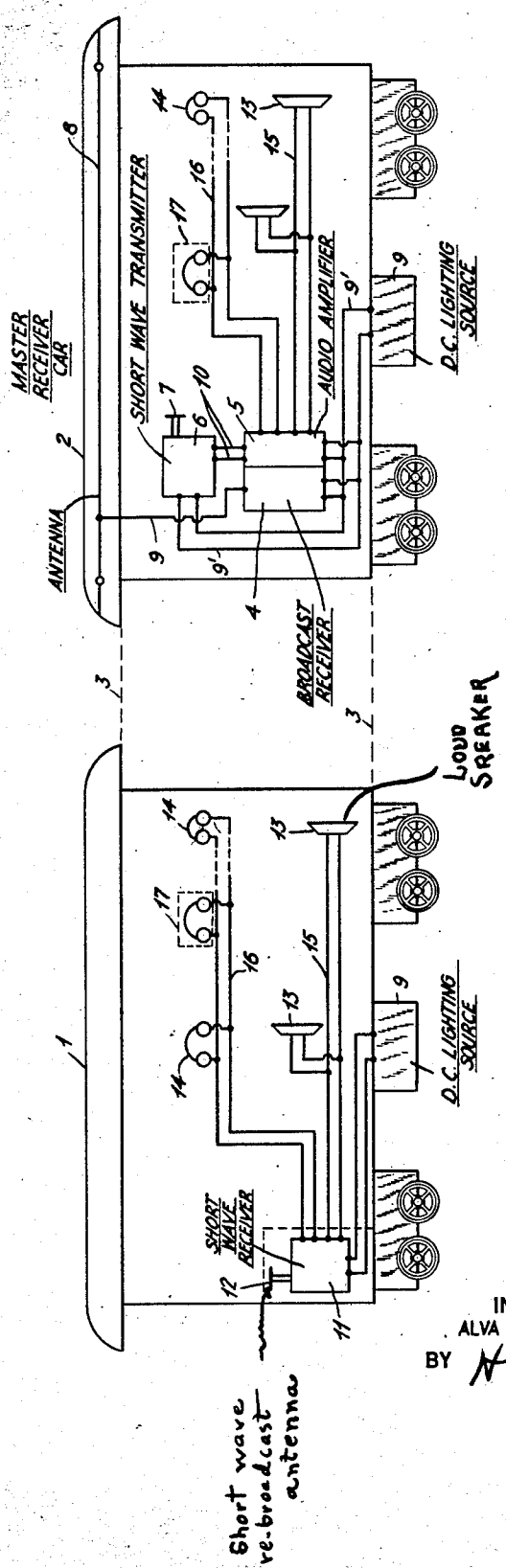
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July 16, 1935. A. R. HOPKINS 2,008,280

RADIO FREQUENCY DISTRIBUTION SYSTEM FOR TRAINS

Filed May 10, 1932




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Patented July 16, 1935 2,008,280

# UNITED STATES PATENT OFFICE

2,008,280

## RADIO FREQUENCY DISTRIBUTION SYSTEM FOR TRAINS

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Application May 10, 1932, Serial No. 610,427

4 Claims. (Cl. 250—15)

My present invention relates to radio broadcast reception and distribution, and more particularly to a novel and improved system of receiving and distributing radio broadcast programs through the cars of a train.

The present system of radio broadcast reception distribution for trains involves many practical features, and offers numerous advantages over a train radio broadcast reception and distribution system which necessitates especial train line connections between cars. This is especially true in the case of systems requiring special train line connections in the "making up" of trains, when not all of the cars are radio equipped.

It may be stated that it is one of the main objects of the present invention to provide a system wherein regular broadcast programs are received on trains and distributed to individual cars by means of ultra-high frequency waves, the individual cars being equipped with short wave receivers and audio frequency amplifiers with sufficient output and proper volume levels to supply the necessary power per car.

Another important object of the present invention is to provide in a train a broadcast receiver, connected with a suitable antenna, and high frequency transmitter with its antenna, or loop, the receiver and transmitter being installed on either a club car or observation car, and the transmitter being adapted to distribute programs to all properly equipped cars in the train regardless of the arrangement of the cars.

Another object of the present invention is to provide a centralized radio system for a train wherein there is provided a broadcast receiver and an ultra-high frequency transmitter in a master receiver car of the train, the broadcast receiver supplying audio frequency power to various outlets in the master receiver car, and also functioning to modulate the transmitter, the latter being utilized to rebroadcast the broadcast signals for pick-up by other cars in the same train, each radio equipped car in the train being provided with an ultra-high frequency receiver, and an audio amplifier system to supply ample audio power to the various outlets in the car, such outlets being loudspeakers, headphones, or radio pillows.

Still another object of the present invention is to provide a program reception and distribution system for a train of cars wherein the necessity of special train line connections is eliminated, and wherein power is supplied to the equipment in each car from the usual direct current lighting circuit of the respective cars thereby dividing the load on the train batteries, and wherein the individual units for each car are small, portable for servicing and replacement, and easily located in the cars.

And still other objects of the present invention are to improve generally the simplicity and efficiency of radio broadcast programs and distribution systems for trains, and to particularly provide a system of this type which is not only economical, durable and reliable in operation, but economically installed and serviced.

The novel features which I believe to be characteristic of my invention are set forth in particularity in the appended claims, the invention itself, however, as to both its organization and method of operation will best be understood by reference to the following description taken in connection with the drawing in which I have indicated diagrammatically one circuit arrangement whereby my invention may be carried into effect.

Referring now, to the drawing, there is shown in conventional form a train comprising at least two cars 1, 2, the dotted lines 3 between the two cars representing additional cars. It is to be clearly understood that the car 2, the master receiver, car, need not be disposed at the end of a train, but may be a club car, an observation car, the dining car or any other car on the train which possesses sufficient space to house a broadcast receiver 4, an audio frequency amplifier 5, and a short wave transmitter 6.

The broadcast receiver 4 is preferably of the superheterodyne type provided with automatic volume control in order to maintain a substantially constant level during operation. Any superheterodyne receiver of this type may be employed for this purpose, it being believed unnecessary to show the details of such a receiver since those skilled in the art are well acquainted with its constructional details. However, for the purposes of illustration, a superheterodyne receiver of the type disclosed by Friis in U. S. Patent 1,675,848 of July 3, 1928 may be employed for this purpose. The audio frequency amplifier 5 may be the usual audio frequency amplifier of the receiver 4, or it may comprise an independent power amplifier device.

The short wave transmitter 6 is an ultra-high frequency transmitter operating on the six meter band, and need not be described in any further detail than to point out that it may be of any well known construction, and includes a dipole, or linear, radiator 7. The master receiver car 2 is equipped with a suitable outside antenna 8, connected by a lead-in wire 9 to the input side of the

broadcast receiver 4, it being understood, of course, that the broadcast receiver has the low potential side of its input grounded in any desired manner, as to the framework of the car.

Power is supplied to the equipment in the master receiver car from the conventional 32 volt direct current lighting source 9 of the car, through conductors 9', it being noted that the circuits between the source 9 and the lighting source of the car are omitted. A power converter may be used, and in that case would be connected in the power supply leads connecting the receiver units and the lighting circuit. This converter may be either a dynamo for generating the required plate voltage, a motor-generator set, or a thyratron inverter to generate a 60 cycle alternating current voltage.

The output of the audio frequency amplifier 5 is distributed to various reproducers disposed within the master receiver car, and another portion of the audio output is impressed, through conductors 10, upon the short-wave transmitter 6 whereby the audio output of the amplifier 5 is employed to modulate the transmitter 6, the latter then rebroadcasting the signals for pick-up by the other cars in the same train.

The remaining cars of the train, that is to say, the cars other than the master receiver car 2, may be each equipped with a short wave receiver 11. Each receiver 11 is provided with a dipole, or linear, collector 12, it being understood that the short wave receiver is designed to select, detect and amplify the energy rebroadcast from the short wave transmitter 6. In other words, the receiver 11 is preferably fixedly tuned to the frequency of the short wave transmitter 6, to wit: in the six meter band. Any desired type of short wave receiver, which is adapted to operate in the six meter band, may be employed, it being believed unnecessary to go into the details of such a receiver, since those skilled in the art are well aware of such construction.

The direct current lighting source 9 of each car, as pointed out heretofore, is utilized for energizing the various circuits of each short wave receiver 11, either directly or by use of a suitable inverter where higher voltage is desired, and the audio output of each receiver is supplied to various reproducers disposed in each car. It is to be understood that suitable audio frequency amplification is provided in conjunction with each receiver 11 so that operation of the various reproducers in each car is readily possible. It will be noted that each of the cars, including the master receiver car, includes loudspeakers 13, the latter being adapted for use in compartments and public spaces.

Furthermore, headphones 14 are provided in the various cars for use in parlor cars and Pullman seats, or in general in any location where individual reception is desirable. It will also be noted that the loudspeakers are disposed on a line 15, which line is distinct from the headphone line 16. The headphone line 16 may also include radio pillow devices 17. Such radio pillow devices usually comprise an inflated pillow, or a pillow filled with rubber padding in the center of which pillow is disposed a headphone so that reception can be had while a person is resting his head against the pillow. Such a device is disclosed and claimed in application Serial No. 412,044 filed December 6, 1929 by E. J. Quinby.

It is to be clearly understood that as many headphones of the head set type or of the radio pillow type, as are desired, may be employed on each of the headphone lines 16 in each car of the train. The radio equipment comprising the units 4, 5 and 6 of the master receiver car, and the short wave receiver 11 in each of the remaining cars is preferably made small, and encased in sturdy metal cabinets of suitable shape whereby they may be disposed in the linen closets, or other out of the way places in the cars of a train.

These units are preferably more or less portable and detachable for replacement and servicing. The output to the loudspeaker lines 15 and the headphone line 16 should be sufficient, and at the proper volume level, to supply the necessary audio power per car. In other words, the loudspeaker lines have their inputs arranged so that the proper volume level is maintained for proper loudspeaker operation, while the headphone lines 16 are maintained at the proper volume level for headphone operation.

The operation of the above system is believed to be clear from the foregoing description and the accompanying drawing. It will be obvious to those skilled in the art that there has been disclosed in the present application a method of receiving and distributing broadcast programs in a system wherein a broadcast receiver, with suitable antenna, and a high frequency transmitter with its radiator is installed on either a club car or observation car, or any other master receiver car, the master receiver car equipment being adapted to distribute programs to all properly equipped cars in the train regardless of the arrangement of the cars.

Local announcements can be made over the system by connecting a microphone to the input of the audio amplifier 5 in the master car. This would modulate the transmitter, and would be picked up simultaneously on all receivers. With practically the same arrangement, a phonograph electric pick-up can be substituted for the microphone and thereby enable recorded programs to be distributed throughout the train.

While I have indicated and described one arrangement for carrying my invention into effect, it will be apparent to one skilled in the art that my invention is by no means limited to the particular organization shown and described, but that many modifications may be made without departing from the scope of my invention as set forth in the appended claims.

What I claim is:

1. In combination in a program distribution system for a train, a receiver tunable to standard broadcast frequencies disposed within one of the cars of said train and adapted to select a desired broadcast program, an ultra-high frequency transmitter arranged to generate currents having a wave length of the order of 6 meters disposed within said car and being arranged to have oscillations generated by it modulated by the output of said broadcast receiver, said transmitter including a radiator located entirely within said car for broadcasting the modulated ultra-high frequency oscillations to the remaining cars of said train, a receiver disposed in one or more of the remaining cars of said train, the receiver being tuned to the frequency of oscillations radiated by said transmitter, each of said ultra-high frequency receivers including a collector disposed within the same car, and a plurality of reproducers connected to the output of each of said ultra-high frequency receivers, and means for energizing the circuits of each ultra-high frequency receiver from the direct current lighting source of each of said remaining cars.

2. In combination in a program distribution system for a train of cars, a radio receiver having an input circuit tunable over the broadcasting frequency range disposed within one of said cars, an antenna mounted on the roof of said car and having a length substantially equal to that of said car, a lead connecting said antenna to an input terminal of said receiver, an audio frequency amplifier connected to said receiver, a pair of leads connected to the output of said amplifier, a plurality of loudspeakers connected across said leads, a transmitter disposed within said car arranged to generate wave lengths of the order of 6 meters, means coupling said transmitter to said audio amplifier, a dipole antenna disposed within said car and connected to said transmitter for broadcasting the modulated high frequency oscillations to the remaining cars of said train, receivers disposed within other cars of said train and tuned to the frequency radiated by said transmitter, each said receiver comprising a dipole antenna disposed within the same car and connected to said receiver, each said receiver also comprising an audio frequency amplifier of sufficient power to energize a plurality of loudspeakers, a plurality of loudspeakers connected to each of said audio amplifiers and located within the same car.

3. The combination defined in the preceding claim in which at least one of said last named audio amplifiers has a pair of output terminals energized at a low volume level, a pair of leads connected to said terminals and a plurality of telephone receivers disposed adjacent the seats of said car and connected to said leads.

4. A method of distributing broadcast programs through a train of cars, which consists in detecting and amplifying a desired audio frequency modulated broadcast program in one of the cars of said train, supplying the amplified audio frequency energy to a plurality of reproducers in said car, producing oscillations having a wave length of the order of 6 meters, modulating said oscillations with a portion of said amplified audio frequency energy, radiating the modulated oscillations to the remaining cars of said train, collecting the radiated modulated oscillations in at least one of said remaining cars of said train, detecting and amplifying at audio frequency the collected oscillations in said one car and supplying a plurality of reproducers with the amplified energy whereby the latter are caused to simultaneously reproduce the same modulations reproduced in the reproducers of said first mentioned car.

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