United States Patent

Davis

[15] **3,646,889**

[45] **Mar. 7, 1972**

[54] BOMBLET FUZE SYSTEM

[72] Inventor: **Edward J. Davis**, Riverside, Calif.

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

[22] Filed: **July 9, 1970**

[21] Appl. No.: **60,955**

[52] **U.S. Cl.** ..... **102/70 B**, 102/7.2, 102/81

[51] **Int. Cl.** **F42c 5/02**

[58] **Field of Search** ..... 102/70, 7.2, 81, 70 B

[56] **References Cited**

UNITED STATES PATENTS

2,513,185	6/1950	Lauritsen	102/81
3,170,398	2/1965	Paulson et al	102/6
3,318,241	5/1967	Gould	102/7.2

Primary Examiner—Samuel W. Engle

Attorney—R. S. Sciascia and J. M. St. Amand

[57] **ABSTRACT**

A bomblet fuze arming device for use inside a bomblet which is dispensed from a container by a remote means; the device utilizes gas or air pressure to compress an enclosed cavity of air which in turn unlocks a stab-detonator holder and during release from the bomb dispenser performs the arming function by use of a reaction turbine, which locks at the end of the arming function.

5 Claims, 8 Drawing Figures

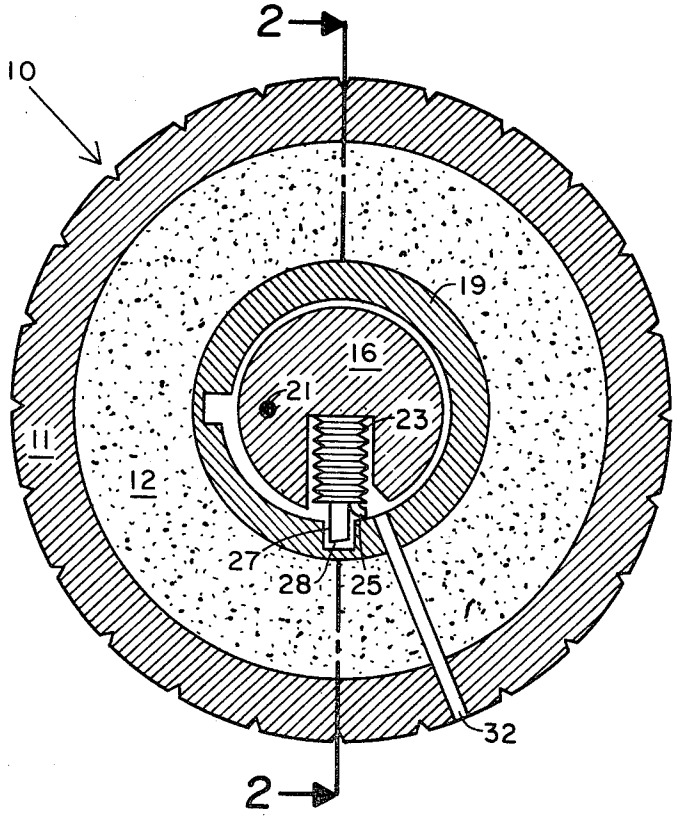


FIG. 4

FIG. 5

FIG. 6

FIG. 2B

FIG. 7

FIG. 2A

FIG. 1

FIG. 3

EDWARD J. DAVIS
INVENTOR.

BY J. M. St. Amand

ATTORNEY

BOMBLET FUZE SYSTEM

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The purpose of the bomblet fuze of this invention is to provide a means of arming a fuze inside a bomblet dispensed by a remote means. The only known method of arming this type fuze is by providing angular velocity to the bomblet and arm by centrifugal force principle. This prior method is unsatisfactory because the bomblet could be armed by spinning by other methods easily. The present invention requires an airtight dispenser containing bomblets of explosive with this fuze system. This bomblet fuze system provides a means of aligning the explosive train inside a dispenser by air pressure without wires, lanyards, tubes or other attachments. The container is pressurized and in turn pressurizes an enclosed cavity of air in the bomblet. This unlocks the stab detonator holder and during dispensing the fuze from the container a simple reduction turbine rotates the detonator holder to the armed position. At completion of the arming cycle the detonator holder locks when zero differential pressure is attained across the reduction turbine. Each bomblet fuze will, upon impact, detonate the bomblet explosive. The prior art pressure activated devices are complicated and expensive and none function the same as the present invention.

Many of the attendant advantages of this invention will become readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a cross-sectional view of a bomblet illustrating an embodiment of the arming device of the present invention.

FIG. 2A is a view of the bomblet taken along line 2—2 of FIG. 1.

FIG. 2B is a partial cross-sectional view showing the stab-detonator in line with the booster change.

FIG. 3 shows a plurality of bomblets in a container-dispenser suspended from an aircraft.

FIGS. 4, 5, 6 and 7 illustrate the arming device during four phases from safe position to fully armed position.

DESCRIPTION OF INVENTION

Referring to the drawings, like numerals refer to like parts in each of the figures.

The bomblet **10** consists of a spherical pragmentation casing **11**, for example, containing the main explosive **12**. The casing **11** can be scored, etc., in any suitable manner for desired fragmentation upon detonation of explosive **12**. Within the bomblet, surrounded by explosive **12**, is the arming and firing mechanism **14**. This mechanism consists of a rotatable cylinder **16** supported on pivots **17** and **18** in the walls **19** of arming and firing mechanism **14**, as shown in FIGS. **1** and **2**.

Rotatable cylinder **16** has a stab-detonator **21** as well as an elastomer or bellows chamber **23** mounted therein. Bellows **23** has a simple check-valve-type nozzle **25** thereon which allows only an outward fluid flow from the bellows when the pressure outside is less than that inside the bellows. A lock tab **27** is carried on the end of bellows **23**.

Tab **27** initially fits into a cavity **28** in wall **19** retaining the device in a safe position. When bellows **23** is compressed and cylinder **16** rotated by 90° to arm position, tab **27** can lock into cavity **29** as shown in FIG. **7**, when the bellows is allowed to expand.

A booster explosive **30** in a wall **19**, as shown in FIGS. **2A** and **2B**, is operable to be detonated by stab-detonator **21** when in the arm position shown in FIGS. **2B** and **7**. At least one air passage **32** is provided through wall **19**, explosive **12** and casing **11** to the exterior of the bomblet **10**.

An airtight dispenser-container **34** is loaded with safe-positioned bomblets **10**, as shown in FIG. **3**, and carried by an aircraft **35** which can supply, for example, 100 p.s.i. for bomblet fuze arming. Container **34** is capable of dispensing the bomblets. Also, container-dispenser **34** may be a warhead canister which is a portion of a missile system.

The operation of the bomblet fuze system described herein can best be described by the four positions, or phases, as illustrated by FIGS. **4**, **5**, **6** and **7**.

In the Phase I position of FIG. **3** the fuze is safe and locked such as during handling, captivation in dispenser **34** and prior to pressurizing the dispenser. In this condition bellows **23** is in a balanced condition, with the pressure inside and outside being the same. Tab **27** locks in cavity **28** keeping stab-detonator **21** out of line with booster **30**.

Prior to launching the bomblets, Phase II shown in FIG. **4**, pressure of 100 p.s.i., for example, is applied to the bomblets in dispenser **34**. Pressure can be applied from the aircraft or any suitable gas pressure means within the dispenser. The gas pressure via passage **32** in the bomblet causes bellows **23** to be compressed disengaging lock tab **27** from cavity **28**. Check valve **25** prevents gas pressure from entering bellows **23**. Dispenser-container **34** is then launched from the aircraft and when a safe separation distance from the aircraft the container opens to dispense the bomblets. Where the pressurizing means for compressing bellows **23** is within dispenser **34**, the pressurizing can be delayed until the dispenser is a safe separation distance from the launching aircraft.

After tab **27** is unlocked from cavity **28** and at the time the bomblets are dispersed from container **34**, the sudden drop in pressure outside the bomblets results in the pressure inside bellows **23** to be higher than outside. At this instant of sudden reversal of differential pressure, compressed gas within bellows **23** exits through reaction nozzle **25** at a greater rate than the bellows expands, causing angular displacement of cylinder **16** toward the armed position, which is now Phase III as shown in FIG. **6**. The fuze arms as a result of the pressure drop from 100 p.s.i. to pressure at 15,000 feet altitude, for example, which is 8.3 p.s.i. The space between cylinder **16** and wall **19** gradually widens at **26** from cavity **28** to cavity **29** to allow clearance for locking tab **27** as bellows **23** expands due to decrease in outside pressure.

In Phase IV, FIG. **7**, prior to target impact cylinder **16** has rotated 90° into arm position and bellows **23** has expanded extending tab **27** to engage in cavity **29** locking the fuze in the armed position. Static conditions plus the differential pressure between the inside and outside of the bellows provides the necessary condition to arm and lock the fuze ready for impact.

Stab-detonator **21** fires upon target impact detonating booster **30** which in turn detonates main explosive **12**.

What is claimed is:

1. A bomblet fuze safety and arming system comprising:

a. a fragmentation casing,

b. a primary explosive within said casing for fragmenting said casing upon detonation thereof,

c. an arming and firing means within and surrounded by said primary explosive, and consisting of a housing having an explosive booster means in a wall thereof adjacent said primary explosive, and a gas pressure operated locking and rotating means carrying a detonator means rotatably mounted within said housing,

d. a passage extending from the inside of said housing to the exterior of said fragmentation casing through which a gas pressure is applied for actuating said arming and firing means,

e. initially said locking and rotating means being locked in a safe position with said detonator means out-of-line with said explosive booster means,

f. application of gas pressure via said passage being operable to unlock said locking and rotating means,

g. release of said gas pressure which was applied for unlocking said locking and rotating means causing said locking and rotating means to rotate to the armed position with said detonator in line with and adjacent to said explosive booster, said locking and rotating means locking into armed position upon complete removal of said applied gas pressure,

h. said detonator firing upon impact of said bomblet thus initiating said booster and in turn detonating said primary explosive when in armed position.

2. A bomblet fuze as in claim 1 wherein said gas pressure operated locking and rotating means comprises:

a. a compressible gas chamber having a check-valve nozzle thereon which allows gas to flow out only when the pressure inside the chamber is greater than pressure outside and does not allow gas to flow into the chamber,

b. said gas chamber and thus the atmospheric gas therein being operable to be substantially compressed by application of suitable gas pressure via said passage,

c. release of said applied gas pressure causing a differential of gas pressures within and without said chamber whereby gas will flow out through said check-valve nozzle faster than said compressed chamber can expand forming a reaction jet which rotates said locking and rotating to the armed position.

3. A bomblet fuze as in claim 2 wherein said compressible gas chamber is formed of compressible elastomer material.

4. A bomblet fuze as in claim 2 wherein said compressible gas chamber is in the form of a compressible bellows.

5. A bomblet fuze as in claim 2 wherein:

a. said compressible chamber has a locking tab thereon which is operable to lockingly engage into either of two differently positioned cavities in the wall of said housing, one said cavity being at safe position and the other being at armed position,

b. compression of said chamber releasing said tab from the armed position cavity and release of said applied gas pressure allowing said tab to lock into the armed position cavity after said locking and rotating means has been rotated to the armed position.

* * * * *