Sept. 13, 1932. F. MARKMAN 1,877,678

CIRCUIT ARRANGEMENT FOR AUTOMATIC TELEPHONE SYSTEMS

Filed Sept. 24, 1929

Fig. 1.

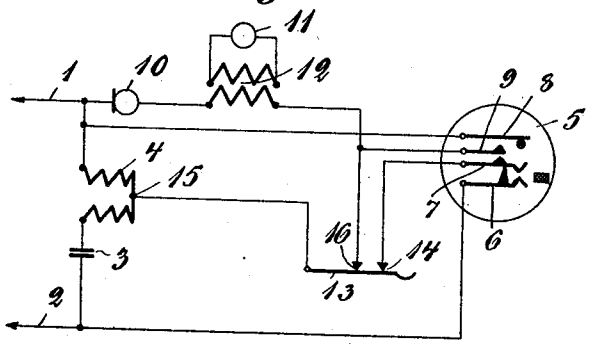


Fig. 2.

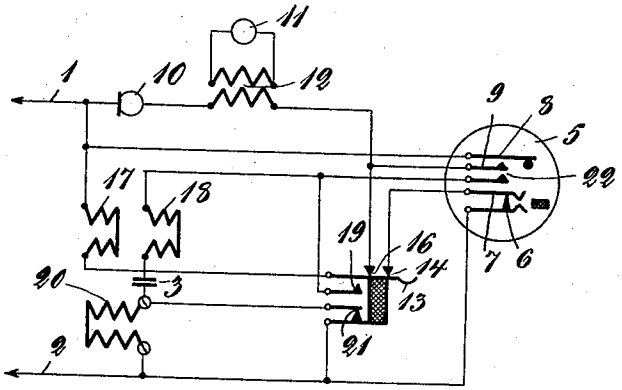
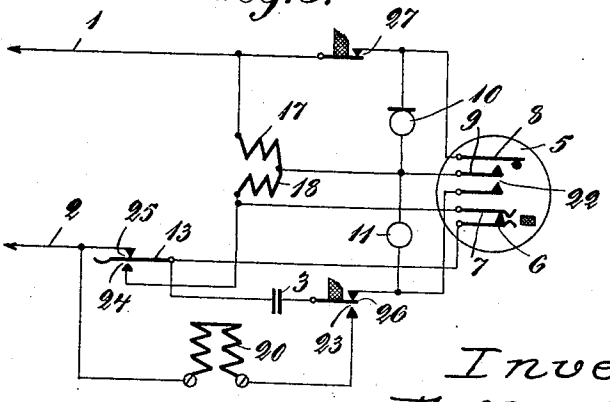


Fig. 3.



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Patented Sept. 13, 1932 1,877,678

UNITED STATES PATENT OFFICE

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CIRCUIT ARRANGEMENT FOR AUTOMATIC TELEPHONE SYSTEMS

Application filed September 24, 1929, Serial No. 394,887, and in Sweden March 7, 1929.

The present invention relates to automatic telephone systems and has for its object to improve the electric characteristics of the impulse circuit extending over the subscriber's line over which circuits the impulses are sent from the impulse sender of the subscriber to set the selectors in the automatic exchange. It has been previously proposed to improve the impulse sending by connecting a shunt including a condenser to the impulse contact of the impulse sender. According to the present invention said shunt consists of a portion of the conducting bridge constituted by the call bell and its condenser, which portion includes said condenser and is adapted to be short-circuited by the impulse contact of the impulse sender over contacts on the hook switch of the telephone apparatus. In said shunt a part of the winding of the call bell is preferably included as an inductive resistance connected in series with the condenser.

The invention will be more closely described with reference to the accompanying drawing in which Figures 1, 2 and 3 show three different embodiments according to the invention.

In Figure 1, 1 and 2 designate the two branches of the subscriber's line extending from the subscriber's set to the exchange. Normally a conducting bridge including the condenser 3 and the call bell winding 4 is interconnected between said two line branches. The impulse sender 5 is only shown diagrammatically. It is in known manner provided with contact springs 6, 7 which together constitute a normally closed impulse contact for the impulse sending and two contact springs 8, 9, forming a normally open contact which in all positions of the impulse sender, except the normal position, short-circuits the microphone 10 and the primary winding of the transformer 12 of the telephone receiver 11.

When the telephone is removed from its hook 13 the impulse contact spring 7 is connected over a contact 14 on the hook switch to a point 15 of the call bell winding. Hereby a part of the bridge including the condenser 3 and the call bell winding is short-circuited over the impulse contact 6, 7. The portion of said bridge not short-circuited by the impulse contact is at the same time shunted with the microphone and the telephone receiver over a contact 16 on the hook switch. The latter part of the bridge will then serve as a protection for the microphone 10 against transient voltages which otherwise would be generated by instantaneous current interruptions or resistance variations in the microphone caused by shocks or by other causes. During the impulse sending the portion of the bridge short-circuited by the impulse contact 6, 7 serves as an auxiliary means to compensate for the inductance in the line circuit, whereby the impulse sending is improved. As soon as the impulse sender is shifted from the normal position the microphone 10 and the transformer of the telephone receiver as well as the part of the call bell winding 4 lying between the line branch 1 and the point 15 are short-circuited over the contact 8, 9, whereby the said parts of the telephone apparatus are made inoperative during the impulse sending. The connecting point 15 of the call bell winding should be selected in such a manner that the part of the call bell winding lying between the point 15 and the condenser 3 offers an inductive resistance which is adapted to suit the electric characteristics of the subscriber's line. Said point may be the middle point of the winding or any other point.

In the embodiment shown in Figure 2 the call bell winding consists of two parts 17, 18 which are normally connected in series over a contact 19 on the hook switch. In the bridge including the condenser 3 and the windings 17, 18 also the winding 20 of an additional bell is included which, upon the telephone being lifted off, is short-circuited over a contact 21 on the hook switch.

Otherwise the circuit arrangement is principally the same as that in Figure 1 with the difference only that the shunt including the condenser 3 and the winding part 18 is normally open at the contact 22 of the impulse sender which contact, however, is closed as soon as the impulse sender is actuated to send impulses said shunt being then short-

circuited by the impulse contact 6, 7 in similar manner as in Figure 1.

Figure 3 shows a modification of the arrangement according to Figure 2. Normally the winding 20 of the additional bell and the condenser 3 and the two winding parts 17, 18 are connected in series between the line branches 1, 2 over contacts 23, 24 on the hook switch. When the telephone is lifted off, the additional bell 20 is dis-connected at the contact 23, whereas the microphone 10 and the telephone receiver 11 are connected into circuit over the contacts 25, 26 and 27 on the hook switch the winding part 17 being then connected in shunt with the microphone 10. The line circuit is then closed over the contacts 25, 6, 7, the winding part 18, and through the microphone 10 and the winding part 17 connected in parallel. When the impulse sender is actuated the condenser 3 and the winding part 18 are connected as in Figure 2 in shunt with the impulse contact 6, 7 over the contact 22. At the same time the microphone 10 and the winding part 17 are short-circuited over the contact 8, 9 and the telephone receiver over the contact 22.

I claim:

1. In a substation telephone circuit two line conductors, a bell bridge with a condenser normally shunted to said conductors, a telephone book switch and an impulse sender, the impulse contact of said impulse sender being adapted to short-circuit a portion of said bell bridge including the condenser over contacts of the hook switch.

2. In a substation telephone circuit two line conductors, a bell bridge with a condenser normally shunted to said conductors, a telephone hook switch and an impulse sender, the impulse contact of said impulse sender being adapted to short-circuit a portion of said bell bridge including the condenser and a part of the call bell winding.

3. In a substation telephone circuit two line conductors, a bell bridge with a condenser normally shunted to said conductors, a transmitter and a telephone receiver, a telephone hook switch and an impulse sender, the impulse contact of said impulse sender being adapted to short-circuit a portion including the condenser of said bell bridge over contacts of the hook switch, while the part of the conducting bridge not short-circuited by the impulse contact being adapted to be connected in shunt with the transmitter and the receiver over contacts of the hook switch.

4. In a substation telephone circuit two line conductors, a bell bridge with a condenser normally shunted to said conductors, a transmitter and a telephone receiver, a telephone hook switch and an impulse sender, the impulse contact of said impulse sender being adapted to short-circuit a portion including the condenser of said bell bridge over contacts of the hook switch, while the part of the conducting bridge not short-circuited by the impulse contact is adapted to be short-circuited over contacts which are closed when the impulse sender is actuated to send impulses.

In testimony whereof I affix my signature.

FREDRIK MARKMAN.