber to be called. Hence I limit my claims to the specific devices which I employ in so far as these devices are allied to those described in the patent referred to.

I claim as new and desire to secure by Letters Patent—

1. In combination, two metallic-circuit telephone-lines, a ground branch at the different substations from like line conductors, and a signal-bell in each ground branch, a spring-jack for each line in a switchboard, a double

connecting-plug in each spring-jack, unlike contact-pieces of said plugs being connected together, a grounded generator of calling-current, and means for applying the free pole of said generator to either of the conductors of the plug-circuit, substantially as described.

2. In combination, two metallic-circuit telephone-lines, normally open at telephone-switches at the substations, a bell at each substation in a normally-closed ground branch from the line, said ground branches being taken from like line conductors, a spring-jack in the switchboard forming the terminal of each line, a ringing-stud near each spring-jack constituting the terminal of a grounded generator, a connecting-plug in each spring-jack, one of said plugs having a shoulder connected with one of the contact-pieces of the plug and adapted to make contact with said ringing-stud when the plug is inserted fully into the spring-jack, unlike contact-pieces of said plugs being connected together, whereby ringing-current sent to one line is prevented from operating the bell of the other line, substantially as described.

3. The combination with a metallic-circuit telephone-line, of a telephone in a bridge thereof, a signal-bell in a ground from one line conductor of the line, a spring-jack having a thimble forming the terminal of said grounded line conductor, and a spring constituting the terminal of the other line con-

ductor, a ringing-stud connected with the free pole of a grounded generator of signaling-current, placed near the thimble of the spring-jack, and a connecting-plug adapted for insertion into the spring-jack and having a shoulder constructed to connect together said thimble and said ringing-stud when the plug is fully inserted into the spring-jack, substantially as described.

4. In combination two metallic-circuit telephone-lines each having a ground branch from one line conductor and a signal-bell included in the ground branch, a spring-jack for each line connected with the line conductors thereof, a plug inserted in each spring-jack, a ringing-stud near the thimble of each jack, said plugs having shoulders adapted to cross together the ringing-stud and the thimble of the spring-jack when the plug is fully inserted in the jack, a grounded generator connected with each of said ringing-studs, whereby the operation of inserting the plug into the spring-jack closes a ringing-current to one of the lines, and a switch adapted to interrupt the circuit to the bell of the other line, substantially as described.

In witness whereof I hereunto subscribe my name this 13th day of May, A. D. 1896.

FRANK R. MCBERTY.

Witnesses:

ELLA EDLER,
LUCILE RUSSELL.