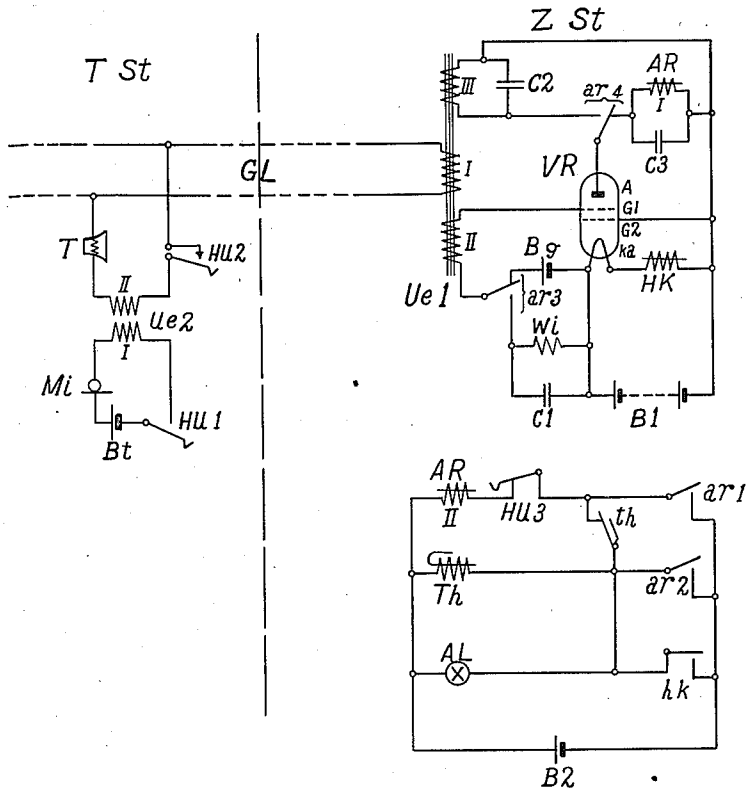
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TELEPHONE SIGNALING SYSTEM

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TELEPHONE SIGNALING SYSTEM

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The present invention relates to a circuit arrangement for long distance communication systems, more particularly for telephone systems in which the signal devices are switched on in an exchange station by varying the grid potential in an amplifying valve.

The invention aims at providing the calling subscriber, in a simple manner, with an indicating signal to show that the call has reached the exchange station. Arrangements are already known in which a calling station is given an audible signal when the bell of the called station is operated, by providing a current produced by the operation of the bell which is sent back to the calling subscriber. If this method is also to be used with exchange stations having visual calling signals, then special switching devices are necessary because the calling lamps cannot effect the sending out of indicating signals. The sending out of indicating signals is accomplished in a more simple manner by the invention, in which an arrangement is provided in which upon receiving the call an amplifying valve serving to receive the call is used as a transmitter for sending out a call indicating signal.

In this manner the switching means operating the calling signal in the exchange station, on becoming operative, causes the amplifying valve to be switched over from the "receiving" to the "transmitting" conditions. The invention may be applied with advantage to systems with several stations attached to the same line, for example, supervisory or alarm systems in which the subscribers' stations, which can be called by automatic selection from the exchange station, can with certainty also call the exchange station.

A train dispatching system is shown in the embodiment in which several subscribers' stations TS*t* are attached to a common line GL and which can be called by means of selectors from an exchange station ZS*t*. The corresponding facility is not provided for the subscribers' stations; it is possible, however, to call the exchange from the subscribers' stations. In order to switch on the calling or signal device in the exchange station ZS*t* an amplifying valve is provided in the latter whose grid is influenced by the currents transmitted over the common line. These currents can be produced in the simplest way at the calling station, for example by speaking into the microphone. It is also possible, however, for these currents to be produced by special current generators (buzzers or the like) or for special impulses to be transmitted by the calling station in order to influence the grid of the amplifying valve in the exchange station.

According to the invention the calling subscriber receives a special signal when the call has actually materialized in the exchange station. In the embodiment shown in the drawing only those details which are necessary in order to understand the invention are shown. The switching operations associated with a call are as follows: When a subscriber at a station TS*t* takes up his receiver and speaks into the microphone M*i*, the speaking currents thus produced travel over the repeater Ue2 and the switchhook contact HU2 to the common line GL, and over this to winding I of repeater Ue*l* in the exchange station. In the normal or rest condition of the system the potential from the battery B*g* connected to the grid G*l* of the amplifying valve VR is so great that no anode current flows. Furthermore, the current flowing over the thermo winding K*a* keeps relay HK energized so that contact *hk* of this relay is normally open and is only closed when the heating current is interrupted; the calling lamp AL used for giving the call signal being then switched on.

The potential of the grid G*l* is altered by the alternating speaking current produced by a call so that now an anode current occurs in the valve VR whereupon the relay AR lying in the anode circuit is energized over winding I. This relay draws up and by closing its contact *ar*1 connects up its winding AR (II). At the same time it forms a locking circuit for itself over its contact *ar*2 and the thermo contact *th*, and by switching over the contacts *ar*3 and *ar*4 which are constructed as make-before-break contacts, it causes the amplifying valve to be switched over from "receiving" to "transmitting". Thus the amplifying valve acts as a transmitting valve and gives the calling subscriber an audible indicating signal in his receiver T by means of the oscillations thus produced over windings III and II of repeater Ue*l*.

At the time relay ARI energizes, the calling lamp AL and also the time relay T*h* are switched on. The latter becomes operative after a certain time and by opening its contact *th* breaks the locking circuit of relay ARII. Relay A*r* releases and by switching over its contacts *ar*3 and *ar*4 causes the amplifying valve to be switched back from "transmitting" to "receiving". Furthermore the circuit of the time relay T*h* is broken by the opening of contact *ar*2. The circuit of relay AR is also broken when the operator in

the exchange station replies by taking up his receiver and thereby opening contact HU3.

Having described the invention, what is considered to be new and is desired to be protected by Letters Patent will be set forth in the following claims.

What is claimed is:

1. In a telephone signaling system, a line having stations thereon, an amplifying valve at a called one of said stations, a call signal at said station controlled by said valve, means at a calling station for varying the grid potential of said valve to operate said call signal, and means controlled by said valve for transmitting an indication back over said line to indicate the call has been received.

2. In a telephone signaling system, a line, a calling and a called station connected to said line, an amplifying valve at said called station, a call signal at said called station controlled by said valve, and means responsive to a call over said line from said calling station for operating said valve to control said call signal and to transmit a signal back over said line to said calling station to indicate the reception of the call.

3. In a telephone signaling system, a line, a calling and a called station connected to said line, an amplifying valve at the called station, a call signal at said called station, a switching means for operating said call signal, means at the calling station for varying the grid potential of said valve over said line to operate the same and control said switching means in a manner to operate the call signal, and means controlled by the operation of said switching means for operating said valve in a manner to transmit an indication over said line to said calling station to indicate the receipt of said call.

4. In a telephone signaling system, a line, a calling and a called station connected to said line, an amplifying valve at the calling station operated responsive to a call over the line from the calling station, a call signal, a relay operated by said valve to operate the call signal to indicate at the called station that a call is made to it, means operated by said relay for altering the connections of said line to said valve, and means operated by said valve over said line to signal the calling station.

5. In a telephone signaling system, a line, a calling station connected to said line, an amplifying valve at the called station, said amplifier operated responsive to a call from said calling station over said line, a relay operated by said valve to indicate the call, said relay also operated to change the connection of said valve with said line, said valve thereafter operated to signal the calling station.

6. In a telephone signaling system, a line, a calling and a called station connected to said line, an amplifying valve at the called station, and means responsive to a call from said calling station for operating said valve in one manner to indicate the call at the called station and for thereafter operating the valve in another manner to indicate the reception of the call to the calling station.

7. A system as claimed in claim 6, in which the valve controls a relay at the called station to operate a call signal, while it transmits an audible signal itself over the line to the receiver of the calling station.

8. In a telephone signaling system, a line, a calling and a called station, an amplifying valve at the called station connected to said line, means responsive to a call from said calling station for operating said valve, a relay having an operating and a holding winding, said relay energized through its operating winding by the operation of said valve and held operated by its holding winding, a slow operating relay operated by said first relay to open the circuit of said holding winding after a time interval to restore said first relay, and means operated by said first relay for controlling the operation of said amplifying valve so that in one instance it indicates a call at the called station and in another instance it indicates at the calling station the reception of the call at the called station.

9. In a telephone signaling system, a line having a calling and a called station thereon, an amplifying valve at the called station, means for operating said valve responsive to a call from said calling station as a receiving means, and means responsive to said call for operating said valve as a transmitter to indicate the reception of the call to the calling station.

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