June 21, 1927. L. ESPENSCHIED 1,633,082

DISTRIBUTION OF INTELLIGENCE

Filed Jan. 25, 1922 4 Sheets-Sheet 1

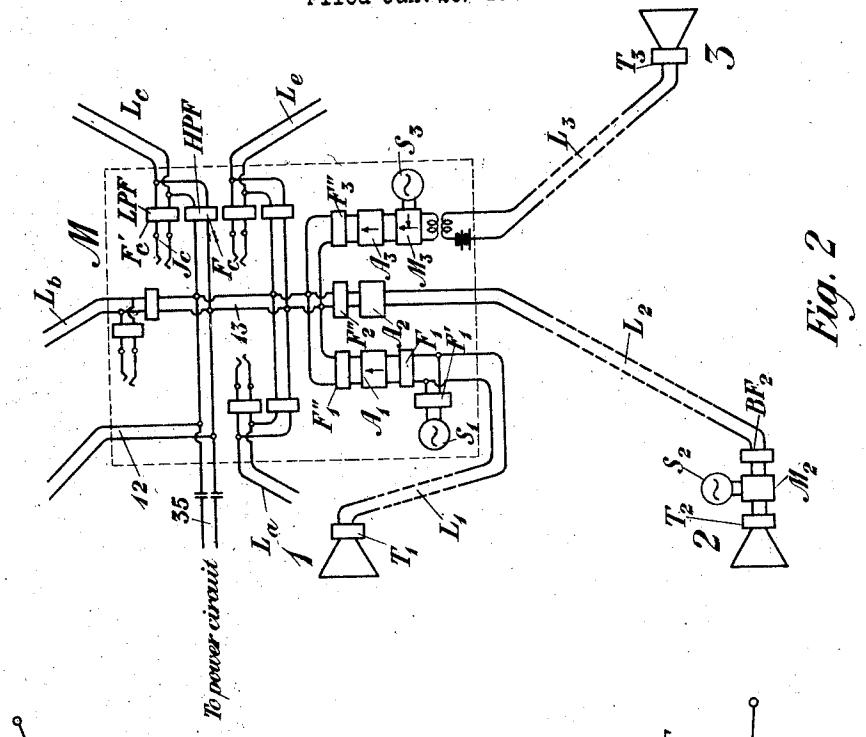

Fig. 2

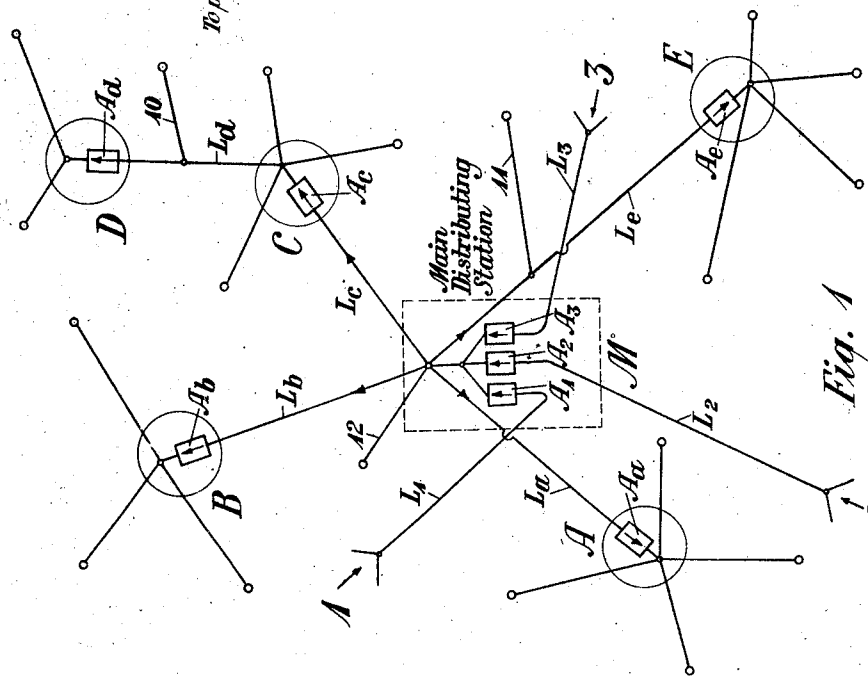

Fig. 1

INVENTOR
L. Espenschied
BY
ATTORNEY

1,633,082.

June 21, 1927. L. ESPENSCHIED

DISTRIBUTION OF INTELLIGENCE

Filed Jan. 25, 1922 4 Sheets-Sheet 2

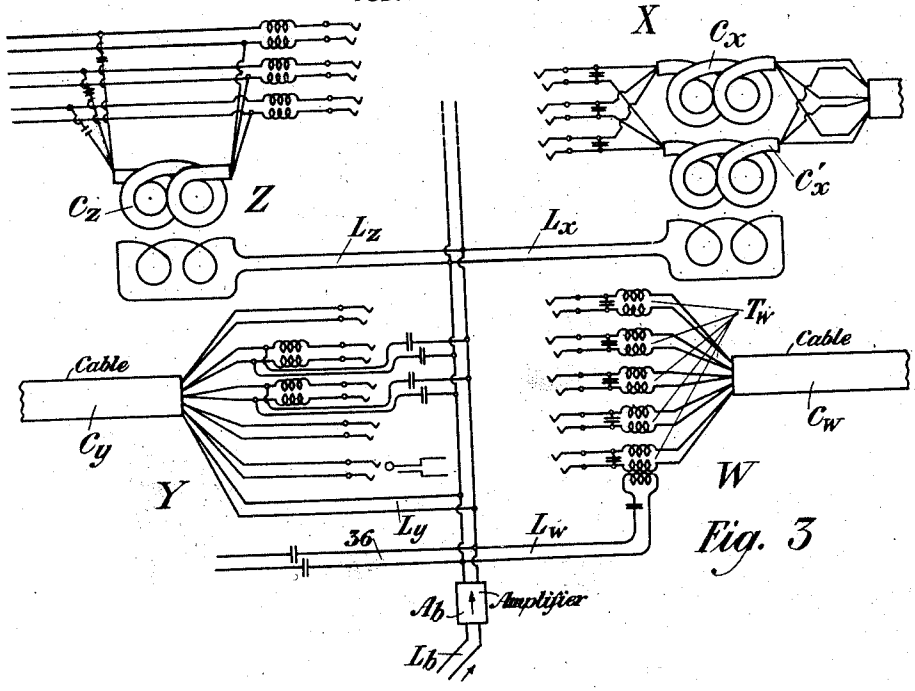

Fig. 3

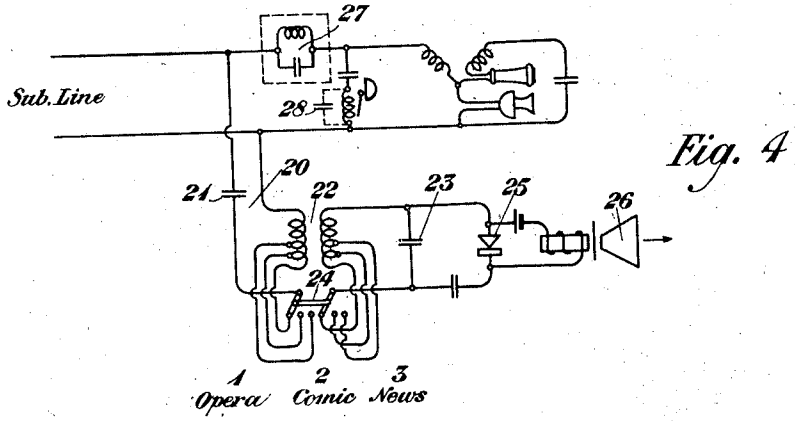

Fig. 4

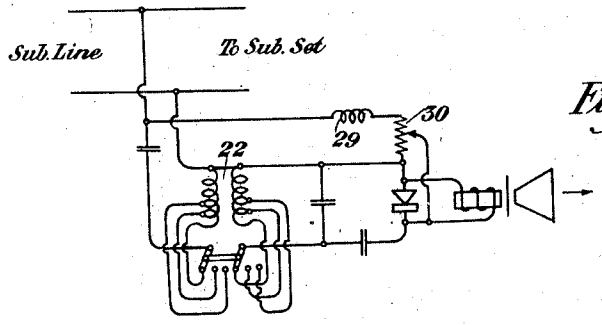

Fig. 5

INVENTOR
L. Espenschied
BY
ATTORNEY

June 21, 1927. L. ESPENSCHIED 1,633,082

DISTRIBUTION OF INTELLIGENCE

Filed Jan. 25, 1922 4 Sheets-Sheet 3

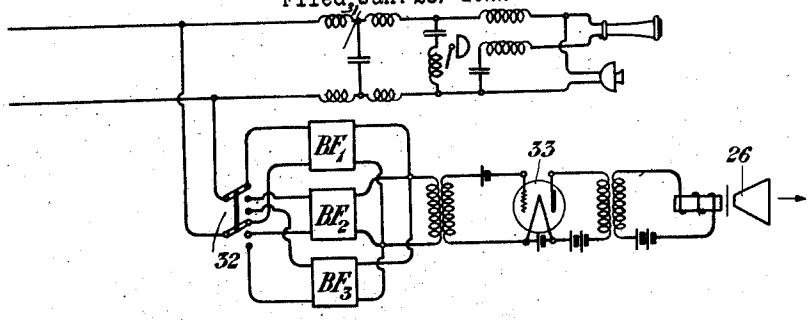

Fig. 6

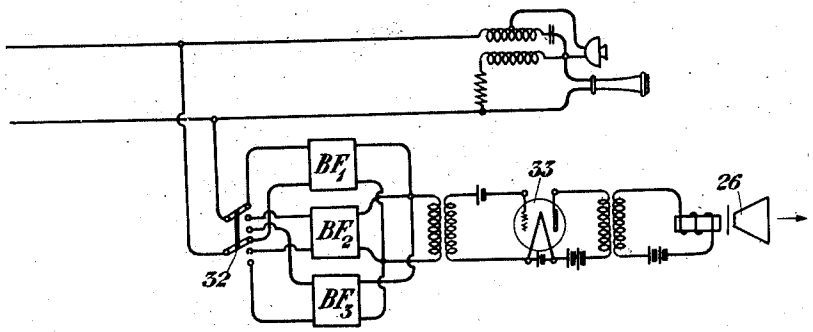

Fig. 7

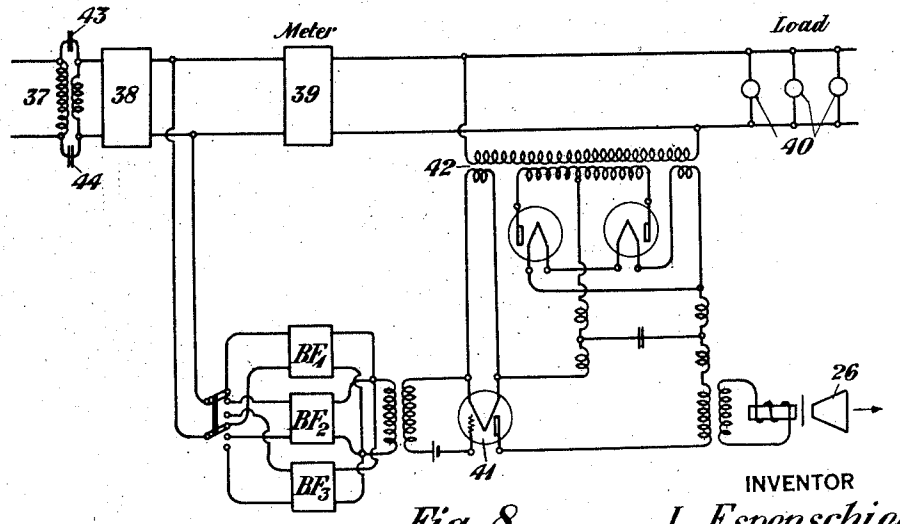

Fig. 8

INVENTOR
L. Espenschied
BY
ATTORNEY

June 21, 1927. L. ESPENSCHIED 1,633,082

DISTRIBUTION OF INTELLIGENCE

Filed Jan. 25, 1922 4 Sheets-Sheet 4

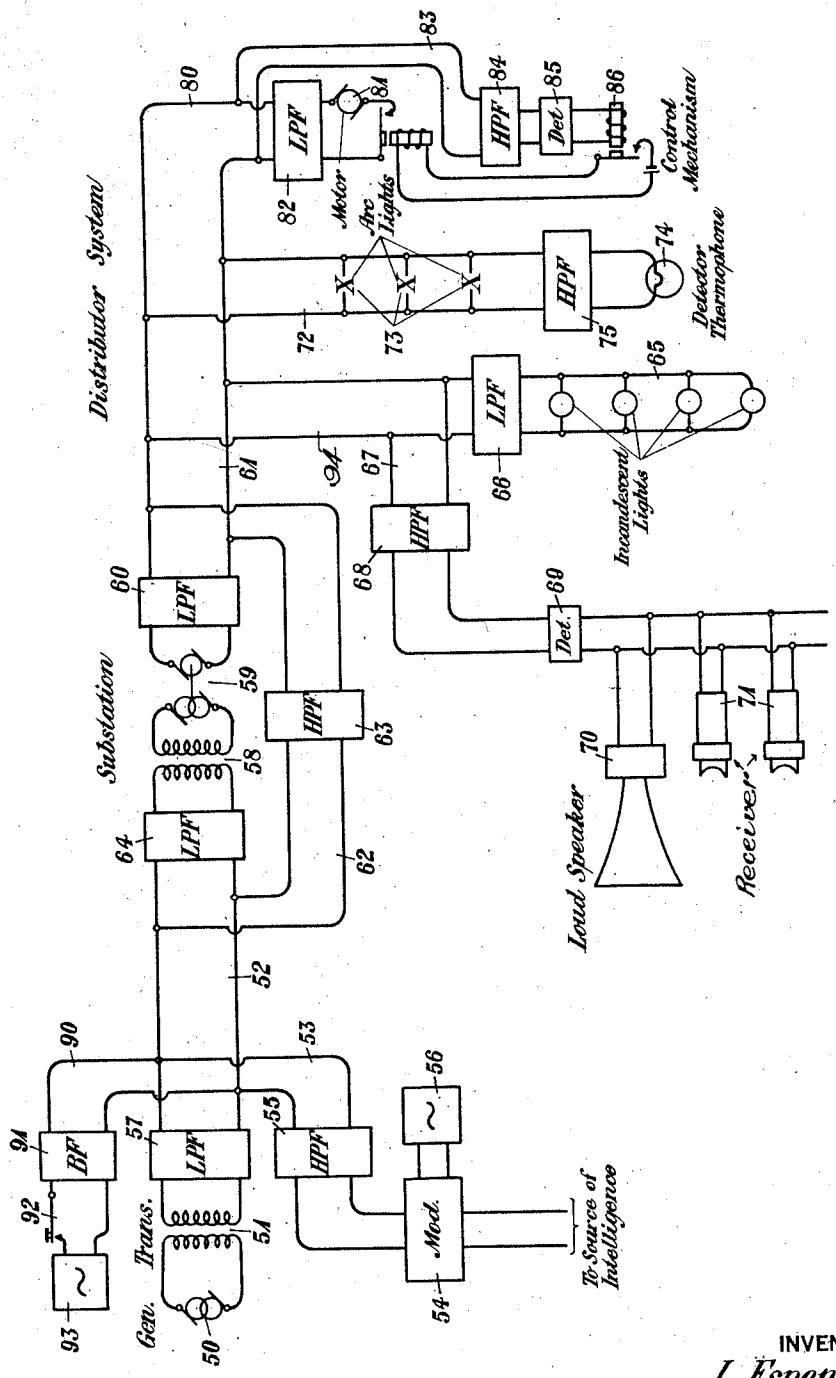

Fig. 9

INVENTOR
L. Espenschied
BY
ATTORNEY

Patented June 21, 1927. 1,633,082

UNITED STATES PATENT OFFICE.

LLOYD ESPENSCHIED, OF QUEENS, NEW YORK, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

DISTRIBUTION OF INTELLIGENCE.

Application filed January 25, 1922. Serial No. 531,803.

This invention relates to signaling systems, and more particularly to systems for the distribution of news, amusement and the like.

The field of communication may be considered to be broadly divided into two classes, first, those communications destined between particular or individual points which are desired to be kept more or less confidential, and second, communications involving a general dissemination of intelligence among a large number of individuals or points and which are not confidential. Heretofore the telephone art has been developed along lines of communication falling into the first class above mentioned. It is the purpose of the present invention, however, to provide a system whereby the telephone art may be applied to communications of the second class.

In carrying out the invention, it is proposed to organize a system in which intelligence, such as music and news, may be transmitted from points at which the intelligence originates to a common distributing point. The signaling currents will then be amplified and distributed over different lines leading to local exchanges or distributing points, at which points the communications will be simultaneously impressed upon the various circuits extending to subscribers. In order that the energy transmitted over the subscribers' circuits may be sufficient to operate a loud speaker at the subscriber's station, for example, the signaling currents may be amplified at the points of distribution.

In order to obtain high quality and freedom from noise interference, it is preferred to transmit the signals representing the news or other form of amusement by means of carrier currents, although the invention is not limited to the use of carrier currents for transmission purposes. By employing carrier currents, however, having a sufficiently high frequency with respect to the width of the band necessary to accurately reproduce the low frequency signaling currents, the distortion resulting from ordinary telephonic transmissions will be practically eliminated. Another advantage inherent in the use of carrier currents resides in the fact that by multiplexing the circuits, different carrier frequencies may be assigned to the transmission of a number of different forms of amusement and news which are transmitted simultaneously over the system, so that the subscribers will be enabled to choose the particular form of amusement or news desired. The feature already referred to of arranging for amplifying at points at which the circuits are branched, is of considerable importance, as this renders it possible to maintain the volume of energy sufficiently high for efficient transmission without providing individual amplifiers for a large number of circuits.

The invention also comprehends the superposition of a distributing system such as above described upon the ordinary telephone plant, particularly the local plant, and the combination with an ordinary subscriber's subset of a carrier current loud speaking receiving set, whereby the news or other form of amusement may be received without interfering with the use of the subscriber's circuit for ordinary telephonic communication. The distributing system may also be superposed in accordance with the present invention upon a power distributing network such as that of a large city, in which case, at each subscriber's premises a loud speaking receiving set may be associated with the power circuit by suitable switching means. In certain instances it may be found expedient to provide special circuits for the distribution of amusement and information, rather than to superpose the distributing system upon existing circuits already employed for other purposes, and in other instances, combinations of the several methods may be used.

The invention will now be more fully understood by reference to the following description, when read in connection with the accompanying drawings, of which Figure 1 shows a schematic layout of a system for the distribution of amusement or intelligence in accordance with the present invention; Fig. 2 is a schematic diagram of the circuits to be employed at the main distributing station; Fig. 3 shows arrangements for impressing the distribution currents upon a plurality of subscribers' circuits simultaneously; Figs. 4, 5, 6 and 7 are diagrams of circuit arrangements at the individual subscriber's stations; Fig. 8 shows how a power circuit may be employed for the transmission of amusement or information where the power circuit is an alternating current circuit, and Fig. 9 shows in simplified forms how a power system pro-

viding subscribers with direct current power may be employed for transmitting intelligence.

Referring to Fig. 1, the entire collecting and distributing system is indicated schematically. In this figure points 1, 2 and 3 represent sources of the original amusement, music or news to be transmitted. For example, point 1 may be a classical concert, point 2 may be a source of popular music and point 3 may be a station at which a person is reciting the latest news or a phonograph is sending out recurrently a standard news bulletin.

The sound at each of these points may be transmitted telephonically either at carrier or ordinary frequencies to a main distributing station M, from which the several communications are distributed by a network through central offices A, B, C, D and E to the subscribers' lines proper. For this purpose, lines L_a, L_b, L_c and L_e extend from the main distributing station M to the stations A, B, C and E, respectively. At each of these four stations local lines radiate out in various directions to subscribers. At station C, a line L_d also extends to the station D, so that transmission to the latter station takes place through an intermediate station. Local lines also radiate out from the station D and, if desired, local lines may be branched at points intermediate between local distributing stations, as indicated at 10 and 11, connection with lines L_d and L_e, respectively. It is also within the invention to transmit the information over local circuits radiating from the main distributing station to local subscribers in the neighborhood thereof, as is indicated at 12.

One of the features of the system resides in the association with it of suitable amplifiers such, for example, as vacuum tube amplifiers. These are located in the system just ahead of the points from which diverging lines radiate. For example, the currents transmitted from the original sources 1, 2 and 3 over the lines L_1, L_2 and L_3, extending to the main distributing station, may be amplified by amplifiers A_1, A_2 and A_3 located in said lines at the main distributing station. Likewise, amplifiers A_a, A_b, A_c, A_d and A_e are arranged at these stations in the main lines connecting the stations with the main distributing station M. By thus amplifying in the different central offices, for example, the transmission as it enters the offices, the currents over the trunk lines may be kept normal and there will be available sufficient energy for supplying all of the subscribers' circuits radiating from the offices.

The arrangement of the collecting system and the circuits at the main distributing station is shown in greater detail in Fig. 2. Transmission from the original sound sources 1, 2 and 3 may occur at either ordinary telephone frequencies or at carrier frequencies. Collecting station 3, for example, transmits from the transmitter T_3 over the line L_3 to the main distributing station at ordinary telephone frequencies, the band being extended in width to say about 5,000 or 10,000 cycles to obtain the high quality necessary for music transmission, instead of limiting the band to 2,000 or 3,000 cycles as is the case in ordinary telephonic transmission. This may be readily accomplished by proper design of the transmitter and transmission circuits in accordance with principles well known in the art. At the main distributing station M, the wide band thus transmitted is modulated by a carrier frequency from a source S_3 supplied at the main station. For modulating purposes, any well-known type of modulator M_3 may be employed, as, for example, a vacuum tube modulator of the type disclosed in Carson Patent, No. 1,343,307, of June 15, 1920.

Collecting station 2 is provided with a transmitter T_2 and the modulator M_2 which is supplied locally with the carrier frequency from the source S_2. The modulator M_2 may be similar to the modulator M_3 and if it is desired to transmit only one side band, a band filter BF_2 of the Campbell type may be provided at the point 2 for suppressing one of the side bands and transmitting the other. By means of this apparatus, transmission from the point 1 to the main distributing station occurs at carrier frequencies.

The apparatus associated with the line L_1 illustrates how carrier transmission may be employed from an outlying point to the main distributing station with the carrier source located at the main station. As shown, the source S_1 is connected to the line L_1 through a filtering apparatus F_1', if desired, and a Campbell filter F_1 is connected between the point at which the source S_1 is associated with the line and the amplifier A_1. The filter F_1 may be arranged to transmit one side band and suppress the carrier frequency, and the other side band, if desired. At the station 1, the transmitter T_1, which may be of any known type, operates to vary the amplitude of the carrier frequency transmitted from the source S_1 over the line L_1, thereby modulating the carrier frequency in a manner analogous to the ordinary telephone practice of supplying battery or direct current carrier from the central office. In other words, the transmitter, instead of modulating a direct current, modulates a carrier frequency from the source S_1 and thereby combines within itself the functions of both a transmitter and a modulator.

The three channel carriers thus brought into the main distributing station, are each amplified by means of the amplifiers A_1, A_2 and A_3, and are selectively superposed upon

a common outgoing bus 13 by means of band filters F_1'', F_2'' and F_3''. These filters may, of course, be of the well-known Campbell type. From the common bus 13 lines extend to subscribers' stations or to the various central offices of one or more cities, as illustrated at L_a, 12, L_b, L_c and L_e. The carrier transmission is illustrated as being superposed upon the existing lines L_a, L_b, L_c and L_d by means of high frequency composite sets consisting of a combination of high-pass and low-pass filters. Thus in the case of the line L_c, for example, the line terminates in a jack J_c and has a branch extending through a high-pass filter F_c to the bus connections 13. A low-pass filter F_c' is connected between the jack J_c and the point of connection between the line L_c and the bus 13. The high-pass filter F_c permits the carrier frequencies to be transmitted to the line L_c but prevents ordinary telephone frequencies which may be transmitted over the line from passing into the bus circuit. The low-pass filter F_c', on the other hand, permits ordinary telephone frequencies to be transmitted to the jack through which connections may be made to other telephone circuits, the filter at the same time preventing the carrier frequencies from being transmitted to the jack.

The feature of employing high frequency composite sets of the type described is mainly important for transmission over long distance circuits. For inter-office trunks or local circuits extending from the main distributing office to subscribers, it may be cheaper to assign or provide a special circuit for the transmission of news and intelligence by means of carrier frequencies than to provide high frequency composite sets such as described. Accordingly, composite sets are shown associated with the lines extending to distant offices, while the line 12, extending to a local subscriber, is shown as being connected directly to the bus-bar 13 without the provision of any jack and composite set enabling the use of the line for low frequency transmission.

At the various local distributing stations such as A, B, C, D and E of Fig. 1, the carrier transmission is superposed en bloc upon all or as many of the subscribers' lines as it is desired to include in the distributing network. As to whether the distribution to the subscribers should occur over existing subscribers' telephone lines or over special provided amusement service lines having upon each a plurality of subscribers, or over existing power circuits, will depend upon the economics of each particular situation.

Fig. 3 illustrates a number of possible arrangements for superposing an amusement transmission upon a plurality of subscribers' circuits at the local distributing stations, such as, for example, the station B of Fig. 1. The trunk line L_b is connected first with an amplifier A_b as illustrated, and the output circuit of the amplifier is connected in any one of the several ways indicated to the subscriber's circuits branching from the distributing office. The problem in this case is to superimpose the high frequency currents upon the subscribers' circuits with a minimum of effect upon the latter and with a minimum of selecting apparatus.

The method of superposition illustrated at W consists in providing in each of the telephone circuits included in a cable C_w a pair of windings of a multi-winding transformer T_w having a small mutual inductance and having a primary winding included in a branch L_w leading from the output side of the amplifier A_b. The drop sides of the windings, that is, the sides adjacent to the jack through which the telephone circuits may be interconnected for ordinary telephone conversation, are closed for high frequency currents by small condensers bridged across the circuit as illustrated. These condensers serve to short-circuit the high frequency carrier currents with respect to the jacks, so that if a given circuit is connected to another telephone circuit for telephonic purposes, the high frequency currents carrying music or the like will not be transmitted to the other circuit.

A modified scheme is shown at X, in which transformer windings are formed by grouping the wires forming one side of each telephone line in one piece of cable C_x and the wires forming the other sides of the telephone lines in another piece of cable C_x', the two pieces then being wound up in coil form, as illustrated, and inductively associated with a primary winding in a branch circuit L_x leading from the output side of the amplifier A_b. Condensers are shunted across the jacks of the lines as at W to prevent interference between lines connected to the lines in the cable at X and the high frequency circuits.

In the modification shown at Y, the cable C_y includes a plurality of lines terminating in jacks as before, but in this case individual connections are provided between the bus leading from the output side of the amplifier A_b and each of the lines, these connections being conductive rather than inductive. Condensers may be included in each of these connections having capacity so proportioned as to readily pass the carrier frequencies but offer a large impedance to ordinary telephone frequencies, and inductances or choke coils may be included in the telephone lines between the jacks and the connections to the bus-bar to prevent the transmission of the carrier frequencies to lines associated with the jacks.

At Z the connection is made by bridging a conductor across the wires of each line

and including these bridged conductors in a common piece of cable C_z, which is wound in coil form similar to that shown at X and is associated with a primary winding included in a branch L_z leading from the bus-bar. In this case also, choke coils may be included in the lines adjacent the jacks to prevent the high frequency currents from being transmitted to other telephone lines connected to the jacks.

Such simple schemes for superposing the high frequencies upon the local telephone circuits as are shown in Fig. 3 presuppose the use of carrier frequencies sufficiently high as compared with ordinary telephone frequencies to permit of discrimination by the simple filtering apparatus disclosed. Where lower carrier frequencies are employed, it will, of course, be necessary to utilize somewhat more complicated and effective filtering means. Filters adapted for this purpose are well known in the art and hence, are not illustrated. In some cases the use of a more expensive type of filter may not be justified as compared with the provision of special circuits for the new type of service. As an example of how a special circuit might be provided to one or more subscribers, a branch L_y is shown, leading from the bus-bar to the cable C_y without any provision for connection to other telephone circuits. Obviously, in the transmission of intelligence of the kind now under consideration, privacy is neither necessary nor desirable, and as many subscribers may be included on such a circuit as transmission conditions will warrant.

Fig. 4 illustrates circuit arrangements which may be used at the subscriber's end of the system. As indicated, the subscriber's line terminates in the usual substation apparatus including transmitter, receiver, induction coil and ringer. The circuit for the loud speaker is bridged across the line, as indicated at 20, and is tuned by means of the condenser 21 and the inductance of a transformer 22. Where high carrier frequencies are employed, this selective circuit may be of the simple loosely coupled type, it being loosely coupled through the transformer 22 to a second tuned circuit, including the condenser 23. In order to enable the subscriber to select any particular type of amusement or news which may be transmitted over the circuit, a switch 24 is provided which may be set in a plurality of different positions, thereby changing the inductance of the windings of the transformer 22, so that the tuned circuits will be adjusted to any one of several carrier frequencies. This enables the subscriber to obtain the communication carried by the frequency selected to the exclusion of other forms of intelligence which may be superposed upon the circuit at the same time.

A simple form of detector, such as the thermal or crystal rectifier detector 25, is connected across the terminals of the tuning condenser 23, and this detector is bridged by a circuit including the loud speaker 26, which may be of any type well known in the art. The form of detector used may vary somewhat, depending upon conditions, and where the expense is not prohibitive, more efficient types of detectors, such as vacuum tubes, may be employed if desired. The showing of the detector 25 in the drawing is therefore intended to be merely conventional, it being understood that any type of detector may be employed. In order to prevent the high frequency currents from being transmitted to the regular subscriber's set, it is desirable to use some form of excluding circuit for the carrier frequencies in the telephone branch. Such a circuit is illustrated in Fig. 4, as an anti-resonant circuit 27. A simple condenser may also be connected in shunt with the winding of the ringer for the purpose of by-passing carrier currents. It will be understood, of course, that a low-pass filter is a more complete solution for the problem, although a more expensive one.

Fig. 5 is similar to Fig. 4 except that it shows a connection whereby the polarizing electromotive force for the rectifying detector is derived from the battery supply of the telephone circuit. As shown, there is a direct current path from one side of the line through the retard coil 29, through the potentiometer 30 to the upper terminal of the detector, and thence over a special connection between the upper terminals of the two windings of the transformer 22 to the other side of the line. A tap may be taken from the potentiometer at any point to the other side of the detector as indicated. Obviously, a similar method may be utilized to supply operating current or any other type of current.

In Fig. 6, a low-pass filter 31 is included in the connection extending to the subscriber's set to prevent the transmission of the carrier frequencies to the subscriber's set, and band filters BF_1, BF_2 and BF_3 are employed in the loud speaker circuit for selecting the desired high frequency transmission. Any particular filter may be connected in the circuit by means of a suitable switch 32. A vacuum tube amplifying detector 33 is employed for detecting high frequency currents and the loud speaker 26 is associated with the vacuum tube detector in a well-known manner.

A similar arrangement is shown in Fig. 7, but in this case the expense of providing the low-pass filter 31 is avoided by using a subscriber's set of the anti-side tone type, as illustrated. The anti-side tone circuit shown is well known in the art, and the elements are so proportioned that the trans-

mitter and receiver are conjugate. The high frequency currents, when transmitted to the subscriber's set, may react in the transmitter, which may function as a detector to reproduce the low frequency currents corresponding to the signal impressed upon the carrier frequencies. If an ordinary substation set were used, these detected currents would affect the receiver so that interference would occur if the set were to be used for ordinary telephonic purposes, while amusement, news and the like are superposed upon the circuit. By arranging the receiver so as to be conjugate with respect to the transmitter, however, any high frequencies detected by the transmitter cannot be transmitted to the receiver. Consequently, the necessity for filtering apparatus to keep high frequency currents out of the substation is not necessary.

Instead of using telephone circuits for the transmission of amusement and news service, power circuits may be employed. For example, in Fig. 2, a connection may be extended from the bus 13 to a power circuit, as indicated at 35, a suitable condenser being used to prevent low alternating frequencies from the power circuit from reacting upon the telephone circuits. Similarly, the connection to the power circuit may be made at any of the local distributing stations. For example, in Fig. 3, the connection 36 may be extended from the common bus-bar to a power circuit, condensers being included as before to prevent interference with the telephone circuits.

The arrangement of the apparatus associated with the power circuit, so far as the subscriber's station is concerned, is illustrated in Fig. 8. In this figure, a typical alternating current power circuit is shown, having the usual step-down transformer 37, cut-out box 38, and meter 39 included between the power circuit and the load, such as lamps or other current consuming devices 40. The receiving circuit for the high frequency amusement and news service is bridged across the power circuit, for example, between the cut-out box 38 and the meter 39, and includes selecting devices similar to those shown in Figs. 6 and 7. A vacuum tube detector 41 is illustrated and the filament and plate currents for supplying this tube may be derived from the power circuit through a suitable transformer 42, vacuum tube rectifiers and a filter being provided to rectify the alternating current for the space circuit of the tube 41 as illustrated. A loud speaker 26 is associated with the detector as in the other substation arrangements illustrated. In order that the high frequency currents may be transmitted through the transformer 37, which is normally designed for the transmission of relatively low frequency power currents, condensers 43 and 44 may be bridged across the terminals of the transformer to provide a path for high frequency currents. In some instances the provision of this condenser will not be necessary, as the capacity of the transformer itself may be sufficient to permit the passage of the high frequency currents. The inductance of the meter 39 may be utilized to choke the carrier frequencies from the load circuit.

Fig. 9 shows an arrangement whereby the news and amusement service may be superposed upon a power circuit over a part of which alternating power currents are transmitted, and over the remainder of which direct power currents are transmitted. In this figure, 50 designates an alternating current power generator associated through a transformer 51 with a power line 52. A circuit 53 is bridged across the power circuit and leads to a modulator 54 through a high-pass filter 55. The modulator is supplied with a suitable source of carrier frequency 56, whereby the amusement or news currents are translated into carrier currents and passed through the filter 55 to the power line. A low-pass filter 57 serves to prevent the high frequency currents from passing into the generator circuit. At a power substation along the line, the alternating currents are passed through a transformer 58 to a motor generator set 59, whereby the alternating currents are translated into direct currents and passed through the low-pass filter 60 into the local power circuit 61. The high frequency currents are shunted around the substation apparatus by means of a circuit 62, including the high-pass filter 63 and a low-pass filter 64 is inserted between the transformer 58 and the junction point of the circuit 62 with the line 52 to prevent the high frequency currents from passing into the transformer 58 and the other substation apparatus.

Subscribers' circuits may be supplied with power and amusement service in several ways. For example, a subscriber's circuit 94 leads to a load 65, which may be incandescent lamps, for example, through a low pass filter 66. A high frequency branch 67 including the high-pass filter 68 leads to a detector 69 of any well-known type in the output circuit of which is arranged a loud speaker 70, and, if desired, a plurality of telephone receivers 71, whereby various individuals may listen to the amusement or news service.

A subscriber's circuit 72, on the other hand, is shown as including a plurality of arc lights 73, which may not only function as lamps, but in accordance with the well-known principles of the speaking arc, may also function as combined detectors and loud speakers to transmit the amusement or intelligence in the form of vocal sounds. The

same circuit may also include one or more detector thermophones 74, for example, associated with the circuit 72 through a high-pass filter 75. The detector thermophone, as is well known, is a fine drawn wire which by its thermal action detects the high frequency currents and transmits them as low vocal sounds to the ear of the listener.

The principles here illustrated readily adapt themselves to the distant control of some remote current consuming device, such as a motor. For example, a branch circuit 80 leads to a D. C. motor 81 through a low-pass filter 82, the latter serving to keep the high frequency currents from the motor circuit. A high frequency branch 83 including a high-pass filter 84 leads to a detector 85 in the output circuit of which is a controlling relay 86. The controlling relay in turn controls the opening or closing of the circuit of the motor 81. In order that this apparatus may be operated from a distant point, there is shown at the generating end of the circuit a branch 90 including a band filter 91 and leading through a controlling key 92 to a high frequency source 93. When the key 92 is closed, high frequency currents are superposed upon a power circuit and operate the detector 85, which in turn, through the relay control, closes the circuit of the remote motor 81 so that it will operate under the power currents supplied from the power generating station.

With regard to the utilization of power circuits for the transmission of news service, it should be noted that such circuits readily adapt themselves to the broadcast transmission of intelligence because the necessity for privacy is not present and the service requires merely one-way circuits. Furthermore, the transmission efficiency of such circuits will be relatively good for the high frequency broadcasting service by reason of the considerable copper involved in the power network. The amplification required at the terminal will thus be relatively small in any case, and in view of the large power carrying capacity of such a system, it will generally be possible to amplify the currents to a very high degree at the transmitting end before superposing them upon the power system.

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

What is claimed is:

1. In a system for distributing amusement, news and the like, a central station, a plurality of subscribers' stations, subscribers' lines extending from said central station to said subscribers' stations, a common terminal at the central station to which said lines are connected in multiple, means to translate intelligence into high frequency carrier currents, means to apply said carrier currents to said common terminal for simultaneous transmission over a plurality of said lines to a plurality of said subscribers' stations, and detectors at said substations for simultaneously detecting the same intelligence from said carrier currents at a plurality of said substations.

2. The method of distributing amusement, news and the like, which consists in producing several different types of intelligence, translating each type of intelligence into a carrier current having a different frequency characteristic of the intelligence translated, superposing the several carrier currents upon a common terminal at a central station, simultaneously transmitting the several carrier currents along individual guiding paths to a plurality of subscribers' stations, selecting at each subscriber's station the carrier current transmitting the type of intelligence desired to the exclusion of other carrier currents, and at certain subscribers' stations simultaneously detecting from the selected carrier current one type of intelligence, and at other subscribers' stations simultaneously detecting from another selected carrier current another type of intelligence.

3. In a system for distributing amusement, news and the like, a central station, a plurality of subscribers' stations, subscribers' lines extending from said central station to said subscribers' stations, a common terminal at the central station to which said lines are connected in multiple, a plurality of sources of intelligence, means to translate intelligence from each source into a carrier current of different frequency, means to simultaneously superpose the several carrier currents upon said common terminal for simultaneous transmission of the several carrier currents over each of a plurality of lines, means at each subscriber's station for selecting the carrier current transmitting the desired intelligence to the exclusion of other carrier currents, and detectors at each substation, the detectors at certain substations simultaneously detecting from the selected carrier current the same desired intelligence, and the detectors at other substations simultaneously detecting from another selected carrier a different desired intelligence.

4. In a system for distributing news, amusement and the like, a central station, a plurality of subscribers' stations, subscribers' lines extending from said central station to said subscribers' stations, a common terminal at the central station to which said lines are connected in multiple, a plurality

of sources of intelligence of different types, means to translate intelligence of each type into a carrier current having a different frequency characteristic of each type, means for simultaneously superposing the several carrier currents upon said common terminal for simultaneous transmission of the several carrier currents over each of a plurality of lines, means at each subscriber's station for selecting a particular carrier current so that certain stations may select the carrier current transmitting one desired type of intelligence to the exclusion of other carrier currents, while other stations may select a carrier current transmitting a different type of intelligence to the exclusion of other carrier currents, and detecting means at each substation for simultaneously detecting the intelligence corresponding to the particular carrier current selected at each substation.

5. The method of distributing news, amusement and the like, which consists in collecting the information which it is desired to transmit at a central point, translating the intelligence into electrical currents, impressing the electrical currents upon individual circuits radiating from said central point, amplifying the currents before impressing them upon the radiating circuits, amplifying the currents received at the terminals of certain of the radiating circuits, and impressing the amplified energy upon branch circuits leading from said terminals.

6. In a system for distributing amusement, news and the like by collecting the intelligence to be transmitted at a central point and transmitting it in the form of electrical energy over circuits branching from said point to outlying points, and from said outlying points over other circuits in turn branching therefrom, the method which consists in amplifying the electrical energy at each distributing point in the system from which branch lines radiate.

7. In a system for distributing amusement, news and the like, means for collecting the intelligence to be transmitted and translating it into electrical energy at a central point, means for amplifying the energy at said point, branch lines extending from said central point to outlying points, means for amplifying the energy at certain of said outlying points, and branches extending from the output of said last mentioned amplifying means to subordinate outlying points.

8. In a system for distributing news, amusement and the like, means for collecting the intelligence which it is desired to transmit and translating it into electrical energy at a central point, a plurality of branch lines extending from said central point to outlying points, subordinate branch lines extending from outlying points to subordinate points, and means for amplifying the electrical energy at each point in the system from which branch lines radiate.

9. In a system for transmitting amusement, news and the like, a central office, a subscriber's station, a transmission line extending from said central office to said subscriber's station, a subscriber's subset and a special receiver at said subscriber's station, a second subscriber's station, a second line extending from said central office thereto, a subscriber's subset at said second subscriber's station, means to interconnect said lines at said central station so that ordinary telephone currents may be transmitted from one subscriber's station over said lines to the other subscriber's station, means for translating a program into a high frequency carrier current, means to apply said carrier current to said first mentioned line at said central office, means to prevent the carrier current so applied from being transmitted over said interconnecting means to the other subscriber's line, and means at said first-mentioned subscriber's station for translating said carrier current into program currents to actuate said special receiver at said first-mentioned subscriber's station.

10. In a system for transmitting amusement, news and the like, a central office, a plurality of subscribers' stations, transmission lines extending from said central office to said subscribers' stations, subscribers' subsets at each subscriber's station, means at said central office whereby any line may be interconnected exclusively to any other line for transmission of ordinary telephone currents from one subset over both lines to the other subset, means for translating a program into a high frequency carrier current, a common terminal at the central office, multiple connections from said terminal to certain of said lines, means to apply said carrier current to said common terminal for simultaneous transmission over the lines connected thereto, means associated with said lines to prevent the carrier current applied thereto over their multiple connections from being transmitted over an ordinary telephone connection at the central office to another line with which it is connected for ordinary telephone transmission, means at the substations of lines to which carrier current is applied for translating said carrier current into a program, and a special receiver at said substations for receiving the translated currents.

11. In a system for transmitting news, amusement and the like, a central office, a plurality of subscribers' stations, transmission lines extending from said central office to said subscribers' stations, subscribers' subsets at each subscriber's station, means at said central office whereby any line may be interconnected exclusively to any other line

for transmission of ordinary telephone currents from one subset over both lines to the other subset, means to translate intelligence from several sources into carrier currents having different frequencies, a common terminal at the central office, multiple connections from said terminal to certain of said lines, means to apply said carrier currents to said common terminal for simultaneous transmission over the lines connected thereto, means associated with said lines to prevent the carrier currents applied thereto over their multiple terminals from being transmitted over an ordinary telephone connection at the central office to another line with which any line is connected for ordinary telephone transmission, means at the substations of lines to which carrier currents are applied to select the carrier current transmitting desired intelligence, means at said substations to detect from the selected carrier the intelligence transmitted thereby, and special receivers at said substations for receiving the detected intelligence.

12. In a system for distributing amusement, news and the like, a main central office, lines extending from said main central office to outlying switching stations, means at said central office for switching said lines into connection with each other for the transmission of ordinary telephone currents, lines extending from said outlying offices to subscribers' stations, switching means at said outlying offices for interconnecting subscribers' lines with each other or with the lines extending to the main central office for the transmission of ordinary telephone currents over said subscribers' lines, a plurality of sources of intelligence of different types, means to translate intelligence from said sources into high frequency carrier currents having frequencies characteristic of the different types of intelligence, a common terminal at said main central office upon which said carrier frequencies may be simultaneously impressed, connections from said terminal to said telephone lines, means associated with said connections for discriminating between low frequency and carrier frequency currents, connections from the lines leading to the main central office at each outlying station for simultaneously impressing said carrier frequencies upon the subscribers' lines, discriminating means associated with said connections for discriminating between high frequency carrier currents and ordinary telephone currents, a program receiver set at each subscriber's station, means at the subscriber's station for selecting high frequency carrier currents corresponding to the desired type of intelligence to the exclusion of other carrier frequencies and ordinary telephone currents, and means for translating the selected frequency into low frequency currents for operating the program receiver set.

13. In a system for distributing amusement, news and the like, a central office, telephone circuits terminating at said central office, switching arrangements for interconnecting said telephone circuits for communication at ordinary telephone frequencies, a source of carrier currents, and means for simultaneously superposing carrier frequencies from said source upon a plurality of said telephone circuits.

14. In a system for distributing amusement, news and the like, means for translating intelligence into electrical energy, a distributing station having a common terminal for impressing said energy upon said terminal, connections from said terminal to a plurality of telephone lines, circuits for the distribution of power, and connections from said common terminals to said power circuits, whereby said electrical energy for the transmission of intelligence may be simultaneously transmitted over said telephone lines and power circuits.

15. In a system for distributing news, amusement and the like, a central station, a plurality of subscribers' stations, lines interconnecting said central station with said subscribers' stations, means at said central stations for interconnecting any subscriber's line with another subscriber's line to the exclusion of other subscribers' lines for ordinary telephone transmission, a subscriber's set including a transmitter and receiver at each subscriber's station, means at said central station to simultaneously impress intelligence to be distributed in the form of high frequency carrier currents upon a plurality of said lines, a special receiver at certain subscribers' stations, and means to operate said special receiver at such stations by said high frequency carrier currents.

16. In a system for distributing news, amusement and the like, a central station, a plurality of subscribers' stations, lines interconnecting said central station with said subscribers' stations, means at said central stations for interconnecting any subscriber's line with another subscriber's line to the exclusion of other subscribers' lines for ordinary telephone transmission, a subscriber's set including a transmitter and receiver at each subscriber's station, means at said central station to impress simultaneously upon a plurality of said lines several carrier currents of different frequencies each transmitting different intelligence, a special receiver at certain subscribers' stations, and means at said stations to select one carrier frequency to the exclusion of the others for operating said special receiver.

17. In a system for distributing news,

amusement and the like, a central station, a plurality of subscribers' stations, lines interconnecting said central station with said subscribers' stations, means at said central station for interconnecting any subscriber's line with another subscriber's line to the exclusion of other subscribers' lines for ordinary telephone transmission, a subscriber's set including a transmitter and receiver at each subscriber's station, means at said central station to impress simultaneously upon a plurality of said lines several carrier currents of different frequencies each transmitting different intelligence, a special receiver at certain subscribers' stations, means at said stations to select one carrier frequency to the exclusion of the others for operating said special receiver, and means associated with each special receiver for detecting from the selected carrier frequency the intelligence transmitted thereby.

18. A transmission system comprising a transmission line over which messages may be transmitted at ordinary telephone frequencies and other forms of intelligence may be transmitted at carrier frequencies, a subscriber's set associated with said line for use in connection with ordinary telephone frequencies, an auxiliary set including selective apparatus and a detector independent of said subscriber's set for operating at carrier frequencies, said subscriber's set including a telephone transmitter and receiver and connections therefor so arranged that said transmitter and receiver will be substantially conjugate, whereby high frequency energy passing into the subscriber's set and detected by said transmitter will not actuate said receiver.

19. In a directed entertainment system, a distributing point from which a plurality of transmission lines lead to subscribers' stations, said lines being connected in multiple, a station distant from the distributing point at which programs originate, means to transmit the programs at voice frequencies to the distributing point, and means to simultaneously distribute the programs over a plurality of said lines to a plurality of subscribers at carrier frequencies.

20. In a directed entertainment system, a distributing point from which a plurality of transmission lines extend to a plurality of subscribers' stations, said lines being connected in multiple, a station distant from the distributing point at which programs originate, means to transmit the programs from said station to said distributing point at voice frequencies, means at the distributing point for translating the voice frequency currents into carrier currents of higher frequencies, and means for simultaneously distributing the carrier currents over a plurality of said lines to a plurality of subscribers' stations.

21. In a directed entertainment system, a distributing point from which a plurality of transmission lines lead to a plurality of subscribers' stations, said lines being connected in multiple, a station distant from the distributing point at which programs originate, means to transmit the programs to the distributing point at voice frequencies, means at the distributing point to modulate carrier currents by the voice frequencies transmitted from the distant station, and means to simultaneously transmit the same modulated current over a plurality of said lines to a plurality of subscribers' stations.

22. In a signaling system, the combination with a telephone cable comprising a plurality of subscribers' loops, each loop having a telephone subscriber's sub-set connected thereto and arranged for exclusive point to point telephone communication between the subscriber of any given loop and the subscriber of any other loop, of a program circuit, means to impress a high frequency alternating carrier current upon said program circuit, means to superimpose a program signal upon said carrier current, means to inductively connect said program circuit to a plurality of the loops in said cable to simultaneously transmit said carrier current over each of said plurality of subscribers' loops without permitting telephone currents originating at any subscriber's station for point-to-point communication to be transmitted through said inductive means to any other loop, and receiving means associated with each of said loops to detect from said carrier current said program signal simultaneously with the transmission of point to point telephone messages over the loops.

23. In a signaling system, a plurality of telephone subscribers' loops, each loop having a telephone subscriber's sub-set connected thereto and arranged for exclusive point to point telephone communication between the subscriber of any given loop and the subscriber of any other loop, a program circuit, means to impress a high frequency alternating carrier current upon said program circuit, means to superpose a program signal upon said carrier current, means to connect said program circuit with said loops so that said carrier current will be transmitted simultaneously over each of said loops while telephone currents originating at any subscriber's station for point to point communication will not be transmitted through said connecting means to any other loop, and receiving means associated with each of said loops to detect from said carrier current said program signal simultaneously with the transmission of point to point telephone messages over said loop.

24. In a signaling system, a plurality of telephone subscribers' loops, each loop having a telephone subscriber's sub-set connect-

ed thereto and arranged for exclusive point to point telephone communication between the subscriber of any given loop and a subscriber of any other loop, a program circuit, means to impress a plurality of alternating carrier currents of different frequencies upon said program circuit, means to superpose a program signal upon each said carrier current, means to connect said program circuit with said loops so that said carrier currents will be transmitted simultaneously over each of said loops while telephone currents originating at any subscriber's station for point to point communication will not be transmitted through said connecting means to any other loop, means at each subscriber's station to select from the carrier currents transmitted over the loop, the particular carrier current upon which is superposed a desired program signal and receiving means associated with each of said loops to detect from the selected carrier current the desired program signal simultaneously with the transmission of point to point telephone messages over said loop.

In testimony whereof, I have signed my name to this specification this 24th day of January, 1922.

LLOYD ESPENSCHIED.