

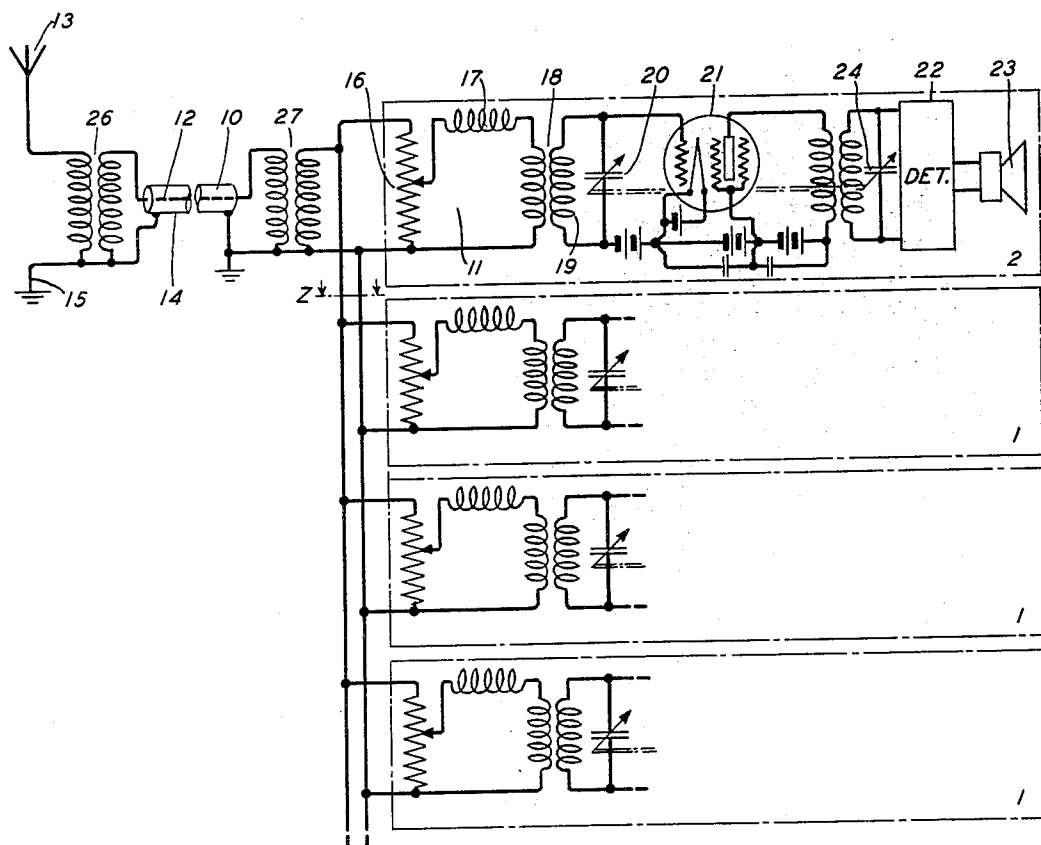
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MULTIPLE RADIO RECEIVING SYSTEM

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MULTIPLE RADIO RECEIVING SYSTEM

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2 Claims. (Cl. 250—9)

This invention relates to the multiple connection of radio receiving systems and in particular to the parallel connection of a plurality of radio receivers to a common antenna.

3 A multiple connection of this sort may require that a large number of radio receivers be connected and operated simultaneously and that all the receivers may at times be tuned to one and the same station. It is desirable that the
10 tuning of any receiver or receivers shall not materially affect either the tuning or the volume of response from any other receivers. It is also desirable that, when a receiver having multiple stage tuning with unified control is used, the
15 coupling of the other receivers to the system will not interfere with the functioning of the tuning mechanism by detuning the input circuit and thereby disturbing the alignment of the several stages. The multiple connection of the re-
20 ceivers should provide as great sensitivity as is consistent with a tolerable amount of interaction between the separate receivers and a minimum of interference with the proper action of the tuning mechanism.

25 In accordance with the present invention the input circuit of each receiving set of a connected group is modified by the addition of a large series inductance through which it is connected to the secondary of a common transformer, the pri-
30 mary of which is connected to an antenna or high frequency transmission line. The transformer is designed to effect a satisfactory impedance match between the antenna circuit and the assemblage of radio receivers. The series induc-
35 tance provides a loose coupling between the several receivers and between each individual receiver and the antenna and also serves to equalize the sensitivity of the receiver over a wide range of frequencies.

40 The invention is described in detail hereinafter in connection with the accompanying drawing in which the single figure shows a plurality of radio receiving sets connected to a common antenna in accordance with the invention.

45 Referring to the drawing, a plurality of radio receiving sets 1, 1 are connected between a shielded high frequency transmission line 10 and the input circuit 11 of an individual radio receiver 2. The transmission line comprises a central conductor 12 associated with an antenna 13 and a
50 concentric tubular shield 14 connected to ground at 15. The input circuit 11 includes a potentiometer 16, a series inductance 17 and a transformer 18. The secondary winding 19 of the
55 transformer 18 is tuned by means of a variable

condenser 20 to resonate with signals of any desired frequency impressed on the antenna 13. The remainder of the receiving set 2 is of the conventional type and need not be completely disclosed as it is not a part of the present in-
60 vention. There is shown only the first vacuum tube 21, the final detector 22 and a receiver or loud speaker 23. The output of the tube 21 includes a tuned circuit containing a variable con-
65 denser 24 which is mechanically coupled to the variable condenser 20 to permit the simultaneous tuning of the respective resonant circuits.

The receivers 1, 1 and 2 are connected in parallel with each other and are associated with the antenna through transformers 26 and 27 and the
70 transmission line 10. The transformer 26 is designed to provide a satisfactory impedance match between the antenna and the transmission line. The impedance ratio of the transformer 27 is to be determined in view of the actual number of receivers 1, 1 and 2 which will be used in a
75 given installation. The transformer should provide a substantial impedance match between the transmission line 10 and the combined impedance of the parallel connected receivers. The receivers 1, 1 have input circuits similar to the one
80 shown in connection with receiver 2, the input impedance of each being determined primarily by the potentiometer.

In the operation of the arrangement shown in
85 the figure the radio receiver 2 is tuned to the desired frequency by suitable means including the variable condenser 20 and the volume of sound produced by the loud speaker 23 is regulated by adjustment of the potentiometer 16. The im-
90 pedance of the other similar receivers 1, 1 connected in common with the transmission line 10 is effectively a shunt across the potentiometer 16 of receiver 2 as shown diagrammatically by Z in the figure. These other receivers are subject to
95 independent operation with respect both to tuning and volume control. The impedance Z, therefore, is subject in the general case to rapid and wide fluctuations in value. Some of the receivers 1, 1 may be tuned to the same frequency as the
100 receiver 2 while others are tuned to different stations. In one case all the receivers may be tuned to the same frequency. Each receiver which resonates with receiver 2 takes a share of the energy of the desired signal intercepted by the antenna 13
105 thus tending to reduce the sound produced by loud speaker 23 of receiver 2. On the other hand, each receiver which is tuned to a different station tends to act as a low impedance shunt across
110 potentiometer 16. Thus, a receiver tuned to an-

other station may produce even greater effect upon the sound in loud speaker 23 than is produced by a receiver tuned to the same station. With a given setting of the other receivers the potentiometer 16 of receiver 2 may be adjusted to give a suitable output of sound in loud speaker 23. Upon readjustment of any other receiver, however, the volume of sound in loud speaker 23 may undergo an undesired change requiring another adjustment of potentiometer 16.

Disturbing as these changes in volume may be, it is found that they are more readily controlled than are the effects upon the tuning of condensers 20 and 24. It is desired, of course, that condensers 20 and 24 be aligned once and for all during the manufacture of the receiving sets so that thereafter the several tuned circuits may be simultaneously tuned in a single mechanical operation. The setting of condenser 24 is practically unaffected by changes in the impedance of other receivers on account of the shielding effect of the vacuum tube 21 which substantially prevents interaction between its own input and output circuits. The setting of condenser 20 for a given station is, however, subject to variations according to the particular value of impedance Z. Therefore, if condensers 20 and 24 are adjusted properly for simultaneous tuning with a given value of Z and this value is thereafter changed, condenser 20 may become seriously detuned thereby decreasing the sensitivity of the radio receiver and lowering the volume of sound produced in the loud speaker 23.

It should be further noted that the transmission line 10 is terminated in the impedance Z in parallel with the potentiometer 16. To maintain the efficiency and sensitivity of the high frequency transmission line, it is important that the terminal impedance should closely match the characteristic impedance of the transmission line. When this impedance match is secured with a given setting of the radio receivers, the match will generally be disturbed when any receiver is readjusted and a loss of sensitivity will follow.

In order to obtain a substantial reduction in the detrimental effects of variations in the impedance Z, it is necessary to somewhat reduce the sensitivity of the initial stage in each radio

receiver. In accordance with the invention this is done in two ways, first by inserting the series inductance 17 thus reducing the coupling between the transmission line 10 and the transformer 18, and second, by making the impedance of the potentiometer 16 somewhat smaller than the impedance of circuit 11 exclusive of the potentiometer. The use of an inductance instead of a resistance for reducing the coupling is found to result in a smaller decrease in sensitivity for a given reduction in the interaction between the several receiving sets. The loosening of the coupling serves to reduce the effect of variations in the impedance of the first tuned circuit when condenser 20 is adjusted. Further, the inductance introduces an increasing loss at the higher frequencies. This is adapted to offset the rising sensitivity of the tuned circuit at these frequencies. The reduction of the impedance of potentiometer 16 serves to make the residual impedance variations of the tuned circuit of relatively small importance because they are shunted by the low impedance of the potentiometer.

What is claimed is:

1. A high frequency transmission system comprising an antenna, a plurality of radio receiving sets connected to said antenna and in parallel with each other, each set including a tuned input circuit which tends to make the set more sensitive at the higher radio frequencies and each set including a series inductive coupling to compensate variations of sensitivity caused by the tuned input circuit while at the same time substantially preventing interaction between the tuned input circuits of the several receiving sets.

2. A high frequency transmission system comprising a plurality of radio receivers connected to a common antenna, each of said receivers including a coupling circuit characterized by an efficiency which increases at the higher frequencies and each receiver including a series inductance element whereby the overall sensitivity of the individual receiver is rendered substantially constant over a wide range of operating frequencies and interaction between the several receivers is substantially eliminated.

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