

April 15, 1958

H. DZIERGWA

2,831,152

ELECTRONIC FLASH LAMPS

Filed May 25, 1953

Fig. 1

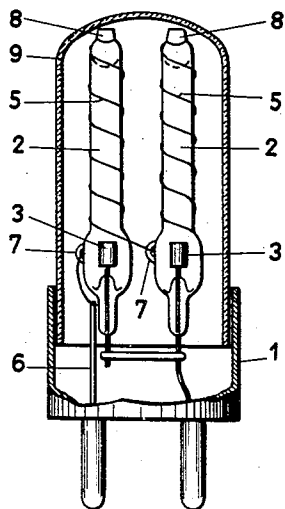
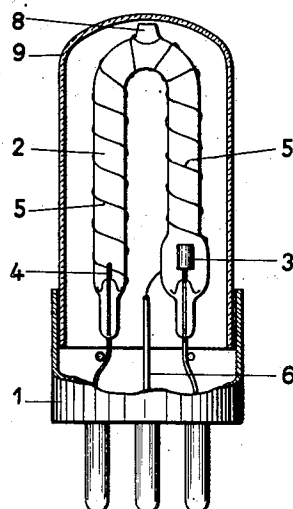


Fig. 2



Inventor
Herbert Dziergwa
by *J. W. Newhouse*
Attorney

1

2,831,152

ELECTRONIC FLASH LAMPS

Herbert Dziergwa, Berlin-Nikolassee, Germany, assignor to Patent-Treuhand-Gesellschaft für elektrische Glühlampen m. b. H., Heidenheim (Brenz), Germany

Application May 25, 1953, Serial No. 357,061

Claims priority, application Germany May 31, 1952

4 Claims. (Cl. 315—325)

The present invention relates to electronic flash lamps and more particularly to such lamps having a relatively high intensity yet having a decreased surface load (watt sec./cm.²) on the envelope.

Generally the tubular glass envelopes for electronic flash lamps are manufactured of hard glass because the use of quartz for such envelopes is expensive and difficult of fabrication. In order to facilitate easy starting commensurate with desired efficiency the outer diameter of such hard glass envelopes is restricted to about 6 mm. and with such diameter restriction there necessarily follows a minimum length for the lamp depending upon the operating voltage. The ignition or starting of the lamp will be made difficult and the efficiency of the lamp will decrease if the minimum length of the tubular hard glass envelope is exceeded. Moreover, if the length of the discharge path falls below a certain length the hard glass envelope will be subjected to too much of a strain causing breakage thereof.

For example, the following table illustrates values at different lamp envelope lengths and operating voltages for producing various energies:

Operating Voltage	Envelope Length, cm.	Flash Energy, watt sec.
3,500 volts.....	50	500
2,500 volts.....	40	400
1,000 volts.....	20	200
500 volts.....	9	100

From this table it will be noted that with these usual type electronic flash lamps, the flash energy per volt of operating voltage amounts to about 1/5 to 1/4 watt sec./volts so that all electronic flash tubes consequently have the same surface load on their hard glass envelopes during each second of lamp operation. It also follows that the discharge volume (length of envelope times diameter) available for producing the light energy, decreases with decrease in operating voltage. Because of these restrictions caused by the above noted factors, it has necessarily followed that once the maximum admissible surface load on the hard glass envelope was established the admissible flash energy is likewise established.

Therefore especially operation of these electronic flash lamps at lower voltages has been unfavourable because the flash energies are too low compared with those produced with higher voltages and longer discharge paths. Yet lower operating voltage of below 1000 volts has the advantage of being safer from the shock standpoint, enables a simpler construction of the entire flash unit by decreasing the size of the otherwise required high voltage rectifier, it is lighter in weight and more economical to manufacture.

It is accordingly the primary object of the present invention to provide an electronic flash lamp for producing, during the operating time of such lamp, flash

2

energies of preferably more than 1/4 watt sec. per volt of operating voltage and yet are operable at low voltage of approximately 500 volts. To this end two or more tubular discharge lamps are provided which are connected in parallel with each other and housed within a common tube bulb. Preferably the parallel connected discharge lamps are U-shaped and made to operate at a voltage of about 500 volts. Each discharge lamp is provided with a special igniting wire which may be wound around the discharge lamps and connected to a common contact. Preferably the discharge tubes are provided at their electrode ends with outwardly projecting glass hooks or eyelets to which the igniting wires are tautly secured. For the purposes of preventing shifting of the discharge tubes interiorly of the enclosing envelope such tubes are provided with projections at their top curved portions, which projections frictionally engage the envelope wall. In order to minimize light losses the interior of the lamp base may be provided with a reflecting or colored coating, or such base may be formed of a white artificial resin.

Although it is known in the prior art to operate several electronic flash lamps connected in parallel, each of which is mounted in a special reflector, such parallel connection of several electronic flash lamps has been for the sole purpose of illuminating an object to be photographed from different directions but so far as I am aware parallel connected electronic flash lamps have not heretofore been used within a single enclosing envelope to produce increased flash energy preferably at low voltages.

The present invention may be better appreciated by reference to the accompanying drawing wherein:

Figure 1 is a side view of the electronic flash lamp of the present invention, and

Figure 2 is another side view taken at right angle to that of Fig. 1.

Referring now to the drawing in detail, the electronic flash lamp therein shown comprises a base 1 on which are mounted in parallel to each other, two U-shaped discharge tubes 2, the anodes 3 of which are sealed into one end of each of the respective discharge tubes and with their leading-in and supporting conductors being connected to each other and in turn connected to one of the base contacts. The cathodes 4 of each of the discharge tubes 2 also have their leading-in and supporting conductors connected together and to a still further base contact. With the anodes 3 and cathodes 4 of the respective discharge tubes 2 connected together in the manner shown, it will thus be appreciated that the tubes are in electrical parallel to each other and also with respect to a source of supply when the base contacts are inserted in an appropriate socket.

Igniting wires 5 are wound around the discharge tubes 2 in a well-known manner and they are also connected to a common base contact 6. The hooks or eyelets 7 which, as before mentioned, are formed of glass and positioned near each of the electrode ends of the discharge tubes, serve for maintaining the igniting wire 5 tautly secured to prevent unwrapping and at the same time allow for slight contraction and expansion during operation of the lamp. Each discharge tube 2 is provided with a projection, preferably at the base of its U-shaped configuration, which projection frictionally engages the interior wall of the enclosing lamp envelope 9 so as to prevent displacement of the discharge tubes 2 from their substantially parallel physical position. The base 1, as hereinabove mentioned, may be formed of white artificial resin or the interior surface thereof may be provided with a reflecting or colored coating in order to prevent absorption of any of the light output by the base during operation.

From the foregoing it should become obvious to those

3

skilled in the art that by arranging and parallel connecting several discharge tubes within one electronic flash lamp, a flash energy of about 200-250 watt sec. can be produced with the discharge tube construction shown in the present invention when each of the discharge tubes has a discharge path of approximately 9 cm. in length. Moreover, by connecting the two discharge tubes in electrical parallel this flash energy of 200-250 watt seconds can be produced from an available voltage source as low as 500 volts. Such flash energy can also be increased still further by the inclusion of additional discharge tubes of approximately 9 cms. in length and also connected in parallel so that the electronic flash lamp can still be operated from a low voltage source of supply of approximately 500 volts, the only limitation on the number of such U-shaped tubes being the desired size of the enclosing lamp envelope. Although one embodiment of the present invention has been shown and described, it is to be understood that still further modifications thereof may be made without departing from the spirit and scope of the appended claims. Of course, it is also possible to increase the flash energy by parallel connection of several discharge tubes within a single flash lamp in case of discharge tubes for higher operating voltages and corresponding greater lengths of the discharge path.

I claim:

1. An electronic flash lamp of high flash energy comprising an enclosing envelope provided with a base, contact terminals carried by said base for connecting said flash lamp to a source of electrical energy of relatively low voltage of about 500 volts for momentary energization thereof, a plurality of U-shaped discharge tubes of substantially identical physical and electrical character-

4

istics disposed within said enclosing envelope with the major axes of their electrodes parallel to each other and with said discharge tubes connected with one connecting wire each in electrical parallel to a common contact terminal carried by said base so that both of said parallel connected discharge tubes are simultaneously energized, the sum of the lengths of said discharge tubes being such that at the operating voltage of said flash lamp a momentary flash energy is produced of at least $\frac{1}{2}$ watt second per volt of operating voltage for each second of lamp flash duration.

2. An electronic flash lamp as claimed in claim 1 in which the igniting wire to facilitate initiation of the flash is wound about the outer surface of each discharge tube for substantially the entire length thereof.

3. An electronic flash lamp as claimed in claim 2 in which the discharge tubes near their respective electrode ends are provided with projections extending from the vitreous tubes to which each igniting wire is tautly secured.

4. An electronic flash lamp as claimed in claim 3 in which each discharge tube at the base of its U-shaped configuration is provided with a vitreous extension frictionally engaging the inner wall of the enclosing envelope to prevent displacement of said discharge tubes.

References Cited in the file of this patent

UNITED STATES PATENTS

2,053,507	Barclay	Sept. 8, 1936
2,080,925	Middleton	May 18, 1937
2,341,541	Grier	Feb. 15, 1944
2,492,619	Casellini	Dec. 27, 1949
2,624,023	Noel	Dec. 30, 1952