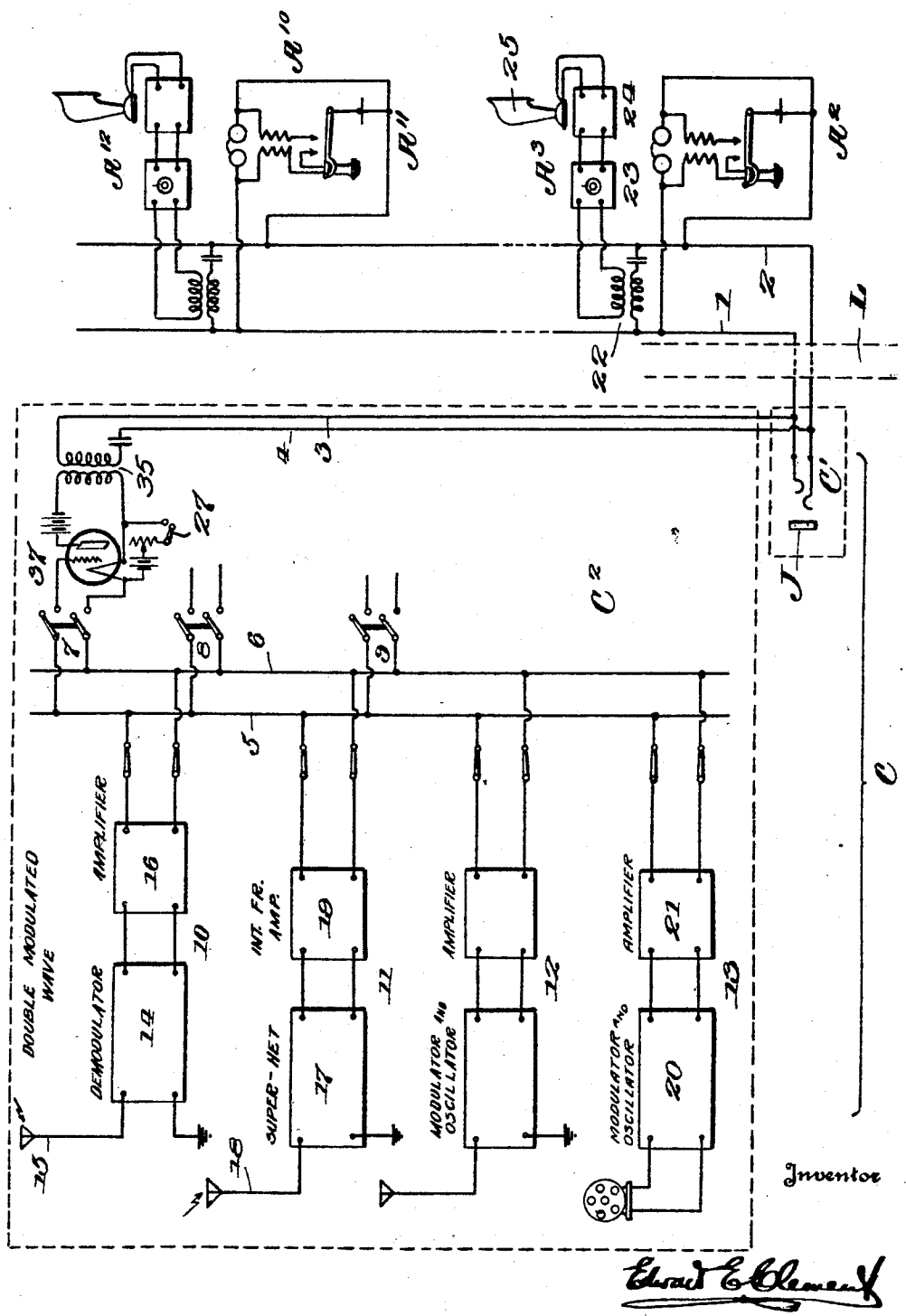
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April 15, 1930. E. E. CLEMENT 1,754,878

TRAFFIC CONTROL SYSTEM FOR RADIO BROADCAST DISTRIBUTION

Filed Feb. 21, 1925



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Examiner

Patented Apr. 15, 1930 1,754,878

UNITED STATES PATENT OFFICE

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TRAFFIC-CONTROL SYSTEM FOR RADIO BROADCAST DISTRIBUTION

Application filed February 21, 1925. Serial No. 10,916.

My invention relates to systems of radio broadcast distribution and more particularly to a system whereby broadcast matter received by radio or originated at a central station may be distributed to subscribers over wired lines, and has for its object the provision of such a system in which the distribution may be made from a telephone central station to both private line and party line subscribers without interfering with the operation of the telephone system or reception of different programs by parties on a common line.

Other objects of the invention will be apparent from a reading of the following specification and the drawings accompanying the same.

My invention is illustrated in the accompanying drawing which is a diagram of a portion of a system embodying the invention.

Referring to the drawing in detail, the portion of the diagram to the left of the dotted lines L and indicated generally by the letter C, represents the equipment at a telephone central station, the portion to the right represents subscribers' substations connected with the central station C, while the portion between the dotted lines L represents the intervening space between the central station and the substations traversed by the line wires 1—2.

At the telephone central station C, the dotted line rectangle C′ represents the usual telephone exchange equipment while the dotted line rectangle C^2 represents the broadcast distributing equipment. The telephone exchange equipment may be of any known or other suitable form in which the subscribers' line such as the line 1—2 terminate in suitable central station line terminal apparatus symbolized by the jack J. The line 1—2 is provided with a pair of multiples 3—4 extending to the broadcast equipment where they connect through a coupler 35 with the output circuit of a line tube 37, the input circuit of which is connected to a bus 5—6 through a suitable switch 7. Other switches 8 and 9 are provided for connecting the bus 5—6 with the input circuits of other line tubes not shown but which, it is to be understood, are the same as 37, and similarly connected through their output circuits and suitable couplings to other line circuits like the line circuit 1—2.

The bus 5—6 is supplied with a plurality of modulated carrier currents of different frequencies, suitable to line transmission, from the different sources 10, 11, 12 and 13 each furnishing a different program. These sources of supply of broadcast matter may consist either of radio relay apparatus operable to receive broadcast matter by radio from distant stations and relay the same onto the bus 5—6, or means for originating broadcast matter at the central station and putting the same directly onto the bus 5—6 on a carrier current of the proper frequency. The apparatus 10 is a radio relay device in which 14 is a receiver and demodulator of double modulated waves arranged to receive a double modulated wave on its antenna 15, demodulate the same to detect an intermediate carrier wave modulated thereon, and of a frequency suitable for line transmission, and supply this intermediate wave to the bus 5—6 through a suitable amplifier 16, the intermediate wave bearing audio modulations.

The apparatus 11 is also a radio relay device and consists of a superheterodyne receiver 17 arranged to receive broadcast on its antenna 18 and relay the beat wave, produced by the heterodyning action, through an amplifier 19 onto the bus 5—6, the heterodyning being regulated to produce a beat wave of a frequency suitable for line transmission and different from that supplied to the bus by the relay 10. The apparatus 12 is a superheterodyne relay like 11 in all respects except that when used simultaneously with 11 it is adjusted to deliver a beat wave to the bus 5—6 different in frequency from that supplied by the relay apparatus 11 or 10.

At 13 is indicated a carrier current transmitting apparatus which may be of any known or other suitable type capable of transmitting speech or other signals as modulations of a carrier current of a frequency suitable for line transmission and arranged to supply the modulated carrier current to the bus 5—6. It may comprise generally a mi-

crophone arranged to control modulator and oscillator device 20 whose output is supplied to the bus 5—6 through an amplifier 21.

Referring now to the subscribers' substations circuits, those of a two party line are indicated at A'' and A^2. As the equipment is the same for all substations a description of one (A'') will suffice. This consists of an ordinary common battery, telephone substation apparatus A^2 connected across the line 1—2, and a broadcast receiving apparatus A^3 coupled to the line 1—2 through a broadly tuned coupler 22 capable of passing the band of frequencies supplied to the bus 5—6. As the telephone apparatus A^2 is of a standard and well known form it will not be described in detail. The broadcast receiver A^3 may be of any known form such as a detector apparatus element 23 arranged to be tuned to the different frequencies supplied to the bus 5—6, an amplifier 24 and a loud speaker receiver 25.

While the one line 1—2, here shown by way of example, is indicated as a two party line, it is to be understood that the other lines of the exchange, such as those connected through switches 8, 9, etc., may be some individual lines and some party lines of two or more parties, according to the demands of the market, the individual lines being the same as the line 1—2 except that only one substation, such as A'' would be connected thereto.

In the operation of the system, a subscriber at one of the substations, for example A', desiring broadcast service, calls and communicates with an operator at the central station C in the usual manner through the associated line terminal apparatus here symbolized by the jack J and requests broadcast service, whereupon the operator causes the subscriber's line tube 37 to be energized and connected to the bus 5—6 through its switching connection 7. The subscriber will now have his detector 23 operatively connected with the bus 1—5 over the following transmission elements: bus 1—5, 7, 37, 3—4, 1—2, 22 to detector 23. As the couplers 35 and 22 are broadly tuned or aperiodic, the entire band of waves supplied to the bus 5—6 will be transmitted to the subscriber's detector 23, and the subscriber may now tune his detector 23 to the carrier current of the desired program. Similarly, the subscriber at substation A'' may initiate the connection of the line 1—2 with the broadcast service, but in either case both subscribers may receive either the same or different programs simultaneously.

The switches 27 and 7 controlling the energization of the subscriber's line tube may be so situated as to be operated by the telephone operator at C' or may be situated remotely from the telephone operator and operated by a special, broadcast service, operator under instructions from the telephone operator received over an order circuit not shown, but which may be an ordinary telephone order circuit or any known or other suitable form of communication or signaling system. Instead of having the telephone operator make or direct the making of the broadcast service connection, provision may be made for control of this connection by the subscriber independently of the telephone operator at C' as disclosed in my co-pending application Serial Number 3,861, filed January 21, 1925, patented March 16, 1926, as No. 1,577,108.

While the radio relay apparatus 10 has been described as operating to detect a single intermediate wave and amplify it on to the bus 5—6, it is to be understood that the primary wave received by the antenna 15 of this apparatus may be modulated with a plurality of different intermediate carrier waves each bearing a different program and all said intermediate waves detected or demodulated from the primary wave by the demodulator 14 and amplified onto the bus 5—6. In any case, of all the different wave lengths supplied to the bus 5—6, one predetermined wave length is delegated to a program or matter consisting of announcements relating to the other programs which announcement program would preferably be supplied through the local transmitting apparatus 13. In operation, the different programs would be identified by their position in the series with reference to the announcement program, so that the subscriber in selecting a given program would start by tuning in on the announcer program and then turning his tuning dial or control a given distance from the announcer program position, according to the program desired. For convenience the position of the announcement program may be marked zero (0) on the tuning scale of the receiver and the positions of the other programs marked 1, 2, 3, etc., from that of the announcer program.

The invention also contemplates supplying the bus 5—6 with a group of programs including an announcement program for the group, all through the radio relay apparatus 10 from a double modulated primary wave received on the antenna 15. Further, this arrangement of a group of programs with an announcement program may be applied to other systems of broadcast distribution, for example the subscribers' broadcast receivers may be provided with antennæ to receive by radio from a station or stations transmitting a group of programs on different wave lengths one of the programs being an announcement program, and the subscribers' tuning dials being graduated or marked to indicate the different programs. In all applications of this principle, the announcer should be provided with means for listening in on any of the programs and for communi-

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cating with the studios or sources of origin of the programs.

What I claim is:

1. The method of broadcast distribution and selection at ultimate receiving stations which comprises broadcasting a plurality of programs each on a different standard wave length and all suitable for reception at the ultimate receiving stations, of a progressive series, one of said wave lengths being allotted to a broadcast program consisting of announcements relating to the other said programs and identifying said other programs by their position in the series with reference to the position of the wave length allotted to the announcement program.

2. In a system of broadcast distribution, central office means for broadcasting a plurality of programs by modulated carrier waves each on a different standard wave length, and other central means for broadcasting announcements relating to said programs on a modulated carrier wave of a constant fixed wave length and receiving means arranged to be tuned to any of said wave lengths, together with operators' receiving means at said central office associated with the announcement broadcasting means for listening in on the sources of said programs.

3. In a system of radio broadcast distribution, a central station with subscribers' substations connected therewith over line wires, relay means at the central station including high frequency circuits for receiving radio broadcast matter, means for changing the carrier frequency and relaying the same simultaneously over a plurality of the line wires as modulated carrier current of a frequency suitable for line transmission, other means at the central office for similarly and simultaneously receiving and transmitting broadcast matter over a plurality of the same lines as modulated carrier current of another frequency suitable for line transmission, and selective tuning and detecting means at each substation operatively connected with its associated line.

4. In a system of radio broadcast distribution, a central station with subscribers' substations connected therewith over line wires, relay means including high frequency wave circuits at the central station for receiving radio broadcast matter, means connected therewith for reducing the carrier frequency and relaying the same onto the line wires as modulated carrier current of a frequency suitable for line transmission, other means at the central office for similarly and simultaneously receiving other radio broadcast matter and transmitting the modulations carried thereby over the same lines on a carrier current of another frequency suitable for line transmission, and a plurality of substations operatively connected with one of said lines, each of said substations having a selective tuning and detecting means connected with the said line.

5. In a system of radio broadcast distribution, a central station with subscribers' substations connected therewith over line wires, means at the central station for receiving different programs of signals modulated on different radio carrier waves, means for relaying each of said signal programs broadcast to all the substations over said lines without detection of the signals; but on carrier currents of frequencies suitable for line transmission, said frequencies being different from the received frequencies and different for the different programs, and selective tuning and detecting means at each substation operatively connected with its line.

In testimony whereof I hereunto affix my signature.

EDWARD E. CLEMENT.