

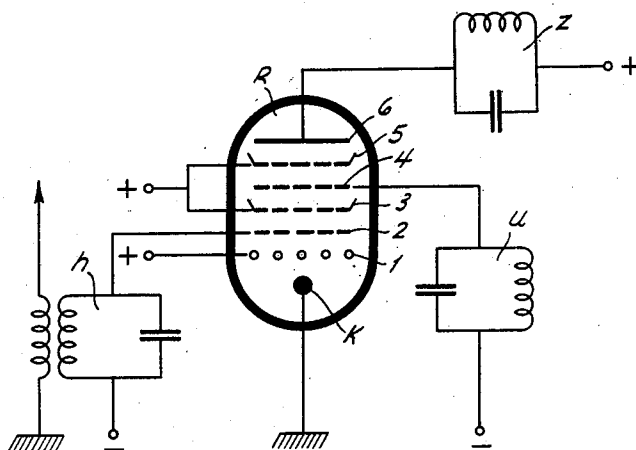
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DISCHARGE TUBE ARRANGEMENT

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DISCHARGE TUBE ARRANGEMENT

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4 Claims. (Cl. 250—20)

The invention resides in a multiplicatively operating mixer tube arrangement with negative input resistance on both control grids.

In U. S. patent application Serial No. 202,186, filed April 15, 1938, by H. Rothe and entitled "Mixing tube circuit arrangement," a mixer arrangement is described in which a control grid for the current distribution, more especially the third grid, of a multi-grid tube has a negative input resistance owing to influence phenomena and the said control grid excites an oscillatory circuit connected thereto and tuned to the locally produced frequency, while the first grid has the receiving oscillations applied thereto.

In accordance with the present invention a negative resistance is produced through influence at the input control grid as well as at the local frequency control grid of a mixer tube. This is possible in view of the fact that the first control grid is not in the direct vicinity of the cathode but is separated therefrom by a grid maintained at positive potential and acting so to say as space charge grid or as acceleration electrode. These two grids bring about a control by current distribution whose characteristic condition is a negative input resistance (see "Telefunken Rohre" Journal 9, page 55 and following).

An example of construction according to the invention is shown in the accompanying drawing in which the oscillatory circuits are designated by the frequencies appertaining to them. The cathode K of the five grid tube R is followed by the auxiliary grid 1 having a positive direct potential of generally about 10 volts. There is arranged in back of said auxiliary grid the input control grid 2 to which the input frequency h is applied. The negative resistance at the grid 2 causes a damping reduction of the input circuit hence it is rendered more selective but is not excited to produce natural oscillations. In back of the input control grid 2 there is arranged a screen grid 3 and in back of the latter the second control grid 4 and a further screen grid 5 which, however, is not absolutely necessary. The second control grid 4 has the local frequency u . To produce the same the negative resistance of the grid 4 produced by influence is utilized and this causes the circuit tuned to the local oscillation and placed between the cathode K and the grid 4 to produce natural oscillations. In back of the grid 5 the anode 6 is situated whose lead-in contains the circuit tuned to the intermediate frequency Z . In order to increase the inner resistance the anode and second screen grid may further be separated by a retarding grid. It is as such also possible to apply the alternating input potential to the current distribution control grid which is the second grid from the cathode and to produce the local oscillations at the first current distribution control

grid, i. e. to exchange the action of the grid 2 with that of 4.

I claim:

1. In a mixer circuit wherein incoming signal energy is combined with locally produced oscillations of a second frequency to produce an intermediate frequency, a mixer tube having a cathode, an anode and first and second grid electrodes interposed between the cathode and anode in the order named, means for providing negative conductance between the second grid and the cathode including means for maintaining the first grid electrode at a positive potential with respect to the cathode, and means for impressing the incoming signal energy between said second grid electrode and the cathode, said negative conductance being sufficient to cause only regeneration of the incoming energy.

2. In an arrangement as described in the next preceding claim and wherein said mixer tube is also provided with third and fourth grid electrodes, means providing sufficient negative conductance between said fourth grid and the cathode to produce oscillations between said two electrodes, said last named means including means for maintaining said third grid at a positive potential with respect to the cathode and a circuit resonant to the frequency of the local oscillations interposed between the fourth grid and the cathode.

3. In a mixer circuit wherein a first frequency is combined with a second frequency to produce a third frequency, a mixer tube having a cathode, an anode and first, second, third and fourth grid electrodes interposed between the cathode and anode in the order named, means for maintaining the first grid electrode at a positive potential with respect to the cathode, means for connecting the second grid electrode to a source of negative potential, said means including a circuit resonant at said first frequency, said first grid acting as a space charge grid with relation to said second grid so that a negative resistance is produced between the second grid and the cathode, means for maintaining the third grid at a positive potential with respect to the cathode, means including a circuit resonant at said second frequency for connecting the fourth grid to a source of negative potential, said third grid acting as a space charge grid between said fourth grid and the cathode so that a negative resistance is produced between the fourth grid and the cathode, and means including a circuit resonant at said third frequency for connecting the anode to a source of positive potential.

4. An arrangement as described in the next preceding claim, characterized by that the first named resonant circuit is coupled to a source of signal energy and is resonant to the frequency of the signal energy.

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