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DEVICE FOR PRODUCING VOLTAGE-IMPULSES OF SHORT-DURATION, WHEREIN
A DISCHARGE-PATH, WHICH IS CONDUCTIVE IN A NEGATIVE DIRECTION
WITH RESPECT TO THE PULSES, IS CONNECTED
IN PARALLEL WITH THE LOAD

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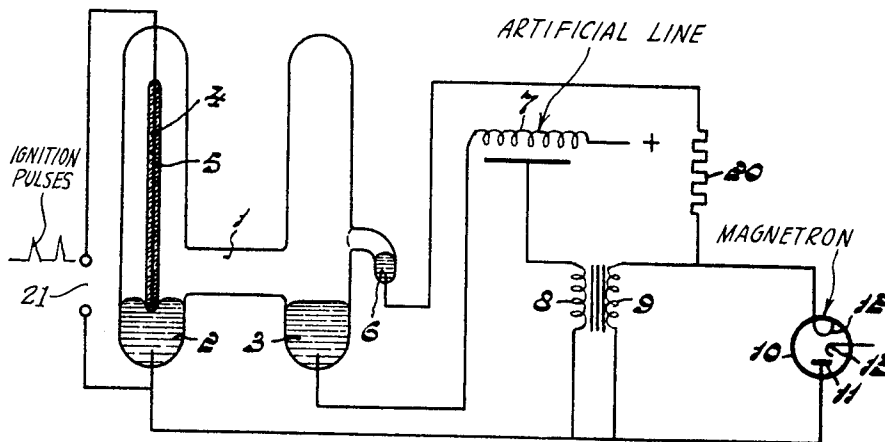


Fig. 1

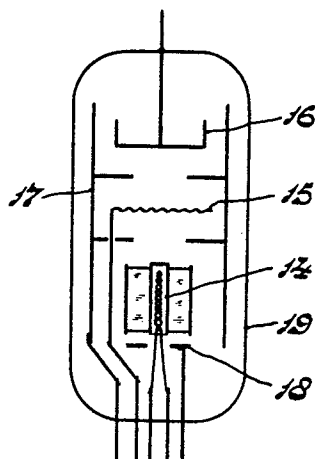


Fig. 2

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4 Claims. (Cl. 250—27)

This invention relates to a device for producing voltage impulses of short duration by means of periodical discharges in a discharge tube, wherein a discharge path, which is conductive in a negative direction with respect to the impulses, is connected in parallel with the load.

Devices of this type are used inter alia for producing oscillations in cavity resonator magnetrons incorporated in apparatus for range and position finding. The discharge path, which is connected in parallel with the magnetron and is conductive in a direction opposite to the impulses, serves to prevent the system constituted by the magnetron and the impulse generator from oscillating for an excessive period upon termination of the voltage impulse, whereby a number of small pulses could occur after the actual impulse. The first half negative wave of this oscillation is now sufficiently damped by the parallel-connected discharge coil to render the residual positive half-waves unimportant.

In the known devices, the discharge tube, wherein the periodical discharges occur, usually is in the form of a vacuum- or gas-filled triode, to whose grid a block-shaped voltage is applied. The diode connected in parallel with the load is a vacuum diode. A disadvantage of this arrangement is that the usually mobile installation requires a good deal of heating energy, whereby the volume and the weight of the installation are increased.

According to the invention, in a device for producing voltage impulses of short duration by means of periodical discharges in a discharge tube, in which device a discharge tube, which is conductive in a negative direction with respect to the pulses, is connected in parallel with the load, the two discharge tubes having a common cathode being housed in one single gas-filled bulb. Since the current through the diode is small in comparison with the current required for the production of impulses, the cathode of the discharge tube producing the impulses need hardly be made larger.

If a gas-filled tube has an incandescent cathode consisting of a heater element comprising radial fins and surrounded by one or more radiation cylinders, the control grid and the anode are mostly arranged near the end surfaces of the open cylindrical cathode. The anode for the auxiliary discharge path may then be provided at the other end of the cylinder.

In a device according to the invention, it is particularly advantageous to use a discharge tube having a liquid cathode since no heating energy is required and, with the use of a capacitive ignition electrode, the energy required for the control is extremely low.

In order that the invention may be more clearly understood and readily carried into effect, it will be now described in detail with reference to the accompanying drawing, given by way of example, wherein:

Fig. 1 shows a circuit-arrangement according to the

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invention, which comprises an electric discharge tube having a liquid cathode.

Fig. 2 represents a tube having an incandescent cathode, which may also be used in the circuit-arrangement shown in Fig. 1.

In Fig. 1, the reference numeral 1 designates a substantially H-shaped discharge tube having a glass envelope, numerals 2 and 3 denoting the mercury cathode and anode respectively. The cathode 2 contains an ignition electrode which consists of a metal rod 4 covered with a glass layer 5. A mercury auxiliary anode is designated 6. A so-called artificial line consisting of a combination of inductances and capacitances is designated 7. Also provided is a transformer whose primary and secondary windings are designated 8 and 9 respectively. The cavity resonator magnetron has a wall 10 and an anode 11, the element 12 being the incandescent cathode and the element 13 a coupling loop for carrying off energy.

When positive voltage impulses are supplied at terminals 21 between the ignition electrode 4 and cathode 2, a current will flow if the anode 3 is at a sufficient potential, and will be interrupted as soon as the anode voltage has dropped to a sufficient degree. By means of the transformer 8, 9 the current impulses in the system 7 are converted into pulses having a high voltage. These voltage pulses are so directed that the anode 11 of the magnetron becomes positive with respect to the cathode 12. Since the voltage required for producing oscillations by means of a magnetron is comparatively critical, these oscillations soon decay upon a voltage decrease. However, the system constituted by the anode-cathode of the magnetron together with the transformer 8, 9 and the discharge path 2—6 constitute an oscillatory circuit adapted to oscillate with the energy still available in the capacitance and inductances of the circuit after termination of the oscillations in the magnetron itself. If, however, the voltage of the cathode 12 becomes positive relatively to the anode 11 of the magnetron, the anode 6 of the mercury discharge tube becomes positive with respect to the cathode 2, so that current can pass through the damping resistance 20, owing to which the amplitude of the oscillations produced is heavily damped.

In Fig. 2, the discharge tube is designated 19. The reference numeral 14 denotes a cathode cylinder provided with fins, element 15 being the grid, element 16 the anode, element 17 the screen-grid and element 18 the anode of the auxiliary discharge path. The tube 19 is functionally equivalent to tube 1 in Fig. 1. Thus the ignition pulses are applied to grid 15 to effect a main discharge between cathode 14 and anode 16, whereas the damping discharge of the magnetron is produced between the auxiliary anode 18 and the cathode.

What I claim is:

1. Apparatus for producing voltage impulses of brief duration comprising first and second discharge devices provided with a common gas-filled envelope, a common cathode and separate anodes, means to effect periodic discharge in said first device to produce impulses, means to apply said impulses to a load, and means connecting said second device across said load in a sense in which the second tube is conductive in a negative direction relative to said impulses.

2. Apparatus, as set forth in claim 1, wherein said first and second devices are constituted by an incandescent cathode having a central heater body provided with radial fins and an open-ended cylinder surrounding said cathode, and anode electrodes disposed at either end of the cylinder.

3. Apparatus, as set forth in claim 1, wherein said first and second devices are constituted by a liquid cathode having a capacitive ignition electrode.

4. Apparatus for producing voltage impulses of brief

duration to modulate a magnetron having a cathode and anode comprising first and second discharge devices provided with a common gas-filled envelope, a common cathode and separate anodes, an artificial line, a transformer having a primary and a secondary, means connecting said primary through said line between the anode and cathode of said first device, means to render said first device periodically conductive whereby said transformer yields periodic impulses, means connecting said secondary between the anode and cathode of said magnetron, a resistor, and means connecting the anode of said second device to the cathode of said magnetron.

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