

Nov. 25, 1930.

L. M. GRANDIN

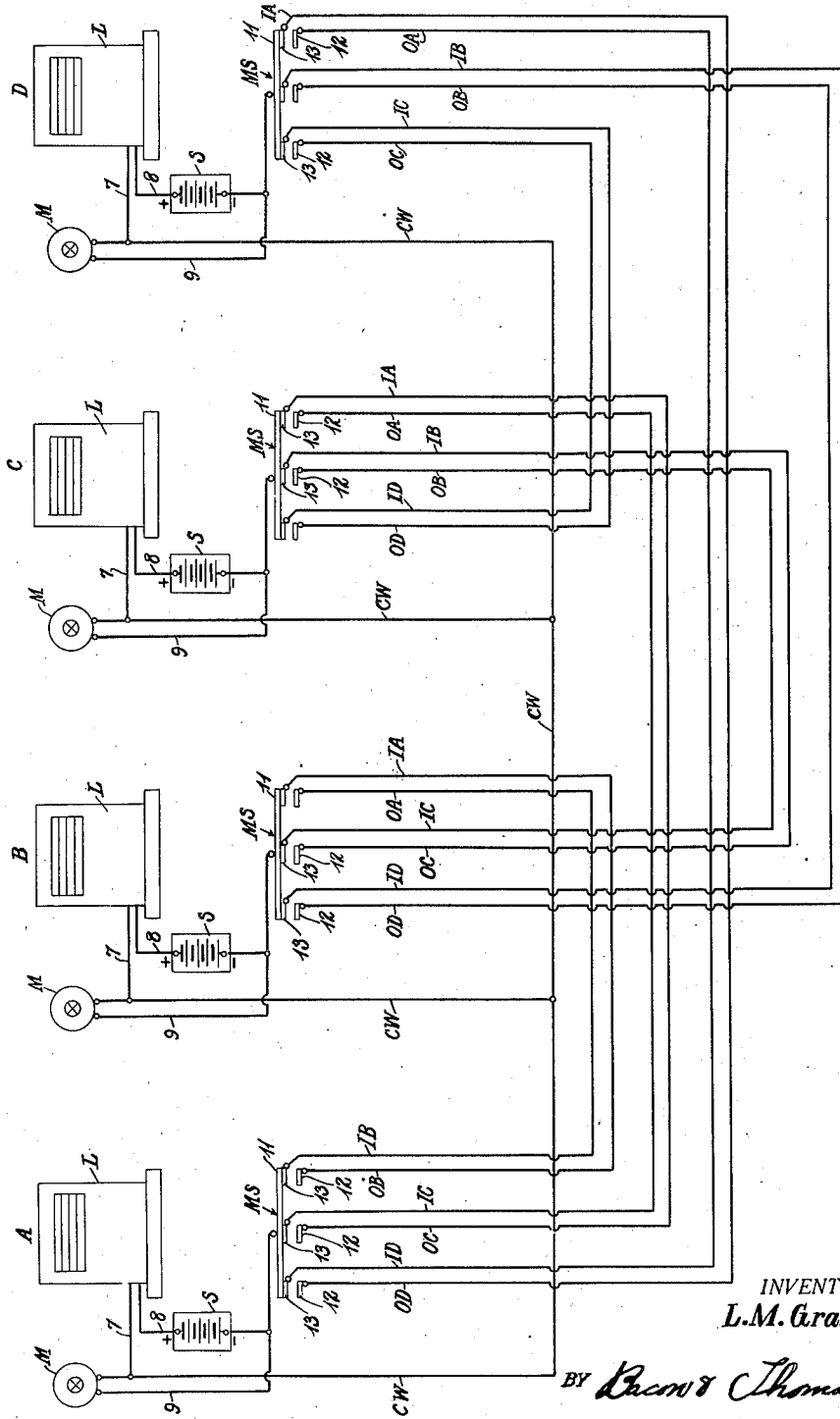
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TELEPHONE SYSTEM

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2 Sheets-Sheet 1

Fig. 1.



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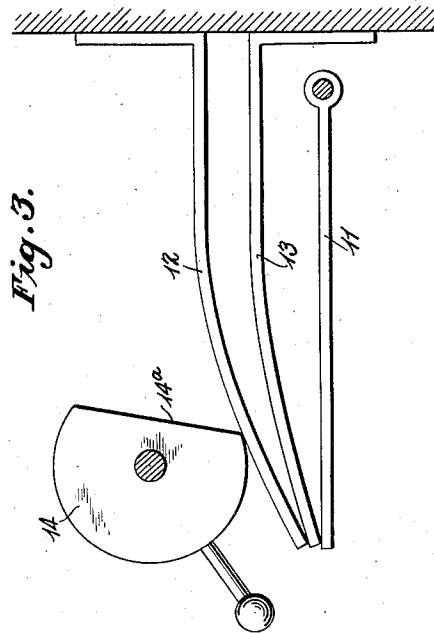
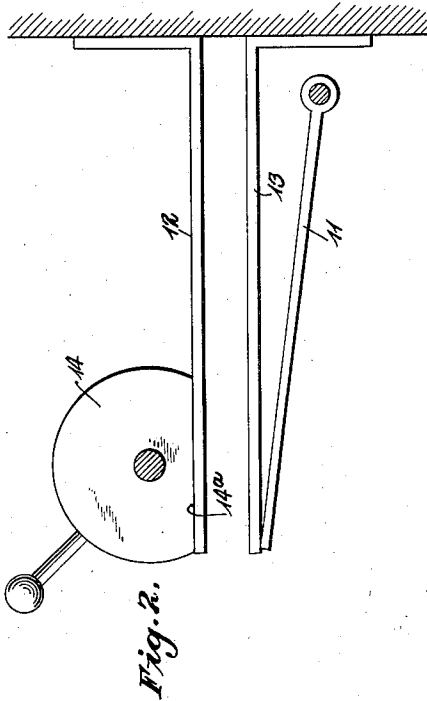
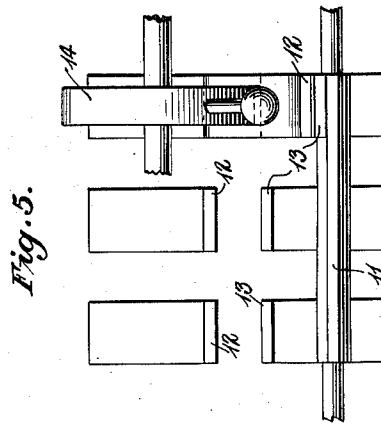
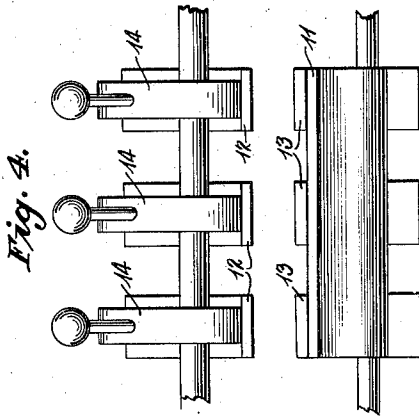
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TELEPHONE SYSTEM

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TELEPHONE SYSTEM

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This invention relates generally to private telephone systems and especially to intercommunicating systems which may be operated without the services of a central operator.

The primary object of the invention is to provide an inter-communicating system including any suitable number of stations which may be distributed as desired throughout offices, homes, factories, hotels, warehouses or the like and which will permit any one station to call any other station or desired number of stations to the exclusion of the other stations.

A further object of the invention is to provide a system of the above mentioned type which will permit a called station to remain in condition to receive a call from other stations while said called station is in communication with a calling station, or said called station may be conditioned so that no outside call will be received and the two stations in communicative relation with each other will be selectively connected for a private conversation without fear of interruption.

A still further object of the invention is to provide a system wherein the called station may answer the calling station without previous knowledge of which station is doing the calling.

Another object of the invention is to provide a system which is of very simple design; one which may be installed at a very nominal cost, principally because of the fact that no signalling apparatus and additional wiring circuits necessary therefor are employed; and one that may be operated by any person of average intelligence who is in possession of his hearing and vocal faculties.

Other objects and advantages of the invention will be apparent during the course of the following description:

In the accompanying drawings forming a part of this specification and in which like reference characters are employed to designate like parts throughout the same,

Figure 1 shows diagrammatically the wir-

ing system employed for connecting the various stations, and

Figures 2 to 5, inclusive, show diagrammatically switching mechanism employed for controlling the various circuits embodied in the system.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of this invention, the reference characters (A), (B), (C), and (D) designate the various stations in their entirety. While only four stations have been illustrated in this system, it nevertheless is to be understood that any desired number of stations may be employed without changing the mode of operation or materially altering the apparatus employed.

Each station includes a microphone unit or transmitter (M), a loud speaking receiver (L), a source of current, such as a battery (S), and a multi-pole switching means (MS).

A common wire (CW) is connected to one side of each of the microphones or transmitters (M) and this common wire (CW) is connected to one side of each of the loud speaking receivers (L) by the wires 7.

The multi-pole switch (MS) for each station includes a connector bar 11 which is electrically connected to the remaining side of the microphone or transmitter (M) by the wire 9 and to one side of the source of current (S) by the wire 10. The circuit through the source of current is completed by the wire 8 which is connected to the remaining side of the loud speaking receiver (L). It now will be seen that one side of each of the transmitters and receivers is connected to a common wire and that a source of current is provided at each station for its respective loud speaking receiver.

The multi-pole switching mechanism (MS) at each station further includes a plurality of pairs of contact members and the similar members in each pair are designated by the reference characters 12 and 13, as illustrated in the drawings. Under normal conditions, the contact elements 13 are in engagement or electrical contact with the connector bar 11. The contacting elements 12 are normally out of contact with either

the element 13 or the bar 11. It is to be understood that each station is provided with a pair of contact elements 12 and 13 for each of the other stations connected in the system.

Each of the contact elements 12 and 13 have wires permanently attached thereto and the wires attached to the elements 13 each extend to one of the other stations and is connected to a contact element 12 at that station. That second station also has a wire extending from one of its contact elements 13 to a contact element 12 of the first mentioned station. The contact elements 12 and 13 of the two stations just referred to constitute a pair of contact elements at each station.

In view of the fact that the contact elements 13 are normally electrically connected to a connector bar 11, the wires connected to these elements 13 are referred to as incoming wires. The wires connected to the elements 12 are referred to as outgoing wires. It will be seen, therefore, that a wire connected to an element 12 in one station is an outgoing wire at that station and as the same wire is connected to an element 13 at one of the other stations, the wire becomes an incoming wire at that second station. To more clearly describe this condition, the wire (OD) for the station (A) is connected to a contact element 12 of that station's switching mechanism (MS). This outgoing wire (OD) extends to station (D) and becomes the incoming wire (IA) at station D and is, of course, with respect to station (D), the incoming wire from station (A). The wire (ID) connected to the element 13 of the multi-pole switch (MS) for station (A) constitutes the incoming wire from station (D) and extends to station (D) where it is designated by the reference character (OA) for it constitutes, with respect to station (D), the outgoing wire for station (A). This same designating system has been carried out in connection with all of the wires leading from the elements 12 and 13 of one station to the elements 12 and 13 of another station.

The pairs of contact elements 12 and 13 for each multi-pole switching mechanism (MS) are each provided with an operator or key 14. This key may be of any desired form and is diagrammatically illustrated in Figures 2 and 3 as including a flat side 14^a whereby the operator or key will function as a cam. Figure 2 illustrates a pair of contact elements 12 and 13 in their normal condition; namely, with the element 13 electrically connected to a connector bar 11 and with the element 12 in engagement with the switch operator 14 and out of contact with the element 13 and the bar 11. Figure 3 discloses the operator 14 in a shifted position which has caused the element 12 to be placed in contact with the element 13 and the elements 13 and 11 moved out of their normal positions or planes. With respect to the va-

rious pairs of contact elements 12 and 13 constituting a multi-pole switch mechanism (MS), Figure 4 diagrammatically illustrates the various pairs of elements and the common connector bar 11 in their normal positions. Fig. 5 illustrates the various pairs of elements in the relative positions assumed when one of the operators 14 has been actuated in the manner illustrated in Figure 3. In other words, in Figure 5 one pair of elements 12 and 13 have been moved out of their normal planes and have forced the common connector bar 11 out of contact with the elements 13 of the remaining pairs of elements.

The operation of this telephone system may be described as follows: With the system in its normal condition, as illustrated in Figure 1, each station is in readiness to receive a call from any of the remaining stations. Should a person at station (A) desire to communicate with a person at station (B), the switch operator 14, as illustrated in Figs. 2 and 3, associated with the contact elements 12 and 13 connected to the wires (OB) and (IB), will be actuated for moving said pair of elements 12 and 13 into the positions illustrated diagrammatically in Figure 5. These elements 12 and 13, therefore, are both electrically connected to the connector bar 11 and have placed the wires (OB) and (IB) in circuit with the transmitter (M), the receiver (L), and the source of current (S) of station (A). Due to the fact that the incoming wire (IA) at station (B) is normally electrically connected to the bar 11, which in turn is connected to the loud speaking receiver (L) through the source of current (S), the person at station (A) now may call a person at station (B) by talking into the transmitter or microphone (M) at station (A). The voice of the speaker at station (A) will be discharged through the loud speaking receiver (L) at station (B) for notifying the person at this latter station of the existence of a call for him. The called party at station (B) may then answer the calling party at station (A) by orally acknowledging receipt of the call through the transmitter or microphone (M) at station (B). It will be noted that the party at station (B) so far does not know who has called him. The party at station (A) then may advise the party at station (B) which station has made the call and the party at station (B) then may actuate the operator 14 associated with the elements 12 and 13 connected to the wires (OA) and (IA). This will place these elements 12 and 13 and the bar 11 in the condition illustrated in Figure 5; namely, out of communication with the remaining pairs of elements 12 and 13. Such an action on the part of the person at station (B) will isolate the wires (OB-IA) and (IB-OA) from all of the other wires of the system and the parties at stations (A) and (B) may con-

verse with each other without danger of interference from any of the other stations or without danger of any person at any of the other stations hearing their conversation.

It will be noted that the party at station (B) has been placed in full communicative relation with the party at station (A) prior to his actuation of an operator 14 at his station. The party at station (B), therefore, may leave his switching mechanism (MS) in its normal condition and carry on his conversation with the party at station (A). With the switching mechanism (MS) in its normal condition at station (B), this station (B) is in condition to receive a call from any of the other stations.

It also will be seen that while stations (A) and (B) are in inter-communicative relation with respect to each other, either to the exclusion of other stations or in readiness to receive a call from the other stations, the parties at stations (A) and (B) may actuate any of the other operators 14 in their switching mechanisms (MS) for cutting into the communicative connection between stations (A) and (B) any of the other stations.

It is believed that the above description of the manner in which stations (A) and (B) have been placed in inter-communicative relation with each other will be sufficient and that the remainder of the system will be understood therefrom. It is believed advisable to note at this point that while stations (A) and (B) are connected together, stations (C) and (D) likewise may be connected together and that the number of different inter-connected and independent conversations carried on at one time over this system is limited only by the number of stations connected into the system.

It is to be understood that the form of this invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

1. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, and a source of current, a common conductor for all of said transmitters, receivers, and sources of current, and switching means provided at each station to selectively connect said station in full inter-communicative relation with any one or more of the other stations, said switching means at each station being operable to exclude from inter-communicative relation all of such stations which previously have not been inter-connected with that station.

2. In a telephone system, a plurality of stations, each including a transmitter, a loud speaking receiver, and a source of current,

a common conductor for all of said transmitters, receivers, and sources of current, and means at each station for connecting its transmitter, receiver, and source of current in full inter-communicative relation with the transmitter, receiver, and source of current of any other station.

3. In a telephone system, a plurality of stations, each including a transmitter, a loud speaking receiver, and a source of current, a common conductor for all of said transmitters, receivers, and sources of current, means at each station for connecting its transmitter, receiver, and source of current in full inter-communicative relation with the transmitter, receiver, and source of current of any other station, and means at each station for disconnecting its transmitter, receiver, and source of current from every station other than the station previously connected therewith.

4. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, and means at each station for connecting the loud speaking receiver at any desired number of the other stations in communicative relation with the transmitter of the station where such means is operated, and to connect the loud speaking receiver of such station in communicative relation with the transmitter or transmitters of the selected stations, whereby a party at any station may call one or more persons located at any of the other stations, said means at the calling station and at the station or stations at which the desired called party or parties are located being operable to disconnect their transmitters and loud speaking receivers from all of the undesired stations and carry on a private conversation by means of the transmitters and loud speaking receivers used for calling.

5. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, a common wire connecting one terminal of all of said transmitters and receivers, means at each station for connecting the second terminal of its transmitter and receiver to wires leading to each of the other stations, and means at each station for connecting the second terminal of its transmitter and receiver to a wire leading to and connected with a second terminal of the transmitter and receiver of one of the remaining stations.

6. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, and means at each station for placing its transmitter and receiver in full inter-communicative relation with the transmitter and receiver of more than one but not all of the other stations.

7. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, means at each sta-

tion for placing its transmitter and receiver in full inter-communicative relation with the transmitter and receiver of more than one but not all of the other stations, and means at each of the called stations for placing that station out of condition to receive a call from any other station while in communication with the calling station.

8. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, means at each station for placing its transmitter and receiver in full inter-communicative relation with the transmitter and receiver of any other station to the exclusion of all of the stations not so connected, and means at the called station for placing that station out of condition to receive a call from any other station while in communication with the calling station.

9. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, a common wire connecting one terminal of all of said transmitters and receivers, a pair of wires extending between each two stations, means at each station for connecting the second terminal of its transmitter and receiver to one of the two wires of each pair of wires leading to the other stations, the transmitter and receiver at each two stations being normally connected to different ones of the two wires extending between said stations, and means at each station for connecting its transmitter and receiver to the wire of each pair of wires which is connected to the similar instruments of the station to which said wires extend for placing the calling station in full inter-communicative relation with the called station.

10. In a telephone system, a plurality of stations, each including a transmitter and a loud speaking receiver, a plurality of independently operable switch devices at each station equal in number to the number of other stations in the system, each switch device being operable to place its station in full intercommunicative relation with one of the other stations whereby one station may call any fractional part or all of the other stations to the exclusion of the stations not called, the switching device at the desired called station, of all of the stations called, corresponding to the calling station being operable to place the said desired called station out of condition to receive a call from any of the other stations while in communication with the calling station, and the switching device at the calling station corresponding with the undesired called stations being operable to disconnect said undesired called stations from the calling station.

In testimony whereof I affix my signature.

LOUIS M. GRANDIN.