

Feb. 16, 1937.

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2,070,772

METHOD OF ELIMINATING HUM IN PUSH-PULL CIRCUITS

Filed Jan. 26, 1935

Fig. 1.

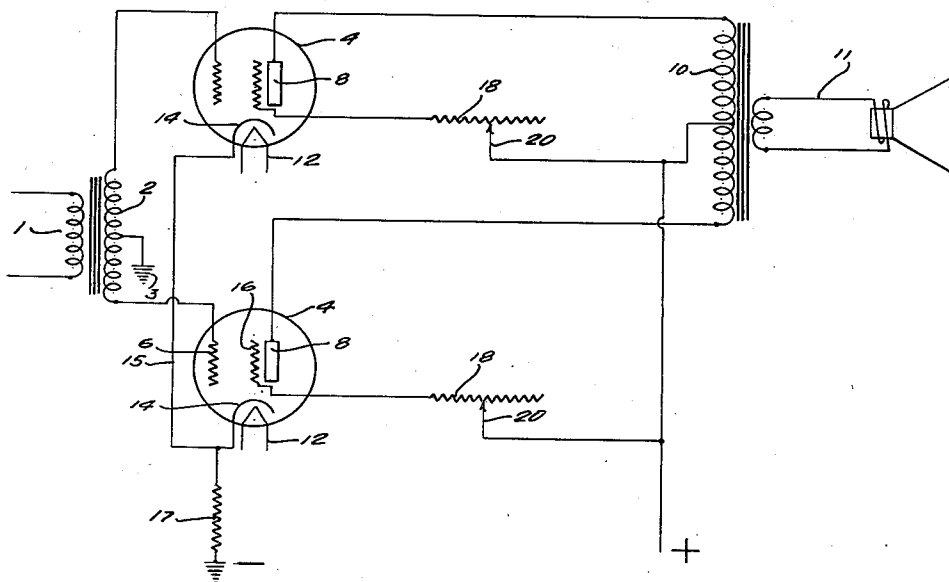
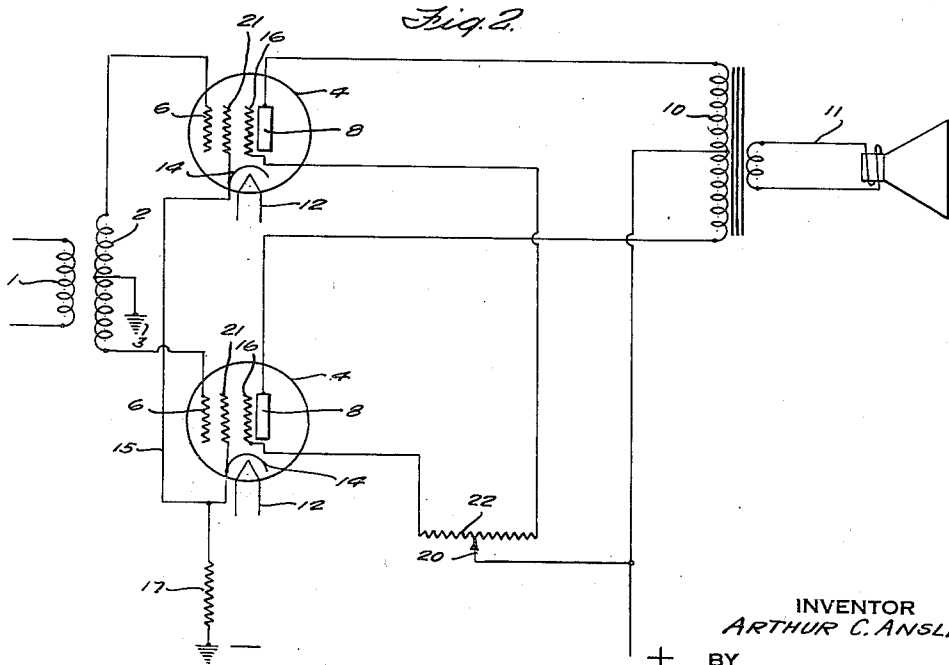


Fig. 2.



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2,070,772

METHOD OF ELIMINATING HUM IN PUSH-PULL CIRCUITS

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Application January 26, 1935, Serial No. 3,573

1 Claim. (Cl. 179—171)

This invention relates to a system of amplification in radio circuits using tetrode or pentode tubes in push-pull relation.

An object of the invention is to eliminate the hum which is sometimes impressed upon the receiver when a pulsating current is used in supplying the system.

It frequently happens that the tubes used in the push-pull circuit do not have identical characteristics and the amount of current supplied to the primary coil of the output transformer by the plate of one tube is not the same as the current supplied by the plate of the other tube.

A feature of the present invention relates to a method by which the hum impressed upon a receiver of a radio set of the type above described is eliminated, which consists in varying the screen voltage to thereby equalize the plate current in the tubes.

The invention will be better understood by reference to the following description and drawing in which—

Figure 1 represents the last stage of amplification in a push-pull circuit using tetrode tubes; and

Figure 2 is a similar circuit using pentode tubes, the connections in the latter figure being somewhat different from those shown in Figure 1.

Referring to the drawing, 1 designates the primary coil of the in-put transformer and 2 the secondary coil thereof. The coil 2 is tapped at its center and the tap is grounded at 3. 4, Figure 1, represents two electron tubes, the grids 6 of which are connected to the ends of the secondary 2. The plate 8 of each tube is connected to the primary 10 of the output transformer, the mid point of which primary being connected to the positive terminal of a source of pulsating current, as supplied by a rectifier tube in an alternating current circuit. The secondary is, as usual, connected in circuit with the loud speaker 11.

Each of the tubes 4 in Figure 1, in addition to the grid and plate, includes a heating source 12, a cathode 14 and a screen 16. The cathodes of the tube are connected together by a lead 15 connected to the negative side of a source of pulsating current through a resistor 17.

In carrying out the present invention I provide means whereby the current delivered to the primary 10 by the plates of each tube may be equalized and instead of connecting the screens directly to the source of positive voltage, as is usual, I interpose a resistance 13 in each of the leads from the screens to the source of positive voltage and I provide a movable arm or variable tap 20 connected to the positive voltage of the current supply. As each tap 20 is moved along each resistance 13 the current drawn by the screens causes a variation in the voltage drop across the resistance and thereby causes a variation in the voltage applied to each screen. This permits a point to be found where the plate current of the two tubes may be equal and the hum resulting from an otherwise unbalanced condition in a push-pull circuit may be eliminated.

In the form shown in Figure 2, a pentode tube is shown, which tube differs from the tetrode tube of Figure 1 by the addition of a suppressor grid 21. The principle of operation, however, is the same as the Figure 1 arrangement except that a single resistance 22 is interposed between the screens of the two tubes and a single movable arm or tap 20 is provided. This is connected to the source of positive voltage as in the Figure 1 form.

By moving the tap along the resistance 22 the portion of the resistance in series with one of the screens may be reduced at the same time that the portion of resistance in series with the other screen is increased. In both forms the variation in the screen voltage operates to equalize the plate current in the tubes.

What I claim is:—

A method of eliminating hum in the receiver of a radio set using a pulsating current which set includes radio circuits having tubes of at least four electrodes, said tubes arranged in push-pull relation and the electrodes including a plate and a screen with supply circuits for each, which consists in varying the screen voltage to equalize the plate current of the tubes while the pulsating current supply remains substantially constant.

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