

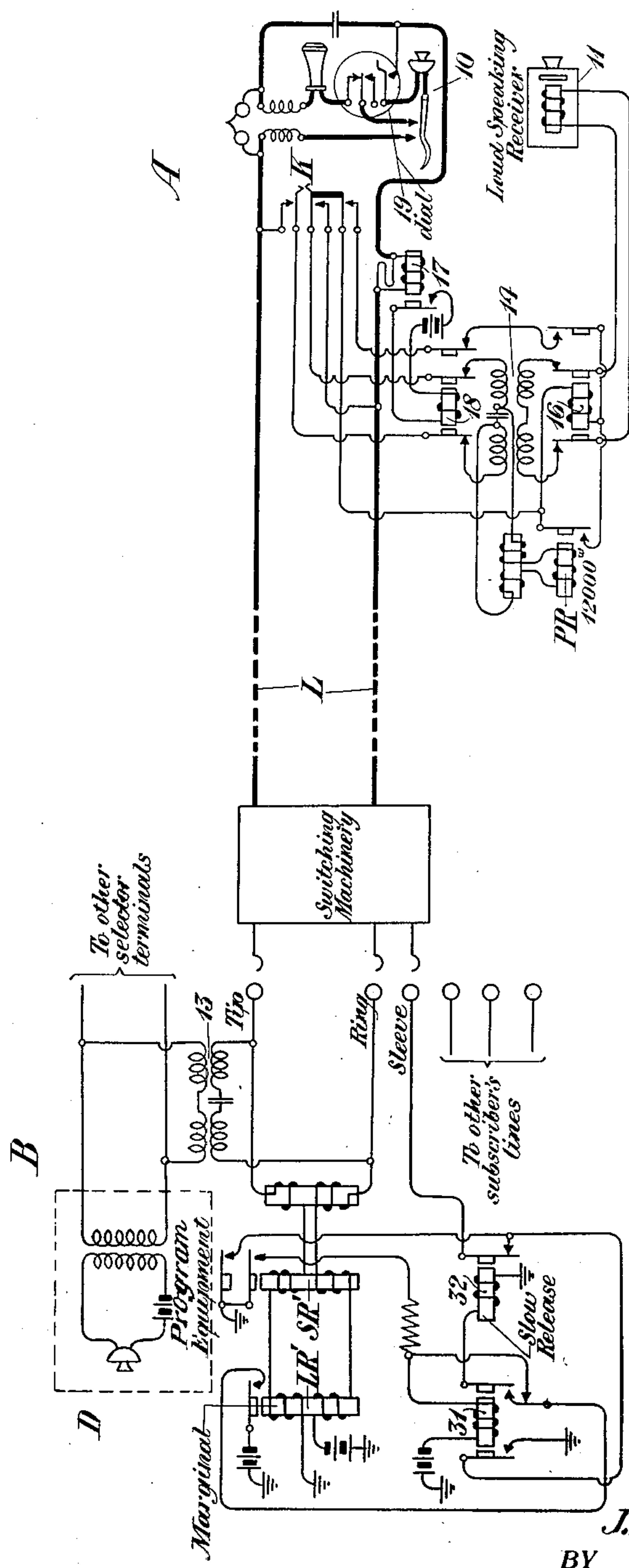
Oct. 1, 1929.

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1,729,649

PROGRAM TRANSMISSION OVER WIRES

Original Filed Nov. 11, 1922



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PROGRAM TRANSMISSION OVER WIRES

Original application filed November 11, 1922, Serial No. 600,356. Divided and this application filed
November 12, 1923. Serial No. 674,280.

This invention relates to systems of communication, and more particularly to systems for disseminating news, information, music or the like.

The present application is a division of application Serial No. 600,356, filed November 11, 1922, for an improvement in program transmission over wires.

Various schemes have been proposed heretofore for program transmission. The only one of these schemes which has been exploited to any extent is radio broadcasting, that is, the broadcasting of news, information or entertainment by means of radio telephone equipment so that persons provided with suitable radio receiving sets tuned to the proper wave length may receive the broadcasted entertainment or the like.

This method, however, has very serious objections. In the first place, numerous broadcasting stations in the same area operate on wave lengths sufficiently close together to interfere with each other. Furthermore, radio telephonic transmission necessarily involves the use of a much wider band of the frequency spectrum than is used for wireless telegraph purposes, and in view of the fact that the number of wave lengths available for radio communication are necessarily limited, it is undesirable that wave lengths necessary for commercial communication should be utilized for purposes of mere entertainment. Finally, in order to avail himself of the distributed information or entertainment, each individual subscriber must provide himself with a radio receiving equipment which involves storing upon his premises expensive storage batteries which are constantly in need of re-charging, together with a considerable amount of delicate and elaborate electrical apparatus, such as coils, detectors, amplifiers, etc., all of which involve careful maintenance. Moreover, the radio receiving set as now known is, at its best, an inherently ugly thing, absolutely out of place in the home and requiring for its operation a network of unsightly wiring.

Realizing the inherent limitations of radio broadcasting, proposals have been made to use existing wire systems, such as telephone,

telegraph or power networks for program transmission by transmitting carrier frequencies over such existing power or communication lines. Such a method, however, would be extremely expensive as well as complicated, as it involves a very considerable reorganization of the telephone plant or power plant, and requires the use of quite complicated and expensive apparatus.

The ordinary telephone plant, however, offers unusual facilities for program transmission by the use of ordinary telephonic methods and without the employment of any high frequency or carrier methods of signaling. When it is realized that the average subscriber's telephone set is in use for telephonic purposes only during an extremely small part of the time, it becomes apparent at once that if the telephone line, during its idle periods, could be used for transmitting news, information or entertainment, the plant could be used much more economically and the information or the like disseminated could be transmitted to the subscriber in the simplest manner possible. It may further be observed that the average subscriber to a program service, particularly a service for distributing entertainment, would only desire to avail himself of the service during the late afternoon or during the evening, at which times the average subscriber's telephone is only used for social purposes and is rarely or never used for business calls.

Having these circumstances in mind, it is proposed by this invention to provide simple, practical and economical arrangements by which news, information, music or other forms of entertainment may be transmitted at ordinary telephonic frequencies from a central program station over subscribers' telephone lines. It is also proposed by this invention to provide a system whereby the telephone subscriber may receive the program service without interfering in any way with the use of his line for ordinary telephone purposes. This invention also renders available a program transmission system in which the apparatus not only at the central station but more particularly at the subscriber's station,

will be extremely simple and economical and yet efficient.

It is, of course, possible to so arrange the circuit for accomplishing these results that the connection and disconnection of the program apparatus to the subscriber's line will be under the control of an operator or attendant at the central office. The circuit arrangement of the present invention, however, is such that the program equipment may be connected to the subscriber's line through automatic switching machinery controlled by the subscriber.

The invention may now be more fully understood by reference to the following detailed description thereof, when read in connection with the accompanying drawing, the figure of which is a circuit arrangement embodying the principles of the invention.

Referring to the figure, L designates an ordinary telephone subscriber's line terminating at one end at a subscriber's station A and at the other in a central office B. At the station A, the usual form of telephone set 10 is provided for ordinary telephonic purposes and a supplemental key K is provided for associating with the line a program receiving equipment comprising a loud speaking receiver 11 and other apparatus to be described later.

At the central station B, switching machinery is provided for automatically connecting the subscriber's line to any other subscriber's line. This switching machinery is of a type well known in the art and is merely indicated symbolically on the drawing. By connecting different programs over trunks to terminals on certain of the selector banks through which the switches establish connections, the switching machinery may be used to select a desired program. For example, the program equipment schematically indicated at D is connected over a trunk through the transformer 13 to the tip and ring contacts of a selector switch so that, by proper manipulation of the switching machinery, the line L may be connected to the equipment at B.

The circuit of the figure is so arranged that the subscriber may dial a certain code number when he wishes to receive the program service and will thereby be connected by the mechanical switches to the terminals of the multiple bank, which are connected through a transformer 13 to the broadcasting station D as indicated. Different code numbers may be assigned to different program trunks and the subscriber may thus select any particular program. Relays LR' and SR' are connected with the tip and ring conductors of the selector bank, the former being marginal and operated only through the low resistance of the subscriber's set when the receiver is off the hook. Auxiliary relays 31 and 32 are also provided for controlling the busy condition of the sleeve circuit and for

performing certain functions incidental to the release of the connection. Further details of the circuit will be clear from a description of the operation which is as follows.

Assuming that the subscriber at station A desires a connection to a program, the receiver will be removed from the switchhook and the dial 19 will be manipulated in a well known manner to operate the step-by-step switching machinery to connect the subscriber's line L to the tip and ring conductors of the terminal bank, which are connected to the program station D through the transformer 13. As soon as this connection is established, the relays LR' and SR' are both energized over the line circuit L and through the low resistance of the subscriber's set 10. Relay LR' at its upper front contact short-circuits the winding of the relay 31 over the right-hand back contact of said relay 31 to prevent said relay from being energized over the lower front contact of relay SR'. Ground is connected over the upper contact of the relay SR' and over the back contact of the relay 32 to the sleeve conductor to hold the selector and to prevent other selectors from making connection to the selected terminals of the selector bank.

After dialing the code for establishing the connection just described, the subscriber will operate his connecting key K and hang up his receiver. The relay LR', being marginal, will not be energized through the high resistance of the polar relay PR but the relay SR' will remain energized. Relay LR', upon being released, removes the short circuit from the winding of the relay 31, which is at once energized and connects ground to the sleeve circuit over the back contact of the relay 32 independently of the relay SR'. The connecting key K at the subscriber's station having connected the loud speaking receiver 11 to the line through the transformer 14, the information or the like transmitted from the station D will be transmitted through the transformer 13, through the machine switching connection and over the line L to operate the loud speaking receiver 11. The relay PR is not operated over the program connection because of the direction of current flow supplied through relays LR' and SR'.

When the subscriber desires to terminate the program connection, he simply restores the connecting key K, which releases the relay SR', thereby removing ground from the sleeve terminal over the upper front contact of the relay SR' and opening the circuit of the relay 31, which falls off and disconnects ground from the sleeve terminal over its left-hand contact. The mechanical switches are at once released and the apparatus is all restored to normal.

If, instead of disconnecting the program station by restoring the connecting key, the subscriber desires to make an ordinary tele-

phone connection while the program connection is still established, the subscriber simply removes the receiver from the switchhook, thereby energizing relay LR' in addition to the relay SR' and also completing the circuit for the relay 17 at the subscriber's station. The relay 17 closes the circuit of the relay 18 to disconnect the loud speaking receiver and associated apparatus in the same manner as described in connection with the previous circuits. The energization of the relay LR' connects battery over the upper front contact of said relay and over the right-hand front contact of relay 31 to the winding of the relay 32, which is energized and disconnects ground from the sleeve conductor of the selector bank, thus releasing the step-by-step switches in a well known manner. As soon as the step-by-step switches, in releasing, open the circuits of the tip and ring conductors, relays SR' and LR' are deenergized, thereby opening the circuits of the relays 31 and 32, which are restored to normal. The line switch (not shown) associated with the line L will now seize a selector trunk in the same manner as if the receiver had just been removed from the hook for the first time and the subscriber may manipulate his dial to obtain the connection desired. With this arrangement, the line will test busy because of the ground connection through the sleeve, and all incoming calls to the subscriber will be excluded so long as the program service is being received, but the trunk itself will not test busy because the busy test apparatus is local to each selector and independent connections extend from the trunk to other selectors.

It will be obvious that the general principles herein disclosed may be embodied in other and different organizations widely different from those illustrated without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. In a program distributing system, a plurality of subscribers' telephone lines terminating at a central office and provided with subscribers' telephone equipment at the subscribers' stations, a program receiver at the subscribers' stations for receiving voice frequency program transmission over said lines, means to prevent ordinary telephone transmission from said subscribers' equipment from actuating said program receiver, a plurality of trunks at the central office upon which different programs may be impressed, automatic means at the central station controlled from a subscriber's station for switching said subscriber's station into connection with any desired trunk, and automatic means at the central station controlled from the other subscribers' stations for switching said other subscribers' stations into connection with the same trunk while said first-men-

tioned subscriber's line is connected thereto without rendering the trunk busy.

2. In a program distributing system, a plurality of subscribers' telephone lines terminating at a central office and provided with subscribers' telephone equipment at the subscribers' stations, a program receiver at the subscribers' stations for receiving voice frequency program transmission over said lines, means to prevent ordinary telephone transmission from said subscribers' equipment from actuating said program receiver, a plurality of trunks at the central office upon which different programs may be impressed, directly operated switching machinery at the central office, and means to control said switching machinery from a plurality of subscribers' stations to establish a plurality of simultaneously existing connections between a plurality of subscribers' lines and any desired trunk without rendering the trunk busy.

3. In a program distributing system, a plurality of subscribers' telephone lines terminating at a central office and provided with subscribers' telephone equipment at the subscribers' stations, a program receiver at the subscribers' stations for receiving voice frequency program transmission over said lines, means to prevent ordinary telephone transmission from said subscribers' equipment from actuating said program receiver, a plurality of trunks at the central office upon which different programs may be impressed, impulse operated switching machinery at the central office and impulse senders at the subscribers' stations for operating said switching machinery to establish a plurality of simultaneously existing connections between a plurality of subscribers' lines and any desired trunk without rendering the trunk busy.

In testimony whereof we have signed our names to this specification this 9th day of November 1923.

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HENRY E. PHELPS.

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