July 14, 1942. M. J. N. DE MARGITTA 2,289,876

PHOTOFLASH LAMP

Filed Jan. 26, 1940

Fig. 1.

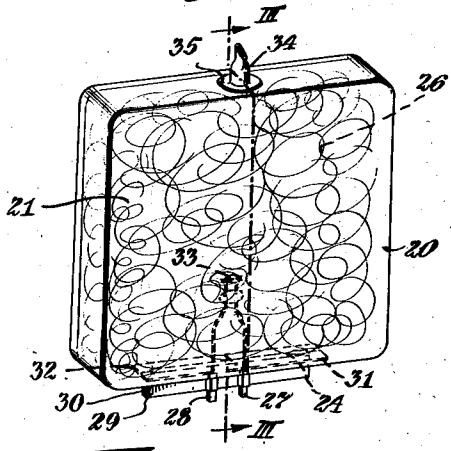


Fig. 2.

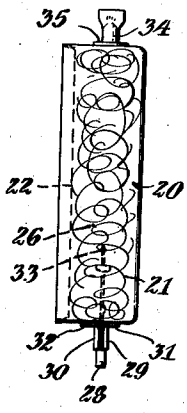


Fig. 3.

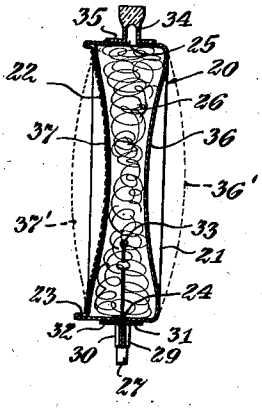


Fig. 4.

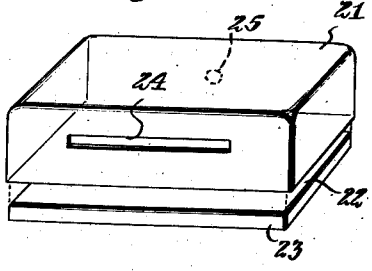


Fig. 5.

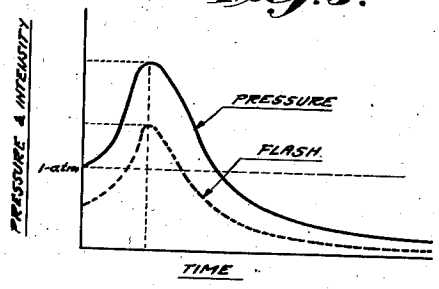


Fig. 6.

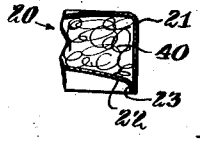


Fig. 7.

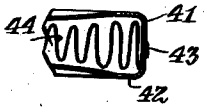


Fig. 8.

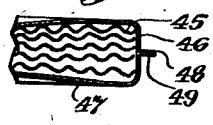


Fig. 9.

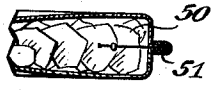


Fig. 10

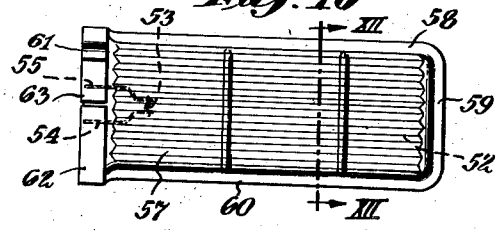


Fig. 11.

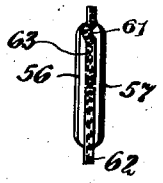


Fig. 12.

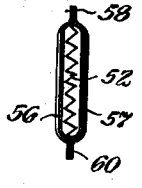
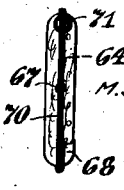


Fig. 13.

Fig. 14.



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BY
ATTORNEY

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2,289,876

UNITED STATES PATENT OFFICE

2,289,876

PHOTOFLASH LAMP

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Application January 26, 1940, Serial No. 315,742
In Hungary September 5, 1939

2 Claims. (Cl. 67—31)

This application is a continuation in part of my prior applications for improvements in flashlamps, Serial No. 298,276, filed October 6, 1939, and Serial No. 302,023, filed October 30, 1939.

The invention relates to lamps and especially to photographic flashlamps.

An object of the invention is to provide a flashlamp of a shape and material that a quantity of them may be carried in one's pocket.

Another object of the invention is to provide a flashlamp of a material that will eliminate any danger of exploding parts of the container.

A still further object of the invention is to provide a container wall that will automatically indicate the normal, exploded or leaky condition of the contents of the flashlamp.

Still further objects and advantages of the invention will be apparent from the following description and drawing:

Figure 1 is a perspective view of a preferred embodiment of the invention.

Figure 2 is a side elevation of the embodiment in Figure 1.

Figure 3 is a cross-sectional view on lines III—III of Figure 1.

Figure 4 is a perspective view of parts of the casing prior to assembly.

Figure 5 is a graph illustrating the relation of the flash intensity to the pressure inside of lamp for a short interval following ignition.

Figures 6, 7 and 8 and 9 are cross-sectional views of a portion of the container illustrating various modifications in the casing and contents of the photoflash lamp.

Figure 10 is a front elevation of a modification of the photoflash lamp of Figure 1.

Figure 11 is an end view of the device of Figure 10.

Figure 12 is a cross-sectional view on lines XII—XII of Figure 10.

Figure 13 is a front elevational view of a still further modification of the invention.

Figure 14 is a side view of Figure 13.

It is well known that photoflash lamps have contributed to photographic development by making possible the taking of pictures in situations which were hitherto impossible except by the use of a dangerous exploding powder. The present commercial flashlamp has a glass casing and this glass casing always presents a possible danger of flying glass in case the ignition of the combustible material within the casing is intense enough to break the glass. Furthermore, where a news photographer, for example, has to be equipped to take a large number of pictures, the transporting and disposal of a plurality of glass flashlamps presents a problem. The lamps must be handled delicately to avoid breakage and cannot be discarded promiscuously. Even where it has been suggested that part of the casing be made of delicate flexible material such as cellulose, the suggestion has been accompanied by a special package sealed with an adhesive strip which is not to be removed until the lamp is in position to be operated so that the flexible part may not be damaged.

My invention, in a generic sense, contemplates forming the casing of the flashlamp of a tough and difficult-to-burn plastic material, whereby the casing can have a suitable shape for the convenient transportation of a large number of flashlamps. Furthermore, in view of no danger of breakage of the casing with average jars and jolts, the flashlamp or a number of them can be carried in the pocket. In addition, my invention contemplates so forming the casing of the flashlamp that a leaky or used condition will be immediately apparent.

The material of the casing is preferably from the plastic group, and the most suitable of this group is cellulose acetate. In addition, phenol-formaldehyde resin, urea-formaldehyde resin, casein, pyroxylin, shellac, rubber, acryl and vinyl compounds having a suitable translucency or transparency may be used. I prefer, however, to utilize the difficult-to-burn cellulose acetate of a thinness such as to be flexible under variations in pressure within the lamp, and yet strong enough to stand handling. The cellulose acetate may be of a thickness from .005 inch to .02 inch or more. Even at this thinness of .005 to .02 inch the cellulose acetate does not require special protection of an enclosing casing or package.

In Figure 1, I have disclosed a casing **20** which is preferably of the thin cellulose acetate .005 to .02 inch thick previously mentioned. This casing **20** comprises a main box-like section **21** more clearly illustrated in Figure 4 which forms the major portion of the complete casing **20**. This box-like casing preferably has a lid **22** with a rim flange **23** for fitting into the open side of the box-like section **21**.

One of these parts has an opening **24** for the insertion of the igniting means, and there is also an opening **25** for the insertion of a combustion-supporting gas after the atmosphere has been exhausted. These openings can be conveniently made on any side of the casing, such as one of the sides of the box-like section **21** shown. Combustible material which may be foil or fine wires

of aluminum or magnesium 26 are inserted in the casing 21.

The igniting arrangement comprises conductors, 27, 28, embedded in two compressed layers 29, 30 of plastic material, such as the cellulose acetate, and these layers have extending flanges, 31, 32 to act as closing flaps for the opening 24 and may be cemented or welded to the box-like casing 21.

The inner portion of the conductors support an igniting element 33 which may be a filament coated with zirconium, aluminum or phosphorous powder. The tubulation 34 is preferably of the same material as the casing, having a flange 35 that may be cemented or sealed to the casing 21.

The lid 22 may have its rim 23 cemented in the casing 21. An alternative means is to weld the rim flange 23 to an edge of the box-like section 21 in the position disclosed in Figure 2. With the lid fitting into the box-like section 21, the rim flange 23 and the peripheral edge of the box are very convenient for welding. This welding can be easily performed by the application of heat and pressure to the plastic material until the two adjoining layers become a homogeneous mass.

The interior of the sealed casing is then exhausted of its atmosphere by attaching the tubulation 34 to an exhausting machine. A combustion supporting gas, such as oxygen, is then inserted in the interior of the device. This atmosphere of oxygen I prefer to have at a pressure below that of the atmospheric pressure, so that the sides of the device instead of being flat are curved inwardly, as disclosed at 36 and 37 in Figure 3. This shape has the special advantage that if the tube is defectively sealed, the atmosphere leaking in will puff out the stretched elastic sides to their original flatness to indicate the leak. After the lamp has been flashed, these elastic sides will be stretched out into the bulged form indicated by the dotted lines 36' and 37'. During flashing a tiny bit of hot metal generally burns a tiny hole in the thin wall with the result that the envelope remains in its extended position. The use of my thin, elastic, yet tough material with a gas filling below atmospheric pressure serves to immediately indicate the normal operative condition of the lamp if its outline is as indicated by the full lines 36—37 in Figure 3, or a leaky lamp if its outline is as indicated by the flat sides of Figure 2, or the used condition of the lamp if its outline is as indicated by the dotted lines 36', 37' of Figure 3.

If desired, a reflecting coating such as aluminum, nickel, etc., may be applied to the inside or outside of one of the flat sides of the casing such as the outside of the lid 22, as illustrated in Figure 3.

In Figure 5 is a graph illustrating that the highest intensity of the flash comes at approximately the same time as the highest pressure from the combustible material in the oxygen atmosphere. In case this high pressure should puncture the casing, this puncture would be a tiny opening for the release of the gas at the point of the highest pressure. The highest intensity of flash would, however, be over with after this highest pressure, and accordingly, this leakage would not affect the efficiency of the lamp.

In Figures 6, 7, 8 and 9, I have disclosed various modifications of the casing and contents. Figure 6 discloses fine aluminum or magnesium foil or wire 40 within the boxlike container 21 with a fitted-in lid 22 having its rim flange 23 cemented or welded to the casing 21 as previously described. The flashlamp 20 may have, however, two covers 41 and 42 fitting into one another with an overlapping portion 43 which is sealed by cement or welding and the combustible material may be a single sheet 44 of aluminum folded back and forth across the interior portion of the casing. In place of this single sheet of combustible material, the casing may contain a plurality of crinkled sheets 45 extending across the casing. The casing may comprise two similar parts 46 and 47 having their adjacent exterior flanges 48, 49 cemented or welded together. The combustible material may also take the form of irregular sheets of material 50 disclosed in Figure 9. The flanges may be bound in metal clamps 51, as illustrated in Figure 9. The form of combustible material illustrated in any of these figures may, of course, be combined with the form of casing illustrated in any of the others.

In Figure 10 I have illustrated a very easily assembled and conveniently elongated flat lamp. Combustible material 52 with an igniting device comprising igniting material 53 between two conductors 54, 55 projecting from one of the edges of the combustible folded sheet may be inserted between two plastic sheets 56, 57. The lamp is preferably formed by clamping these two sheets together and welding the rims on the sides 58, 59 and 60 together. A portion 61 on the fourth side has an opening for exhausting the atmosphere and for the insertion of an active gas such as oxygen. The two conductors 54, 55 to the igniting means extend to this fourth open side with one conductor extending to the upper part and the other to the lower part of this fourth side. Two metal clamps 62, 63 are then forced about the edge of this fourth side and contact is made with the conductors. The metal clamps are spaced from each other and close the opening 61 as well as the rest of the fourth side. The conductors may make a lateral contact with the metal flanges 62, 63 while embedded in the cellulose acetate or may project through the casing and have their ends bound by metal terminals. The folded sheet 52 as illustrated in Figure 12, provides a very efficient means for lateral projection of light as no self shadows are formed.

Figure 13 discloses a further modification of the invention, in which the combustible material, such as 64, and igniting means 65 with longitudinal extending conductors 66, 67 is enclosed in a single sheet folded on itself, with an overlapping portion 68 making a homogeneous joint by welding or cement. The two ends 69, 70 are then sealed either by cement or welding, suitable provision being made for the inclusion of a tubulation 71.

It will be readily apparent that the new flat shape of my photoflash lamp provides a means for the convenient transportation of a considerable quantity of photoflash lamps. The material of the casing permits these flashlamps to be carried in the pocket without damage through jars. The particular shape of the casing disclosed in Figure 3 permits the indication of the operating condition of the lamp. While I have disclosed several embodiments of the lamp, including many modifications that may be applied to one another, it is apparent that still further modifications may be made without departing from the spirit of the invention. Accordingly, I desire only such limita-

tions to be imposed upon my invention as are necessitated by the spirit and scope of the following claims.

I claim:

1. A flashlamp comprising a relatively flat box-like gas-tight air-exhausted self supporting casing of light transmitting organic flexible material, a combustible material in said casing, an oxygen gaseous filling in said casing interspersed with said combustible material and at less than atmospheric pressure thereby concaving a part of the casing as an indicator of sub-atmospheric pressure within the casing, faulty character of the casing being evidenced by equalization of pressure therein with the atmosphere and loss of concavity of the casing, and means within said casing in intimate association with both the said combustible material and gaseous filling for instigating combustion.

2. A flashlamp comprising a relatively flat box-like gas-tight air-exhausted self supporting casing of light transmitting organic flexible material, a combustible material dispersed substantially throughout the interior of said casing, an oxygen gaseous filling in said casing interspersed with said combustible material and at less than atmospheric pressure, said combustible material being loosely dispersed and enabling, in conjunction with the less than atmospheric pressure of the oxygen, external atmospheric pressure to normally concave the walls of said casing inward and thereby reduce external size of the casing and to give external indication of continued presence of less than atmospheric pressure in said casing, and means within said casing in intimate association with both the said combustible material and gaseous filling for instigating combustion.

MICHAEL J. NEUMANN DE MARGITTA.