April 3, 1956 W. HONING ET AL 2,740,281

FLASH LAMP

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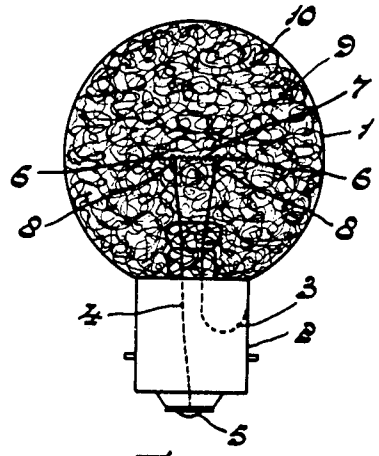


Fig. 1

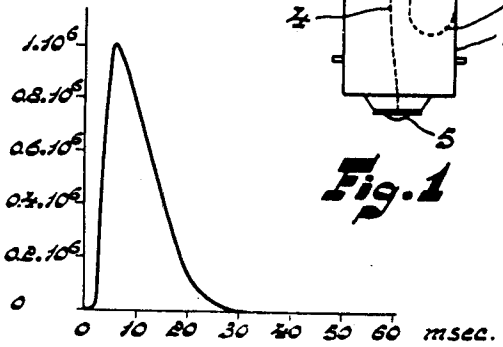


Fig. 2

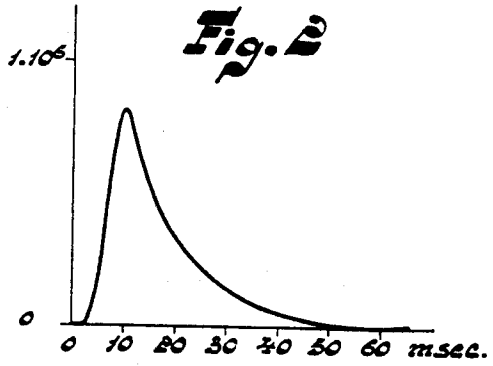


Fig. 3

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FLASH LAMP

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5 Claims. (Cl. 67—31)

This invention relates to electrically ignited flash lamps comprising a bulb which contains a solid material in the form of foils, strips or wires burning actinically together with oxygen which produces an emission of light. The bulb also contains an oxygen containing gas mixture. The invention more particularly relates to small sized flash lamps having a bulb volume of 35 ccs. or less, which permit a very short flash to be obtained. Such flash lamps are widely used in taking photographic pictures when the natural illumination is insufficient.

It has been proposed to speed up the combustion of the actinically burning material by mixing the oxygen gas with a combustible auxiliary gas in the bulb of a flash lamp. Since, however, the combustion of the auxiliary gas takes in an explosive manner, its content must not be raised excessively if bursting of the bulb is to be avoided upon ignition.

In carrying the invention through it has been found that with the use of a mixture of acetylene and oxygen, the deflegration is not too vigorous so that a high acetylene percentage of approximately 7 to 15 percent by volume may be employed without unduly increasing the risk of bursting of the bulb.

The present invention concerns an electrically ignited flash lamp whose bulb, the volume of which is less than 35 ccs., contains a solid material in the form of foils, tapes, wires burning actinically together with oxygen with the emission of light and furthermore contains a combustible gas mixture, which gas mixtures contain acetylene.

The acetylene content to be used in the gas mixture depends upon the fineness of the dimensions of the actinically burning material and in addition upon the rate at which the combustion is to take place. This rate of combustion is naturally also influenced by other structural features. Thus, for example, a flash lamp in which a short combustion time is required, will preferably be given a spherical, egg-shaped or oval section. Furthermore, the ignition will preferably take place centrally by means of an ignition paste, even if the gas mixture can be ignited by means of a filament or a spark. As a matter of fact it has been found that, even if the flash lamp contains a sufficient quantity of acetylene gas to be ignited by a conducting wire or a spark, an ignition paste permits the combustion to be speeded up somewhat. The invention is particularly suitable for use in flash lamps in which a time of combustion of 15 milliseconds or shorter is required as is the case in some cameras.

In a great number of modern cameras a synchronizer is built, which causes the flash to coincide with the short period during which the shutter is open. For practical reasons such cameras require only flash lamps whose flash terminates within 15 milliseconds after switching on the current. With the existing flash lamps of this type this period is usually much longer, for example 35 milliseconds.

The invention permits the manufacture of flash lamps having a time of combustion of 15 milliseconds or shorter

without the fineness of the proportions of the actinically burning material needing to be raised to a degree exceeding that of flash lamps of known customary types.

Thus, for example, the invention permits a flash lamp to be made which fulfils this condition while employing actinically burning material consisting of a filamentary aluminum-magnesium alloy approximately 32/μ thick.

For relative comparison of flash lamps, the time of combustion is read off from the curve indicating the relation existing between luminous intensity and time. The term "time of combustion" is to be understood to mean the time elapsing between operation of the ignition contact and the instant at which the luminous intensity, after having reached a maximum, has dropped to 50% of its maximum value.

In order that the invention may be more clearly understood and readily carried into effect, it will now be described more fully with reference to the accompanying drawing in which:

Figure 1 represents one embodiment of a bulb of the invention.

Figures 2 and 3 show time-luminous intensity curves for two bulbs.

The reference numeral **1** designates a glass bulb having a volume of 30 ccs., a cap **2** to which an electric conductor **3** is secured. An electric conductor **4** is secured to terminal contact **5**. The electric conductors **3** and **4** are connected at **6** to a filament **7** which fires the ignition paste **8** upon the passage of current. The reference numeral **9** designates combustible material consisting of wires of an aluminum-magnesium alloy containing 7% of magnesium. The wires are 32/μ thick, their overall weight being 15 mgms. The gas-filling **10** consists of a mixture of oxygen and acetylene. In the drawing, one curve illustrates the relation existing between luminous intensity and time. Fig. 2 shows the combustion curve of the above described flash lamp whose gas-filling has an acetylene content of 11.5 volume percent. Fig. 3 showing the same curve for a corresponding lamp whose gas-filling consists of oxygen containing 8 volume percent of acetylene.

In the table below, the values of the time of combustion, derived from these curves, are expressed in milliseconds.

Acetylene content:	Time of combustion
11.5 volume percent	14
8 volume percent	18
0 volume percent	31

What we claim is:

1. An electrically ignited flash lamp comprising a bulb of a radiation transmitting material and having a volume of less than 35 ccs., an actinically active solid material within said bulb in the form of foils having a thickness of approximately 32/μ, a filling atmosphere within said bulb including oxygen and a combustible gas mixture of acetylene in such an amount to effect a time of combustion of no more than 15 milliseconds, and ignition means within said bulb to ignite said material which actinically burns in said oxygen to produce an emission of light.

2. An electrically ignited flash lamp comprising a bulb of a radiation transmitting material and having a volume of less than 35 ccs., an actinically active solid material in the form of strips, a filling atmosphere within said bulb including oxygen and a combustible gas mixture of 7 to 15 percent acetylene by volume, and ignition means within said bulb for igniting said material which actinically burns in said oxygen to produce an emission of light.

3. An electrically ignited flash lamp comprising a bulb of radiation transmitting material having at least two terminals therein, said bulb having a volume of less than 35 ccs., an actinically active solid material within said bulb in the form of strips, a filling atmosphere within said bulb

including oxygen and a combustible gas mixture of 7 to 15 per cent acetylene by volume, a filament connected to said terminals, and ignition paste within said bulb and on said filament to ignite said material which actinically burns in said oxygen to produce an emission of light.

4. An electrically ignited flash lamp comprising a bulb of radiation transmitting material having a volume of less than 35 ccs., an actinically active solid aluminum-magnesium alloy in foil-like form within said bulb and having a thickness of approximately $32/\mu$, a filling atmosphere within said bulb including oxygen and a combustible gas mixture of 7 to 15 per cent acetylene by volume, and ignition means within said bulb to ignite said material which actinically burns in said oxygen to produce an emission of light.

5. An electrically ignited flash lamp comprising a substantially oval-shaped bulb of radiation transmitting material and having a volume of less than 35 ccs., an actinically active solid material in foil-like form within said bulb, a filling atmosphere within said bulb including oxygen and a combustible gas mixture of 7 to 15 per cent acetylene by volume, and ignition means located centrally in said bulb to ignite said material which actinically burns in said oxygen to produce an emission of light.

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