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TELEPHONE SYSTEM

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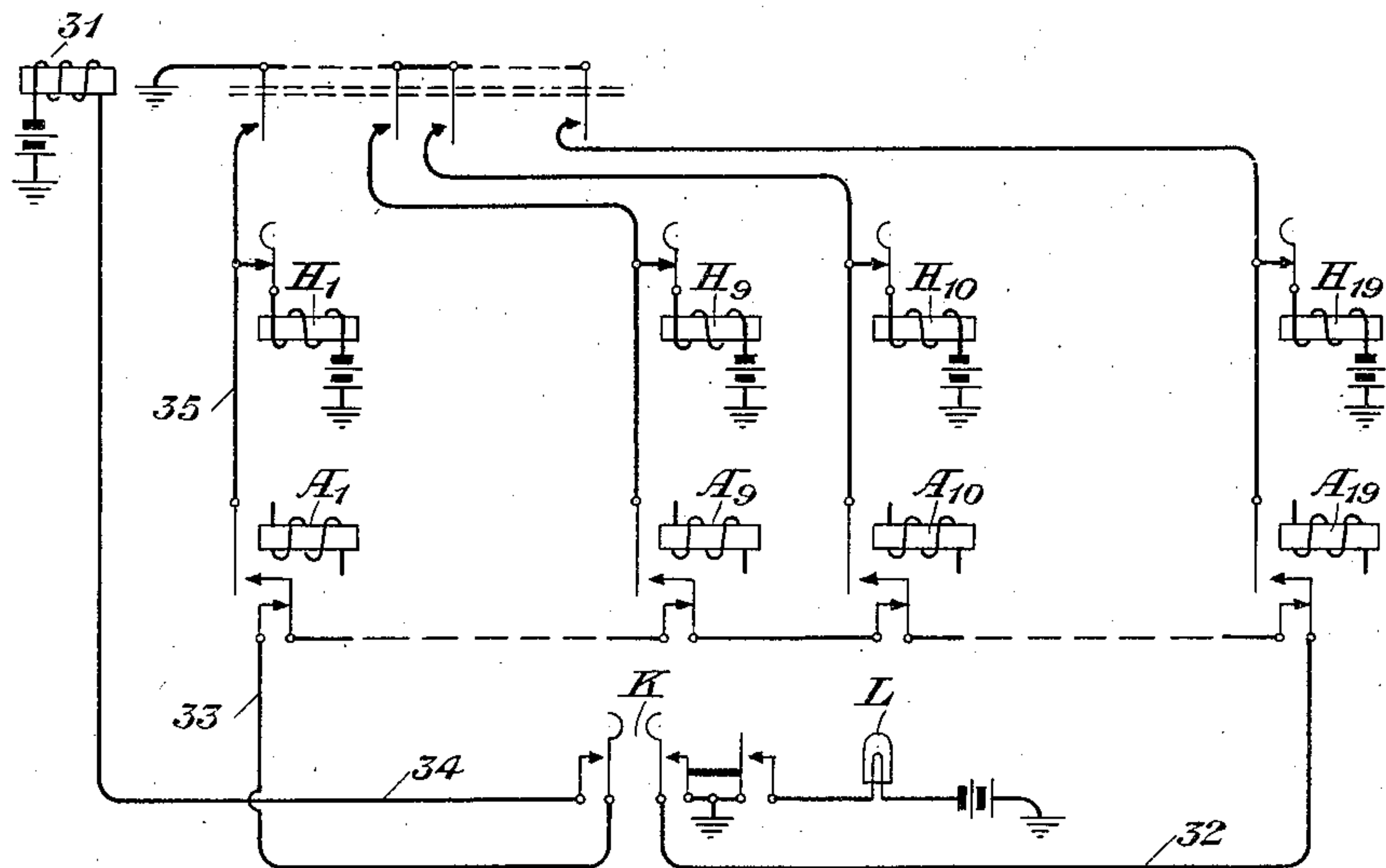
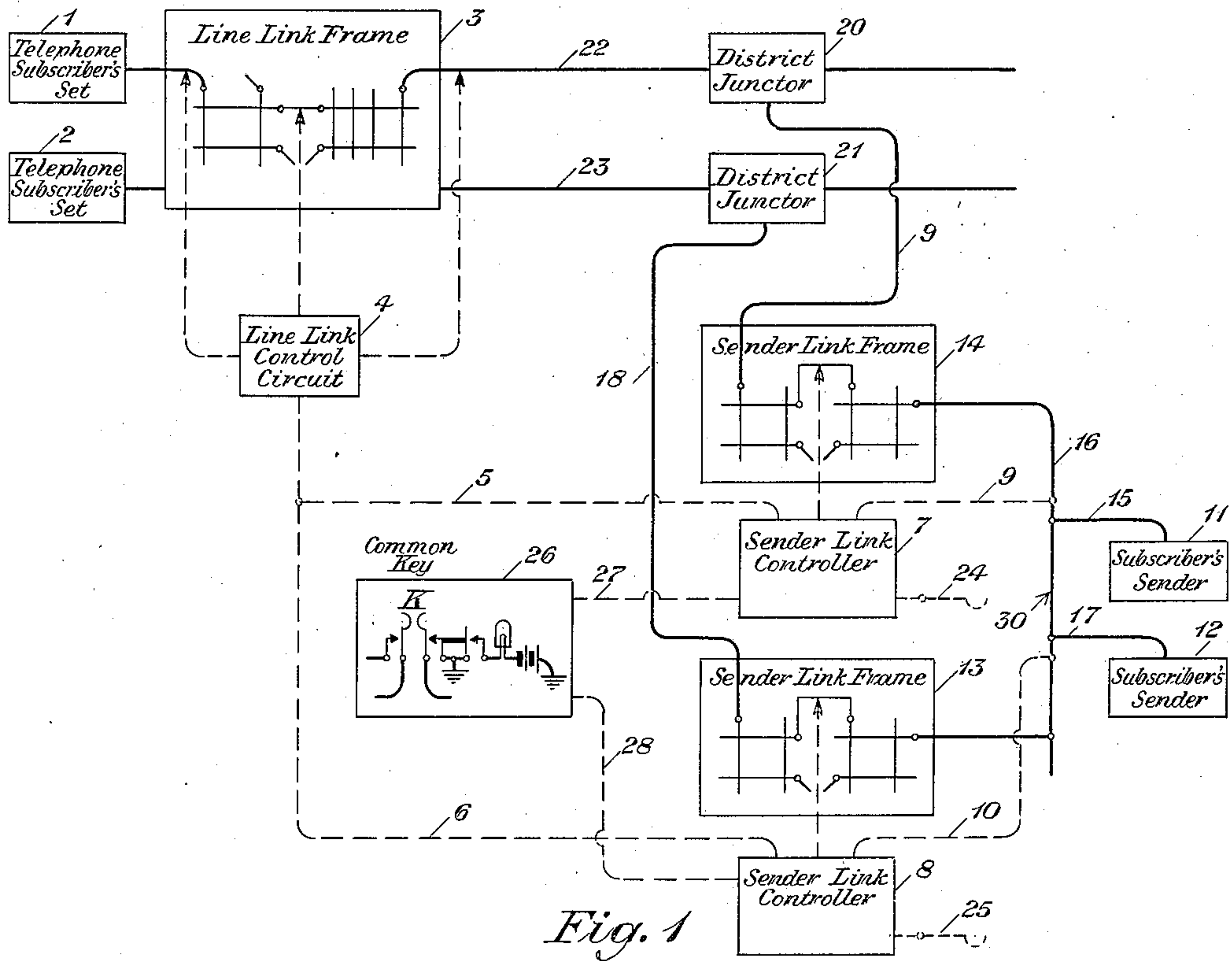


Fig. 2

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TELEPHONE SYSTEM

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3 Claims. (Cl. 179—175.23)

This invention relates to telephone systems of the automatic type and more particularly to improved arrangements for locating trouble or faults occurring in central office equipment of such systems.

In automatic telephone systems of the cross-bar type a calling subscriber will be connected through one of a number of sender link controllers to one of a number of subscribers' senders. The sender link controllers are so arranged that when trouble is encountered which stops the progress of the controller in selecting a sender, the controller will automatically time out and a trouble lamp will light in the proximity of the controller in trouble. The maintenance man will then place a hold plug in a jack individual to this controller and observe the action of certain relays in the controller circuit. If the trouble is in the controller circuit itself, it will repeat on the same frame and can usually be readily located. However, if the trouble is located in apparatus outside of the controller and common to other controllers, it might cause several other controllers to time out and operate their trouble lamps. Under such conditions it might be rather difficult to utilize the present hold jacks individual to each controller to quickly analyze and locate the trouble. In the arrangements of the invention the individual hold jacks are eliminated and a single key is provided, which, when operated in response to a trouble lamp will set certain arrangements in operation to allow a controller in trouble to time out and hold and to prevent other controllers from holding and thus allow the trouble to be readily located. Other objects and features of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing in the Figures 1 and 2 of which the invention is illustrated. Fig. 1 is a circuit diagram showing schematically a calling subscriber's line connected to a district junctor and a subscriber sender. Fig. 2 is a circuit diagram illustrating in detail the arrangements of the invention.

In Fig. 1 is shown a telephone subscriber's set 1 connected to a line link frame. The line link frame would have a multiplicity of telephone subscribers' sets such as 2 connected to it also. The telephone subscriber's set 1 would be connected to a line link control circuit 4, and thence would be connected to one of a number of sender link controllers such as 7 and 8. A connection

would be established to these controllers by means of the paths 5 and 6. The function of a sending link controller, such as 7, would be to select one of a number of subscriber senders such as 11 and 12. The selecting circuit is shown as 9. It would also be a function of the sender link controller, such as 7, to establish a connection through the sender link frame 14 to a district junctor such as 20. One of the subscriber senders, such as 11, would then be connected over conductors 15 and 16, switching mechanism in the sender link frame 14, conductor 9, through district junctor 20, over conductor 22, through switching mechanism in the line link frame 3 to the telephone subscriber's set 1. A dial tone would be sent over the last mentioned path from the subscriber sender 11 to the telephone subscriber's set 1.

Heretofore it has been the practice, in order to facilitate the location of trouble arising out of the operation of a sender link controller, such as 7 or 8, to provide a holding jack at each of such controllers. Such holding jacks are shown in dotted lines as 24 and 25. If a connection were established between the controller 7 and a subscriber's set and trouble developed in the selecting operation of the controller, the controller would automatically time out and a trouble lamp (not shown) would light in the vicinity of the controller. The maintenance man would accordingly insert a hold plug in jack 24. As soon as the trouble was repeated the hold jack would cause the controller to hold with its equipment in the exact condition obtaining when it encountered trouble in completing its function. Thus the maintenance man could readily locate and clear the trouble. The details of such arrangements are not illustrated as they are well known in the art. However the trouble might not occur in the controller 7 but might occur at a point outside the controller itself such for example as at a point 30. The apparatus at point 30 is common to other controllers. For example the controller 8 is connected to this point. After controller 7 timed out due to trouble at point 30, the subscriber's set might be disconnected therefrom and connected to controller 8. Due to the fault at point 30 the controller 8 would now time out and cause its trouble lamp to operate. The maintenance man, who had first placed a hold plug in the jack of controller 7, would now have to place a hold plug in the jack of controller 8. By this time the subscriber's set might be connected to another controller connected to point 30 and the last-men-

tioned controller would time out. Thus the maintenance man might have to go from controller to controller to catch up with the trouble and might have considerable trouble in locating it.

The foregoing trouble is obviated by the arrangements of the invention. The individual jacks and hold plugs are not used by the maintenance man to hold the controller when it times out. Instead a single key or switch common to all of the controllers is provided. When a controller times out the key is operated and causes mechanism to condition all of the controllers so that the next time any one of the controllers times out it will hold but none of the other controllers will hold even though they may subsequently time out.

In Fig. 2 is shown a circuit diagram illustrating in detail the arrangements of the invention. As is well known in the art each sender link controller would be provided with a relay which would operate when the controller times out. These are illustrated as A₁, A₉, A₁₀ and A₁₉. For the purposes of this description only four such relays are shown. However one would be provided for each controller. As is also well known in the art each sender link controller is also provided with another relay such as relays H₁, H₉, H₁₀ and H₁₉. These relays would be operated when a hold plug was inserted in the jack by the maintenance man in response to the operation of a trouble lamp. The function of these relays would be to cause the controller to hold after it again times out. As heretofore pointed out with the arrangements of the invention hold plugs and jacks individual to each sender link controller are no longer needed. Instead a key K common to all of the sender link controllers is provided. When a controller times out and operates its trouble lamp the maintenance man operates the key K. This will close the following circuit; from ground, right hand contact of key K, conductor 32, over the contacts of all of the A series of relays in all of the sender link controllers, conductor 33, left hand contact of key K, conductor 34, winding of relay 31, to battery and ground. The completion of this circuit operates relay 31. Relay 31 is a multi-contact relay, having a contact for each controller. The operation of relay 31 will connect ground to the windings of all of the H series of relays and operate them. This simulates the placing of hold plugs in all of the jacks of the controllers. The operation of the H relay of a controller conditions it to hold when it next times out. With the key K operated let us now assume that one of the controllers, such for example as the one including relay A₁ times out. As heretofore pointed out when the controller times out relay A₁ will operate. This will break the previously traced

circuit for relay 31 and release said relay. This will remove ground from all of the operating circuits of the H series relays and cause them to release except relay H₁ because a holding circuit for relay H₁ is provided as follows: from ground and battery, winding of relay H₁, conductor 35, make contact of relay A₁, over the contacts of all the other A series relays, conductor 32, right hand contact of key K to ground. The timing out of the controller including relay A₁ and the holding of relay H₁ operated will in a well known manner cause that controller to hold. As the operating circuits of all the other H series relays have been opened and no holding circuits provided for these relays any other controller to time out will be prevented from holding. If desired a lamp L may be provided and operated by the operation of key K.

While the invention has been disclosed as embodied in certain specific arrangements which are deemed desirable, it is understood that it is capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. In an automatic telephone system, central office equipment comprising a plurality of sender link controllers, a key common to all of said controllers, and means operative when said key is operated to prevent all of said controllers from holding except the first one to time out subsequent to the operation of said key.

2. In an automatic telephone system, central office equipment comprising a plurality of sender link controllers, each of said controllers including means for timing out and means for holding after timing out, a key common to all of said controllers, means controlled by the operation of said key for conditioning all of said holding means for operation, and means operative when a controller next times out for unconditioning all of said holding means for operation except the holding means in said last mentioned controller.

3. In an automatic telephone system, central office equipment comprising a plurality of sender link controllers, each of said controllers including a first relay operated when a controller times out, each of said controllers including a second relay which when operated and when its controller has timed out will cause said controller to hold, a key common to all of said controllers, circuit arrangements controlled by the operation of said key for operating each of said second relays, and means responsive to the subsequent operation of one of said first relays for closing a holding circuit for its associated second relay and for releasing all of said other second relays.

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