

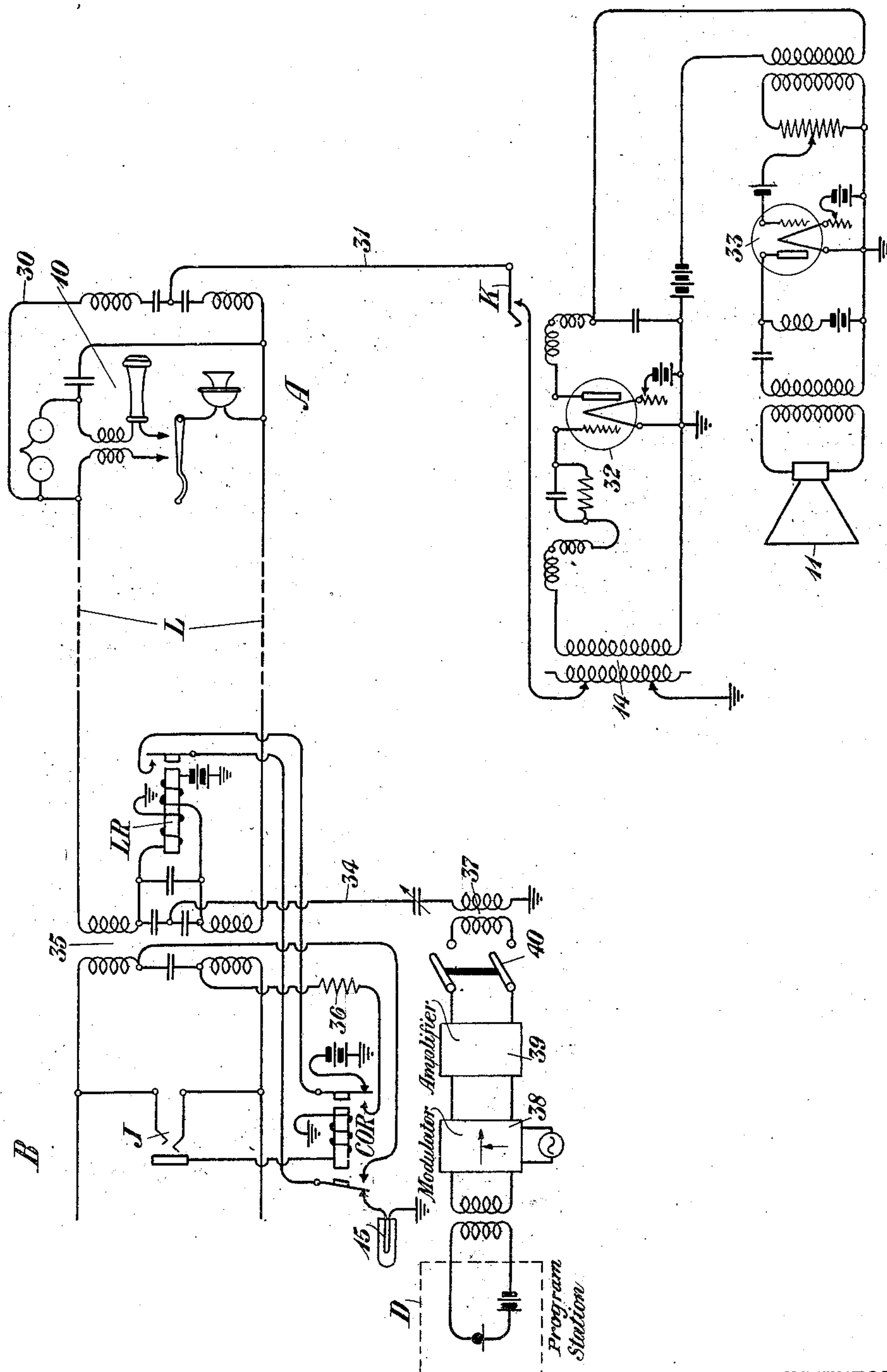
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PROGRAM TRANSMISSION OVER WIRES

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INVENTOR

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UNITED STATES PATENT OFFICE.

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PROGRAM TRANSMISSION OVER WIRES.

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To all whom it may concern:

Be it known that I, JOHN F. TOOMEY, residing at New York, in the county of New York and State of New York, have invented certain Improvements in Program Transmissions Over Wires, of which the following is a specification.

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

Various schemes have been proposed heretofore for program transmission purposes. The only one of these schemes which has been exploited to any extent is radio broadcasting, that is the dissemination 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 distributed 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 transmitted 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 recharging, 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 purposes by transmitting carrier frequencies over such existing power or communication lines. Such methods, however, as have been heretofore proposed along this line have involved somewhat complicated and expensive apparatus owing to the use of filters for separating the ordinary voice frequencies from the carrier frequencies. In accordance with the present invention, however, it is proposed to overcome this difficulty in systems of this character by transmitting the carrier frequency on which the program is superposed over the two sides of the line in parallel.

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 shows a circuit arrangement illustrating the principles of the invention.

Referring to the drawing, L designates an ordinary telephone subscriber's line terminating at one end at a subscriber's station A and at the other end in a central office B. At the station A, the usual form of telephone set 10 is provided for ordinary telephonic purposes. A bridge 30, tuned to the carrier frequency used for transmission, is also provided at the substation and at the midpoint of the bridge a connection 31 is extended to ground through the contacts of a key K, by which the program connection may be controlled at the subscriber's station. A detector 32 is associated with the ground tap 31 through a transformer 14, and an amplifier 33 is connected between the output of the detector 32 and the loud speaking receiver 11.

At the central station B, the usual type of switching jack J is provided but in order to provide a ground tap 34 at the central station for the purpose of superposing the carrier frequencies on the line L a transformer 35 is interposed between the line L and the jack J. The usual line relay LR is connected with the line winding of the transformer 35 and controls the circuit of a line lamp 15 over the contacts of the usual cut-off relay COR, the winding of the cut-off relay being connected to the sleeve of the jack J. The cut-off relay is not arranged to disconnect the line relay when operated, as is usually the case, but its contacts are so arranged that when actuated the cut-off relay opens a circuit of the line lamp and

places under the control of the line relay a circuit through a resistance 36 for operating the supervisory apparatus of the cord circuit.

5 The ground tap 34 at the central station is tuned to the carrier frequency used for program transmission and is connected through a transformer 37 to a circuit leading to a program station D. A modulator
10 38 is provided for modulating the carrier frequency in accordance with the program currents and an amplifier 39 is also provided for amplifying the program carrier frequencies impressed upon the circuit 34.

15 The operation is as follows: when the circuit is to be used for ordinary telephone purposes, the contact of the key K is open and the subscriber, by taking down the receiver, energizes the line relay LR, which
20 completes a circuit for the line lamp 15 over the contacts of the cut-off relay COR. The operator, in answering the call by inserting a plug in the jack J, operates the cut-off relay COR, which opens the circuit of the
25 line lamp and completes a circuit for the supervisory apparatus of the cord circuit from the tip of the jack J to the upper winding of the transformer 35, over the left-hand front contact of the cut-off relay COR,
30 right-hand front contact of the line relay LR, right-hand front contact of the cut-off relay COR, through the resistance 36 and lower winding of the transformer 35 to the ring of the jack J. This circuit maintains
35 switchhook control over the supervisory apparatus of the cord circuit so that when the subscriber hangs up his receiver at the end of the conversation the line relay LR is de-energized and the circuit just traced is
40 opened, thereby giving the disconnect signal.

Either while the line is being used for ordinary telephone purposes or when it is not so used, a program circuit may be established over the line by closing key K, thereby
45 connecting the midpoint of the bridge 30 to ground through the transformer 14. The program currents from the station D modulate the carrier frequency supply to the modulator 38 and the amplified carrier is
50 transmitted through the transformer 37 and over the two sides of the line L in parallel and thence to ground over the ground tap 31. The carrier frequencies thus transmitted over the line do not actuate the subscriber's set as the subscriber's set 10 is connected to equal potential points of the two
55 sides of the line with respect to the carrier currents. The carrier currents received in the circuit 31 are detected by the detector 32 and after being suitably amplified with the amplifier 33, actuate the loud speaker 11 so that the information, music or news transmitted from the station D may be heard
60 in said receiver. The loud speaking set at the station A may be also used to receive

from a radio broadcasting station. This may be done by tuning the circuit of the detector 32 to the frequency of the radio broadcasting station and closing the key K, thereby treating the line L and the ground
70 tap 34 at the central station as a receiving antenna. If the program station D should be in operation, the subscriber may call up the central operator and ask to have the program connection to the station D opened
75 by means of the switch 40 so that only the radio broadcasting will be received.

It is obvious that the general principles herein disclosed may be embodied in other and different forms without departing from
80 the spirit of the invention as defined in the appended claims.

What is claimed is:

1. In a telephone system, a telephone line terminating at a central office at one end
85 and a subscriber's station at the other, a telephone set at the subscriber's station, a program transmitting station, means to translate currents from said program transmitting station into carrier frequencies,
90 means to transmit said carrier frequencies over the two sides of the line in parallel, a connection at the subscriber's station to receive currents transmitted over the two sides of the line in parallel, a special receiving
95 apparatus at the subscriber's station, including means for translating carrier frequencies into ordinary signaling currents, and an operator's position at the central office having switching means whereby said
100 line may be interconnected with other telephone lines for telephonic intercommunication while maintaining the connection to said program transmitting station.

2. In a telephone system, a telephone line
105 terminating at a central office at one end and a subscriber's station at the other, a telephone set at the subscriber's station, bridge connections across the line at the central office and at the subscriber's station, ground
110 taps connected to the mid-points of said bridges, a program transmitting station connected with the ground tap at the central office, a special receiving apparatus associated with the ground tap at the subscriber's station,
115 means at the program transmitting station for translating the program currents into carrier frequencies, means at the subscriber's station for translating the carrier frequencies into ordinary signaling frequencies,
120 and an operator's position at the central office having switching means whereby said line may be interconnected with other telephone lines for telephonic intercommunication while maintaining the connection
125 to said program transmitting station.

In testimony whereof, I have signed my name to this specification this 10th day of November 1922.

JOHN F. TOOMEY.