United States Patent [19]

Tepper

[11] 3,747,530

[45] July 24, 1973

[54] WINDOW PROTECTOR

[75] Inventor: Charles W. Tepper, Rochester, N.Y.

[73] Assignee: The United States of America as represented by the Secretary of the Navy

[22] Filed: Oct. 26, 1966

[21] Appl. No.: 590,149

[52] U.S. Cl. ..... 102/70.2 P, 244/3.16, 343/872, 250/239

[51] Int. Cl. ... F42c 13/02, F42c 19/00, F42c 19/04

[58] Field of Search 102/70.2, 92.5; 244/3.16; 250/238, 239

[56] References Cited

UNITED STATES PATENTS

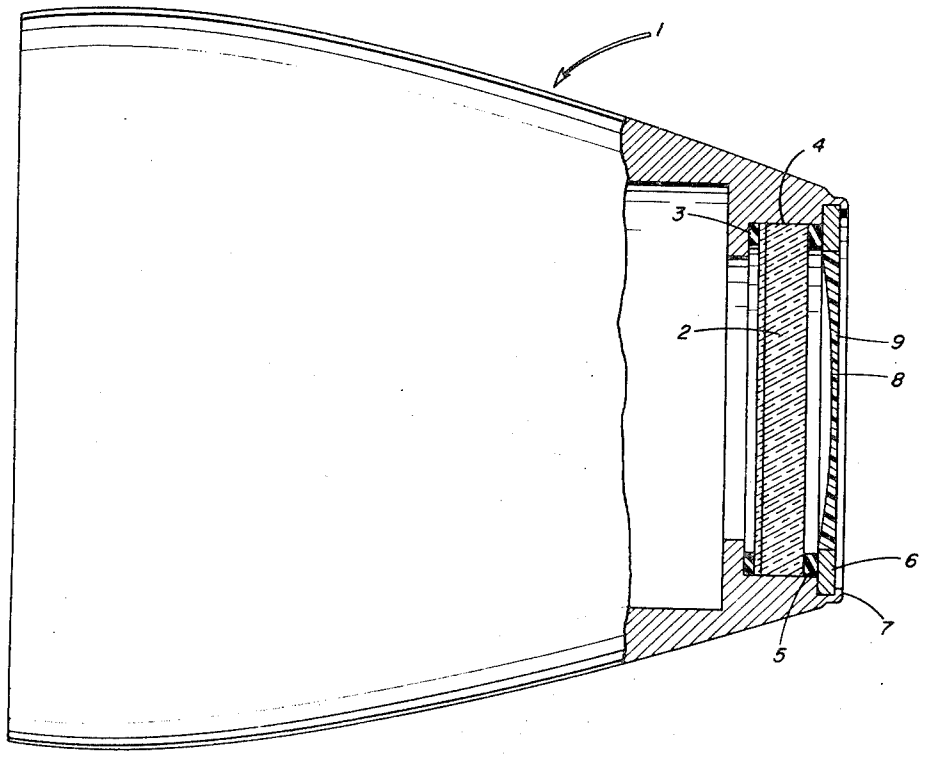
2,986,637	5/1961	Null	250/238 X
2,987,999	6/1961	Robinson, Jr.	102/92.5
3,026,805	3/1962	Becker	102/70.2 P
3,113,521	12/1963	Waller	102/92.5
3,270,503	9/1966	Meyer, Jr.	102/92.5 X

Primary Examiner—Benjamin A. Borchelt
Assistant Examiner—Thomas H. Webb
Attorney—J. P. Dunlavey, J. O. Tresansky and J. G. O'Neill

[57] ABSTRACT

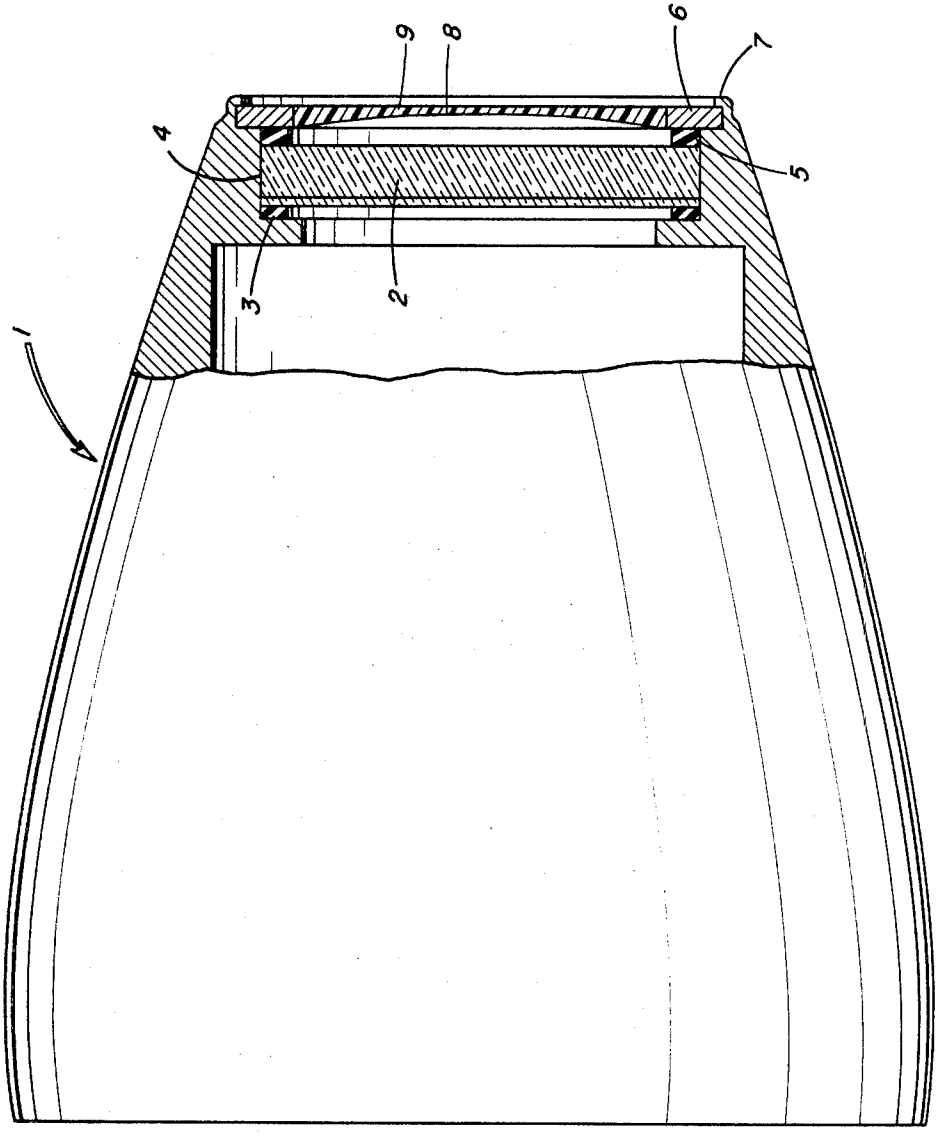
A protector for an optical fuze window formed of a thin polyester film spatially displaced in front of the window and having a thin film of meltable wax deposited thereon.

5 Claims, 1 Drawing Figure



PATENTED JUL 24 1973

3,747,530



Charles W. Tepper
INVENTOR

J. O. Tresansky
ATTORNEY

BY James H. O'Neill
AGENT

WINDOW PROTECTOR

The present invention relates generally to ordnance fuzes and more particularly to an apparatus for protecting the lens of an optical fuze.

In a rocket or projectile using an optical fuze, such as an infra-red fuze, it is important to keep the lens, or window, of the fuze clean to assure proper operation of the fuze in response to impinging rays of infra-red energy.

Many problems have been encountered in the handling of infra-red fuzes and in their operation while in a projectile or rocket in flight. It has been found desirable to place a protective wax covering over the window of the fuze but great difficulty was had in placing the protector directly on the fuze lens without getting fingerpints on the window. These fingerprints adversely affected the operation of the infra-red fuze. Another reason for placing wax or some type of window protector on the fuze lens is to prevent the deposition of gun blow-by products on the outside of the window when a projectile incorporating an infra-red fuze is fired from a gun.

When a window protector has been placed over the fuze lens it is desirable to remove this window protector while the projectile is in flight in order that the infra-red fuze will operate when in proximity to the target. Removal of window protectors has been realized by the combination of the effects of stagnation temperature and projectile spin. Under certain cold environmental conditions the removal of the window protector was found to be incomplete, thus adversely affecting the fuze sensitivity. Under these cold conditions the heat applied to the window protector would be dissipated by the fuze window, thereby not fully melting the wax window protector. Furthermore, the presently employed sapphire infra-red windows when directly covered with a wax coating act as heat sinks and delay the melting of the coating by drawing the heat therefrom. Resort to thin coatings of wax also proved unsatisfactory since the coating did not dissipate the heat with sufficient rapidity to entirely melt the wax before target approach.

An object of the present invention resides in the provision of a new and improved window protector for a fuze.

Still another object of this invention resides in the provision of a thermally insulated window protector for an optical fuze.

According to the present invention, the foregoing and other objects are attained by providing a window protector for an optical fuze formed of a thin polyester film such as MYLAR, having good thermal insulation qualities, spaced a small distance from the fuze window. A thin film of wax is placed on the polyester film which is completely removed by the heat generated when the fuze is in flight. The polyester film and the spacing between the window and the film act as good thermal insulators so that the window of the fuze will not dissipate the heat generated when the fuze is in flight.

Other objects and features of the invention will become apparent to those skilled in the art as the disclosure is made in the following description of a preferred embodiment of the invention as illustrated on the accompanying drawing in which the sole FIGURE schematically shows a preferred embodiment of the window protector of this invention.

The sole figure shows an infra-red fuze assembly 1 capable of being mounted in the nose of an ordnance vehicle, such as a projectile. A sapphire window, or lens, 2 is held against a washer 3 which rests in a counter-sunk opening 4 located in the nose portion or front end of the fuze assembly 1. The window 2 is securely held in opening 4 by a rubber seal, or washer, 5 forced into contact with the window by a crimp ring 6 acted upon by a lip 7. The lip 7 is formed by crimping or spinning an extension of the fuze casing over the crimp ring 6 with sufficient pressure to force the crimp ring into contact with the rubber seal 5 and in turn force the rubber seal against the window 2.

A plastic film 8, preferably formed of Mylar, is inserted between the crimp ring 6 and the rubber seal 5 to form a continuous surface covering the window opening. The film is formed so as to protrude between the surfaces of the crimp ring and the inside of the crimp lip on the front of the casing, but not to extend above the crimp ring 6. After crimping, air trapped between the window and the thermal insulating film forms the film into a convex surface, i.e., the film bulges outwardly from the window, to enhance the thermal insulation properties thereof. Melted wax 9 is then poured over the film surface so as to completely cover the surface thereof. The wax coating must solidify in contact with the crimp ring so as to be held thereby and not be capable of working loose. The wax to be used should be of a homogeneous mixture so as to form a consistent coating throughout the film surface to assure the proper melting of the coating during flight.

Obviously many modifications and variation of the present invention are possible in the light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In combination with the window of an optical fuze, a protector for said window comprising,
   a film of thermal insulating material disposed in the optical path of said window and
   a meltable coating applied to completely cover said film of thermal insulating material.

2. The protector of claim 1 wherein said film of thermal material is spaced from said window so as to form a pocket of air therebetween.

3. The protector of claim 2 in which said film of thermal insulating material is a formed from a polyester.

4. The protector of claim 3 wherein said coating is a thin film of wax.

5. The protector of claim 1 in which said film of thermal insulating material is convex in shape.

* * * * *