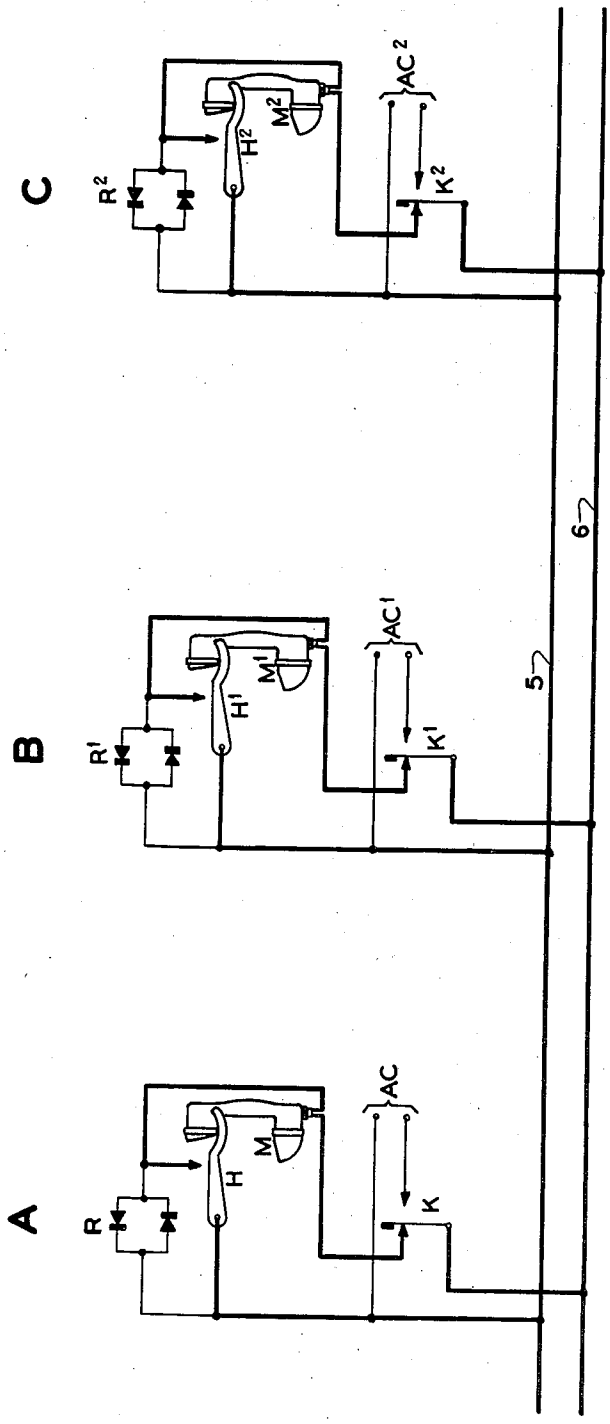
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TELEPHONE SIGNALING SYSTEM

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TELEPHONE SIGNALING SYSTEM

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This invention relates to telephone systems but more particularly to improvements in signaling arrangements in such systems.

An object of the invention is to simplify the signaling equipment at a telephone substation by eliminating the usual ringer coils and gongs, and the condenser and, instead, utilize the receiver of the substation to produce an audible signal.

A further object is the provision of means for reducing the transmission losses on a party line caused by the connection of many ringers across the line or from one side of the line to ground.

A feature of the invention is a circuit arrangement employing a dry disc rectifier unit which will permit signaling current to pass but will not permit the passage of voice currents at the usual voltages. Another object is to provide an arrangement for removing the rectifier unit from the circuit when the receiver is removed and the telephone is placed in talking condition.

Other objects and features of the invention will appear more fully from the detailed description hereinafter given.

In the arrangement of the invention the rectifier unit is connected directly across the line conductors in series with the receiver at the substation and is shunted out by the hook switch when the receiver is removed. The application of signaling current of suitable voltage and frequency to the line breaks down the rectifier and at the same time actuates the receiver to produce an audible signal.

The invention will be more fully understood from the following description read together with the drawing, which discloses one embodiment of the invention.

Referring to the drawing, there is indicated, diagrammatically, a telephone line, indicated by the reference characters 5 and 6, to which is connected a number of telephone substations such as A, B, and C. While only three substations are shown in the drawing, there may be as many as twenty telephones connected to the same line, each telephone being identical with those shown. The substation A, which is identical with all others on the line, comprises a handset M, of the magnetic type containing receiving and transmitting units like that shown in the pending application of Woodruff et al., Serial No. 738,030, filed August 2, 1934, patented Nov. 30, 1937, No. 2,100,500, a hookswitch H, a rectifier unit R, a source of alternating current AC, and contacts K for controlling the connection of ringing current to the line.

The rectifier unit R consists of a pair of oppositely poled copper oxide rectifiers connected in multiple and having such characteristics as to present a comparatively high resistance to the passage of voice currents of the usual magnitude, approximately .01 volt, but to decrease sharply in resistance with an increase of voltage across the unit, to approximately 3 volts.

The alternating current applied to terminal AC may be obtained from any convenient source of power, of a suitable voltage and frequency, common to all the stations on the line, or could be produced by a small hand generator individual to each station. In the former case, the switching springs K would be manually operated by a push button, while in the latter case the springs K would be mounted on the hand generator, being operated while the generator is in motion as is the usual practice in magneto telephone systems.

In order to better explain the invention, the operations which take place when a call is made will now be pointed out. A subscriber at station A desiring to establish a connection with a subscriber at station B will operate the switching springs K, by means of a push button, or turn the generator crank, as the case may be, a number of times corresponding to the ringing code by which the called station is identified. The operation of spring K disconnects the handset of the calling station from the line to increase the current available to the other stations on the line, and connects a source of ringing current AC, to the line conductors 5 and 6. The comparatively high voltage of the ringing current reduces the resistance of the rectifiers R to a very low value, the reproducers at each station thereby responding to the alternating current to produce a tone signal. When the called party at station B removes the handset from the switchhook, the rectifier R' is shunted by the switchook contacts, thus connecting the handset directly to the line and conversation between the two parties may then take place.

It will be observed that when the telephones A and B are in direct communication the instrument at substation C and others on the same line will not interfere with the transmission or prevent a loss in transmission such as usually occurs with the ordinary type of ringing apparatus employed. Nor will the transmitters at other substations on the line pick up and pass to the line, extraneous noises that might be present in the vicinity of the telephone even though the unit is connected directly across the line for signaling. This is so because the rectifier pre-

sents a high resistance to voice currents and will permit only relatively high potential signaling current to flow through it.

It will be appreciated that while a simple form of telephone circuit has been illustrated the invention may be applied to other types of telephone systems without departing from the spirit of the invention.

What is claimed is:

1. In a multi-party telephone line, a line having a plurality of telephones thereon, a signaling circuit for each telephone on the line, a telephone receiver in each circuit connected in series with a bridge of oppositely poled dry-disc rectifiers, means for transmitting signaling current to said line to operate said receiver at said telephone as an audible signal, and means for removing said bridge at the desired telephone from said signaling circuit by shunting it with the telephone switchhook, said receiver being maintained in said circuit for talking purposes.

2. In a telephone circuit, a telephone receiver arranged to be operated both as a telephone instrument and as a signal, and a dry-disc rectifier having a breakdown value of three volts or less connected in series with said receiver in the signaling circuit to prevent the operation of the receiver by talking current and to permit the operation thereof by signaling current.

3. In a telephone circuit, means for transmitting signaling current and talking current over said circuit, a telephone receiver in said circuit responsive to said signaling current to operate as a call signal and responsive to said talking current to operate for talking purposes, and a rectifier whose resistance decreases sharply when subjected to potentials even below three volts, said rectifier connected to said telephone receiver for permitting said signaling current but not said talking current to operate said receiver.

4. In a telephone circuit, means for transmitting signaling current and talking current over said circuit, a telephone receiver in said circuit responsive to said signaling current to operate as a call signal and responsive to said talking current to operate for talking purposes, a rectifier whose resistance decreases sharply when subjected to potentials even below three volts, said rectifier connected to said telephone receiver for permitting said signaling current but not said talking current to operate said receiver, and means for rendering said rectifier inoperative and to change said circuit to permit the passage of said talking current.

5. The combination with a telephone subset having talking instrumentalities adapted for use exclusively in a telephone system employing no direct current, of a line, a rectifier connected across said line in series with the subset to enable the subset then to be used only for signaling purposes, and means for shunting the rectifier to enable the subset to be used for talking purposes.

6. The combination with a telephone subset having talking instrumentalities adapted for use exclusively in a telephone system employing no direct current, of a line, a rectifier connected across said line in series with the subset, a source of alternating current adapted to be impressed upon the line to actuate at least one of the talking instrumentalities of said subset as a signaling device through said rectifier, and means controlled by the switchhook for shunting said rectifier to permit said talking instrumentalities to be used for talking purposes.

7. The combination with a telephone subset having talking instrumentalities adapted for use exclusively in a telephone system employing no direct current, of a line and a bridge circuit comprising a pair of oppositely poled rectifiers connected in series with said subset across said line to permit only current exceeding a predetermined value to actuate the talking instrumentalities.

8. The combination with a telephone subset having talking instrumentalities adapted for use exclusively in a telephone system employing no direct current, of a line, a bridge circuit comprising a pair of oppositely poled rectifiers connected in series with said subset across said line, a source of alternating current adapted to be impressed upon the line to actuate one or more of the talking instrumentalities of said subset as a signaling device through said bridge circuit, and means controlled by the switchhook for shunting said bridge circuit to permit said talking instrumentalities to be used for talking purposes.

9. A magnetic telephone substation comprising a subset having talking instrumentalities adapted for use exclusively in a batteryless telephone system, and a rectifier through which said subset is connected to the line to permit current exceeding only a predetermined value to actuate one or more of the talking instrumentalities.

10. A magnetic telephone substation, comprising a subset having talking instrumentalities adapted for use exclusively in a batteryless telephone system, and a pair of oppositely poled rectifiers forming a bridge circuit through which said subset is connected to the line to permit current exceeding only a predetermined value to actuate one or more of the talking instrumentalities.

11. A magnetic telephone substation comprising a subset having talking instrumentalities adapted for use exclusively in a batteryless telephone system, and blocking means connected to the line in series with said subset for substantially preventing the passage of currents of the magnitude generated by said talking instrumentalities, the blocking of said means rendered ineffective by subjecting said means to a potential of three or more volts whereby signaling current of comparatively low voltage may actuate one or more of the talking instrumentalities.

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