

Aug. 14, 1945.

O. A. SHANN

2,381,986

COMMUNICATION APPARATUS

Filed Oct. 24, 1942

2 Sheets-Sheet 1

FIG. 1

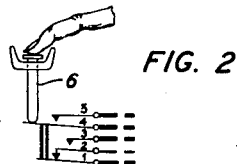
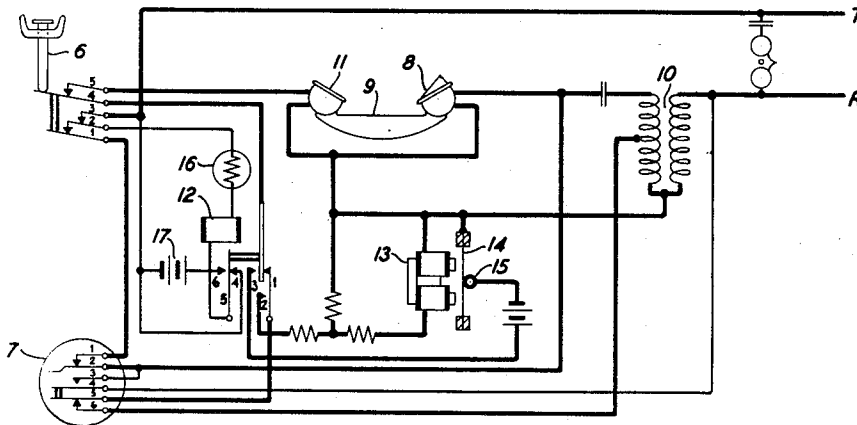
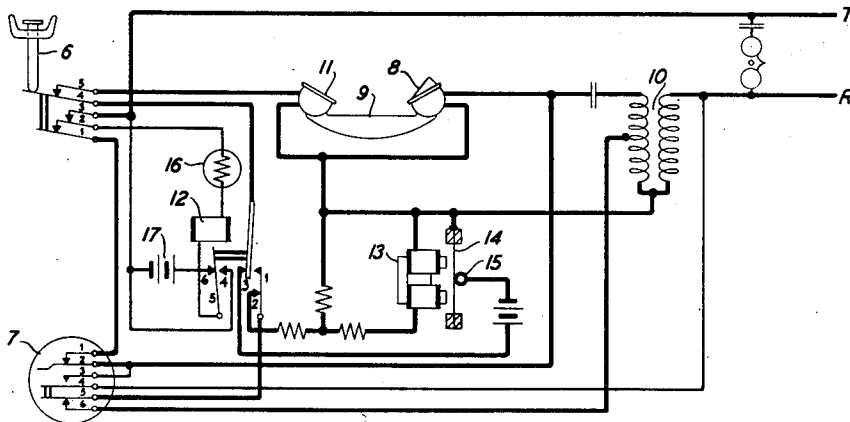


FIG. 3



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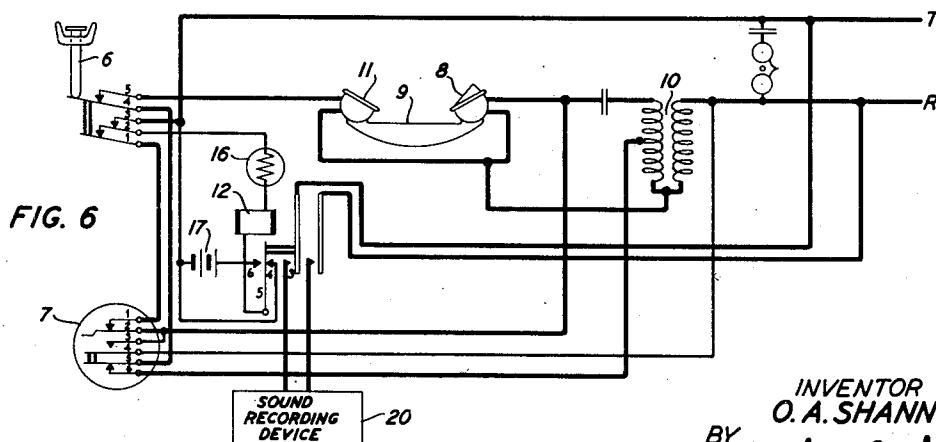
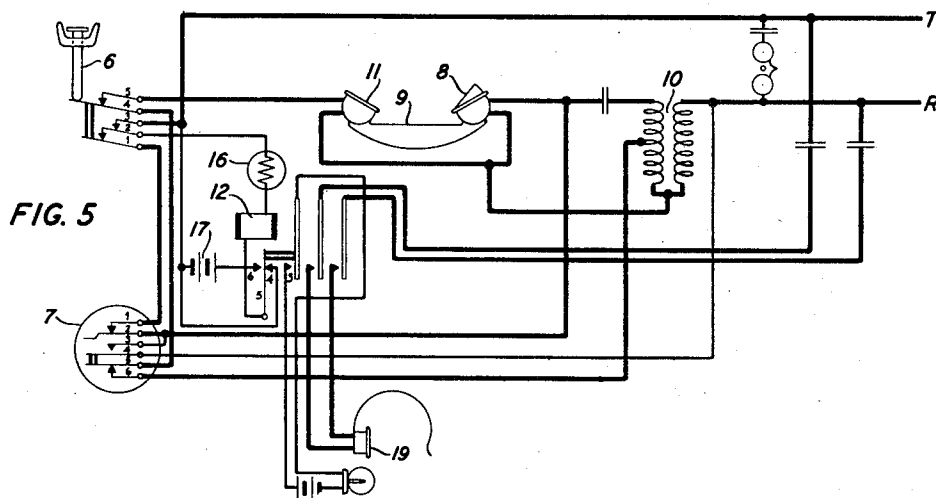
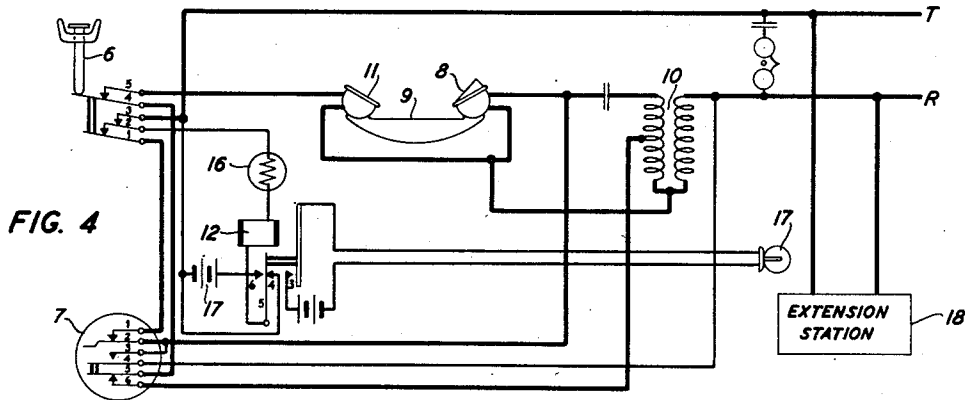
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COMMUNICATION APPARATUS

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2 Sheets-Sheet 2



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COMMUNICATION APPARATUS

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6 Claims. (Cl. 179—81)

This invention relates to communication apparatus and particularly to telephone substation devices.

The object of the invention is to provide means responsive to a simple manipulation of the substation instrument whereby a subscriber may establish a given circuit condition such as to change the transmission characteristics of his station, to signal an assistant or to connect a monitoring instrument to his circuit. Almost from the beginning of the use of the telephone it has been a habit of the telephone user to "jiggle" his receiver hook when he found difficulty in making himself heard. The effort is, of course, to attract the attention of the operator whereupon the difficulty may be stated and remedied. This habit of quickly manipulating the switchhook has carried over into the machine switching field but of course is ineffectual there as no operator's attention may be attracted. It is, therefore, the object of the present invention to automatically improve the transmission characteristics of a substation telephone in response to the manipulation of the switchhook during use of such instrument.

This same operation may be employed to signal an assistant, to connect a monitoring instrument to the circuit, or to perform any other useful function such as to turn off a radio set.

In accordance with this invention an amplifier is provided in the substation circuit but is normally out of circuit and ineffective. In addition a device which is cumulatively responsive to pulses of current created by rapid manipulation of the switchhook is provided which upon response will switch such amplifier in circuit. In accordance with the preferred embodiment of the invention a thermistor is provided which is effectually in circuit only during the movement of the switchhook. This device in response to a small current flow therethrough will change its electrical resistance from a high to a low value so that if the switchhook is rapidly manipulated several times the resistance of the thermistor will change to a point where a relay in circuit therewith may be operated. The relay upon operation will switch the amplifier in circuit and lock in its operated position until the use of the substation instrument is terminated.

In accordance with other embodiments of this invention the thermistor and relay circuit may be employed for other useful purposes. A simple signal may be displayed before an assistant who may in this manner be summoned, or such a signal may be displayed alongside an assistant's ex-

tension instrument so that he may be thus directed to "listen in" on the conversation, or such a signal may be displayed and a monitoring connection may be established so that an assistant may "listen in" on the conversation, or a mechanical recording instrument may be connected to the line so that a record of the ensuing conversation may be made.

A feature of the invention is a means in a telephone responsive to rapid manipulation of the switchhook thereat for operating a relay to perform any one of a number of useful functions.

Another feature is a means in a telephone cumulatively responsive to current surges for operating a relay to perform any one of a number of useful functions.

Another feature of the invention is a relay in a telephone circuit unresponsive to either the normal open or closed circuit thereof but responsive to the rapid manipulation of the switchhook. Such a relay is in a self-locking circuit and once energized will remain in that condition responsive to the normal closed condition of the telephone circuit.

Another feature of the invention is a thermistor effectively in circuit only during the movement of the switchhook.

Still another feature is a thermistor and a relay in a normally ineffective circuit which is rendered effective by the change in resistance of the thermistor in response to the rapid manipulation of the switchhook.

Another feature of the invention is a means in a telephone responsive to rapid manipulation of the switchhook for effecting improved transmission thereover.

The drawings consist of two sheets having six figures, as follows:

Fig. 1 is a circuit diagram of a telephone substation circuit in condition for use but with the mechanical amplifier out of circuit;

Fig. 2 is a fragmentary view illustrating the method of bringing the mechanical amplifier into circuit, showing how the switchhook may be rapidly manipulated and the condition of the switchhook contacts that will set up the required circuit conditions;

Fig. 3 is a circuit diagram similar to that of Fig. 1 showing the mechanical amplifier effectively included in the circuit;

Fig. 4 is a circuit diagram, schematic in part, showing how a signal may be displayed alongside an assistant's extension station either to summon the assistant or to notify the assistant to come in on the conversation;

Fig. 5 is another circuit diagram, schematic in part, showing how a monitoring receiver may be connected to the telephone circuit; and

Fig. 6 is another circuit diagram, also schematic in part, showing how a mechanical recording device may be connected to the circuit so that a record of the ensuing conversation may be made.

In the drawings, particularly Figs. 1 and 3, there are two conductors leading off to the right representing the tip and ring conductors which extend in known manner to a telephone exchange whereat a source of current is located and which supplies line current for this substation. The transmitter current flows from the tip conductor T, over contacts 3, 2 and 1 of the switchhook 6, contacts 1 and 2 of the dial 7, transmitter 8 of handset 9, the right-hand winding of induction coil 10 to the ring conductor R. The receiver 11 is in a local circuit including the receiver 11, the lower half of the left-hand winding of induction coil 10, contacts 6 and 5 of dial 7, contact 1 and armature of relays 12, contacts 4 and 5 of switchhook 6 to receiver 11.

The mechanical amplifier consisting of coil 13, diaphragm 14 and microphone 15 is not in circuit since contact 3 of relay 12 is open at this time. The relay 12 cannot be operated since the closure of contact 2 to contact 3 of the switchhook places this relay in a circuit which does not include any source of current.

However, if the switchhook is "jiggled" the condition depicted in Fig. 2 is set up once on the downstroke and once on the upstroke of the switchhook plunger 6. The contacts 1, 2 and 3 are arranged so that contact is made between contacts 1 and 2 before contact 3 is closed to contact 2. At this time a circuit may be traced from tip conductor T, contacts 4 and 5 of relay 12, winding of relay 12, thermistor 16, contacts 2 and 1 of switchhook 6 and thence over the transmitter circuit previously traced. Thus if the switchhook is rapidly manipulated there will be a train of current impulses fed through the thermistor 16 and relay 12. The thermistor 16 is a well-known device which is normally of very high resistance. However, the heating effect of a current flow therethrough results in a change to a comparatively low resistance. Hence in a comparatively short time the current flow through relay 12 rises to a point sufficient to operate this relay which thereupon locks in a local circuit which is maintained thereafter until the use of the circuit is given up and the handset returned to its cradle. The local circuit for maintaining relay 12 energized is shown in Fig. 3 and may be traced from relay 12, through thermistor 16 which is now maintained at a comparatively low resistance, contacts 2 and 3 of switchhook 6, battery 17, contacts 6 and 5 of relay 12 and thence to relay 12. The coil 13 of the mechanical amplifier is now in circuit with the lower half of the left-hand winding of induction coil 10 and by responding to incoming voice currents will, through microphone button 15, cause an increased or amplified response in the receiver 11.

In Fig. 4 relay 12, besides operating its locking contacts, now closes a contact to operate a signal, such as a lamp 17. This may be placed near an assistant's extension station 18 which

is connected to the line conductors T and R so as to notify the assistant to listen in on the conversation. Alternatively, it may simply be used to summon an assistant.

In Fig. 5 the relay 12 may be used to signal an assistant and at the same time to connect a monitoring device, such as a receiver 19, to the telephone line. In such an arrangement the monitoring device may only be rendered effective at the will of the subscriber.

In Fig. 6 the monitoring device of Fig. 5 is replaced by a mechanical recording device 20, such as a telegraphophone for making a reproducible record of the conversation.

What is claimed is:

1. In a communication system, a station circuit equipped with a switch for placing said circuit in condition for service, an auxiliary station circuit, a relay for rendering said auxiliary circuit effective and a thermistor responsive to the repeated rapid manipulation of said switch for operating said relay.

2. In a communication system, a station equipped with transmission means, means for changing the characteristics of said transmission means, a switch for placing said station in condition for service, and means including a thermistor responsive to the repeated rapid manipulation of said switch for rendering said amplifying means effective.

3. In a communication system, a station equipped with signal receiving and transmitting means, a signal amplifier, a switch for placing said station in condition for service, and means including a thermistor responsive to the repeated rapid manipulation of said switch for rendering said amplifier effective.

4. In a communication system, a station equipped with signal receiving and transmitting means, a signal amplifier, a switch for placing said station in condition for service, a relay for effectively placing said amplifier in service, a thermistor, contacts controlled by said switch for transiently energizing said thermistor during movement of said switch between its on and off positions, said relay being responsive to said thermistor.

5. In a communication system, a station equipped with signal receiving and transmitting means, a signal amplifier, a switch for placing said station in condition for service, a relay for effectively placing said amplifier in service, a thermistor, contacts controlled by said switch for transiently energizing said thermistor during movement of said switch between its on and off positions, said relay being responsive to said thermistor, and a locking circuit for said relay for holding said amplifier in circuit after an initial operation of said relay.

6. In a communication system, a station circuit equipped with a switch for placing said circuit in condition for service, an auxiliary circuit at said station, means controlled by said switch for creating a local impulse during the movement thereof and means responsive to a train of local impulses created by the repeated rapid manipulation of said switch for rendering said auxiliary circuit effective.

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