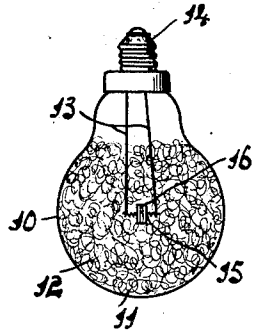
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FLASHLIGHT LAMP

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FLASHLIGHT LAMP

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1

The present invention relates generally to flash lamps, and more particularly to those flash lamps constructed to have a long 50% flash time. Such flash lamps are used to advantage in photographic apparatus comprising a slow-action focal-plane shutter. The term 50% flash-time is to be understood here to mean the time between the moment at which the light intensity has increased to 50% of its maximum value and the moment at which the light intensity has decreased to 50% of its maximum value.

In a flash-light lamp the closed bulb of which contains a filling of oxygen gas with which a substance such as aluminium, magnesium, or an alloy thereof produces an actinic reaction, steps have been made to increase the 50% flash-time by the use of a mixture consisting of nitrous oxide (N_2O) and oxygen. In order to obtain a noticeable result, it is necessary to add to oxygen a fairly large amount, for example more than 30% by volume, of nitrous oxide and this involves the necessity of increasing the pressure of the gas-mixture filling in order to have available an amount of oxygen sufficient for the actinic reaction.

The object of the invention is also to realise a long 50% flash-time with the use of an auxiliary gas, but without involving the disadvantage of a material increase in the pressure of the gaseous filling and the attendant risk of breakage of the bulb caused by the actinic reaction.

The present invention relates to a flash-light lamp the closed bulb of which contains oxygen and a material producing therewith an actinic reaction, and it has the characteristic that the gaseous filling contains an auxiliary gas retarding the combustion and comprising a halogen-containing compound of boron, carbon, silicon, titanium, germanium or tin with a combustion heat lower than 200 kgs. cal./mol.

As an alternative, the auxiliary gas may comprise a mixture of the said compounds.

In order to make the invention better understood, it is mentioned that the kind and the quantity of an auxiliary gas used according to the invention, together with the oxygen pressure, the kind of the material producing an actinic reaction and the dimensions all contribute to affect the extent of retardation of the combustion by the auxiliary gas and hence the increase of the 50% flash-time. The use of an amount of auxiliary gas smaller than 10% by volume of the gaseous filling may result in material increase of the 50% flash-time.

It is noted that an auxiliary gas is required to

2

have a vapour tension such that it may be used, at the operating temperature, in sufficient concentration to ensure noticeable retardation of the combustion or increase in the 50% flash-time. Thus, for example, perchloroethylene will not be used in practice because of its low vapour tension at operating temperature. As a result, this gas provides only a small increase in the 50% flash-time. Furthermore, it is mentioned that the serviceability of an auxiliary gas in practice is also determined by its reactivity at operating temperature with the substances contained in the bulb. Substances such as chlorine and hydrochloric-acid gas whilst having a retarding effect upon the actinic reaction attack the igniting filament so readily that merely for this reason they are unserviceable for the purpose considered. Carbon tetrachloride and trichloroethylene are particularly suitable for use of the invention in connection with the value of their vapour tension and the important increase in 50% flash-time that is obtainable. The flash-time increasing effect of the first-mentioned substance is somewhat smaller than that of carbon tetrachloride.

The table following hereinafter shows the influence exerted by some auxiliary gases according to the invention upon a given flash-light lamp, the bulb of which contains material producing an actinic reaction and comprising an aluminium-magnesium alloy and oxygen.

A flash-light lamp of the kind with which the results mentioned in the table are obtained is shown in the accompanying drawing as an example of a flash-light lamp according to the invention.

Reference numeral 10 indicates the circular glass bulb having a section of 55 mms. and a volume of about 155 ccs. The bulb contains a filling 11 of wire consisting of an alloy of aluminium with 7% by weight of magnesium having a weight of 54 mgs. and a diameter of the wire of 32 microns and furthermore contains a gas mixture according to the invention which is designated 12 and the composition and pressure of which are shown in Table 1.

The flash-light lamp comprises two current supply wires 13, each of which is secured at one extremity in a cap 14 and which are connected at the other extremities to a double igniting wire 15 having a length of 2 mms. and a diameter of 18 microns and which is provided with an igniting paste 16 constituted by phosphorus and lead peroxide.

Table

Retarding gas	Vol. per cent	Pressure gaseous filling, cm.	50% flash-time×10³ sec.	Combustion heat, k. cal./mol.
BCl_3	2	45	27	ca. 30 (calculated).
	6	45	35	
	10	50	40	
CCl_4	0.3	45	24	44.
	0.65	45	27	
	1.3	45	30	
	2.6	46	31	
	4	47	31	
	5.3	47	34	
	6.6	50	35	
	8	50	35	
$CHCl_3$	2	46	27	70.
	4	46	30	
	6	47	32	
	8	50	31	
$CHCl=CCl_2$	3	45	33	ca. 140.
	6	45	37	
	10	50	40	
CH_2Cl_2	4	45	26	107.
	10	50	28	
	20	55	35	
CH_3Cl	2	45	26	164.
	6	45	34	
	10	50	30	
CH_3Br	2	45	23	184.
	6	45	27	
	10	50	31	
CH_3J	2	45	29	195.
	6	45	30	
	10	50	30	
$SiCl_4$	2	45	23	ca. 10 (calculated).
	6	45	33	
	10	50	35	
SiF_4	2	45	23	ca. 173 (calculated).
	6	45	30	
	10	50	37	
$TiCl_4$	1	45	27	ca. 34 (calculated).
$GeCl_4$	2	45	32	ca. 5 (calculated).
	6	45	39	
	10	50	42	
$SnCl_4$	2	45	27	ca. 10 (calculated).
	3.3	45	27	
nil	0	45	20	

What we claim is:

1. A flash-lamp comprising a closed transparent bulb, an actinically reactive material in said bulb, and a gaseous filling in said bulb; said gaseous filling comprising oxygen for reacting with said actinically reactive material, and an auxiliary combustion-retarding gas; said auxiliary gas comprising a halogen containing compound of one of the elements of the group boron, carbon, silicon, titanium, germanium and tin, and having a combustion heat lower than 200 kgs. cal./mol.

2. A flash-lamp comprising a closed transparent bulb, an actinically reactive material in said bulb, and a gaseous filling in said bulb; said gaseous filling comprising oxygen for reacting with said actinically reactive material, and an auxiliary combustion-retarding gas; said auxiliary gas comprising no more than 10% by volume of said gaseous filling and comprising a halogen containing compound of one of the elements of the group boron, carbon, silicon, titanium, germanium and tin, and having a combustion heat lower than 200 kgs. cal./mol.

3. A flash-lamp comprising a closed transparent bulb, an actinically reactive material in said bulb, and a gaseous filling in said bulb; said gaseous filling comprising oxygen for reacting with said actinically reactive material, and an auxiliary combustion-retarding gas; said auxiliary gas comprising carbon tetrachloride.

4. A flash-lamp comprising a closed transparent bulb, an actinically reactive material in said bulb, and a gaseous filling in said bulb; said gaseous filling comprising oxygen for reacting with said actinically reactive material, and an auxiliary combustion-retarding gas; said auxiliary gas comprising trichloroethylene.

5. A flash-lamp comprising a closed transparent bulb, an actinically reactive material in said bulb, and a gaseous filling in said bulb; said gaseous filling comprising oxygen for reacting with said actinically reactive material, and an auxiliary combustion-retarding gas; said auxiliary gas comprising halogen containing compounds of the elements of the group boron, carbon, silicon, titanium, germanium and tin, and having a combustion heat lower than 200 kgs. cal./mol.

6. A flash-lamp comprising a closed transparent bulb, an actinically reactive material in said bulb, and a gaseous filling in said bulb; said gaseous filling comprising oxygen for reacting with said actinically reactive material, and an auxiliary combustion-retarding gas; said auxiliary gas comprising no more than 10% by volume of said gaseous filling and comprising halogen containing compounds of the elements of the group boron, carbon, silicon, titanium, germanium and tin, and having a combustion heat lower than 200 kgs. cal./mol.

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