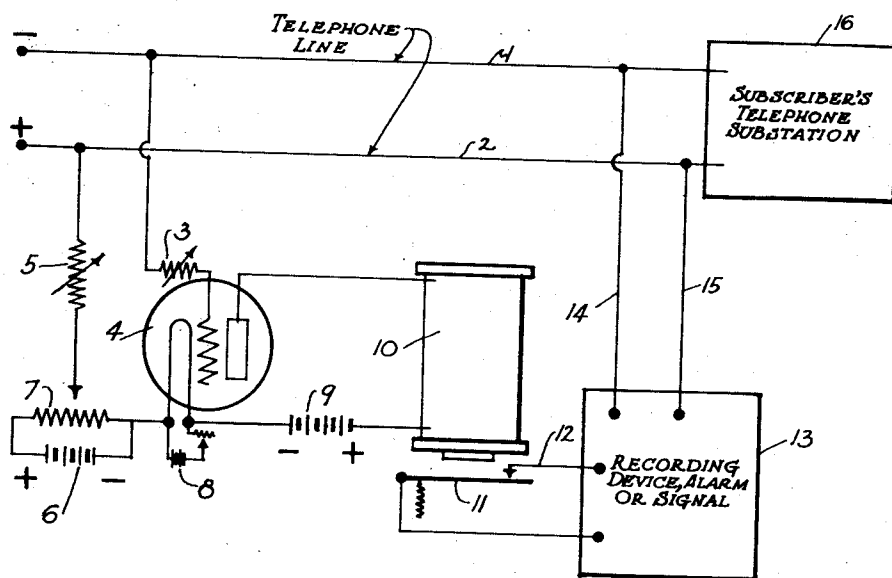


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C. E. REEVES
TELEPHONE RELAY SYSTEM

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TELEPHONE RELAY SYSTEM

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4 Claims. (Cl. 179—2)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government of the United States for governmental purposes without the payment to me of any royalty thereon in accordance with the provisions of the act of April 30, 1928 (Ch. 460, 45 Stat. L. 467).

This invention relates to a relay system and more particularly to a method of and means for automatically starting and stopping such equipment as recorders, signal lamps, alarms or time recorders responsive to the use and non-use respectively of a communication channel. A specific object of the invention is to provide a relay system for use in connection with a telephone subscriber's line of either the automatic or manual type for energizing a sound recording device connected to the subscriber's line responsive to the use of that line and for de-energizing the recording device responsive to the non-use of that line in such a manner as to cause no impairment to the normal operation of the telephone line.

A further object of this invention is to provide audible and/or visual signals to indicate the use or non-use of a telephone line.

Other and further objects of the invention will be apparent from the following specification when read in connection with the accompanying drawing in which the system is shown diagrammatically.

In the drawing wires 1 and 2 are the wires leading from a subscriber's telephone substation 16 to the central office. Telephone wire 1 normally has applied thereto a negative potential while telephone wire 2 has applied thereto a positive potential. Wire 1 is connected by way of a resistance 3 to the grid or control electrode of a triode 4. Wire 2 is connected by means of a resistance 5 and a source of biasing potential 6 with potentiometer winding 7 thereacross to the cathode of the tube 4. The cathode of the tube 4 is energized by the battery 8 or other appropriate source of cathode potential. The plate or anode of the tube 4 is connected to one terminal of the winding 10 of an electromagnetic relay, the other end or terminal of which is connected to the positive side of a source of anode potential 9 the negative side of which is connected to the cathode of the tube 4. The electromagnetic relay winding 10 has associated therewith an armature 11 which engages with the contact 12 when the relay winding 10 is energized. The armature 11 and contact 12 are connected to a recording device, alarm or signal 13 for energizing the recording device, alarm or signal when the relay is energized. Con-

ductors 14 and 15 are connected from wires 1 and 2 of the telephone line respectively to the recording device 13.

The operation of the system disclosed above is substantially the same when used with an automatic telephone line as with a manual line, but due to certain differences that will be dealt with later, the resistances 3 and 5 have been shown as variable and a potentiometer device has been shown at 7 for applying a biasing potential to the grid or control electrode of the tube 4 in opposition to that applied by the telephone line. It is to be understood, however, that these devices need not be made variable but may be made to suit the particular case.

In the case of an automatic telephone system, the voltage across the line leading to a subscriber's telephone station is approximately 50 volts when the line is idle. This voltage immediately drops to about 10 volts when the receiver is raised and remains at that value during conversation until the receiver is replaced. On a manual line the voltage is usually 24 volts when idle, and approximately 7 when the receiver is raised. This voltage difference is utilized to control the energization and de-energization of outside equipment such as the recording device 13 in the following manner. During such time as the telephone line 1—2 has applied thereto the normal idle line voltage the grid or control electrode of the tube 4 is biased to such a point that no plate current flows in the plate circuit of the tube and consequently the winding 10 of the electromagnetic relay is not energized. When the receiver is lifted at the subscriber's substation 16 and the voltage between wires 1 and 2 of the line drops, the reduced line voltage is insufficient to maintain the grid of the tube 4 sufficiently negative to prevent plate current flow. The reduced line voltage caused by lifting the receiver permits the plate current to flow energizing the winding 10 of the electromagnetic relay, the armature 11 is attracted to contact 12 closing the circuit for the recording device 13 connected to the telephone line 1—2. During such time as the telephone substation 16 is in use the recorder 13 continues to function to record the conversation on the line. Upon replacement of the receiver at the subscriber's substation 16 the normal voltage of the line again charges the grid or control electrode of the vacuum tube 4 sufficiently negative as to stop plate current and release the armature 11, opening the circuit 11 and 12, stopping the operation of the

sound recorder 13 or other alarm or signal device.

In an actual device of the above nature, type 56 and 76 tubes have been used. The telephone line 1—2 is connected to the grid and cathode respectively of the vacuum tube 4 through a resistance of two million ohms in series with each side direct to the grid and cathode, the negative side to the grid and the positive side to the cathode. These values have been found satisfactory for use in connection with automatic telephone systems wherein the line voltage is 48 or 50 volts across the line. On manual lines where the line voltage is 24, the cathode resistor 5 has a value of ten thousand ohms instead of two million. The grid resistor remains at two million.

Having described only a typical form and application of my invention, I do not wish to be limited or restricted to the specific form and application herein set forth, but wish to reserve to myself any modifications or variations that may appear to those skilled in the art or fall within the scope of the following claims.

I claim:

1. In combination with a telephone subscriber's line a relay comprising a thermionic tube having a cathode and anode and a control electrode, means including a resistance connecting the negative side of said subscriber's line to the control electrode of said tube, means connecting the positive side of said subscriber's line to the cathode of said tube, a source of anode potential for said tube, an electro-magnetic relay having circuit opening and closing devices, means connecting said source of anode potential and the wires of said electro-magnetic relay between the cathode and anode of said tube whereby said electro-magnetic relay is energized at such times as said subscriber's line is in use with a consequent

low voltage thereacross, and a device connected to the circuit opening and closing device on said electro-magnetic relay that is put in operation responsive to the energization of said relay.

2. A device adapted to be connected to a telephone line for recording the conversations passing thereover without in any way impairing the normal operation of said line, comprising a sound recording device, a thermionic tube having at least a cathode, a control electrode and an anode, means for connecting the cathode and control electrodes of said tube to the positively polarized and negatively polarized leads respectively of said line, an electro-magnetic relay and a source of anode potential connected in series between the cathode and the anode of said tube, and means responsive to the energization of said electro-magnetic relay for energizing said recording device and responsive to the deenergization of said electro-magnetic relay for deenergizing said recording device.

3. The method of utilizing a vacuum tube relay to control the energization of a sound recording device connected to a telephone line responsive to the use of that line which comprises applying to the control electrode of said tube a potential of such value as to prevent anode current flow when the line is not in use and changing the potential value of said control electrode to a lower value permitting anode current to flow responsive to the use of said line and energizing said recording device responsive to the flow of anode current.

4. A device in accordance with claim 3 including a signal for indicating when said line and said recording device are energized and deenergized.

CLARENCE E. REEVES.

CERTIFICATE OF CORRECTION.

Patent No. 2,228,673.

January 14, 1941.

CLARENCE E. REEVES.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 34, claim 4, for the claim reference numeral "3" read --2--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of February, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.