

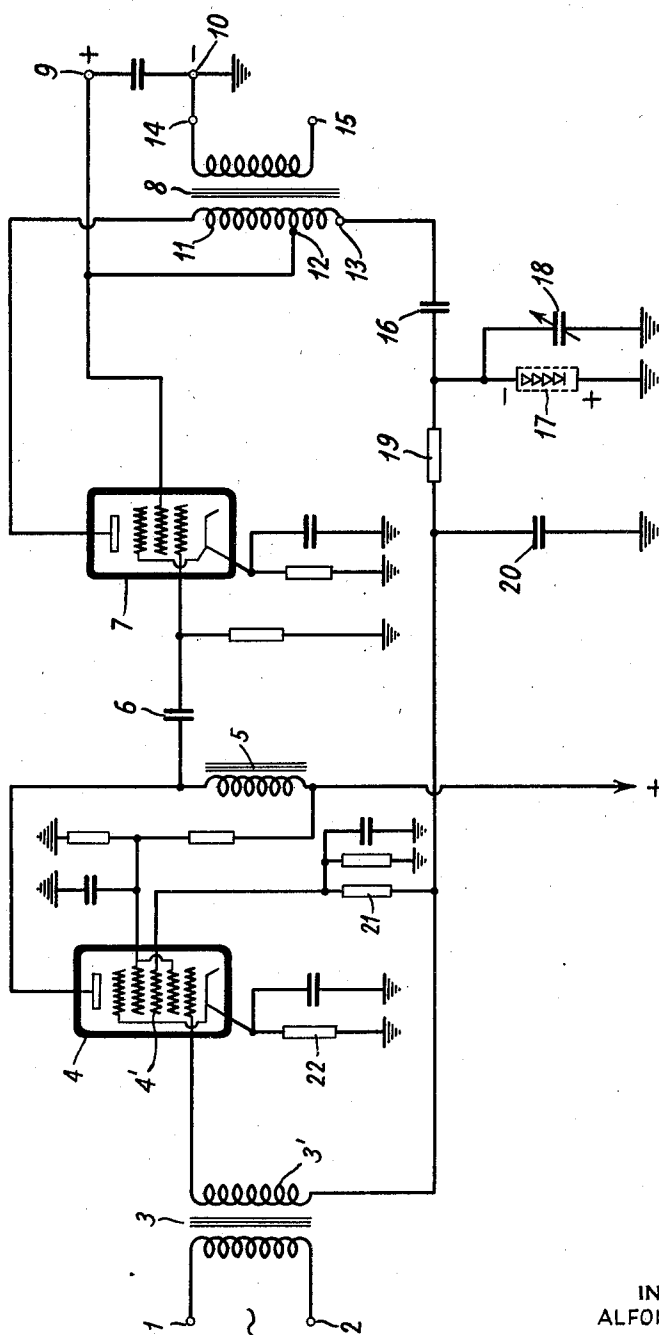
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TUBE AMPLIFIER

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TUBE AMPLIFIER

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7 Claims. (Cl. 179—171)

The present invention relates to a tube amplifier with automatic potential regulation.

Up to the present time the amplifier art has used automatic sound intensity regulating circuits that insured, for instance in a radio receiver, that a certain sound intensity was kept constant if the input potentials were subject to certain variations. For this purpose, the prior art has branched off a part of the alternating output potential of the low-frequency amplifier, and used the rectified potential as regulating potential for one or several grids of preceding tubes. In a circuit of this type difficulties are encountered when input and output alternating potential are in phase or approximately in phase. Since it cannot be avoided that a residual, if small, alternating potential is superposed on the rectified alternating potential, a feed-back results between the input and output circuits of amplifier which may cause the amplifier to oscillate. An elimination of the superposed small alternating potential is not often feasible for the reason that the measures therefor result in an undesirable increase in the time constants of the regulation.

These disadvantages are removed in accordance with this invention, wherein the alternating potential in the output circuit of the amplifier is kept automatically constant in that an alternating potential that is of opposite phase to the alternating output potential is produced, rectified and used as regulating direct potential. According to the present invention there is impressed on the controlled tube a rectified alternating output potential which has an alternating component, or ripple, which is in phase opposition to the alternating input potential, or signal, applied to the control grid of said controlled tube.

The drawing shows an exemplified embodiment of the arrangement according to invention. Numerals 1 and 2 are the input terminals of an amplifier impressed with an alternating potential, preferably a tonal frequency potential. It is fed through transformer 3 to the control grid of tube 4, and amplified therein, and conducted through an anode choke 5 and condenser 6 to the control grid of a further tube 7 in whose output circuit is connected a transformer 8. The plate potential is impressed on the amplifier through terminals 9 and 10. The terminals of output transformer are marked 14 and 15. The winding 11 of output transformer 8 is extended in the manner of an auto-transformer, so that a potential is produced between points 12 and 13 of opposite phase to that of the impressed

potential. The produced alternating potential is led through a condenser 16 to rectifier 17, rectified thereby and smoothed with the aid of resistance 19 and condenser 20. The rectified, and smoothed, regulating potential is fed in a manner known in the art through the secondary 3' to the control grid of the first tube. A portion of the regulating potential may be transmitted through resistance arrangement 21 to the second control grid 4' of the input tube 4. The alternating component, or ripple, of the rectified potential applied to the grid of tube 4 for volume control is in phase opposition to the signal applied to the grid. This prevents the production of the aforesaid tendency toward oscillation.

In a particularly suitable embodiment of the invention a rotary condenser 18 is connected in parallel with rectifier 17, thus providing the means for adjusting the magnitude of the regulating potential. In the embodiment shown tube 4 is impressed, in addition to the regulating potential, with a constant grid bias potential produced by the potential drop of the cathode current at resistance 22.

What is claimed is:

1. In a tube amplifier, the method of keeping the alternating potential in the output circuit of said amplifier automatically constant with varying input alternating potentials, which includes producing at said output circuit an alternating potential in phase opposition to the input alternating potential, rectifying the produced potential to secure a gain regulating unidirectional current potential having an alternating component in phase opposition to the said input potential, and controlling the amplifier gain with said regulating potential.

2. An amplifier network comprising an alternating potential input circuit, a first amplifier tube, a second amplifier tube coupled thereto, an alternating output circuit, means for producing in the output circuit an alternating potential in phase opposition to the alternating potential amplified by the second tube and developed across said output circuit, a rectifier for rectifying the phase-opposed alternating potential produced in said output circuit, the rectified potential having an alternating component in phase opposition to the alternating potential at said input circuit, and means for impressing said rectified potential upon a gain control electrode of said first amplifier tube.

3. A network, according to claim 2, wherein said first tube includes at least two gain control electrodes, and means for impressing a part of

the said rectified potential on a second gain control electrode of said first tube.

4. A network, according to claim 2, comprising a variable condenser connected in parallel to the rectifier for adjusting the magnitude of the rectified potential.

5. In a wave transmission network of the type including at least one tube provided with input and output circuits, the method which includes impressing waves upon the input circuit, deriving from said output circuit an alternating current which is of a different phase than the alternating current developed by said waves in said output circuit and which is in phase opposition to the input waves, rectifying the derived current, and controlling the gain of said tube with the rectified current.

6. In a wave transmission network of the type including at least one tube provided with input and output circuits, the method which includes

impressing waves upon the input circuit, deriving from said output circuit an alternating current which is of a phase opposed to the alternating current developed by said waves in said output circuit and of a phase opposed to said input waves, rectifying the derived current, and controlling the gain of said tube with the rectified current.

7. In a wave transmission network of the type including at least one tube provided with input and output circuits, the method which includes impressing waves upon the input circuit, deriving from said output circuit an alternating current which is of a different phase than the alternating current developed by said waves in said output circuit and of a phase opposed to said input waves, rectifying the derived current, and decreasing the gain of said tube with the rectified current.

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