

L. W. CARROLL.  
TELEPHONE SYSTEM.  
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1,337,752.

Patented Apr. 20, 1920.

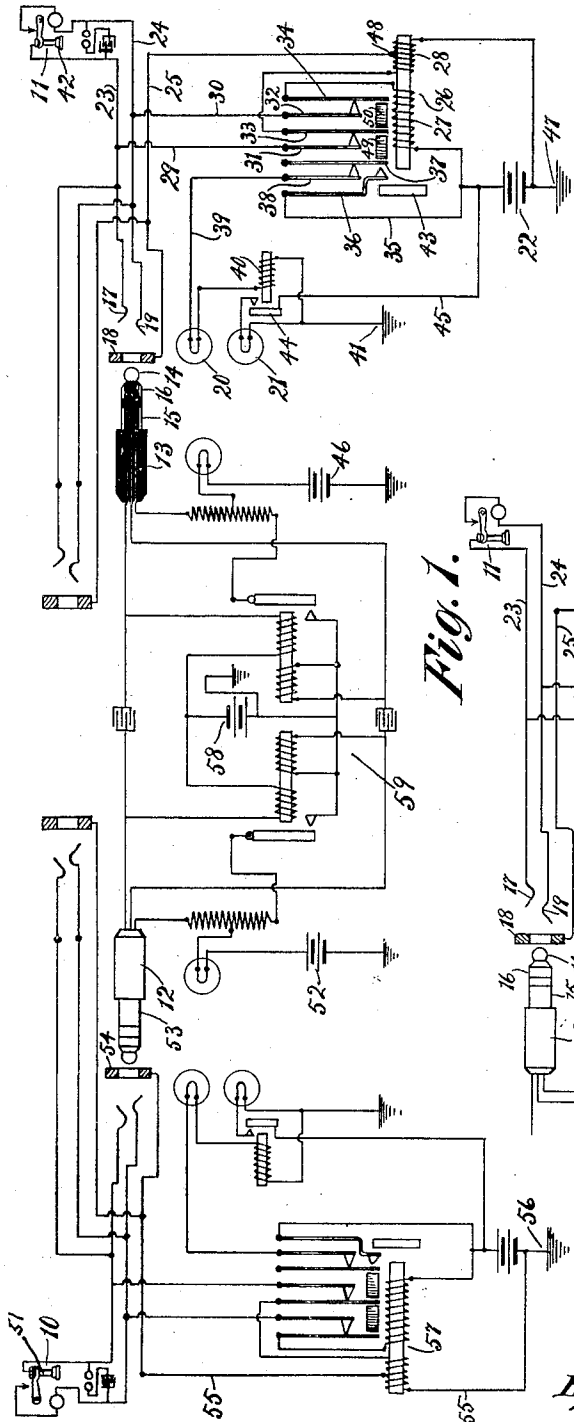


Fig. 1.

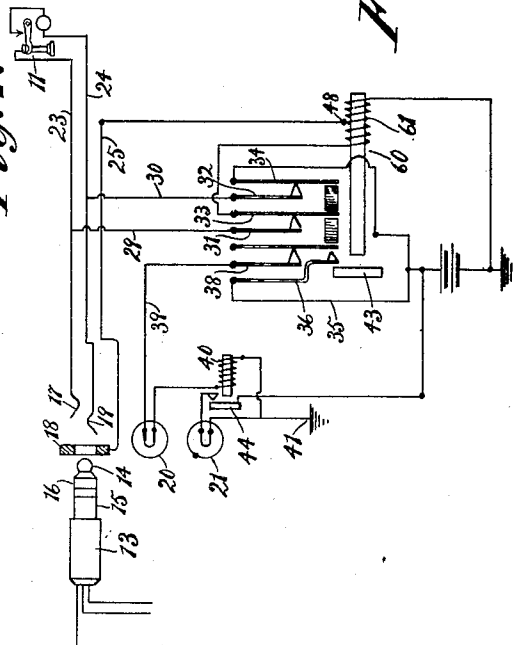


Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE SYSTEM.

1,337,752.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, LOUIS W. CARROLL, a citizen of the United States, and resident of Riverside, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Telephone Systems, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to the signaling mechanism for telephone systems; and its objects are to simplify and reduce the cost of construction of such devices; to reduce the size of the apparatus as a whole and thereby economize space; and to increase the efficiency thereof.

The invention consists in the parts and arrangement of parts as hereinafter described, and as illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic view of a telephone system; and Fig. 2 is a diagrammatic view of a portion of such a system, showing a modified form of construction.

There is shown in the drawings a plurality of subscribers' telephone sets, as 10, 11, with central station plugs 12, 13, co-operating therewith, each plug being provided with three contacts, viz:—a tip 14, a sleeve 15, and an intermediate or ring contact 16. Coöperating with each plug is a jack comprising a tip connection 17, a sleeve connection 18, and ring connection 19.

The line signal lamp is represented at 20, and the auxiliary lamp at 21. The battery for supplying current to the signaling line of the telephone set 11 is represented at 22.

The system represented is of the three wire type, the lines 23, 24, connecting the subscriber's station with the central station, and the line 25 serving as a signal cutout. A signal controlling relay 26, having two coils 27, 28, is connected across the circuit 23, 24, by the lines 29, 30, this local circuit including the battery 22, and normally closed switches 31, 32, which coöperate with spring contacts 33, 34.

The circuit of the signal lamp 20 leads from the battery 22 through the line 35, the normally open switch 36 coöperating with a spring contact 37, a normally closed switch 38 engaging the member 37, the line

39 and the coil 40 of an electro-magnet to ground at 41.

Upon the closing of the circuit comprising the lines 29, 30, by the removal of the receiver 42 from its hook, the relay 26 attracts the armature 43, drawing it against the switch member 36 and forcing the latter into engagement with the spring 37, thereby closing the lamp circuit. The electromagnet 40 thereupon attracts the armature 44, which constitutes a switch member in the circuit of the auxiliary lamp 21, which circuit leads from the battery 22 through the line 45 to ground at 41.

Upon receiving the signal by means of the lamps 20, 21, the operator inserts the plug 13 into its jack, closing a circuit from the battery 46 through the plug sleeve 15, the jack sleeve 18, and the line 25, to ground at 47, the line 25 being tapped into one of the coils, as 28, of the relay 26, as shown at 48.

The coils 27, 28, are of high resistance and are arranged in series. The current caused to flow through them by the removal of the receiver 42 from its hook is sufficient only to close the switch 36, but will not deflect the springs 37, 33, and 34. The section of the coil 28 traversed by the line 25 is of low resistance and permits the passage of a larger volume of current, sufficient to energize the relay to draw up the armature 43 and deflect the springs 37, 33, and 34, movable blocks 49, 50, being interposed between these springs for the purpose of communicating movement to them. This action separates the spring 37 from the switch member 38, thereby opening the circuit of the lamp 20 and causing the opening of a circuit of the lamp 21. It also disengages the springs 33 and 34 from the switch members 31, 32, in the circuit 29, 30, leaving the talking line balanced or free from disturbing influences, and preventing the signaling apparatus of the line circuit from interfering with the signaling means associated with the cord circuit.

The operator now connects the calling subscriber with the subscriber with whom it is desired to communicate, as the telephone set 10, by inserting the plug 12 into the jack associated with the latter instrument, and gives the necessary and usual signal. The insertion of the plug 12 into its

jack closes a circuit for cutting out the signaling devices associated with the telephone set 10, which latter circuit would be closed by the removal of the receiver 51 from its hook, thus preventing the line signaling apparatus from interfering with the talking circuit, relieving the talking circuit from inductive disturbances. This cutting out circuit is traced from the battery 52 through the plug sleeve 53, jack sleeve 54, line 55 to ground 56, and includes a part of the coil of the relay 57. The signal lamp circuit and the circuit for opening the same being identical in form with the circuit arrangement already described in connection with the telephone 11, need not be further traced.

The talking current is derived from a battery 58, and the line is provided with such relays, condensers and resistance coils as may be necessary, all as generally indicated at 59, and, being of common form, do not call for a detailed description.

The modification of Fig. 2 differs from the device of Fig. 1 only in that in place of the relay 26 there is employed a relay 60 having a single coil 61 in the signal cutout circuit 29, 30. The action in the two arrangements is the same in character, that of Fig. 1, however, being the more efficient in that the subscriber's line circuit is at all times in perfect balance with relation to the battery ground connection at the central station.

I claim as my invention:

35 1. A telephone system comprising a telephone line extending from a subscriber's station to a central office, an electromagnetic

relay having an energizing winding normally connected with the line and partially energized over the line upon the removal of the receiver from the switchhook, a signaling device operating upon the partial energization of the relay, a link circuit comprising talking conductors for extending the telephone line, and a circuit separate from the talking conductors and including a portion of the energizing winding of the relay established upon the connection of the link circuit with the line for causing the further energization thereof, thereby stopping the operation of the signaling device and entirely disconnecting the energizing winding from the telephone line.

2. A telephone system comprising a telephone line extending from a subscriber's station to a central office, an electromagnetic relay having a pair of energizing windings normally connected with the telephone line and partially energized over the line upon the removal of the receiver from the switchhook, a signaling device, an operating circuit therefor closed through engaged contacts of the partially energized relay, a link circuit for extending the telephone line, and a circuit including a portion of one of the energizing windings of the relay established upon the connection of the link circuit with the telephone line for causing the further energization thereof, thereby opening the operating circuit of the signaling device and disconnecting the energizing windings from the telephone line.

LOUIS W. CARROLL.