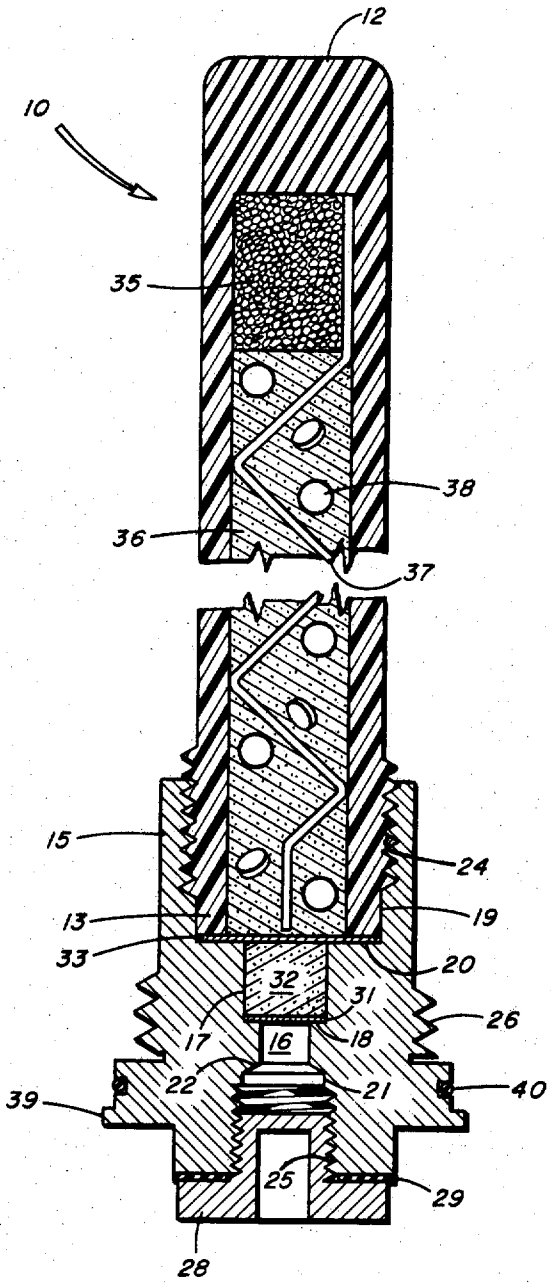
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BURSTER-IGNITER DEVICE

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BURSTER-IGNITER DEVICE

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This invention relates generally to a device for igniting a fire package and more specifically to a burster-igniter device particularly adapted for use with a special floating fire package having designated military application. The flotation principle of the special floating fire package is similar to that of a life jacket using foam, so designed that punctures will not cause sinking, and in which the attitude of the container thereof is controlled by a counterweight. The unit can be loaded with various fuels, such as gasoline, JP–4, napalm mixes and many others. In all past burster-igniter devices dealing with the ignition of a napalm unit on water, both a high explosive burster tube and another container of sodium were required in order to successfully ignite the napalm or other fuel being used.

The principal object of the invention is the provision of a new and improved burster-igniter device that will eliminate the necessity for having the sodium and high explosive components in such floating fire packages.

Another object of the present invention is the provision of a burster-igniter device including means whereby the device may be quickly attached to a container for a floating fire package and thereafter fired at will for igniting the fire package.

Another object of the present invention is to provide a new and improved burster-igniter device which is economical to manufacture, reliable in operation and which possesses the qualities of durability during handling and transportation.

Accordingly, the burster-igniter device of the present invention comprises an elongated cylindrical-shaped nylon tube closed at one end and having packed therein a length of black igniting powder, a quantity of boron pellets scattered throughout the length of powder, a strip of magnesium passing therethrough and a small foam plug positioned between the powder and the closed end of the tube. A small amount of initiating powder is placed at the open end of the tube separated from the igniting powder by an aluminum disc and adapted to be secured to the tube by an actuating member incorporated within the floating fire package. In the aforedescribed device, the foam plug compresses just before the critical bursting point for the particular tube is reached, thus permitting the powder to burn further, but not completely, and when it ruptures there is still an interface of flame between the burned and unburned powder which ignites the fire package after the tube bursts.

The exact nature of this invention as well as objects and advantages in addition to those already mentioned will be readily apparent from consideration of the following specification when taken in connection with the accompanying drawing, wherein the single figure thereon shows a central longitudinal sectional view of a preferred embodiment of the present invention.

Referring now to the drawing, there is shown a cylindrical tube generally designated by the reference numeral **10** and being composed preferably of nylon and being closed at one end **12** and open at the other end **13**. The outer peripheral wall of tube **10** is threaded near the end portion **13** thereof for receiving thereon in threaded engagement a top plug member **15** which may be composed of stainless steel or any other suitable metallic material and which is designed for incorporation into the floating fire package.

Plug **15** is a substantially cylindrical member having an axial bore **16**, a first counterbore **17** facing one end of the plug and cooperating with the axial bore **16** to define a shoulder **18**, a second counterbore **19** cooperating with counterbore **17** to define a shoulder **20**, and a third counterbore **21** facing the other end of the plug and cooperating with axial bore **16** to define a tapered shoulder **22**. The plug **15** is provided with internally-threaded portions **24** and **25** at either end thereof in counterbores **19** and **21**, respectively, and with an externally-threaded portion **26** substantially midway along the axial length thereof. During transportation and normal handling of the device a protective screw cap **28** is secured within the counterbore **21** threadably engaging the threaded portion **25** therein. An annular gasket member **29** composed of rubber or the like is secured between the head portion of screw cap **28** and the end wall of the top plug **15** and is compressed therebetween upon tightening of the screw cap **28** to provide sealing of the plug **15**. This sealing may be made even more effective if an adhesive is first applied to the end wall of plug **15** receiving the annular gasket **29** and to the side of the gasket which abuts that end wall.

Within the top plug member **15**, a thin aluminum disc **31** having substantially the same diameter as that of counterbore **17** is positioned within the counterbore **17** and is secured to the shoulder **18** by an epoxy adhesive-sealant or other suitable means. The cavity within the plug **15** defined by the counterbore **17** is then filled with an initiating powder **32** such as, for example, FFF–G black powder and a second thin aluminum disc **33** having substantially the same diameter as that of counterbore **19** is positioned within the counterbore **19** against the shoulder **20** therein. Disc **33** serves to contain initiating powder **32** within the cavity of counterbore **17** and may be secured in place by an adhesive-sealant similar to that employed with disc **31**. Although the discs **31** and **33** have been described as being composed of aluminum, it is to be understood that they might be constructed of other suitable light-weight metallic materials.

A small foam plug **35** composed of a closed-cell polyurethane such as, for example, Ethafoam, is positioned within the cylindrical nylon tube **10** in abutting relation with the closed end thereof. The remaining length of the tube **10** is filled with a black igniting powder **36** such as, for example, FIG. F–G black powder having dispersed therein a quantity of boron pellets **38**, and a strip of magnesium ribbon **37** secured at one end by compression thereof between the foam plug **35** and the inner peripheral wall of the nylon tube **10** is positioned within the powder-filled tube extending substantially along the entire length of the tube. The open end **13** of igniter tube **10** is effectively closed when the top plug member **15** is threadably secured thereon, whereupon the disc **33** is contacted by the annular end wall of the tube **10** and is urged into even tighter engagement with shoulder **20** within the plug **15**.

The externally-threaded portion **26** on the top plug member **15** is provided for the purpose of securing the burster-igniter device within the fire package in which it is to be used. A flange element **39** and an O-ring **40** are shown in the drawing and are adapted for matingly engaging the fire package container in a sealed relationship therewith.

One of the most unique features of this device is the simplification of the burster-igniter, which eliminates the sodium and high explosive components required in all past burster-igniters dealing with the ignition of a napalm unit on water. When readying the present device once it

is installed in a fire package, it is only necessary to remove the shipping plug or protective screw cap **28** and to replace it with either a mechanical firing plug or an electroresponsive initiator, as may be desired, and which when installed will engage tapered shoulder **22** and abut the thin aluminum disc **31**. The ignition of the initiating powder **32** within the plug member **15** can of course be brought about by many means having small flaming outputs, such as conventional squibs and similar delay-firing devices. Subsequent ignition of the length of igniting powder **36** takes place upon failure of the thin aluminum disc **33**, and bursting of tube **10** and ignition of the fuel within the fire package follows thereafter. Upon the rupture of the tube **10**, the pellets **38** are scattered a greater distance and will maintain their temperature for a greater period of time than the black powder, a feature found desirable with certain incendiary mixtures.

It should be observed that if the burster-igniter tube **10** of the device disclosed herein were fully loaded with the same amount of black igniting powder **36**, but without the foam plug **35**, there would be an inconsistency as to the amount of powder that would burn. Tests have shown, for example, that approximately half the length of powder **36** would be burned and the remaining length would remain hardpacked and unburned. If the strength of the tube were increased to permit additional burning prior to bursting of the tube, the result would merely be complete burning of the powder accompanied by a violent explosion. The secret, therefore, of getting ignition plus acting as a burster and igniter, and a novel feature of this invention, is that just before reaching the critical bursting point of the tube **10**, the foam plug **35** is compressed by the force of the pressure generated therein, thus allowing the powder **36** to burn on further, but not completely, so that when tube **10** ruptures there is still an interface of flame between the burned and unburned lengths of powder **36** that brings about ignition of the napalm or other fuel within the fire package after the bursting of tube **10**.

What is claimed is:

1. A burster igniter device for use with a fuel container comprising:

a cylindrical tube closed at one end and open at the other end thereof,

a compressible foam plug positioned within said tube adjacent the closed end thereof,

igniting powder substantially filling said tube between the foam plug and the open end of said tube,

a magnesium ribbon positioned within said igniting powder and extending substantially along the entire axial length of said tube,

means for closing the other end of said tube, and

means for initiating said igniting powder.

2. A device according to claim **1** wherein said tube is composed of nylon.

3. A device according to claim **1** wherein said foam plug is composed of a closed-cell polyurethane.

4. A device according to claim **1** wherein said igniting powder is an F–G black powder.

5. A device according to claim **1** wherein said initiating means is an FFF–G black powder.

6. A device according to claim **1** wherein said end closure means for said tube comprises a plug member threadably engaging said tube about the open end thereof.

7. A device according to claim **6** wherein said plug member includes means therein separating said initiating means and said igniting powder.

8. A device according to claim **7** wherein said separating means is a thin aluminum disc.

9. A device according to claim **8** wherein said plug member is provided with a normally-closed passageway communicating with said initiating means and adapted for receiving therein means for activating said initiating means.

10. A device according to claim **1** wherein said end closure means for said tube comprises a metallic plug member threadably engaging said tube about the open end thereof,

said plug member having an axial bore therethrough,

a first counterbore containing said initiating means and a second counterbore for receiving said tube therein,

a first disc member positioned within said plug member and separating said initiating means from said igniting powder, and

a second disc member positioned within said plug member and retaining said initiating means within said first counterbore.

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