

Sept. 14, 1948.

HANNS-HEINZ WOLFF

2,449,536

ELECTRICAL LIGHT IMPULSE GENERATOR

Filed Jan. 15, 1941

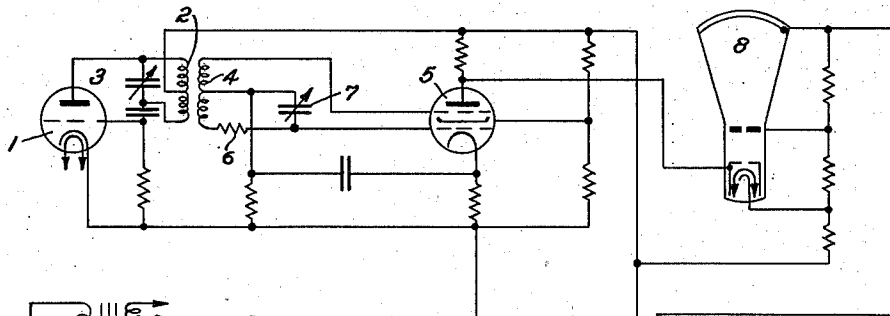


Fig. 1

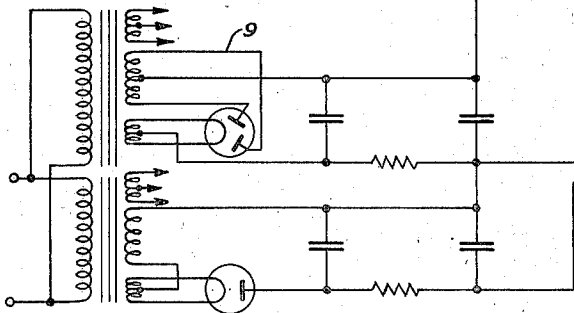


Fig. 2

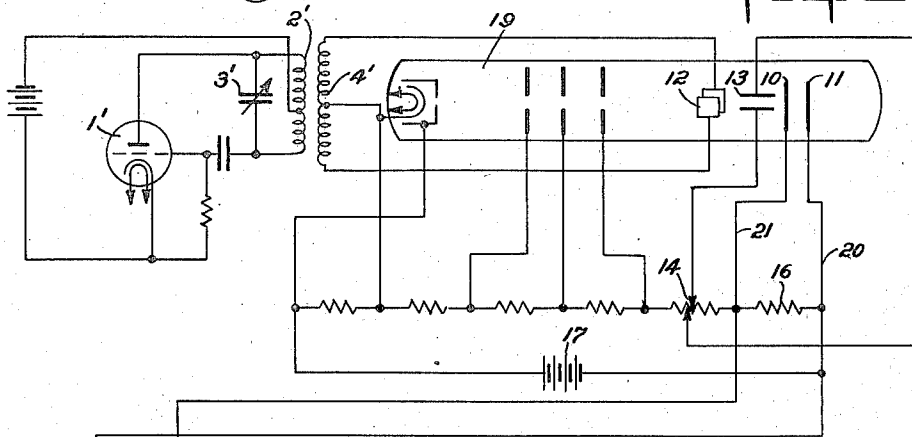


Fig. 2a



Fig. 2b



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2,449,536

ELECTRICAL LIGHT IMPULSE GENERATOR

Hanns-Heinz Wolff, Berlin, Germany; vested in
the Attorney General of the United StatesApplication January 15, 1941, Serial No. 374,461
In Germany January 15, 1940

1 Claim. (Cl. 315—9)

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The present invention relates to means for photographic reproduction of very rapid occurrences. For these purposes the object which shall be observed is lighted by a large number of light pulses in such a manner that said occurrence is reproduced by a fixed or moved film at different times. It has been already proposed for producing said light pulses to use an electrical generator producing pulses of a variable frequency and a cathode ray tube operating as a light source.

The present invention relates to generators of the described type.

The known embodiments of the generator of the type described hereinbefore have disadvantages consisting in that for using a large number of pulses per second the light of the pulses is insufficient. Even if the best optics and the most sensible films are used the light of the generator cannot expose perfectly the film. A further disadvantage consists in distorting the reproduction in the case of using a low frequency of light pulses and reproducing a rapid occurrence.

According to the present invention means for adjusting the frequency and the duration of the light pulses are provided. For these purposes arrangements are used by which short electrical impulses of adjustable times may be produced from a given control voltage.

Methods for producing short impulses from a sinusoidal control voltage have been already proposed which impulses have times being independent of the amplitudes of the control voltage.

E. g. it is possible to use an arrangement containing an electron valve with two homogeneous control grids being arranged one after another. This valve is connected by its anode and cathode in a circuit of a D. C. source. The control voltage is applied to both control grids in nearly reverse phase. The difference of the shifted phases from 180 degrees on both control grids corresponds to the required impulse duration.

According to a further object of the invention a cathode ray tube may be employed as a generator for producing short adjustable impulses. Such a cathode ray tube contains a separate electrode. The cathode ray strikes this electrode if it passes a diaphragm being arranged between the anode and said electrode. By the control voltage the cathode ray is moved over the diaphragm in the rhythm of the frequency of the control voltage. Thereby an impulse arises in the circuit of said electrode. The diaphragm may have a triangular aperture. The interruption of

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the cathode ray is the smaller the larger is the distance of the ray from the top of the triangle.

In order to describe the invention more fully, attention is directed to the accompanying drawing, in which

Fig. 1 is a circuit diagram of an embodiment of the invention;

Fig. 2 shows a circuit diagram of another embodiment of the invention, and

Figs. 2a and 2b illustrate front views of electrodes of the cathode ray tube diagrammatically shown in Fig. 2.

In Fig. 1, an oscillator consisting of a tube 1, a coil 2 and a variable condenser 3 produces a control frequency which may be adjusted by tuning the condenser. Via the coil 4 the coil 2 is coupled to the tube 5 operating as an impulse generator. Each of the ends of the coil 4 are connected to the control grids of the tube 5. The middle point of the coil 4 is connected to the cathode. A phase shifting arrangement consisting of the resistance 6 and the condenser 7 is used for adjusting the phase displacement of more or less than 180 degrees.

A variation of the phase displacement e. g. by a variation of the capacity of the condenser 7 causes a variation of the duration of light impulse.

When the alternating impulses applied to the grids of tube 5 are displaced in phase 180°, they block out each other and the tube 8' does not function to produce any light pulses. However, when the phase displacement causes both grids to become intermittently positive, tube 8 may then function.

The cathode ray tube 8 is the light source the intensity control electrode of which is connected to the output of the tube 5. The main supply apparatus 9 consists of two parts one of which supplies the low voltages for the impulse generator, the other supplies the high voltages for the cathode ray tube. The cathode ray tube 8 may have a fluorescence screen operating as an accelerating electrode.

Figure 2 shows a further embodiment of the invention containing an impulse generator in the form of a cathode ray tube and an oscillator 1', 2', 3' tuned to the frequency of the light impulses. The cathode ray tube 19 contains a diaphragm 10 having a triangular opening as shown in Fig. 2a after which an electrode 11 as shown in Fig. 2b is arranged. The oscillator 1', 2', 3' is connected to a pair of deflecting plates 12 of the cathode ray tube 19. Another pair of deflecting plates 13 is connected to

a direct voltage which deflects the cathode ray in the direction of the top of the triangle diaphragm. By variation of the tap on the potentiometer 14 the cathode ray is deflected to pass the triangle diaphragm 10 distant by more or less from the top. The control electrodes of the light producing tube 8 are connected to the diaphragm electrodes 10 and 11 so that the duration of the light pulses are dependent on the passage or nonpassage of the cathode rays through the triangular opening in the diaphragm 10.

Electrodes 10 and 11 are connected through a resistance 16 which forms part of a tapped resistance connected across the source of direct current supply 17 for the tube 19. Electrode 11 is connected by a conductor 20 to one terminal of the source of direct current supply for tube 8', while electrode 10 is connected through a conductor 21 to the control electrode 15 of tube 8'.

When the cathode ray in tube 19, as deflected by the pairs of plates 12 and 13, passes through the triangular opening in the electrode 10 and impinges on electrode 14, the potential of the control electrode 15 in tube 8' is such that the tube is lighted. However, when the cathode ray in the tube 19 impinges on the electrode 10 at one side of the triangular opening, the potential of control electrode 15 is changed so as to cut off the illumination.

The impulses produced at the electrode 1 are used to control the light impulses.

If the optics, the sensibility of the film, and the intensity of light are given the most suitable values, duration of the light impulses is different for each frequency of the light impulses. Therefore according to a further object of the invention the variation of duration of light impulse should be dependent on the variation of the frequency of the light impulses.

I claim:

A device for producing light flashes consisting, in combination, of a cathode ray tube having a luminescent screen and a generator of short electrical pulses controlling the intensity of said ray, said generator comprising a source of an alternating voltage the frequency of which being the frequency of the required light impulses, a variable direct voltage source, a further cathode ray tube having a cathode, anode, elements for deflecting the cathode ray in the horizontal and in the vertical direction, two electrodes arranged in the direction of the cathode ray, the electrode next the cathode having an aperture the second electrode being connected in the circuit of the cathode in such a manner that current flows in it when the cathode ray strikes said second electrode, said alternating voltage source connected to one of said deflecting elements, the other pair of the deflecting elements being connected to said variable direct voltage source.

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