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ELECTRONIC SWITCH AND RECTANGULAR WAVE GENERATOR

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Fig. 1

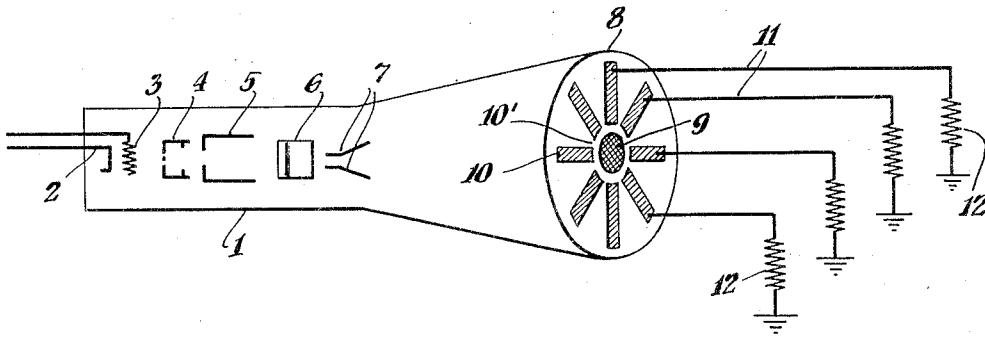


Fig. 2

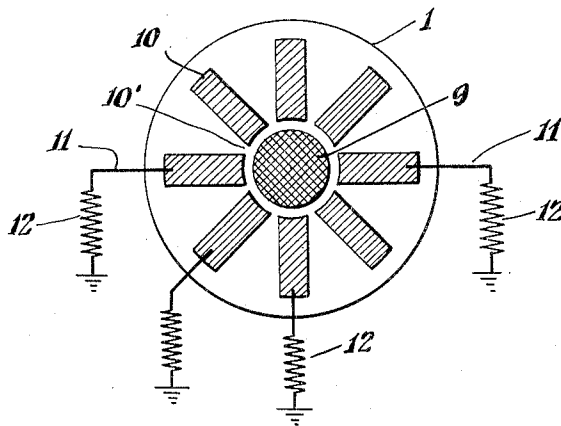
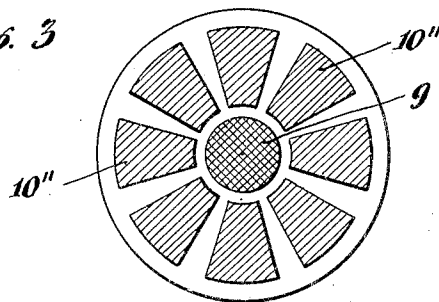


Fig. 3



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ELECTRONIC SWITCH AND RECTANGULAR
WAVE GENERATOR

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6 Claims. (Cl. 250-152)

This invention relates to the generation of rectangular shaped currents or voltages that range in frequency from zero to hundreds of kilocycles per second. By this invention the frequency can be easily and quickly varied over a very wide range of frequencies and a plurality of signals of the same or different lengths can be generated simultaneously.

The invention may be understood from the description in connection with the accompanying drawing, in which:

Fig. 1 is a side view shown slightly in perspective illustrating an embodiment of the invention;

Fig. 2 is an end view of the same; and

Fig. 3 is a similar view of a modification.

In the drawing, reference character 1 indicates a cathode-ray tube of the well known sort which is provided with a cathode 2, grid 3, first anode 4, second anode 5, and pairs of horizontal deflection plates 6 and vertical deflection plates 7 in the usual way.

The large end 8 of the tube is provided with fluorescent screen material 9 at the center on the inside. A plurality of areas or plates of conducting material 10 having radial sides and arcuate ends is provided on the inside around the screen 9. These plates may, for example, be carbonized metallic plates, or they may be made of other conducting material that can be adhered to the inside surface of the end of the tube 1. The corners 10' may be about one-sixteenth of an inch apart.

The leads 11 are hermetically sealed through the wall of the tube, and they make contact separately with the respective plates 10. The number of these plates may be whatever is desired and may be the same or more or less than is indicated on the drawing. A resistance 12 is located in each lead and these leads may be grounded as shown. Only a few of the leads and resistances are shown in the drawing.

The operation is as follows: The cathode-ray beam is focused upon the fluorescent screen 9 whereby it can be readily ascertained whether it is of the desired intensity. A beam of one-sixteenth of an inch in diameter of 200 milliamperes current at normal bias has been found to be sufficient for many purposes. The pairs of deflecting plates 6 and 7 may have sine waves of equal potentials and frequencies at 90 degrees difference in phase applied to them, thus providing a circular path on the screen 9 of a diameter dependent upon the amplitude of the signals applied to these plates, thus avoiding burning the screen 9 while this test is being made.

For generating the square wave impulses, the

potentials applied to the plates 6 and 7 are increased until the circular path or trace of the cathode-ray beam crosses or moves in a circular path across all of the plates or areas 10. A sudden increase of current starts through each resistor 12 as the beam crosses its radially extending edge, the current remains constant while the beam is making its transit across the area 10 and suddenly drops to zero as it passes across the other radially extending edge of this area, thus producing a series of equally spaced rectangular impulses of the same height and length when the areas 10 are of the same size and are symmetrically disposed around the center screen 9.

By increasing the signals applied to the pairs of plates 6 and 7, the beam is caused to cross the areas 10 nearer their outer ends, thus decreasing the duration of each rectangular impulse since the time to cross each one individually is decreased due to the increased velocity of the end of the beam.

When it is desired to keep the duration of each rectangular pulse the same regardless of the intensity of the signals applied to the plates 6 and 7, the sides of the areas 10' are made radial, as shown in Fig. 3. The voltage developed across each external series resistance 12 connected to its collector plate 10 is used to change the grid bias of an amplifier channel individually, thus enabling any desired signal to be transmitted to an indicator.

The signals made to appear at the resistances 12 by this invention can be amplified in known ways and utilized when desired; such signals may, for example, be used for electronic switching; the frequency range can be expanded over present electronic switching; multi-channel switching is provided for, which is limited only by the number of collector elements 10 on the end of the tube 1; rectangular wave signals of adjustable periods and repetition rates can be produced; and the invention can be used for observing wave frequency transients.

What is claimed is:

1. In a device of the character described, a cathode-ray tube having a series of separated circularly spaced radially extending conducting areas on the inside end of said tube, fluorescent screen material at a central area around which said conducting areas are located and separate electrical connections from said areas to the outside of said tube, each of said conducting areas having its side dimensions greater than its circumferential dimensions.

2. The device of claim 1, in which resistances are placed between the areas and ground.

3. The device of claim 1, in which the areas have parallel sides.

4. The device of claim 1, in which the areas have radially extending sides.

5. The device of claim 1, in which the side dimensions of said conducting areas are parallel to each other and the end dimensions thereof lie along two concentric circles.

6. The device of claim 1, in which the side dimensions of said conducting areas lie along the radii of a circle whose center is at the middle of the end of said tube and the end dimensions of said conducting areas lie along two concentric circles.

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