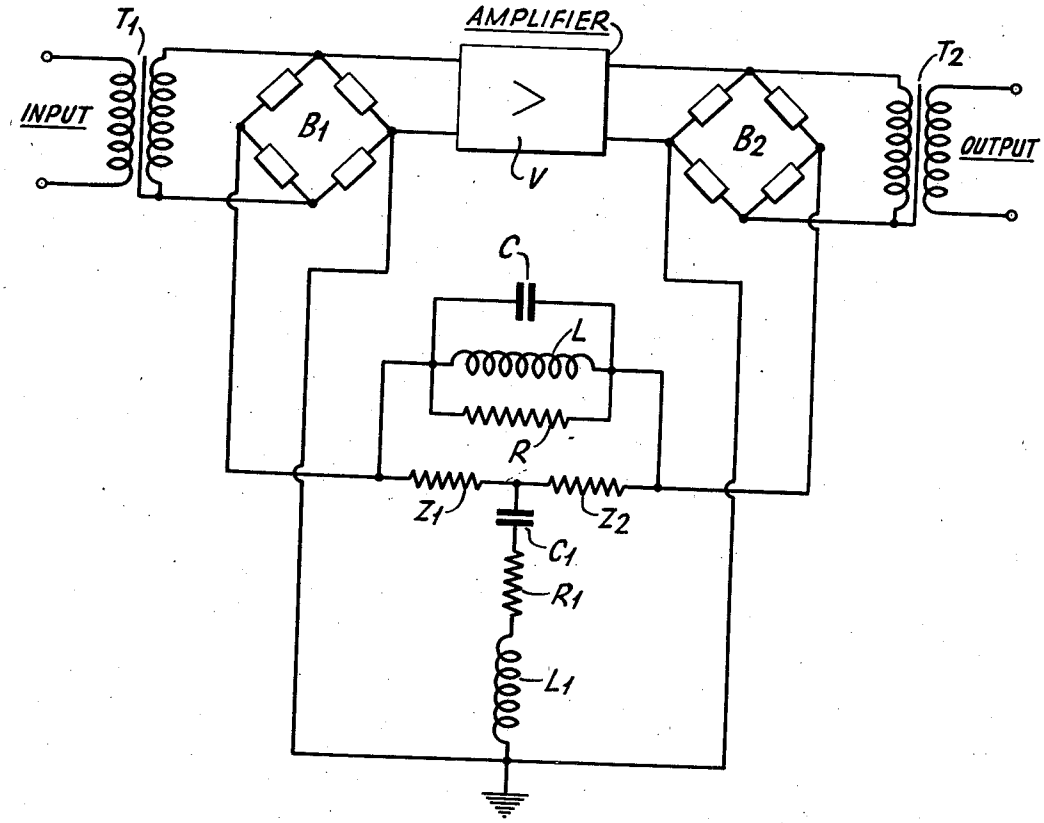
July 16, 1940. H. WERRMANN 2,207,962

NEGATIVE FEEDBACK AMPLIFIER

Filed Oct. 23, 1937



INVENTOR
HELLMUT WERRMANN
BY
ATTORNEY

Patented July 16, 1940 2,207,962

UNITED STATES PATENT OFFICE

2,207,962

NEGATIVE FEEDBACK AMPLIFIER

Hellmut Werrmann, Berlin-Charlottenburg, Germany, assignor to Siemens & Halske, Aktiengesellschaft, Berlin-Siemenstadt, Germany

Application October 23, 1937, Serial No. 170,563
In Germany December 3, 1936

1 Claim. (Cl. 179—171)

It is known that linearity of amplifier circuits can be obtained by employing a negative feedback. To provide a possibly favorable linearity it is desirable to render the degree of the negative feedback as high as possible. This degree is limited by the appearance of natural oscillations. It has been proposed to extend this limit as far as possible by the use of additional stabilizing means. The stabilizing means are inserted in the feedback circuit and serve for influencing the phase angle and the damping in the coupling path such that the amplifier remains stable in case of a high degree of feedback. The additional stabilizing means are of rather complicated structure, if its stabilizing action is to be a considerable one.

In accordance with the present invention a more favorable exploitation of such known amplifier circuit is brought about in that the stabilizing means which shall not be dispensed with in the interest of the stability of the entire circuit, are so adapted and dimensioned that they influence at the same time the frequency pattern of the amplifier in the desired manner. Additional means which hitherto had to be provided for the purpose of reducing distortion are now omitted, and the entire structure of the amplifier circuit will be simplified. It is especially suitable to compensate by an appropriate design of the stabilizing means the decrease of the degree of amplification caused at the limits of the transmission range due to the transformers provided at the input and output of the amplifier. These stabilizing means may, however, be utilized to compensate for the distortions caused by the transmission elements such as lines connected to the amplifier.

An amplifier tube V, of any construction, is shown in the drawing connected to the input circuits and output circuits across the transformers T_1 and T_2. The feedback path, containing as a stabilizing member a single (or several) bridged T-circuit, is coupled in the known manner with the grid circuit and plate circuit of the amplifier across two bridge circuits B_1 and B_2. The bridged T-circuit consists of ohmic series resistors Z_1 and Z_2 and parallel resistors R and R_1; the inductances L, L_1, and the condensers C, C_1. If care is taken by a proper design of the bridging element and of the parallel element, that for instance for the lower frequencies the damping increases slowly within a suitable range, the degree of amplification will likewise increase for these frequencies, and the decrease caused by the transformers will thereby be compensated. A corresponding pattern of the amplification curve can be attained at the upper frequency limit of the transmission range by means of a corresponding stabilizing member necessary for stabilizing the amplifier at the high frequencies. In like manner, also, the distortion produced by the connected transmission lines can be eliminated. However, the invention is especially suited for compensating the distortions caused by the transformers, since this compensation can be accomplished without additional circuit means.

What is claimed is:

In an amplifier system adapted to transmit a wide range of frequencies of the type comprising an amplifier having an input transformer and an output transformer, a bridge network connected across the secondary of the input transformer, a bridge network connected across the primary of the output transformer, a degenerative feedback path connected between the two bridge networks, said feedback path including a network whose constants are chosen to compensate for the decrease of the degree of amplification caused at the limits of said range by said input and output transformers, and said compensation network consisting of a pair of resistors in series in said feedback path, a series path of a condenser, resistor and inductance connected between the junction of said resistors and ground, and a shunt path across said pair of series resistors comprising a condenser inductance and resistor in parallel to each other.

HELLMUT WERRMANN.