

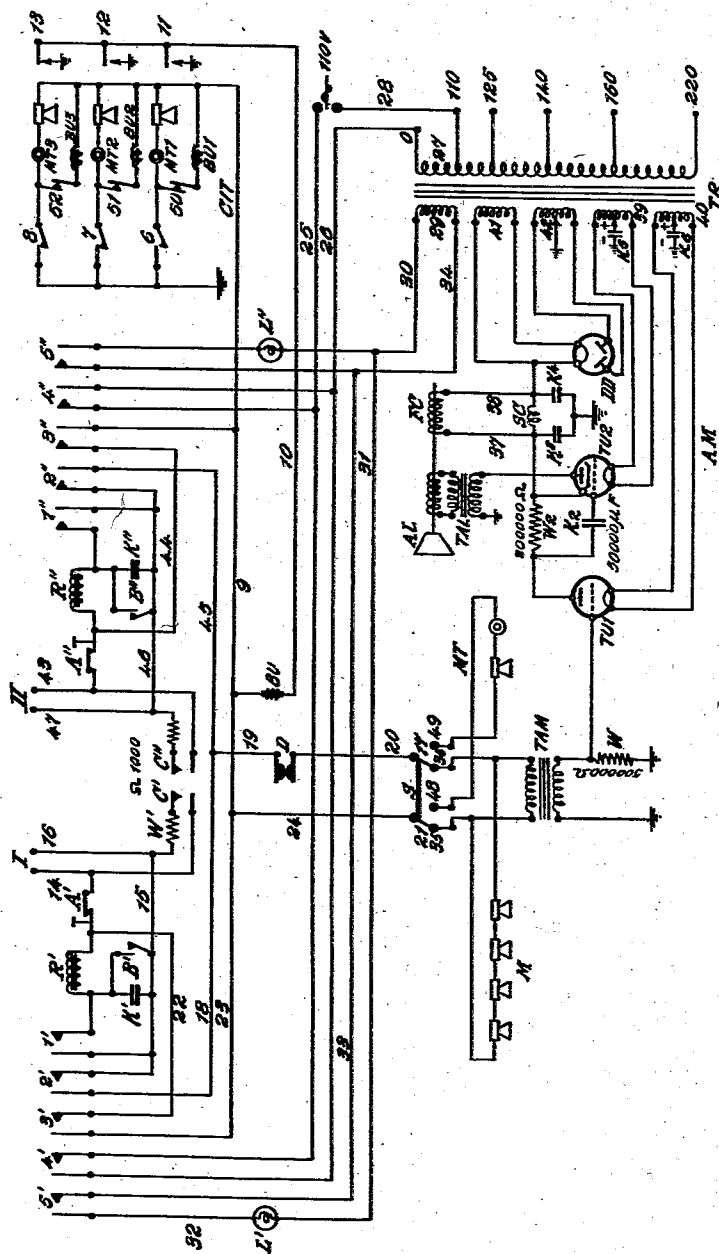
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TELEPHONE SYSTEM

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TELEPHONE SYSTEM

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The present invention has for its object an improvement in the systems of simultaneous telephony on a number of lines.

According to the present invention there is provided telephonic apparatus adapted to be connected to the normal local telephone lines which will receive and transmit simultaneous calls on a number of lines and furthermore permits connections to other lines which do not belong to the local network, for example the internal lines of a factory or the like, engaged directly or through a manual or automatic party exchange.

Further according to the invention there is provided apparatus for simultaneous conversation on a number of lines, wherein it is possible to pass from a conversation by means of an ordinary microtelephone set to a conversation by means of a microphone with elevated sensibility, situated at a certain distance from the person who uses the apparatus and by means of a loud speaker through an amplifier which is automatically included in the circuit.

According to this invention a device is provided, which permits the suspending of a conversation with one or more lines, although maintaining them busy, and to effect simultaneously desired operation with the remaining lines, for instance calling one or more of the remaining lines, leaving free one or more of said remaining lines, receiving an incoming call through one or more of said remaining lines, and finally re-establishing the suspended communication with the line or the lines first mentioned.

These and other advantages and possibilities will be obtained by means of the present invention, which is illustrated in the accompanying drawing in one diagrammatic figure, which represents by example party telephone equipment connected with two local lines and with three internal lines.

Referring to the drawing, the apparatus of the private set comprises the entrance conductors of two local or trunk lines I and II, which are connected respectively through normally closed keys A' and A'' to complete circuits through condensers K' and K'' and relay coils R' and R''. The relay coil R' operates a group of contact springs 1', 2', 3', 4' and 5' while the relay coil R'' actuates contact springs 1'', 2'', 3'', 4'' and 5''.

The springs 1', 1'' are designed to close a holding circuit for each of the relays R', R''. The springs 2', 2'' are provided for the purpose of connecting one of the conductors of each line I, II with one of the movable contacts of the switch S through the dial D. The springs 3', 3''

have the object to connect the other conductor of each of the lines I, II with the other of the movable contacts of the switch S.

The springs 4', 4'' form interrupters for the general feeding of the amplifier forming part of the telephonic apparatus. The springs 5', 5'' are simple interrupters for the ignition of signal lamps adapted to indicate which of the two lines I, II is in operation.

The switch S is designed to bring the line or the lines I, II in connection with a normal microtelephone MT or with a device constituted by a group of microphones M in series and an amplifier AM provided with a loudspeaker AL.

To one of the contact springs 3', 3'' there is connected a conductor CIT which leads to a group of internal office telephone stations arranged in parallel which may be induced to operate by means of contacts 6, 7, 8, by which the exit of the stations are connected with earth. A buzzer BU is connected with the conductor 9 and by means of a conductor 10 this circuit extends to the interrupters 11, 12 and 13, with the aid of which—from the posts where are installed the inter-office stations MT1, MT2, MT3,—there may be effected the call of the principal post M, AL and MT respectively.

When there is an incoming ringing current through one of the two lines connected with the party set, for instance through the line I, the alternating ringing current passes through the following circuit: conductor 14, interrupter A', relay R', condenser K', conductor 15 and the second conductor 16 of line I. In this way the relay R' is energized closing at the same time all the contact springs 1', 2', 3', 4' and 5'. The spring 1' thus closes a holding circuit for the relay R' bridging the condenser K'. Thus when the alternating ringing current ceases, the relay R' remains energized.

The closing of the springs 2' connects the conductor 16 of the line I with the movable contact 17 of the switch S through the conductor 15, closed springs 2', conductor 18, conductor 19, dial D, and the conductor 20. The closing of the springs 3' connects the conductor 14 of line I with the contact 21 of the switch S through the interrupter A', the conductor 22, the springs 3', the conductor 23 and the conductor 24.

The closing of the springs 4' feeds the primary winding of the supply transformer TR with the alternating current of the network, for instance at 110 volts, through the following circuit: conductor 25, springs 4', the primary winding 27, and the conductor 28.

The closing of the springs 5' energizes the lamp L' through the following circuit: secondary winding 29 of the transformer TR, conductor 30, conductor 31, lamp L', conductor 32, springs 5', conductor 33, conductor 34, and the winding 29.

Assuming the switch S to be in the position indicated in the drawing, the line I will thus be extended to the contacts 35 and 36, with which there are connected, in parallel, the transformer TAM for the amplifier AM and the microphone set M in series. The resistance offered by the microphones in series and by the primary winding of the transformer TAM is substantially equal to the resistance offered by an ordinary micro-telephone, for instance by the microtelephone MT, in such a way as not to create any disturbance on the network when the assemblage M, AM, AL is substituted by means of the switch S for the normal microtelephone MT. The mounting in parallel of the group of microphones M with respect to the primary winding of the transformer TAM has the object to avoid reciprocal perturbing actions between the group of microphones M and the loudspeaker AL.

The amplifier AM which is automatically placed in operation in consequence of the energization of relay R' owing to the closing of the springs 4' which close the feeding circuit of the primary winding of the transformer TR, may be of any suitable type, but as an example in the following is described as an amplifier which in practice has given very good results. It comprises two amplifying tubes TU1 and TU2 each having a filament with direct heating and rapid ignition.

One end of the secondary winding TAM is connected with the earth whilst the other end is connected with the grid of the tube TU1 and is further connected with the earth through a resistance W, for instance of 500,000 ohms. The anode of the tube TU1 is connected through the condenser K2 for example of the capacity of 50,000 μ f. with the first grid of the tube TU2, and through a resistance W2, for instance of 300,000 ohms with the second grid of the tube TU2. The anode of the tube TU2 is connected to the primary winding of the transformer TAL, the secondary winding of which energizes the movable coil of the loudspeaker AL. The field coil FC of the loudspeaker AL is fed by the conductors 37 and 38, arranged across an induction coil SC which is connected in series between the second grid of the tube TU2 and the cathode of the duo-diode DD. Two condensers K3 and K4 disposed in series are also connected across the coil SC and a point between the condensers is grounded. The cathodes of the tubes TU1 and TU2 are fed by the secondary windings 39 and 40 of the transformer TR, the respective electric centres of which are conducted to earth through the polarized condensers K5 and K6. The duo-diode DD has the cathode thereof fed by the secondary winding 41 of the transformer TR and the anodes are connected with the ends of the secondary winding 42 the electric centre of which is connected with the earth.

The incoming call, in accordance with what has been described has therefore by excitation of the relay coil R' caused the operation of the amplifier AM, whereby it is now possible to converse with the line I, employing the group of microphones M and the loudspeaker AL.

If the operation of the station M, AL desires to call in conference also the line II, he first closes the contact C', bringing the resistance

W' in parallel on the line I, and the interrupter A' is then opened, thus deenergizing the relay coil R' causing the opening of the spring contacts 1', 2', 3', 4' and 5'. If the operators closes for a short while the interrupter B'', providing energization of the coil R'' and therefore the closing of the group of springs 1'', 2'', 3'', 4'', 5''. In such a way the line II is connected with the switch S and thereby with the station M, AL in a manner substantially identical to what had previously happened when energizing the relay R'. A detailed description of the operation of the circuits connected with the springs 1'-5' will not be necessary, since such operation is similar to the operation of the circuits connected with the springs 1'-5'. During this operation the line I remains occupied, since the interrupter C' is closed and therefore includes in the circuit of the line the resistance W', which for instance has the value of 1,000 ohms.

By means of the dial D the operator now calls the desired subscriber through the line II and after having received an answer, he closes the interrupted B', energizing the coil R' and causing the closing of the springs 1'-5' after which the switch C' is opened.

The lines I and II are thus connected with the switch S. The circuit from the line I to the switch S is established from the conductor 14 through the interrupter A', the wire 22, the contacts 3', the conductors 23 and 24, the switch S, the contact 20, the dial D, the conductors 19 and 18, the contacts 2', the wires 15 and 16. The circuit of the line II is established to the switch S from the conductor 43 through the interrupter A'', the conductor 44, the contacts 3'', the conductors 9 and 24, the switch S, the contact 20, the dial D, the conductors 19 and 45, the contacts 2'' and the conductors 46 and 47. The subscribers of the lines I, II and the station at M may now freely converse between each other.

The operator of the station M can now call into conference also one or more of the inter-office stations MT1, MT2, MT3, respectively by closing one or more of the interrupters 6, 7, 8. In such a manner the operation of the buzzers BU1, BU2, BU3 is effected, which operation may be terminated by the called person opening the respective interrupters 50, 51, 52.

If it is desired to pass from the conversation by means of the set of microphones M and the loudspeaker AL a conversation by means of the microtelephone MT, it will be sufficient to displace the movable contacts 17 and 21 of the switch S from the position indicated in the drawing to the contact position with the contacts 48 and 49.

The operator of the station at M, AL may call one of the lines I and II, by first closing the interrupter B' or B'', thus energizing the coil R' or R''. In this way the springs 1'-5' or 1''-5'' are closed, wherefore the station M, AL is in connection with the desired line. The call is therefore effected in an ordinary way by means of the dial D.

By means of the closing of the respective interrupters 11, 12, 13 each operator which finds himself at one of the inter-office telephone stations MT1, MT2, MT3 may cause the operation of the buzzer BU, as a consequence of which the operator of the principal post M, AL, upon closing the corresponding interrupters 6, 7, 8, places himself in communication with the calling station. The operator of the inter-office station perceives the reply of the operator of the principal

pal post, hearing the buzzing of the respective buzzer BU1—BU3. Thereupon by opening the corresponding interrupter 50, 51 or 52 communication is established with the principal post.
 5 Through the principal post the operator of the inter-office station may be placed into communication with one of the lines I, II or with both of them in the manner described above.

The present invention is illustrated in a diagrammatic form in which but two local lines and three inter-office telephone stations can be connected with the private party set M, AL, and MT. It is obvious however that by means of a simple multiplication of the circuit elements, the local lines may be brought to whatsoever desired number, as well as the internal lines. Therefore, each internal line may be provided with microphone and loudspeaker, furnished with respective amplifiers for free conversation. Applicant however does not confine himself to the example illustrated and described but declares that his invention has no other limits beyond those established in the following claims:

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. System of simultaneous telephony on a number of lines comprising in combination, entrance conductors for each line, a relay connected with said entrance conductors through a condenser, a holding circuit for said relay controlled by the relay itself, groups of contact springs controlled by said relays adapted to insert into the circuit of each line a private party set, and a resistance provided with an interrupter normally opened connected in parallel with each of said lines in the manner and for the purposes described.

2. System of simultaneous telephony on a number of lines comprising in combination, entrance conductors for each line, a relay connected with said entrance conductors through a condenser, a holding circuit for the said relay controlled by the relay itself, groups of contact springs controlled by the said relays adapted to insert in the circuit of each line a private party set, a resistance provided with an interrupter normally opened connected in parallel with each of said lines, an interrupter normally closed inserted between a conductor of each of said lines and the relay, and a second interrupter inserted between the second conductor of each of the lines and said relay in parallel with the condenser.

3. System of simultaneous automatic telephony on a number of lines comprising in combination, entrance conductors for each line, a relay connected with said entrance conductors through a condenser, a holding circuit for the said relay controlled by the relay itself, groups of contact springs controlled by said relay adapted to insert in the circuit of each line a private party set, a resistance provided with an interrupter nor-

mally opened connected in parallel with each of said lines, a microphone connected with said lines through contact springs operated by said relay, an amplifier connected in parallel with said microphone, and a loudspeaker connected with said amplifier.

4. System of simultaneous automatic telephony on a number of lines comprising in combination, entrance conductors for each line, a relay connected with said entrance conductors through a condenser, a holding circuit for said relay controlled by the relay itself, groups of contact springs controlled by the relay adapted to insert in the circuit of each line a private party set, a resistance provided with an interrupter normally opened connected in parallel with each of said lines, a supply transformer connected with the network for an amplifier energized through contact springs controlled by said relay.

5. System of simultaneous automatic telephony on a number of lines comprising in combination, entrance conductors for each line, a relay connected with said entrance conductors through a condenser, a holding circuit for said relay controlled by the relay itself, groups of contact springs controlled by the relay adapted to insert in the circuit of each line a private party set, a resistance provided with an interrupter normally opened connected in parallel with each of said lines, a microphone and an amplifier, a number of internal telephone lines connected with said microphone and said amplifier through a number of interrupters.

6. System of simultaneous telephony on a number of lines comprising in combination, entrance conductors for each line, a relay connected with said entrance conductors through a condenser, a holding circuit for said relay controlled by the relay itself, groups of contact springs controlled by said relay, adapted to insert in the circuit of each line a private party set, a resistance provided with an interrupter normally opened connected in parallel with each of said lines, a switch for alternatively bringing into connection with said telephone lines a microphone and an amplifier in parallel between them and a microphone respectively.

7. System of simultaneous automatic telephony on a number of lines comprising in combination, entrance conductors for each line, a relay connected with said entrance conductors through a condenser, a holding circuit for said relay controlled by the relay itself, groups of contact springs controlled by the relay adapted to insert in the circuit of each line a private party set, a resistance provided with an interrupter normally open connected in parallel with each of said lines, a switch for alternatively bringing into connection with said telephone lines a set of microphones in series and an amplifier in parallel between them and a microtelephone.

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