

July 6, 1937.

P. KOTOWSKI

2,086,229

RADIO RECEIVING SYSTEM

Filed April 30, 1935

Fig. 1

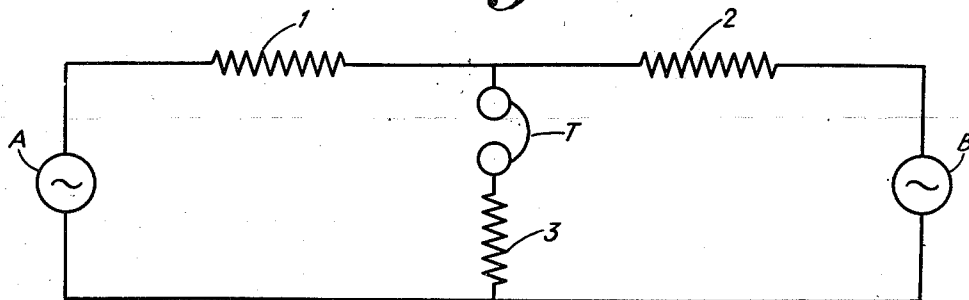
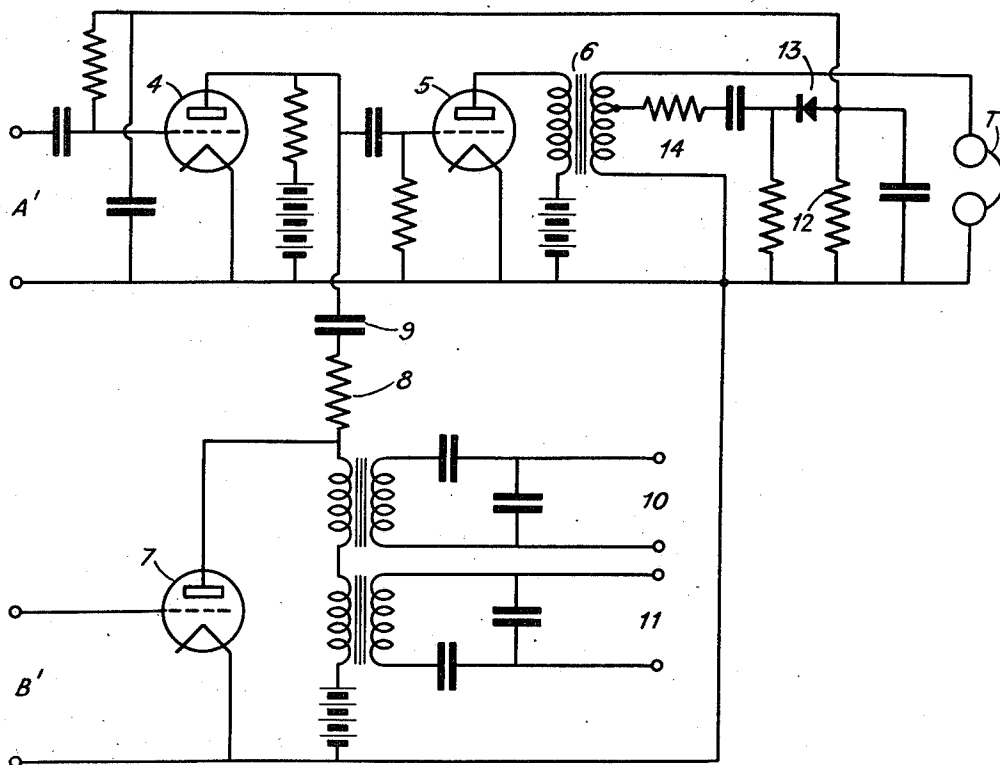


Fig. 2



INVENTOR
PAUL KOTOWSKI
BY *H. S. Brown*
ATTORNEY

UNITED STATES PATENT OFFICE

2,086,229

RADIO RECEIVING SYSTEM

Paul Kotowski, Berlin, Germany, assignor to
Telefunken Gesellschaft für Drahtlose Tele-
graphie m. b. H., Berlin, Germany, a corpora-
tion of Germany

Application April 30, 1935, Serial No. 19,006
In Germany June 9, 1934

4 Claims. (Cl. 250—9)

This invention relates to radio receiving systems and has particular reference to improvements in receiving apparatus such as may be used for the reception of different signal groups with dissimilar modulation frequencies.

It is among the objects of my invention to provide a receiving system in which a plurality of receiving networks may be employed each having at least one amplifier stage and these networks being adapted to feed energy into a combining circuit having means therein for regulating the operation of an automatic volume control device associated with only one of the receiving networks so as to maintain substantially constant the amplitude of the signals received by that particular network.

Other objects and advantages of my improved receiving system will become apparent upon reference to the detailed description to follow.

Radio frequency equipment is known in which several signals coming in by way of different receivers must be supervised and observed by one and the same person. A case like this prevails, for instance, in airplane receiver outfits whenever the pilot is not only called upon to listen in on signals by the aid of which the airplane is kept on a definite course or zone (as when he utilizes the Scheller-Kiebitz method of receiving complementary signals), but must pay attention also to other signals, say, caution and main signals indicative of the crossing of certain cross-beams or beacon waves to indicate the distance from the landing field or airport. In this instance, one condition must be laid down that the incoming volume of the signals serving for keeping the craft on a certain zone or course should be subject to the least possible variation as the distance from the transmitter or beacon is changed. This is a condition that is satisfied by the use of an automatic volume control arrangement known in the art. It is desirable, however, that there should be no interaction between other signals and the volume control device for the signals first referred to.

According to this invention, favorable conditions for undisturbed reception are obtained by using several receivers designed for the reception of different signal groups with dissimilar modulation frequencies. Arrangements are then made so that the different receivers are brought to act upon a joint output circuit containing an automatic volume control device which will be actuated only by a certain signal group and will exercise a control action upon the particular receiver corresponding to this signal group.

In the accompanying drawing, which is illustrative of the principles involved in the carrying out of my invention,

Fig. 1 shows diagrammatically how signals from two sources such as A and B may be combined in one circuit including a responsive device such as a telephone receiver T,

Fig. 2 shows diagrammatically a circuit arrangement in which signals received on two networks A' and B', respectively, may be combined for simultaneous response in the telephone receiver T but the signals received on the network A' alone are subject to automatic volume control.

Referring to Fig. 1, I show for example, how the output energy from two receivers A and B may be impressed upon a telephone T. In order that the output frequencies of each of the receivers may not influence the respective other receiver and the volume control means possibly included therein, they may be mutually blocked by the aid of resistances 1 and 2. However, in order to be effective, these resistances should far exceed the resistance 3 of the telephone circuit, and this would tend to greatly diminish the utilization and efficiency of the receivers.

A circuit scheme embodying the improvements of this invention is shown by way of example in Fig. 2. Here the outputs of two receivers are shown. In one receiver A' whose incoming volume is to be regulated automatically, the audio frequency stage 4 works upon an audio frequency amplifier 5, and the latter through a transformer 6 upon a headset or telephone T. In the other receiver B' an audio frequency stage 7 feeds energy through a resistance 8 and a capacity 9 to the audio frequency amplifier 5 and thence through transformer 6 to the headset T. The signals of the first receiver are assumed to be of a frequency F1, and those of the second receiver of say, frequencies F2 and F3. In a case where the outfit is mounted on board an airplane for piloting the craft under conditions of low-visibility and adverse weather, the first receiver may serve for control of the course inside a definite zone, and the second receiver for checking up on the crossing of two or more transverse beacons indicative of distances from the airport. In this case, energy from the second receiver, in addition to rendering the telephone T responsive, may be fed by way of circuits 10 and 11 to convenient optical or visual signal devices. These devices are not shown but it is to be understood that they may be of any conventional type and a plurality thereof may be employed so that signals of differ-

ing characteristics may be suitably differentiated from one another. Regulation of the first receiver to a roughly stable incoming signal strength is obtained by control of the biasing voltage of tube 4, which, in turn, is derived from a variable potential drop across resistance 12. The voltage across resistance 12 is furnished from a rectifier 13 which is preferably supplied from a circuit 14 connected with part of transformer 6 and tuned to a frequency F1. By insuring adequately sharp tuning, conditions may be made so that frequencies F2 and F3 will exercise no influence upon the regulating voltage of the resistance 12. If desired, instead of, or in combination with, the series elements of the circuit 14 there may be provided a stopper consisting of a combination of capacities and inductances for frequencies F2 and F3, or any other outbalancing means known in the art.

I claim:

1. In a radio receiving system a plurality of receiving networks each having at least one amplifier stage, a combining circuit on which signals from the different networks may be impressed, unitary means connected to said combining circuit for detecting signals from said different networks, means including an automatic volume control device for regulating the gain in one only of said networks and an output circuit connected to said combining circuit and having means differentially responsive to signals of modulation frequencies received by the different networks, said means being operative to supply suitable regulation to said automatic volume control de-

vice, independently of variations in the strength of the signals from the non-regulated network.

2. A system in accordance with claim 1 in which said automatic volume control device comprises an electron discharge tube having a control grid the bias potential for which is regulated by said means in said output circuit.

3. In a radio receiving system a receiving network for signals of one frequency characteristic, a second receiving network for signals of a different frequency characteristic, an automatic volume control device for regulating the gain in the first said network, and a combining circuit to which signaling energy from both said networks may be fed, said combining circuit having means substantially exclusively responsive to variations in the signal strength of the energy derived from the first said network for regulating the operation of said automatic volume control device.

4. In a radio receiving system a plurality of receiving networks, an automatic volume control device connected to one stage of amplification in one of said networks, an output transformer through which signaling energy may be fed from the several receiving networks simultaneously, and means including a tuned circuit, a rectifier and a resistor connected across suitable points on one of the windings of said transformer for supplying a regulatory grid bias potential to said automatic volume control device in response to variations in the strength of the signals derived from the particular receiving network with which said volume control device is associated.

PAUL KOTOWSKI.