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TELEPHONE SYSTEM

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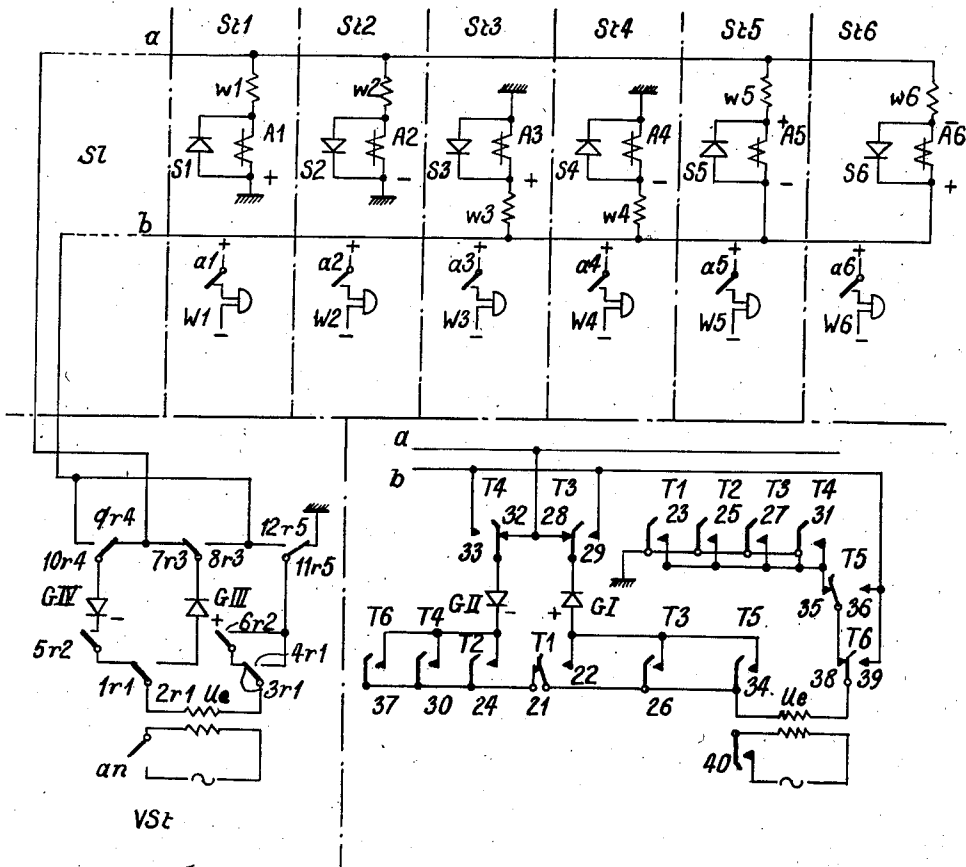


Fig. 1.

Fig. 2.

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TELEPHONE SYSTEM

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1 Claim. (Cl. 179—86)

In distant communication systems, more particularly telephone systems, it is known to use various ringing currents, for example alternating current of different frequencies, for selectively ringing the individual stations connected to a party line. Where only one source of current is used different ringing signals are given, each one of which is characteristic of a certain station. It has also already been proposed to ring individually a plurality of stations connected to a two-conductor party line by one source of current without the use of different ringing signals by connecting the call receiving devices at each station to the party line in a manner different from that which is provided in the other stations. This is effected by applying to the party line the source of ringing current corresponding to the station to be called and permits ringing three stations separately at most. In the one station the call receiving devices are arranged in shunt with the line, in a second station they are arranged between the *a*-conductor and earth and in the third branch station they are arranged between the *b*-conductor and earth.

The object of this invention is to provide means whereby up to six stations may be connected to one party line and be called separately while but one source of ringing current is used. This is attained by the use of induced current, in that in each of two stations which, by differently connected rectifiers, are adapted to be rung by current of a different direction, the call receiving devices are arranged in bridge across the party line or between a conductor and earth, and that in a calling station a rectifier which permits only ringing current of a direction marking the desired station to pass through, is connected to the ringing circuit completed in accordance with the connection of the induction current carrying call circuit with its associated receiving device to be operated.

Fig. 1 of the drawing shows a party line. Of the equipment of individual branch stations only the call receiving devices are shown. The distant communication apparatus, for example the telephone apparatus and the guarding arrangements which may also be necessary, in order to prevent an improper connection to the seized party line are not shown, as these devices have nothing to do with the invention. Fig. 1 further shows devices in an exchange, by means of which the induction current effecting the call of a branch station can be connected to the party line in a proper way.

Fig. 2 shows a set of keys by means of which

ringing current can be connected to the party line in a manner adapted for the call of a desired branch station.

It is presumed that the bells provided in the individual branch stations are not connected directly to the party line, but are inserted in local circuits which are closed by the ringing relays operable over the party line by ringing current.

The ringing relays to be operated by the ringing current are not connected in the same way to the party line at the six branch stations. At the branch stations *St1* and *St2* the ringing relays *A1* and *A2* are connected between the conductors *a* and earth over resistances *w1* and *w2*; at the branch stations *St3* and *St4* the ringing relays *A3* and *A4* are connected between the *b*-conductor and earth over the resistances *w3* and *w4*, and the ringing relays *A5* and *A6* of the branch stations *St5* and *St6* are shunted across both conductors *a* and *b* in series with resistances *w5* and *w6*. The branch stations where the ringing relays are connected to the party line in the same manner differ from each other by the different insertion of a rectifier. The rectifiers are arranged in parallel with the ringing relays, but may also be connected in series with the ringing relays. From the — and + symbols designating the individual ringing relays it can be seen in which direction the ringing current must flow in order to energise the ringing relays. Energisation takes place: of relay *A1*, if + is applied to *a*; of relay *A2*, if — is applied to *a*; of relay *A3*, if + is applied to *b*; of relay *A4*, if — is applied to *b*; of relay *A5*, if + is applied to *a* and — applied to *b*, and of relay *A6*, if — is applied to *a* and + is simultaneously applied to *b*.

Of the call mechanism provided in the exchange *VSt* only a few contacts, a repeater *Ue* and a starting contact *an* are shown. The contacts must be controlled by relays energised in a predetermined combination by a selecting operation. The selecting operation may be carried through by an operator in the exchange or by a calling subscriber on a line of another system, or by a subscriber on a party line to which also the desired subscriber is connected. Of the rectifiers connected in the exchange the rectifier *GIII* permits only the positive half waves and the rectifier *GIV* only the negative half waves to pass through.

Assume the branch station *St1* is to be called. The contacts *r1* are thrown from their normal position shown in the drawing, into their operative position. The contact *an* is closed and alternating current is applied to the primary of

the transformer Ue. The call circuit is completed as follows: +, contacts 11r5, 4r1, secondary winding of transformer Ue, contact 2r1, rectifier GIII, contact 1r3, a-conductor, branch station St1, resistance w1, relay A1, +. At the same time the call current at the branch station St2 passes over resistance w2 and rectifier S2 to earth. The relay A2 of the branch station St2 is short-circuited over the rectifier S2. Therefore only the relay A1 of the branch station St1 is operated, so that the bell W1 is connected up at the contact a1.

In order to call the branch station St2 the r2 contacts must be operated. Rectifier GIV will then be included in the following call circuit: +, earth, contacts 11r5, 6r2, 3r1, secondary of transformer Ue, contacts 1r1, 5r2, rectifier GIV, contact 9r4, a-conductor, branch station St2, resistance w2, relay A2, earth. Relay A2 operates and connects up the bell W2. When negative potential is connected to the a-conductor, relay A1 is short-circuited over the rectifier S1.

When the branch station St3 is to be called, the contacts r1 and r3 are operated, whereby the rectifier GIII is included in the following call circuit: earth, contacts 11r5, 4r1, secondary of transformer Ue, contact 2r1, rectifier GIII, contacts 3r3, b-conductor, resistance w3, relay A3, earth. The bell W3 is connected up. The relay A4 of the branch station St4 is short-circuited over the rectifier S4, as positive potential is applied to the b-conductor.

In order to call the branch station St4 the contacts r2 and r4 are operated, so that the following call circuit is completed: earth, contacts 11r5, 6r2, 3r1, secondary of transformer Ue, contacts 1r1, 5r2, rectifier GIV, contact 10r4, b-conductor, resistance W4, relay A4, earth. The bell W4 is connected up. Relay A3 is short-circuited over the rectifier S3.

When the branch station St5 is to be called the contacts r1 and r5 are caused to operate whereby the rectifier GIII is included in the following circuit: secondary of transformer Ue, contact 2r1, rectifier GIII, contact 1r3, a-conductor, resistance w5, relay A5, b-conductor, contacts 12r5, 4r1, secondary of transformer Ue. The bell W5 is connected up. With this direction of flow of ringing current, relay A6 which, as relay A5, is in bridge across the line is short-circuited over the rectifier S5. When the branch station St6 is to be called the contacts r2 and r5 are operated whereby the rectifier GIV is included in the following circuit: secondary of transformer Ue, contacts 1r1, rectifier GIV, contact 9r4, a-conductor, resistance w6, relay A6, b-conductor, contacts 12r5, 6r2, 3r1, secondary of transformer Ue. The bell W6 is connected up at contact a6. Relay A5 of branch station St5 is short-circuited over the rectifier S5, as negative potential is applied to a-conductor and positive potential to the b-conductor.

Fig. 2 shows a set of keys which may be used at the operator's position in the exchange for calling a subscriber of a party line and which may also be used in each branch station for the direct call of the other branch stations of their own party line. For the mutual direct call of the branch stations inductive current must be available in the same. This current may be taken

from a main, or an inductor may be used as source of current.

Upon depression of any one of the six keys contact 40 is closed, whereby the alternating current (from a main or an inductor) is applied to the primary of the transformer Ue. Depending on which one of the keys 1—6 is closed the ringing current is applied to the a-conductor, or to the b-conductor, or in bridge across the line, and depending on whether the rectifier GI or the rectifier GII is inserted, only the positive or only the negative half waves of the induced current can pass into the line.

For calling the branch station St1 key T1 is depressed whereby the ringing circuit is applied to the a-conductor over the following path: earth, contacts 23T1, 35T5, 38T6, secondary of the transformer Ue, contact 22T1, rectifier GI, which permits only the positive half waves to pass through, contact 28T3, a-conductor.

When the key T2 is depressed, in order to call the branch station St2, the induced current is likewise applied to the a-conductor, but it is applied over the rectifier GII which permits only the negative half waves to pass through: earth, contacts 25T2, 35T5, 38T6, secondary of transformer Ue, contacts 21T1, 24T2, rectifier GII, contact 32T4, a-conductor.

In order to call branch station St3 the key T3 is actuated. The induced current is applied to the b-conductor over: earth, contacts 27T3, 35T5, 38T6, secondary of the transformer Ue, contact 26T3, rectifier GI, contact 29T3, b-conductor.

In order to call branch station St4 the key T4 is actuated. The induced current is then likewise applied to the b-conductor over earth, contacts 31T4, 35T6, 38T6, secondary of transformer Ue, contacts 21T1, 30T4, rectifier GII, contact 33T4, b-conductor.

In the branch stations St5 and St6 the call receiving apparatus is arranged in bridge across the line. Therefore, when the keys T5 or T6 are actuated, the secondary of the transformer, in series with one of the rectifiers, is also connected in bridge between the conductors a and b. When the key T5 is actuated, the rectifier GI is inserted over: b-conductor, contacts 36T5, 38T6, secondary of transformer Ue, contact 34T5, rectifier GI, contact 28T3, a-conductor. When the key T6 is depressed, the rectifier GII is inserted over: b-conductor, contact 39T6, secondary of transformer Ue, contacts 21T1, 37T6, rectifier GII, contact 32T4, a-conductor.

I claim:

In a party line signalling system, a line having a plurality of substations thereon, each substation having a signalling device connected either to one side of the line or the other or across the conductors thereof, rectifiers connected to each device to render each device responsive to only one polarity of signalling current, a signalling arrangement for selectively operating said devices, said arrangement comprising a source of alternating current and a pair of rectifiers, and means including a plurality of contacts operated in combinations to connect said source through one or the other of said rectifiers either to one or the other side of said line or across the conductors thereof to operate the devices of said substations selectively by direct current of a particular polarity.

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