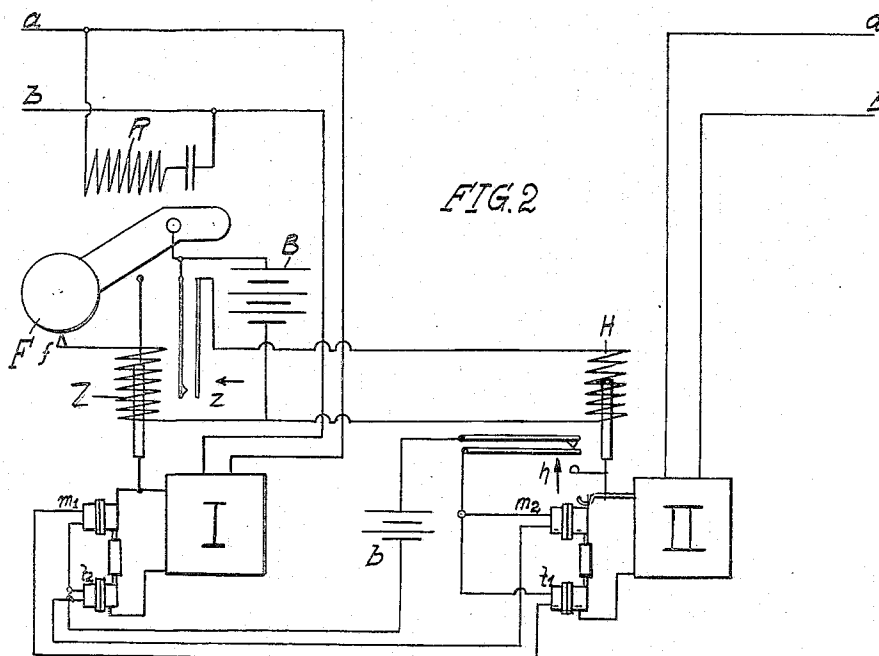
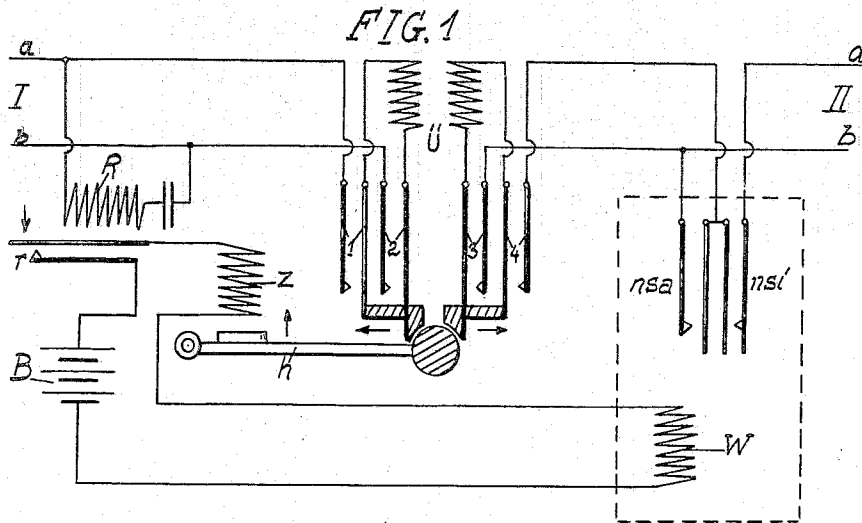


July 3, 1934.

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CALL FORWARDING SYSTEM
Filed Nov. 13, 1931

1,965,123



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UNITED STATES PATENT OFFICE

1,965,123

CALL FORWARDING SYSTEM

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Application November 13, 1931, Serial No. 574,914
In Germany July 10, 1931

19 Claims. (Cl. 179—18)

This invention relates to improvements in call forwarding systems, and has for an object the provision of means whereby subscribers who have two or more automatic or self-connecting telephone lines, such as is described in co-pending application S. N. 550,338, filed July 13, 1931, may direct calls, arriving at their telephones, further on to other predetermined subscribers.

Heretofore, it has not been possible for telephone subscribers to hold conversations over their telephone connections other than by the regular fixed connections.

By means of the system described and claimed herein, a telephone subscriber is provided with a telephone system having further flexibility in that incoming messages may be automatically imparted to one or more predetermined telephones.

Referring to the drawing, Figure 1 shows one embodiment of the invention in which an automatic selecting device is shown in circuit with two office telephone lines, all of the instrumentalities being shown diagrammatically; and

Figure 2 shows another embodiment of the invention in which means is disclosed for automatically raising the switch-hook and thereby automatically connecting the telephone associated with said switch-hook to the calling telephone.

To show the utility of such a system, a typical example of its use is herein given. Assuming that a physician has a system of this character with two stations, each having a line connected to the central office, the telephones being of the so-called "dial" type, one of the lines may be assumed to be the line I, Figure 1 and the other line II in Figure 1, the apparatus and operation of which will presently be described.

Now assuming that the physician is invited to Mrs. Jones' home to play bridge, the self selecting device shown in dotted lines in Figure 1 is set for Mrs. Jones' telephone number by the physician before he leaves home. He goes to Mrs. Jones' home and is playing bridge. Now a party calls the physician over line I in his office. The calling current relay R closes the contacts r completing a local circuit including the battery B, the electromagnetic release W of the self selecting device and the magnet Z which inductively couples the lines I and II together through the coupling member U. The self selecting device upon being released calls Mrs. Jones' telephone and when the latter is answered the party originally calling the physician talks to him through line I, the coupling device U, the line II and Mrs. Jones' telephone, making it unnecessary for the

physician to have someone in his office to answer the telephone and transfer the calls to him.

Two office telephone lines, *abI* and *abII* (Figure 1) are so arranged that they may be inductively connected by means of a transmitting coil U. A calling current relay R is connected across the line *abI* with a condenser in series. The line *abII* is inter-connected with the interrupter contacts *nsa* and *nsi* of an automatic selecting device, such as is described in the co-pending Appln. Ser. No. 443,137, filed Apr. 10, 1930 and application Ser. No. 550,338, filed July 13, 1931, above referred to, in which the mechanism is provided with an electromagnetic release for setting the mechanism into operation.

When the coil of the calling current relay R is energized by means of a call coming on the line *abI*, the contact *r* is closed and a circuit is set up which may be traced as follows: from the contact *r* via the source of electric current or battery B to the release magnet W of the self-selecting device to the magnet Z of the time-switch and back to the contact *r*.

When this circuit is energized, after the operation of the calling current relay R, the time-switch lever *h*, attracted by the coil Z, is thereby pulled up in the direction shown by the arrow, thereby moving the contact arms 1 and 2 to the left, as shown by arrow, and the contact arms 3 and 4 to the right, as is also shown by an arrow, thereby connecting one winding of the transmitting coil to the line *abI* and the other winding of the transmitting coil U to the line *abII*.

At the same time, the release magnet W, of the self-selecting device, releases the mechanism therein and allows this device to operate, and by means of the same the desired station is selected.

As an alternative, a relay or similar device may be substituted in place of the time-switch having an electron winding Z and an armature *h* associated therewith, for connecting the windings of the transmitting coil U to the lines *abI* and *abII*. In this case the disconnecting of the transmitting coil from the lines may be effected by means of a sensitive reset coil forming an integral part of this relay, or by means of a separate sensitive relay.

In the arrangement shown in Figure 2, two telephone stations, I and II, are shown, each having an office line *ab*, which are adapted to be connected by means of suitable mechanism provided for raising the switch-hook of the telephone to be connected, and speaking connection is established and sound waves produced in the receiver

and transmitted into the microphone of the other telephone.

The operating coil R of a calling current relay having a condenser in series therewith, is connected across the line *ab* of the telephone station I. When the line *abI* is energized the coil R is thereby also energized and the drop disc F is released and establishes contact with the contact *f*, thereby establishing a circuit which may be traced as follows: from the drop disc F to the contact *f*, through the magnet coil Z of the time-switch and via a source of current or battery B back to the drop disc F.

As current passes through the magnet coil Z the contact arm is pulled to the left in the direction of the arrow, closing the contact *z* and establishing a circuit which may be traced as follows: from the contact *z* via the battery B to the solenoid coil H and back to the contact *z*. When the solenoid H is energized the switch-hook of telephone station II is raised. The armature of the solenoid Z is pulled up, thereby raising the switch-hook of telephone station II. The action resulting from the raising of the solenoid armature will be presently described.

At the same time that the contact *z* was closed by the action of the time-switch coil Z the hook-switch of telephone station I was raised.

A projection on the armature of the solenoid H, when the same is raised, closes the contacts *h* and establishes circuits which may be traced as follows: from the contact *h* to the microphone or transmitter *m*² and to the receiver or telephone *t*¹ and via the battery *b* back to the contact *h*.

The transmitter *m*² is placed adjacent to the receiver of the instrument II and the telephone or receiver *t*² is placed adjacent to the transmitter of station I, likewise, the transmitter *m*¹ is placed adjacent to the receiver of station I and the receiver *t*¹ is placed adjacent to the transmitter of station II, thereby speech impulses coming over the line *ab* to station I are transferred to the line *ab* of station II.

In the system described in Figure 1, station I may be inductively coupled to any line or lines selected by means of the automatic selector.

In the modification shown in Figure 2, impulses over the line *ab* of station I are transferred to the line *ab* of station II, by means of microphones, or transmitters, and receivers co-operating with the receivers and transmitters of the stations I and II, respectively.

I claim—

1. In a call forwarding system a plurality of telephone stations and transmission lines therefor, an automatic selecting device for transmitting code signals to select a predetermined station, a calling current relay associated with at least one of said stations, a local circuit controlled by said relay, said circuit including means for inductively coupling two of said lines with each other and also including the control magnet of an automatic selecting device.

2. In a call forwarding system of the character described, a plurality of telephone lines, an automatic selecting device for transmitting code signals to select a predetermined station, a plurality of contact arms connected to said lines, a second set of contact arms adapted to contact with said first arms, a coupling coil having windings thereon connected to said second set of arms, means including an electro-magnet for actuating the contact arms, and a relay associated with one of said lines adapted to control a local circuit including said electro-magnet, a source of current

and a releasing magnet of an automatic selecting device.

3. In a call forwarding system a plurality of telephone stations and transmission lines therefor, an automatic selecting device associated with any one of said stations and adapted to select any one of the plurality, a calling current relay associated with at least one of said stations, a local circuit controlled by said relay, said circuit including means for inductively coupling two of said lines with each other and also including the control magnet of the automatic selecting device.

4. In a call forwarding system of the character described, a plurality of telephone lines, telephone stations associated with said lines, a calling current relay associated with one of said lines, a local circuit controlled by said relay including a time-switch and a source of current, said time-switch being adapted to actuate a switching mechanism of one of said stations and also adapted to control a second local circuit including said battery and a solenoid associated with the switching mechanism of a second telephone station, and a third local circuit controlled by said solenoid which includes a transmitter adjacent to the receiver of said first station and a receiver adjacent the transmitter of said second station, and a source of current for said first transmitter.

5. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, an automatic station selecting code transmitter at said subscriber's station and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line.

6. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a normally non-operative automatic station selecting code transmitter at said subscriber's station, and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line.

7. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a normally non-operative automatic station selecting code transmitter at said subscriber's station, and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line for simultaneously electrically associating said incoming and outgoing lines whereby speech signals received over one of said lines are repeated over the other of said lines.

8. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, an automatic station selecting code transmitter at said subscriber's station, means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line and means for simultaneously electrically connecting said incoming and outgoing lines.

9. In a call forwarding system for telephone

systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, an automatic station selecting code transmitter at said subscriber's station, means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selection code over said outgoing line, a telephone repeater intermediate said lines, normally non-operative and means responsive to the incoming call for rendering said repeater operative to transmit signals received over one line to the other.

10. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a normally non-operative automatic station selecting code transmitter at said subscriber's station and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line and for simultaneously electrically associating said incoming and outgoing lines.

11. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a normally non-operative automatic station selecting code transmitter at said subscriber's station and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line and for simultaneously electrically associating said incoming and outgoing lines whereby speech signals received over one of said lines are repeated over the other of said lines.

12. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a normally non-operative automatic station selecting code transmitter at said subscriber's station and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line and for simultaneously electrically associating said incoming and outgoing lines whereby speech signals received over one of said lines are repeated over the other of said lines.

13. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, an automatic station selecting code transmitter at said subscriber's station, a local circuit at said subscriber's station, a relay in the incoming line responsive to telephone calling signal frequency for controlling said circuit, a switch for electrically associating the incoming and outgoing lines, a relay in said local circuit for operating said switch and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line.

14. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, an automatic station selecting code transmitter at said subscriber's station, a local circuit at said subscriber's station, a relay in the incoming line re-

sponsive to telephone calling signal frequency for controlling said circuit, a switch for electrically associating the incoming and outgoing lines, a relay in said local circuit for operating said switch and a second relay in said local circuit for starting said automatic station selecting code transmitter.

15. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, an automatic station selecting code transmitter at said subscriber's station, a local circuit at said subscriber's station, a relay in the incoming line, responsive to telephone calling signal frequency for controlling said circuit, a telephone repeater, a switch for rendering said repeater operative to transmit speech signals from one of said lines to the other, a relay in said local circuit for operating said switch and means responsive to an incoming call for automatically setting said transmitter into operation for transmitting a predetermined station selecting code over said outgoing line.

16. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, an automatic station selecting code transmitter at said subscriber's station, a local circuit at said subscriber's station, a relay in the incoming line responsive to telephone calling signal frequency for controlling said circuit, a telephone repeater, a switch for rendering said repeater operative to transmit speech signals from one of said lines to the other, a relay in said local circuit for operating said switch and a second relay in said local circuit for starting said automatic station selecting code transmitter.

17. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a telephone repeater intermediate said lines, normally non-operative, and means responsive to the incoming calls for rendering said repeater operative to transmit speech signals received over one line to the other and means for simultaneously selecting a predetermined station over said outgoing line.

18. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a telephone repeater intermediate said lines, normally non-operative, means responsive to the incoming calls for rendering said repeater operative to transmit speech signals received over one line to the other and for simultaneously selecting a predetermined station over said outgoing line, said means comprising a local circuit at said subscriber's station, a relay in the incoming line responsive to telephone calling signal frequency for controlling said circuit, a normally non-operative code transmitter for transmitting a code to select a predetermined station, and a switch for electrically associating the incoming and outgoing lines.

19. In a call forwarding system for telephone systems comprising a plurality of telephone subscriber stations, a subscriber's station having an outgoing and incoming telephone line, a telephone repeater intermediate said lines, normally non-operative, means responsive to the incoming calls for rendering said repeater operative to transmit speech signals received over one line to

the other and for simultaneously selecting a predetermined station over said outgoing line, said means comprising a local circuit at said subscriber's station, a relay in the incoming line responsive to telephone calling signal frequency for controlling said circuit, a normally non-operative code transmitter for transmitting a code to select a predetermined station, a switch for electrically associating the incoming and outgoing lines, and a relay in said local circuit for operating said switch.

LÉON KARDORFF.

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