

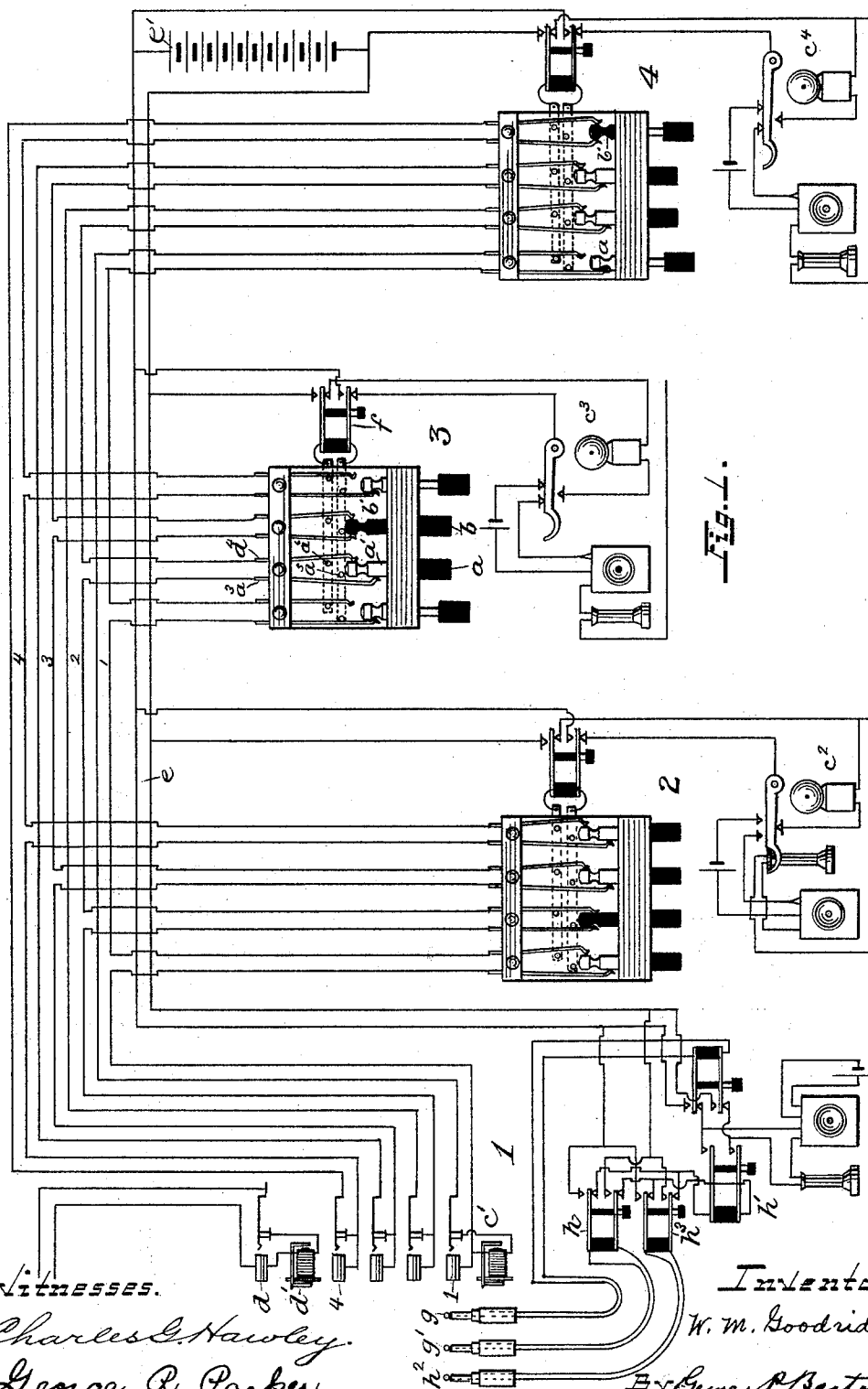
(No Model.)

2 Sheets—Sheet 1.

W. M. GOODRIDGE.
METALLIC CIRCUIT HOUSE TELEPHONE SYSTEM.

No. 476,793.

Patented June 14, 1892.



Witnesses.

Charles C. Hawley.
George A. Parker

Inventor:

W. M. Goodridge

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Attorney

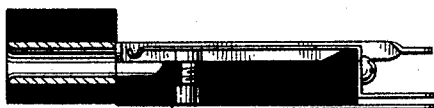
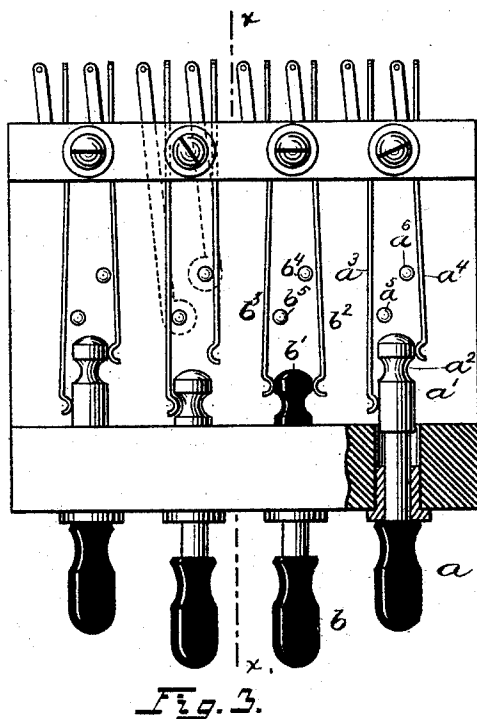
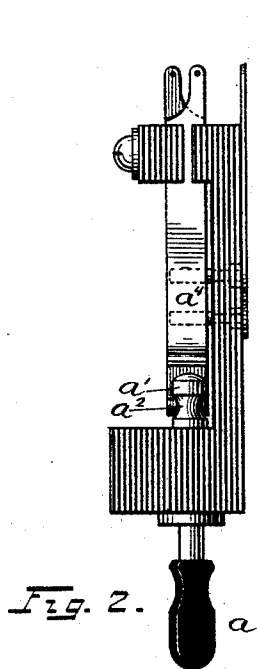
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Charles C. Hawley.
George A. Parker.

Inventor.

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UNITED STATES PATENT OFFICE.

WILLIAM M. GOODRIDGE, OF HIGHLAND PARK, ASSIGNOR TO THE WESTERN
ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

METALLIC-CIRCUIT HOUSE-TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 476,793, dated June 14, 1892.

Application filed September 30, 1889. Serial No. 325,511. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. GOODRIDGE, a citizen of the United States, residing at Highland Park, in the county of Lake and State of Illinois, have invented a certain new and useful Improvement in Metallic-Circuit House-Telephone Systems, (Case No. 14,) 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.

It is sometimes found convenient—as, for example, in a large building—to provide what has been sometimes termed a “house-telephone exchange,” different rooms of the building being provided with telephone sets and apparatus whereby any two of the stations may be connected together for telephonic communication. In connection with such a house-telephone system it is found desirable also to provide ready means of connecting any one of the local stations with the main or central telephone-exchange of the town. Heretofore where the lines have been grounded satisfactory apparatus has been provided for doing this work. In such systems within the building a common return-wire has sometimes been employed instead of grounding the lines. As to the prior state of the art reference is made to Letters Patent No. 356,427, (Case No. 116,) of Charles E. Scribner, granted January 18, 1887, for factory-telephone exchange.

My invention herein relates more especially to the form of the switching apparatus employed and to the circuits used in connection therewith.

My invention consists, first, in a loop-key having a metallic plunger provided with a groove and springs operated thereby in connection with their contacts.

My invention consists, second, in a telephone set provided with pairs of contacts connected with the different sides thereof, each of said pairs of contacts being adapted to be closed at will to the different limbs of different circuits leading to other stations, in connection with means for signaling the station wanted when connection is made therewith.

My invention consists, third, in several stations reciprocally connected together by dif-

ferent metallic circuits and loop-switches upon a switchboard at one of said stations, in connection with a switchman's telephone set and a city-line having a switch upon the same switchboard, whereby any of the stations may be connected with the city-line.

My invention consists, fourth, in a switch having a plunger of insulating material so arranged that the springs of the switch may be allowed to close upon their respective contacts or separated therefrom, according to the position of the plunger.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a diagram showing my complete system. Fig. 2 is a detailed view of one of my loop-switches upon section-line *xx* of Fig. 3. Fig. 3 is a plan view, partly in section, of three such loop-switches and another key having a plunger of insulating material upon a single strip. Fig. 4 is a detailed view of an ordinary spring-jack switch such as is used upon the switchboard.

Like parts are indicated by similar letters and numerals of reference throughout the different figures.

It will be observed that the loop-keys *a*, as shown in Figs. 2 and 3, consist of a plunger *a'*, provided with a groove *a²* and springs *a³*, having contacts or pins *a⁵* *a⁶*, upon which said springs are adapted to close, respectively, by their own tension. It will be seen that the spring *a³* is longer than the spring *a⁴*. When the plunger is drawn out, the bent end of spring *a³* falls into the groove *a²*, serving to hold the plunger in position, while permitting said spring to close upon its contact *a⁵*, the spring *a⁴* being entirely separated from said metallic plunger and left free to rest upon its contact *a⁶*. On inserting the plunger between the springs both springs are lifted from their contacts and connected together through the medium of the plunger. The loop-key *b* is provided with a head *b'* of insulating material, and the springs *b²* *b³* when falling in the groove thereof come against their contact-points *b⁴* *b⁵*, respectively. On drawing out this plunger the springs are separated from said contact-points, thus opening the circuit.

At station 1 I have shown a switchboard provided with switches 1 2 3 4, one in each of

the metallic circuits of corresponding numbers reciprocally connecting together the said stations 1 2 3 4. In each of these metallic circuits at the particular station thereof is provided a signal-receiving instrument. Thus at station 1 the annunciator c' is provided, while at stations 2, 3, and 4 are provided the bells c^2 c^3 c^4 . The annunciator c' is included in a circuit between the frame of the switch and the contact thereof. Thus when the spring of the switch is raised from its contact the circuit of this annunciator will be opened. Upon this same switchboard I have provided the loop-switch d of a city telephone-line and the usual annunciator d' , included in the circuit thereof. Other lines may be connected with the same switchboard in the same manner, if desired.

An attendant will be required at station 1 to receive the orders from the city-line and also the orders from the different stations 2 3 4, so as to connect the city telephone-line with the different stations 2 3 4, as occasion may require. A circuit e , including a source of electricity e' , extends to each of the stations 1 2 3 4, and at each of these stations is provided a switch for looping said signaling-circuit into the telephone-line of any other station. The operator at station 1 is provided with cords and plugs for making the connections upon the switchboard. I have shown only one pair of such plugs and cords, though ordinarily several pairs will be required, each being provided with separate ringing and listening keys.

I will now describe the operation of my system as illustrated in Fig. 1. Ordinarily all of the plungers will be pushed in, as illustrated at station 2. In this position the different circuits will be closed through the metallic plungers, respectively, and the individual circuit of the station will be closed to the outfit of said station, and the telephone being on the switch the circuit will be through the bell, as illustrated at said station 2. Thus at station 2 the limbs of circuit 1 are connected together through the medium of the plunger of the loop-key of said line. The same may be said of lines 3 and 4, these lines 1, 3, and 4 being disconnected from the telephone outfit of station 2. The line 2, however, is looped onto the telephone outfit, and, the telephone being on the switch, as shown, the bell c^2 is included in the circuit thereof, so that the bell is in position to receive the signal when current is sent over metallic circuit 2 from any other station. Suppose the user at station 3 wishes connection with station 2. He pulls out the plunger a' , thus closing the springs a^3 a^4 upon contacts a^5 a^6 . He also at the same time pulls out the plunger b' , so as to open the circuit of his own line 3, so that while he is getting connection and communicates with some other station he may not be interrupted by a signal sent over his own line 3. The plunger a' being thus pulled out, the user at station 3 presses on

ringing-key f , thus looping the signaling-circuit e into the circuit of line 2, and line 2 at station 2 being connected through the bell c^2 the bell c^2 will respond, and the one at station 2 is now only to take down his telephone, whereupon the telephonic connection is complete. Thus the user at any station may make immediate connection with any other station, as occasion may require. In case the manager—we will say the one at station 4—desires to consult with two or more of his assistants at other stations, as at 2 and 3, he will call them up and request them to come in on his line, and then the three or more will be all looped into the circuit of the manager's line 4 and they may talk together. If now a user at stations 2, 3, or 4 desires a connection with the city-line, he must call up the operator at station 1 and ask for the proper connection. Thus suppose the user at station 4 wishes to connect with the city-line. He draws out the plunger a' of said line 1 and preferably also the rubber plunger b' of his own line, as shown at station 4. The calling-key f of station 4 is then closed, sending current over line 1 to operate the signaling-instrument c' at station 1. The operator at station 1 inserts a loop-plug g into loop-jack 1, thus disconnecting annunciator c' , and thus loops in her telephone. Listening at her telephone, she then gets the order from station 4 for the particular subscriber of the city-exchange wanted. The user at station 4 may thereupon hang up his telephone and push in plungers a' b' of his station and wait until the operator at station 1 has got the subscriber wanted and signals the user at station 4 over his own line 4. The operator at station 1 now pulls out the plug g , restores the shutter c' , so as to be ready for another call, and then proceeds to get connection with the subscriber of the city-exchange called for. This she does by inserting one of a pair of loop-plugs, as g' , into the loop-switch d . Now by pressing upon key h current is sent over the city-line and by means of key h' the telephone of station 1 is looped into the circuit of the cord of plug g' . The city-exchange now having made the proper connection, the operator at station 1 inserts the other plug h^2 of her pair into the switch 4 of line 4 of station 4 and by pressing ringing-key h^3 calls up the user at station 4, who on taking down his telephone may talk over the city-line. The conversation being completed, the user at station 4 clears out by sending current, as at first, over line 1 to operate the shutter c' . The operator, seeing this shutter fall, connects plug g with switch 1, and the user at station 4 thereupon tells her that he is through. She then pulls out the loop-plugs g' h^2 . It will be observed that whenever the shutter of annunciator c' falls the operator must connect with line 1 and listen in to find out what is wanted. The call might be from a user who wishes to clear out or it might be from a user at another station wishing for some service. In all cases she

must listen when a signal is received upon instrument *c'*. When a signal is sent over the city-line, the shutter of annunciator *d'* is thrown down and the operator at station 1 finds out which particular one of the stations 2 3, &c., is required by the caller and makes the proper connection.

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

1. The combination, with the metallic plunger provided with the groove, of two springs, the tension of which tends to force them against separate contact-points to close upon separate points, said plunger being adapted to be normally forced between said springs to hold them away from their contacts and form an electric medium between them, said springs being of different lengths and the longer being adapted to fall into the groove of the plunger when the plunger is withdrawn, while the shorter spring is separated from the plunger, whereby said springs are separated from their contacts when the plunger is inserted and closed thereon when the plunger is withdrawn, substantially as and for the purpose specified.

2. A telephonic system comprising a telephone and signal-receiving apparatus at a station, connected to a telephone-line extending through several sub-stations, said line normally including at each of said sub-stations two line-springs and the metallic body of a plunger extending between said springs, said plunger being adapted to be withdrawn from between said springs, and a loop containing a telephone, terminating in contact-points

adapted to make contact with said springs when the plunger is withdrawn, substantially as described.

3. The combination, with a telephone-line including a telephone at a station and extending through several sub-stations, of springs at each sub-station, forming the opposite terminals of said line at that station, a metallic plunger inserted between said springs, said plunger being adapted to be withdrawn from between said springs, contact-points adapted to make contact with said springs when said plunger is withdrawn, a conducting-loop terminating in said contact-points, and a key in said loop adapted to alternately include in the loop a source of electricity or a telephone, substantially as described.

4. The combination of several stations, each having an individual line extending through every other station and including at each other station two springs and the metallic body of a plunger establishing contact between said springs, said plunger being adapted to be withdrawn from between said springs, and contact-points forming the terminals of a conducting-loop, adapted to make contact with said springs when said plunger is withdrawn, and a key adapted to include alternately a source of electricity or a telephone in the loop, substantially as described.

In witness whereof I hereunto subscribe my name this 11th day of September, A. D. 1889.

WILLIAM M. GOODRIDGE.

Witnesses:

CH. G. HAWLEY,
ELLA EDLER.