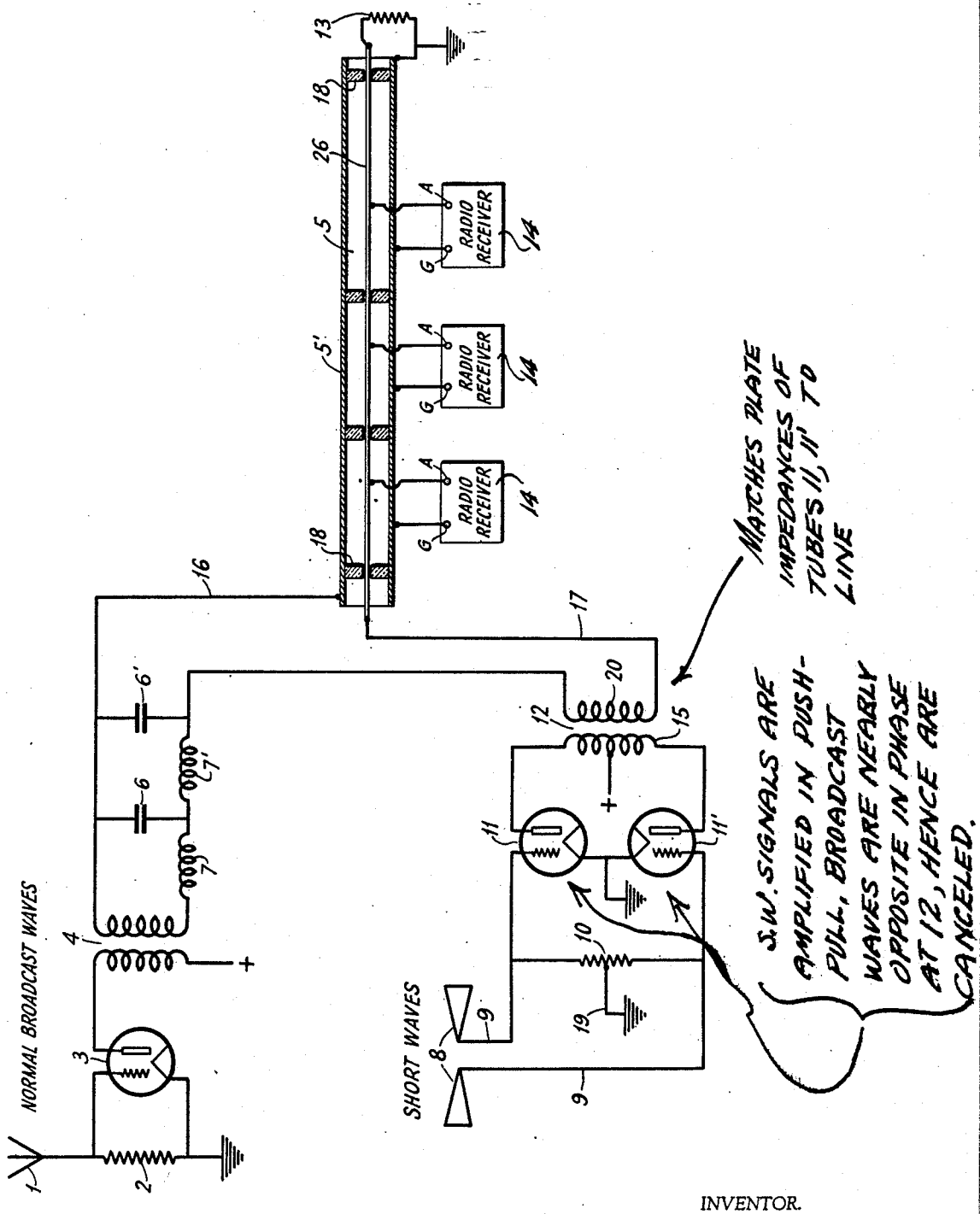
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CENTRALIZED RADIO SYSTEM FOR SHORT AND BROADCAST WAVES

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CENTRALIZED RADIO SYSTEM FOR SHORT AND BROADCAST WAVES

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6 Claims. (Cl. 250—9)

The object of this invention is to obtain a reception and distribution system for centralized radio installations of the radio frequency distribution type, which will be capable of distributing not only the normal broadcast band of frequencies (e. g. 550 to 1,500 k. c.) but also the so-called short-wave band (e. g. 5 to 20 megacycles) on which international broadcasting is carried on.

The trend in modern radio receivers is towards the "all-wave" type, capable of receiving both normal broadcast and the above-mentioned short waves. When such a receiver is used in connection with present types of centralized radio systems, it is ineffective for short wave reception, because these systems are only designed to distribute the normal broadcast waves.

In my invention, a system is shown which is capable of receiving and distributing both bands of waves. The attached figure illustrates one embodiment of the invention.

Referring to this figure, 1 is an antenna which is designed to receive normal broadcast waves, and which is connected through resistance 2 to ground. Across 2 are connected the input terminals of vacuum tube 3. The plate circuit of this tube is connected to the primary of the radio frequency step-down transformer 4 which is designed to couple the tube efficiently to the radio frequency transmission line 5 over the normal broadcast band of frequencies. Resistor 2 is chosen of a sufficiently high value such that the amplifier 3 is aperiodic and thus amplifies currents of the different frequencies of the broadcast band substantially equally. A low pass filter comprising condensers 6, 6' and inductance coils 7, 7' designed to have a cut off at a frequency somewhat above the broadcast band but below the short wave band, for example, at 3,000 kilocycles, is introduced between transformer 4 and line 5. This filter transmits currents of the broadcast band efficiently and at the same time prevents the short wave signals from being affected by the losses which would be introduced were they passed through the secondary of transformer 4. For efficient transmission the transformer 4 may be designed to match the impedance of the low pass filter to the plate impedance of the tube for the broadcast band of frequencies. Condenser 6' is chosen to have a very low impedance, or act as a by-pass, for currents of the short wave band.

As shown, a short wave antenna 8 which may be of any type efficient at short waves, such as a doublet antenna, has its opposite halves connected to the ends of a resistor 10 by a transmission line 9, the center of resistor 10 preferably being grounded as shown. The ends of the resistor are connected to the grids of a pair of push-pull tubes 11, 11', which serve as an aperiodic amplifier for currents of the short wave band. The plate circuits of these tubes are shown as connected to the line 5 by a transformer 12 whose secondary winding 20 is connected in series with line 5. For the short wave signals the antenna system 8 causes the control grids of tubes 11, 11' to be in substantially opposite phase so that they operate as a push-pull amplifier to cause amplification of the incoming signal currents, whereas any signal currents of the broadcast band picked up by antenna 8 cause the two grids to be operated substantially in phase, so that the effects are balanced out in their plate circuits due to the connection of the plate voltage supply at the midpoint of primary winding 15. Transformer 12 is preferably designed to match the plate impedance of tubes 11, 11' to that of transmission line 5 and would ordinarily be a step-down transformer.

Transmission line 5 is a specially designed cable of such low capacity that it will transmit currents of both the broadcast and short wave bands to a plurality of radio receivers 14 located at spaced points along the line, such as in the different rooms of a building or vessel. This line may comprise a hollow metal pipe 5', of brass or copper, and which may be grounded as shown, and connected by a lead 16 to one side of the low pass filter. The high potential side of the line 5 comprises a fine copper wire 26 connected to one end of secondary coil 20 by a lead 17. Wire 26 is mounted within pipe 5' and is supported therein at its center by a plurality of spaced insulating washers 18. The line may be terminated at its far end by a resistor 13 in such manner as to avoid reflection currents from the end of the line, as by making the value of the resistor equal to the surge impedance of the line. As shown, the ground terminals G of the radio receivers 14 are connected to pipe 5' and their high potential or antenna terminals A to the wire 26, the pipe serving as a very convenient ground connection for the several receivers. The pipe 5' also serves as a shielding sheath to prevent the line from picking up noise currents or undesired signal currents.

It will be understood that one or more of the radio receivers 14 includes a suitable selecting or tuning means whereby any desired station transmitting within either the broadcasting or short wave bands may be received. Such selecting

means, being well known to those skilled in the art, is omitted for simplicity of illustration.

While I have described a single embodiment of my invention, it will be understood that the invention is not limited thereto, but embraces all such structures and combinations as come within the scope of the appended claims.

What I claim is:

1. In a wave transmission system, the combination of a long transmission line adapted to pass currents of the broadcast band and the short wave band, an antenna adapted to pick up currents of the broadcast band, an aperiodic amplifier having its input circuit connected to said antenna and its output circuit coupled to one end of said transmission line, an antenna arranged to pick up currents of the short wave band, a second aperiodic amplifier having its input circuit connected to said last named antenna and its output circuit coupled to the same end of said transmission line and a condenser shunted across the first amplifier output circuit which has a low impedance to currents of the short wave band.

2. In a wave transmission system, the combination of a long transmission line adapted to pass currents of the broadcast band and the short wave band, a grounded metallic shield for said transmission line, an antenna adapted to pick up signal currents of the broadcast band, an aperiodic amplifier having an input circuit and an output circuit, said input circuit being connected to said antenna, a coupling means connected to said output circuit, a low pass filter having its input terminals connected to said coupling means and its output terminals to said transmission line, a transformer having primary and secondary windings, said secondary winding being connected in series between said low pass filter and one side of said transmission line, an antenna arranged to pick up currents of the short wave band, an amplifier having input and output circuits, means coupling said input circuit to said last named antenna and said output circuit including said transformer primary winding, and at least one radio receiver having its input terminals connected respectively to said transmission line and said grounded shield.

3. The combination defined in claim 2 in which said low pass filter comprises a condenser connected across its output terminals, said condenser having a low impedance to currents of the short wave band.

4. In a wave transmission system, the combination of a long transmission line adapted to pass currents of the broadcast band and the short wave band, means for maintaining one side of said line at ground potential, an antenna adapted to pick up currents of the broadcast band, an aperiodic amplifier having an input circuit connected to said antenna and its output circuit coupled to one end of said transmission line, a pair of vacuum tubes having control grid-cathode circuits and plate circuits, an antenna system arranged to pick up currents of the short wave band, means connecting said antenna system to said control grid-cathode circuits to cause said control grids to operate substantially 180 degrees out of phase, means coupling the plate circuits of said pair of tubes to said end of said transmission line, a condenser having a low impedance to currents of the short wave band connected between said last named coupling means and the grounded side of said transmission line and a plurality of radio receivers connected across said transmission line.

5. In a transmission system the combination of a hollow metal tube, a wire within said tube, a plurality of insulating washers arranged to support said wire near the center of said tube, a plurality of radio receivers having their ground terminals connected to said tube and their antenna terminals to said wire, a circuit connecting one end of said tube and wire and comprising the series connection of a long wave coupling device and a short wave coupling device, a long wave antenna, means coupling said antenna to said long wave coupling device, a short wave antenna, and means coupling said short wave antenna to said short wave coupling device.

6. In a device of the class described the combination of a transmission line adapted to transmit currents of the short wave band and the broadcast band, a source of signals of the broadcast band, a low pass filter having a cut-off frequency above the broadcast band but below the short wave band connected to one end of said transmission line, means coupling said filter to said signal source, a source of signals of the short wave band, means coupling said last named signal source to the said end of the transmission line, and means for maintaining one side of said filter circuit at ground potential.

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