

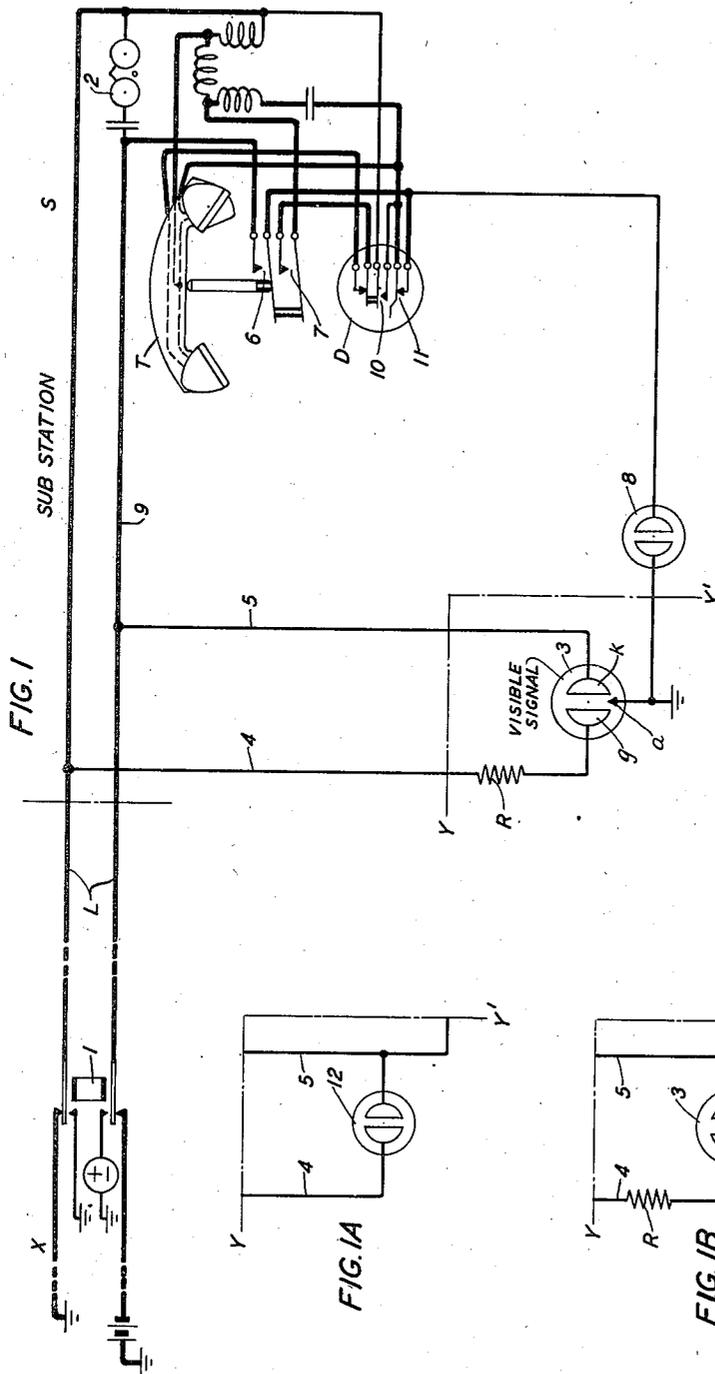
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TELEPHONE SIGNALING SYSTEM

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TELEPHONE SIGNALING SYSTEM

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3 Claims. (Cl. 179—81)

This invention relates to automatic telephone systems and more particularly to subscriber's station circuits, which employ a visual ringing signal at the station comprising a gas-filled discharge tube in bridge of the line which is adapted to flash over and produce a visual glow discharge upon the application of ringing current to the line at the exchange as disclosed, for example, in the patent to C. B. Bartley 1,903,972 (Fig. 1).

When visual signal glow discharge tubes of this type are used at dial subscribers' stations, there is a tendency for these tubes to flash over when the subscriber's dial is operating and the dial contact open, due to momentary high voltage surges on the line.

An object of the present invention is, therefore, to prevent such tube flash-overs, during dialing, without interfering with the operation of the glow discharge tube when the station is being rung.

A feature of the invention resides in connecting a second discharge tube in shunt to the visual signal tube, while the subscribers' switchhook contacts are closed, thereby preventing the visual signal tube from flashing due to high potentials intermittently present on the line.

The invention will be understood from the following description when read in connection with the accompanying drawing, Fig. 1 of which shows a dial subscriber's station, connected by a line with a dial central office to which line, at the station, is connected a three-element gas-filled glow-discharge tube responsive to ringing current applied to the line to give a visual signal, together with a second discharge tube arranged to be connected in shunt to the visual signal tube when the subscriber's telephone is removed from the switchhook, i. e., when the station dial is connected to the line; Fig. 1—A shows a two-element visual signal device in place of the three-element device of Fig. 1; and Fig. 1—B shows the addition of an audible signal (buzzer) associated with the three-element visual device of Fig. 1.

Referring to Fig. 1 of the drawing, a conventional dial subscriber's station is shown at S, connected by means of a line L with an automatic exchange indicated at X provided with a ringing relay 1 which relay, when operated, connects alternating ringing current to the line to actuate the usual telephone ringer or bell 2 at the subscriber's station. A visual signal device 3, at the subscriber's station, is shown connected across the line conductors at some convenient point which device consists of a gas-filled ionic

tube comprising a main anode *a*, a cathode *k* and a control anode *g*, the control anode and cathode being connected by means of conductors 4 and 5 to the tip and ring conductors, respectively, of the line and the main anode being connected to ground. A current limiting resistance R is shown between the tip of the line and the control anode.

When the subscriber's telephone is on the switchhook, i. e., resting on the cradle, the application of ringing current to the line, by operation of the ringing relay 1 at the exchange, causes an ionizing discharge to be effected between the control anode *g* and cathode *k* of the device 3, whereupon a glow discharge is established between the main anode and cathode, in a well-known manner, which serves as a visible indication to the subscriber that this station is being rung. The ringer 2 also operates as usual.

In case the subscriber desires to initiate a call, he removes his telephone from the cradle, thereby closing switch contacts 6 and 7 which connects telephone T and dial D to the line in the usual manner.

In accordance with the present invention, the closure of contact 6 also connects a second gas-filled ionic device 8 in shunt to the main discharge gap *a—k* of visual signal tube 3, i. e., one electrode of the device 8 is connected to the anode *a* of tube 3 and the other electrode over switchhook contacts 6 to the ring conductor 9 of the line to which the cathode *k* of the visual signal is also connected. Each time the pulsing contacts 11 of the dial open, a line surge occurs whose peak voltage is considerably higher than the central office battery which, in the absence of the device 8, may be sufficient to cause an ionizing discharge between the control anode *g* and cathode *k* of the visual signal device 3 thereby causing the main gap *a—k* to break down and cause the device 3 to flicker. However, the presence of the shunt path including device 8 in parallel with the main gap *a—k* of device 3, reduces, if not substantially eliminates, this tendency of the visual signal device 3 to give a false indication. It will be understood that although a three-element discharge tube is shown as the visual signal device 3, a two-element tube, as shown in Fig. 1—A, may be substituted therefor.

In case an audible signal, responsive to the discharge of the visual device 3, is desired an arrangement as shown in Fig. 1—B can be substituted for the arrangement of Fig. 1—A in which an alternating current buzzer 13, shunted by a full wave rectifier 14, is connected between

the main anode *a* and ground, the operation of which is obvious.

What is claimed is:

1. In an automatic telephone system, a subscriber's station and line, a dial at said station adapted to be connected to the line, a glow discharge tube comprising an anode, a cathode, and a control electrode, and having the control electrode and cathode connected in bridge of the line and its anode connected to ground, whereby ringing current applied across the line and between one side of the line and ground causes the gap between said anode and cathode to break down and conduct a glow discharge, and means for preventing voltage surges during operation of said dial from causing said discharge tube to glow falsely, said means comprising a second discharge tube having a pair of closely spaced electrodes connected in parallel with the anode and cathode of the first tube in response to connection of the dial to the line.

2. In an automatic telephone system, a subscriber's line, a subscriber's set associated with

the line having a dial adapted to be connected to the line when the set is taken for use, and a glow-discharge tube connected between one side of the line and ground so constructed that a glow-discharge therein will be established in response to ringing current applied to the line, and means for preventing glow discharges in said tube during dialing by the subscriber, said means comprising a second discharge tube connected in shunt to the first tube while the subscriber's set is in use.

3. In an automatic telephone system comprising a dial subscriber's station and a line having a glow-discharge tube connected between one side thereof and ground, as a visual ringing signal, and means for preventing false glow discharges in said tube during dialing from the station which comprises a second space discharge tube arranged to be connected in shunt with the first tube, responsive to connection of the subscriber's dial on the line.

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