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ARRANGEMENT FOR THE GENERATION OF RELAXATION WAVES

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Fig. 1

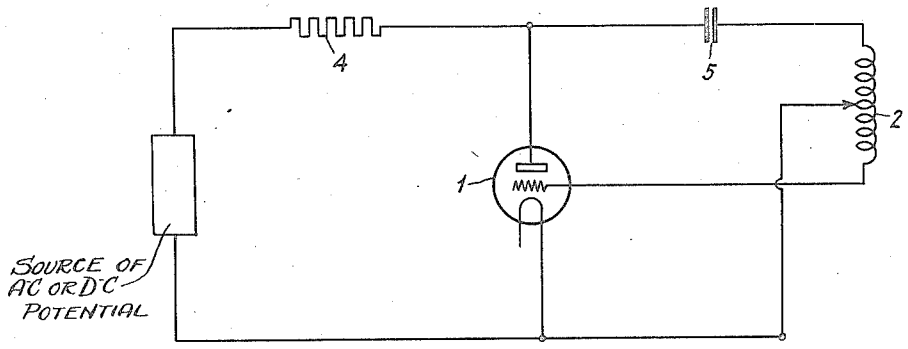
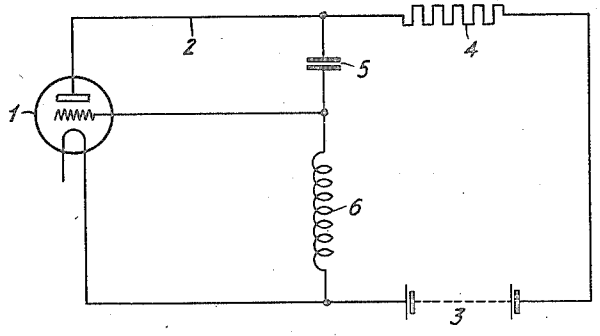


Fig. 2



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ARRANGEMENT FOR THE GENERATION OF RELAXATION WAVES

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2 Claims. (Cl. 250—36)

The present invention is concerned with an arrangement adapted to produce the so-called relaxation or "Kipp" oscillations more particularly of the kind in which a condenser is periodically charged up by a resistance and is thereupon discharged again by a device of suitable characteristic.

The present invention has recourse to circuit arrangements comprising vacuum tubes containing three or more electrodes of the kind employed in the generation of radio frequency electric oscillations, for example, of the kind comprising regeneration means. Schemes of this type, generally speaking, have the property that a certain minimum plate potential known as the starting potential is required in order that oscillations may be excited, but that the wave generation process will be maintained, once the oscillations have been initiated, even in the presence of a plate potential reduced below the starting value, the oscillatory state suddenly being stopped when a certain still lower value arises.

According to this invention, tubes are used for this purpose of a kind wherein the gain reciprocal $(1:\mu)$ is so low that inside the range of plate potential here coming into consideration the plate feed current is less than the plate current prevailing in the presence of oscillations.

Now, if such a regenerative arrangement is connected with a condenser which is united by way of a sufficiently high resistance with a source of potential, the following will happen:

By action of the said source of potential the condenser is gradually charged until the potential has attained the point where oscillations are started. By the ensuing oscillations the plate current of the tube will be raised to a point where, in the presence of a suitably chosen dimension, the condenser will become discharged more speedily than current is supplied to it by way of the resistance. As a result, its voltage will decrease so long until the voltage point has been reached where the oscillations cease and where, owing to reduced plate current the condenser can be charged anew. This process is repeated periodically at a rate or frequency which substantially is a function of the size of the resistance and the condenser.

One exemplified form of construction of the idea is illustrated in Figure 1 and another in Figure 2. Referring to Figure 1, 1 is a tube whose grid and plate are united with the respective ends, and whose cathode is connected with the middle, or some other turn, of the coil, the assembly representing the generator scheme known in the prior art as an "inductive three-point" arrangement. 3 is the source of potential, 4 the resistance, 5 the condenser which separates the plate from the coil 2 and to which, therefore, the full D. C. potential is applied. In the manner hereinbefore described the condenser is periodically charged up from the source 3 by way of resistance 4, while being discharged upon initiation of oscillations across tube 1.

If in lieu of a D. C. potential 3 an alternating potential is used, then the frequency of the ensuing relaxation waves will be a whole submultiple (fraction) of the frequency put in. Hence, the arrangement may serve as a frequency "demultiplier" or step-down scheme in the same manner as known for relaxation waves generated by different ways and means, for instance, by the aid of glow discharge (gaseous-conduction) lamps or tubes.

If a thermionic tube is used in lieu of the resistance 4 which operates inside the range of saturation current, then the condenser 5 will be charged up with a constant current, and its voltage rises linearly with the time. Oscillations of this kind may be employed for the deflection of the spot of a Braun tube, e. g., in television work. Also this is known in the prior art, though only for relaxation waves generated with gaseous conduction tubes. The present arrangement, however, offers the merit that it involves less inertia, with the result that higher frequencies are obtainable. Contrasted with circuit schemes producing relaxation waves comprising a plurality of high vacuum tubes the scheme of this invention offers the advantage of great simplicity.

In order that the sluggishness of the arrangement may be minimized as much as possible it is recommendable to choose the frequency of the self-excited high frequency oscillations as high as possible. A circuit arrangement known in the earlier art as an ordinary oscillation circuit, adapted to the production of ultra short waves, and, as modified in accordance with the invention, is shown in Figure 2. The inductance of the oscillation circuit comprises a wire clip 2 which at a suitable point has a break containing a blocking condenser as at 5. The coat of condenser 5 which is connected with the grid is united with the filament by way of a choke coil 6, optionally by way of a grid leak and a grid biasing battery which have not been indicated in the drawing. The coat of the condenser 5 connected with the plate is associated normally by way of a choke, in the present instance through a high resistance 4, with the plate potential source 3 so

that essentially the situation is the same as in Figure 1. (Regeneration in this scheme as is known is insured by way of the internal tube capacities.)

Finally, a circuit arrangement of the kind here disclosed could be employed for the production of alternating current in electric phonographs. Contrasted with the schemes comprising gaseous-conduction lamps frequently employed for this purpose it offers the advantage that the obtainable alternating currents are larger so that the use of loudspeakers without preliminary amplification is feasible. Regulation of pitch in connection with the suggested use of the scheme of this invention is realizable by the variation of the resistance included in the plate circuit, the plate blocking condenser, the plate potential or else by the variation of such resistances as are included in the grid circuit so that they affect the damping of the oscillations.

We claim:

1. An oscillation generator arrangement comprising an electron discharge device having a high amplification factor, said device including anode, cathode and control electrodes, a condenser and an inductance serially connected between said anode and control electrodes, a connection from the center of said inductance to said cathode, a source of potential, a high resistance connecting one terminal of said source with said anode, and a direct connection from the other terminal of said source to said cathode, the potential supplied by said source through said resistance to said anode being of a value not sufficiently high to cause the initiation of oscillations and within a predetermined range being such that the anode feed current in the absence of oscillations is less than the anode current in the presence of oscillations, said condenser being arranged to be charged by said same source of potential for periodically applying to said anode a potential high enough to initiate oscillations upon the occurrence of which said condenser discharges across said device.

2. An oscillation generator arrangement comprising an electron discharge device, said device including anode, cathode and control electrodes, a condenser and an inductance serially connected between said anode and control electrodes, a connection from a point intermediate the ends of said inductance to said cathode, a source of potential, a resistance connecting one terminal of said source with said anode, and a direct connection from the other terminal of said source to said cathode, the potential supplied by said source through said resistance to said anode being of a value not sufficiently high to cause the initiation of oscillations and within a predetermined range being such that the anode feed current in the absence of oscillations is less than the anode current in the presence of oscillations, said condenser being arranged to be charged by said same source of potential for periodically applying to said anode a potential high enough to initiate oscillations upon the occurrence of which said condenser discharges across said device.

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