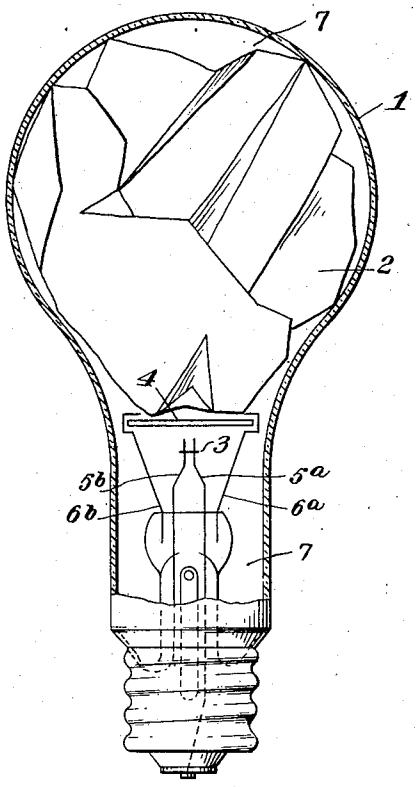
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FLASH LAMP

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FLASH LAMP

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5 Claims. (Cl. 67—31)

This invention relates to flash lamps of the enclosed type and has for its object an inexpensive and safe lamp especially for photographic usage.

Metallic foils and wire have been mentioned in this connection as usable with oxygen gas atmosphere at sub-atmospheric pressures. Metallic powders mixed with a solid oxidizing agent in vacuo represent another variation of the previous art. Ignition of these light producing materials has been accomplished, heretofore, by applying heat from a filament, intensified if necessary by a fulminating compound, directly to this flash material.

The flash lamp to be described is a departure from the previous art in that ignition of flash material is brought about by a self-propagating flame produced upon ignition of an inflammable gaseous mixture. The ignition impulse is thus transferred from the ignition device indirectly to the flash material. Combustion of the flash material progresses from a multitude of points and is aided by this flame.

The flash material may be as foil, wire, powder or similar form. Aluminum and magnesium are adaptable as flash materials, though any solid may be used which will emit light upon combustion with oxygen. Speed of the flash is largely a function of the fineness of these materials.

The accompanying drawing shows a side view, partly in section, of a lamp embodying the principles of this invention.

In the figure, the sealed transparent envelope, (1), to which the usual base has been attached, consists of a conventional glass bulb equipped with the conventional style stem and exhaust tube. A solid flash material, here illustrated as aluminum foil, (2), is held in the upper portion of the envelope by a shielding device, (4). This shielding device, consisting of an asbestos sheet disk which prevents direct ignition of the foil by the filament ignition device, is here held in place by support wires, (6*a*) and (6*b*), incorporated in the stem press. A filament wire (3), separated from the foil by the shielding device, (4), is supported by the lead wires, (5*a*) and (5*b*), which connect it electrically with the base in the conventional manner. The envelope is filled with an inflammable gaseous mixture of natural gas and oxygen at sub-atmospheric pressure. This inflammable gaseous mixture 7 contains an excess of available oxygen i. e. sufficient oxygen to combine with the natural gas and an excess which will combine with the flash material. By omitting the metal filament, (3), the gaseous mixture enclosed in the lamp may be ignited by applying sufficient induction voltage to the base contacts to cause a spark or discharge inside the envelope.

It is well known that a gaseous mixture may be ignited by many other methods. These methods may be used in connection with the described lamp. For example, causing a spark or discharge inside the envelope by applying an electrode from a high voltage source to any portion of the lamp will bring about ignition. A solid inside the envelope which may be ignited by heat applied to the outside of the container will also perform as an ignition device.

This inflammable gaseous mixture is composed of an inflammable gas or vapor with an oxygenous supporter of combustion. The inflammable gas or vapor may be any of the compounds or mixtures possessing the flame producing characteristic with oxygen or the gaseous oxides of nitrogen as the supporter of combustion. The lighter paraffin hydrocarbons, some of which are present in natural gas, are suitable because of their stability.

For illustration a natural gas composed of approximately 78% methane, 18% ethane, 2% nitrogen, 1% illuminants, 0.8% oxygen, 0.2% carbon dioxide, is considered. A change in the inflammable gas will necesitate a change in the ratios and amounts of components which should be present in the inflammable gaseous mixture; the principle involved will remain the same. Experiment indicates that the lower inflammable limit of this gas in oxygen or in oxygen-air mixtures is approximately 5.5%, low total pressures requiring an increase in this ratio for the production of a self-propagating flame. For example, reduction of the total pressure of a 6% mixture of this gas in oxygen enfeebles the flame, at 300 mm. of mercury and with spark ignition the flame which is produced might better be described as a glow. This glow is noticeable at 200 mm. with an 8% mixture and at 80 mm. with a 10% mixture. Cooling effect of the container, temperature, and method of ignition affect these ratios to a small extent.

In a flash lamp an inflammable gaseous mixture may be adapted to non-inflammability upon leakage of air into the envelope by limiting the ratio and amounts of the gaseous components which are present in the lamp. For greatest advantage of this safety action the ratio of natural gas to oxygen should be as low as possible and yet insure ignition of the flash material under prac-

tical conditions; the amounts such that violation of the inflammable limit occurs before the added air renders the lamp explosive upon firing. Leakage is limited in that it may progress only until atmospheric pressure is reached inside the envelope, the partial pressure of natural gas must be, therefore, less than 5.5% of atmospheric pressure for this leakage to produce non-inflammability. Lamps constructed as per illustration were filled, for example, to 200 mm. with a 10% mixture of natural gas in oxygen, non-inflammability may be made to occur at a lower pressure by filling to a lower pressure for example, 120 mm.

I claim:—

1. A flash lamp comprising in combination; a sealed transparent envelope; an ignition device within said envelope; an inflammable gaseous mixture at sub-atmospheric pressure containing an excess of available oxygen; a solid material adapted to light emission upon combination with said excess oxygen, said ignition device causing combustion of said inflammable gaseous mixture and combustion of said inflammable gaseous mixture initiating combustion of said solid material.

2. A flash lamp comprising in combination; a sealed transparent envelope; an inflammable gaseous mixture at subatmospheric pressure, said mixture containing an excess of available oxygen and adapted, by virtue of ratio and amounts of components present, to non-inflammability upon addition of air due to leakage of said envelope; an ignition device within said envelope; a solid material adapted to light emission upon combination with said excess oxygen, said ignition device initiating combustion of said inflammable gaseous mixture, and combustion of said inflammable gaseous mixture initiating combustion of said solid material.

3. A flash lamp comprising in combination; a sealed transparent envelope; an inflammable gaseous mixture at subatmospheric pressure, said mixture containing an excess of available oxygen and adapted, by virtue of ratio and amounts of components present, to non-inflammability upon addition of air due to leakage of said envelope; an ignition device within said envelope; a solid material adapted to light emission upon combination with said excess oxygen; a shielding device preventing direct ignition of said solid material by said ignition device, said ignition device initiating combustion of said inflammable gaseous mixture, and combustion of said inflammable gaseous mixture initiating combustion of said solid material.

4. A flash lamp embodying a sealed transparent envelope containing a gaseous mixture capable of producing a self-propagating flame upon ignition, said gaseous mixture containing an excess of available oxygen, said envelope containing also a solid material which will combine with said excess of available oxygen to produce light.

5. In a flash lamp having a gas-tight transparent envelope the combination; a solid combustible material adapted to light emission upon combustion with oxygen; an inflammable gaseous mixture at sub-atmospheric pressure, said gaseous mixture containing an excess of available oxygen and adapted, by virtue of ratio and amounts of components present, to non-inflammability upon addition of air due to leakage of said envelope.

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