# United States Patent

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[54] **AMMUNITION ANTIDEFUZING DEVICE**
**10 Claims, 4 Drawing Figs.**


[52] **U.S. Cl.** ..... **102/57,** 102/58, 102/66, 102/73
[51] **Int. Cl.** ..... **F42b 13/02**
[50] **Field of Search** ..... 102/57, 58, 66, 6, 90, 70, 8



[56] **References Cited**

UNITED STATES PATENTS

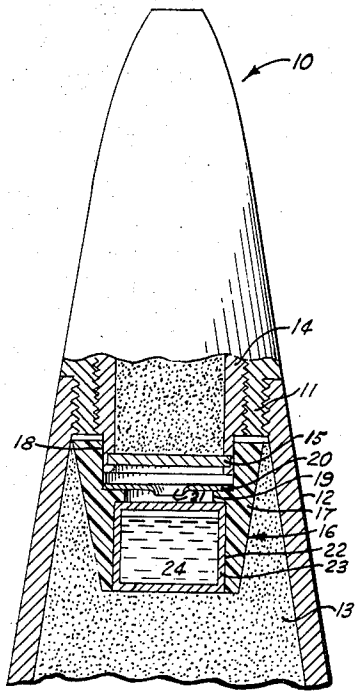
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|---|---|---|---|
| 305,881 | 9/1884 | Bachelder | 102/57 |
| 2,368,310 | 1/1945 | Lecky et al. | 102/70 |
| 2,863,391 | 12/1958 | Diels | 102/8 |
| 3,101,053 | 8/1963 | Stevenson et al. | 102/58 X |



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**ABSTRACT:** A device consisting of a container, which is filled with a liquid chemical material having combustion characteristics, that is positioned in a bomb or shell in conjunction with the fuze therefor, so that upon impact of the bomb or shell with the target, the container will be ruptured and cause the liquid chemical material to be dispersed in the explosive in the bomb or shell and in the event the bomb or shell is a dud, that any attempts to remove the fuze therefrom, will result in the liquid chemical material being exposed to the atmosphere, water or the perspiration of any one removing the fuze, to cause the liquid chemical material to combust and thus ignite or detonate the explosives within the bomb or shell.

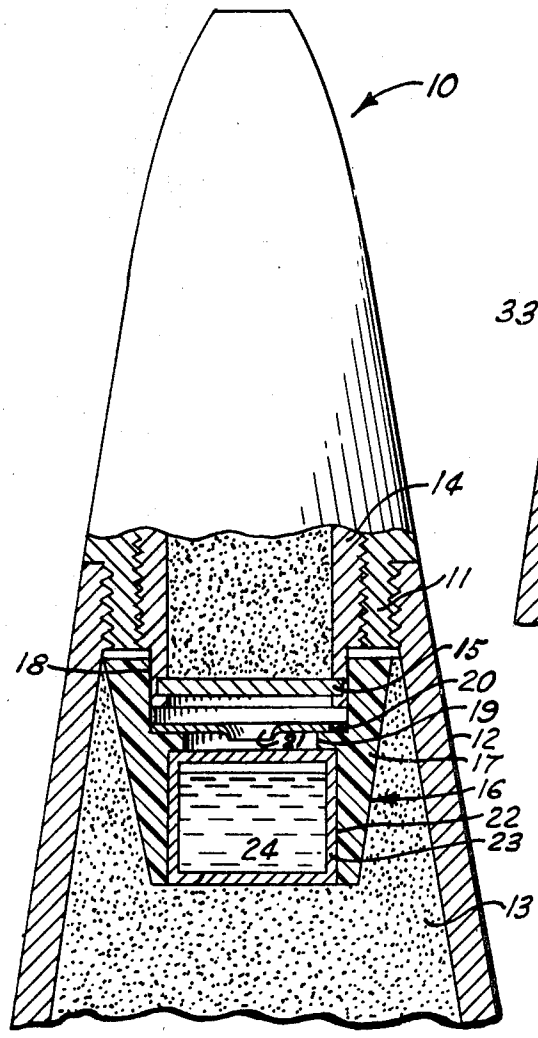



Fig. 1

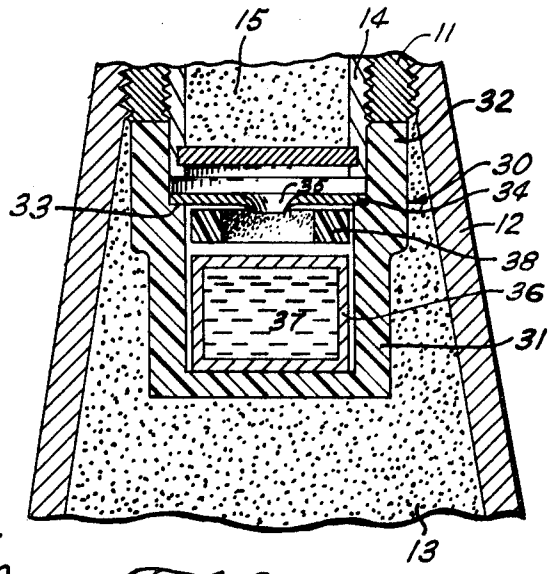



Fig. 2

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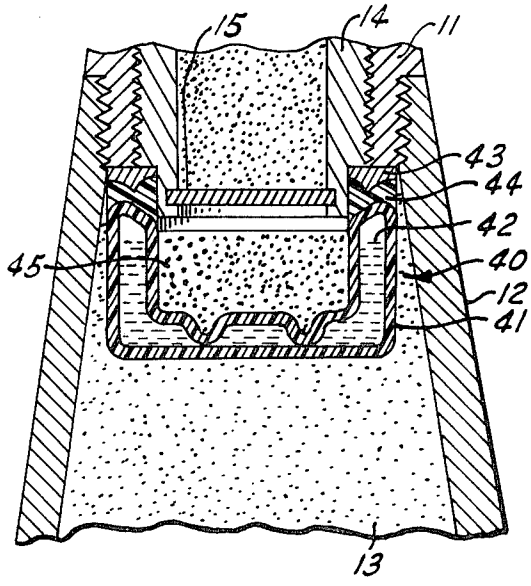



Fig. 3

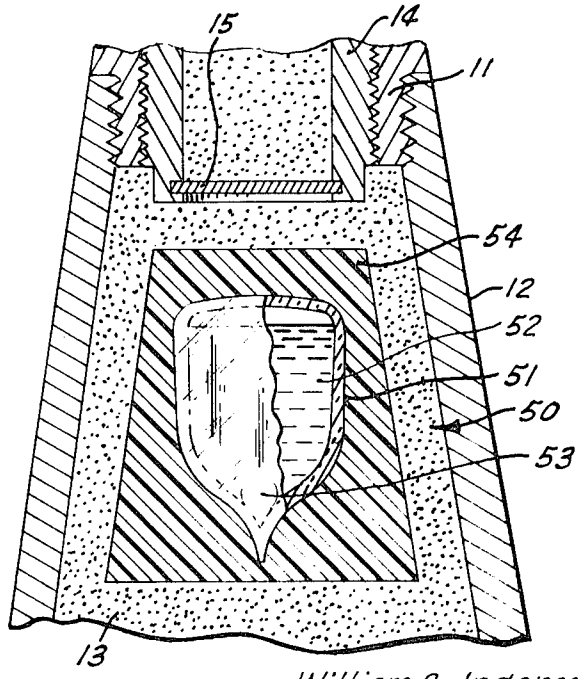



Fig. 4

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# AMMUNITION ANTIDEFUZING DEVICE

## BACKGROUND OF THE INVENTION

1. Field of the Invention

Recent intelligence sources have reported that the "guerrilla" fighters in Vietnam have been recovering the explosives from dud bombs or shells and using such explosives in carrying out their "guerrilla" warfare. The explosives being retrieved upon removing the fuze from the bomb or shell, therefore, the instant invention contemplates the ignition of the explosives within the bomb or shell, upon removal of the fuze, by a liquid chemical material that will combust upon contact with the atmosphere, water and perspiration of the one attempting to remove the fuze, to ignite the explosive and thus destroy the bomb or shell.

2. Description of the Prior Art

Delayed-action assemblies, auxiliary cartridges, tetryl lead charges and other arrangements have been used to detonate a bomb or shell to prevent them from becoming duds, but the instant invention contemplates the use of liquid chemical material which will ignite the explosive in a dud bomb or shell to destroy the same if an attempt is made to remove the fuze.

## SUMMARY OF THE INVENTION

This invention relates to improvements in a device that will cause a chemical reaction to ignite the explosive in a dud bomb or shell when the end of the bomb or shell is opened by removal of the fuze therefrom.

The liquid chemical material is positioned in a container that is in close proximity to the fuze so that upon impact with the target, the container is fragmented, the liquid chemical material will be released and in the event the bomb or shell is a dud, the liquid chemical material will contact and be dispersed within the explosive in the dud bomb or shell. Then, since the liquid chemical material is sensitive to atmosphere, water or the perspiration of the one removing the fuze, the explosive will be ignited when the fuze is removed.

It is also to be noted that the container in which the liquid chemical material is placed will withstand normal handling shocks and the acceleration load on firing and will not fragment until impact with the target.

It is an object of this invention, therefore, to provide an antidefuzing device that will include a container having therein a liquid chemical material that is subject to combustion upon contact therewith of atmosphere, water and body perspiration to ignite an explosive within a dud bomb or shell.

With the above and other objects in view that may appear to one skilled in the art from the following description when taken in conjunction with the drawings in which:

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view, partly in elevation and partly broken away, of one form of the antidefuzing device embodying the invention;

FIG. 2 is a fragmentary sectional view of another form of the invention;

FIG. 3 is a fragmentary sectional view of still another form of the invention; and

FIG. 4 is a fragmentary sectional view of a further form of the invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring more in detail to the drawings, and more especially to FIG. 1 thereof, wherein like parts are designated by like reference numerals, the reference numeral **10** is generally used to designate a fuze, such as is generally shown in the Army Technical Manual TM-9-1300-205.

The fuze **10**, as is conventional, comprises a reduced externally threaded portion **11** whereby the fuze **10** is threadably connected to a bomb or shell **12** which contains therein a conventional explosive **13**.



A booster charge **14** is threadably connected within the reduced portion **11** and is provided with a frangible closure disk **15**.

An antidefuzing device **16** includes an inverted truncated conical-shaped foamed plastic adapter **17** that is provided with a circular cavity **18** at the base end thereof to receive and be bonded to the outer end of the booster charge **14**. An annular shoulder or seat **19** is provided at the bottom of the cavity **18** on which rests a rupture disk **20** that is provided at the center thereof with a punched opening **21**. As the opening **21** is pinched, the metal will form a roughened ridge about the opening **21** for a purpose to be later described.

A second circular cavity **22** is provided in the adapter **17** and the cavity **22** extends from the truncated end of the adapter **17** to the shoulder or seat **19**. A flat-sided circular container **23** containing therein a liquid chemical material **24**, such as sodium-potassium alloy (NaK) or any of several metal alkyls, is slipped into the cavity **22** until it comes to rest on the side of the shoulder or seat **19** opposite to that on which rests the disk **20**. It is also possible within the scope of the invention to make the container **23** of any shape or size as required.

The fuze **10**, and bomb or shell **12** are assembled as shown in FIG. 1 with the adapter **17** in a position as previously described and the bomb or shell **12** is ready for activation.

The action of the antidefuzing device **16** is the same whether the bomb or shell **12** explodes or becomes a dud. The impact of the bomb or shell **12** will cause the disk **20** to be ruptured and the impact of the roughened edges or particles of the disk **20** with the container **23** will destroy the container **23** and cause the liquid chemical material **24** therein to flow into and be dispersed within the explosive **13**.

If the bomb or shell **12** is not activated and if the fuze **10**, or the bomb or shell **12** is not damaged so that air or moisture will come into contact with the chemical material **24**, the bomb or shell **12** will become a dud and will so remain until an attempt is made to remove the fuze **10**. If then air or moisture comes in contact with the liquid chemical material **24**, the bomb or shell **12** will be activated.

Throughout the description of the remaining forms of the invention, the elements of the fuze **10** and the bomb or shell **12** will be designated by the same reference numerals as previously used for FIG. 1.

In FIG. 2 the antidefuzing device **30** includes a cup-shaped foamed plastic adapter **31** that is provided with an enlarged annular flange **32** at the open end thereof to receive and be bonded to the outer end of the booster charge **14**. Where the flange **32** forms a continuation of the adapter **31**, an annular shoulder or seat **33** is provided on which rests a metal rupture disk **34** having a punched opening **35** therein so that it is similar in construction in all respects to the rupture disk **20**.

A glass container **36** filled with a liquid chemical material **37** is positioned in the adapter **31** and a cushioning washer **38** is positioned between the container **36** and the disk **34** so that the sharp edge of the opening **35** will not engage the container **36** under ordinary handling and firing of the bomb or shell **12**, but the container **36** will still fracture under impact of the bomb or shell **12** with the target.

The operation of this form of the invention is identical with the operation of the antidefuzing device **16** of FIG. 1 as previously described.

In FIG. 3 the antidefuzing device **40** comprises a sectional two-walled cup-shaped container **41** and the hollow space provided by the two-wall construction has sealed therein a liquid chemical material **42**. The container **41** is to be ruptured by a knife-edged rupture ring **43** upon impact of the bomb or shell **12** with the target. The ring **43** engages the lower end of the portion **11** and is in contactual circumjacent relation to the lower end of the booster charge **14**. A cushioning washer **44** is positioned between the ring **43** and the container **41** to prevent damage thereto during ordinary handling and firing of the bomb or shell **12**. An auxiliary booster charge **45** may also be positioned within the cavity formed by the inner wall of the container **41** to assist in fragmenting the container **41** upon impact of the bomb or shell **12** on the target.

In this form of the invention the rupture disk **20** is replaced by the rupture ring **43**, otherwise the operation of this form of the invention is identical to the forms of the invention as previously described.

In the form of the invention as shown in FIG. **4**, the antidefuzing device **50** comprises a glass ampul **51** which before sealing is filled with a liquid chemical material **52** and a metal ball **53** is also placed in the ampul **51**. The ampul **51** is then encapsulated in a truncated conical-shaped block **54** of a foamed plastic material and the block **54** is placed in the explosive **13** when it is placed in the bomb or shell **12**. The block **54** does not have to be positioned at any specific location and the viscosity of the liquid chemical material **52** will dampen any oscillations of the ball **53** to prevent breakage of the ampul **51** during normal handling shocks received by the bomb or shell **12**. The firing of the bomb or shell **12** will impart sufficient momentum upon the ball **53** to break the ampul **51**, but the material from which the block **54** is formed will delay the dispersion of the liquid chemical material **52** until after impact. The dispersion of the liquid chemical material **52** in the block **54** will attain enough surface to be oxidized upon exposure to air or moisture to combust the liquid chemical material **52** and activate the explosive **13**.

All forms of the invention contemplate the use of a container of various shapes or sizes and formed from various materials and such containers to be positioned in a bomb or shell so that if the bomb or shell is a dud and the container has been fragmented upon impact of the bomb or shell with a target, any attempt to remove the fuze from the bomb or shell will cause the liquid chemical material to be contacted by air or moisture, which will create combustion of the liquid chemical material and subsequent activation of the explosive within the bomb or shell.

It is believed that from the foregoing description the construction and mode of operation of all forms of the invention will be clear to one skilled in the art and it is to be understood that variations in the construction and mode of operation of the invention may be adhered to provide such variations conform to the spirit of the invention.

Having thus described the invention what I claim as new and desired to be secured by Letters Patent is:

**1**. The combination with a fuze for a bomb or shell having an explosive therein of an antidefuzing device comprising a container, a liquid chemical material in said container and means for rupturing said container upon impact of the bomb or shell with a target so that the liquid chemical material will be dispersed within the explosive and will cause ignition thereof when an attempt is made to remove the fuze from the bomb or shell.

**2**. The combination as in claim **1** wherein the means for rupturing the container comprises a metal disk having a punched opening therein forming a rough rim about said opening.

**3**. The combination as in claim **1** wherein the means for rupturing the container comprises a metal ring having a knife edge on one face thereof.

**4**. The combination as in claim **1** wherein the means for rupturing the container comprises a metal ball.

**5**. The combination as in claim **1** wherein a truncated conical-shaped adapter is provided for holding said container.

**6**. The combination as in claim **1** wherein a cup-shaped adapter is provided for holding said container.

**7**. The combination as in claim **1** wherein the container is of two-walled construction and the liquid chemical material is positioned within the spaced formed by the two-walled construction of the container.

**8**. The combination as in claim **1** wherein cushioning means is provided to prevent damage to the container during ordinary handling thereof.

**9**. The combination as in claim **5** wherein the base of said adapter is provided with a cavity to receive one end of the fuze.

**10**. The combination as in claim **6** wherein said adapter is provided with an annular flange to receive one end of the fuze.