Jan. 30, 1945. F. G. MANSON ET AL 2,368,258

STABILIZING RETARDER FOR BOMBS

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FIG. 1

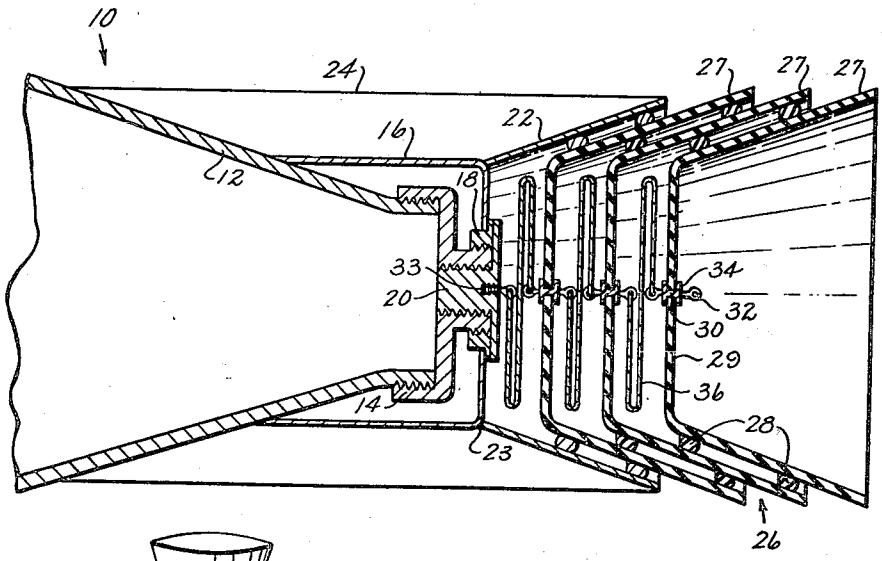

FIG. 2

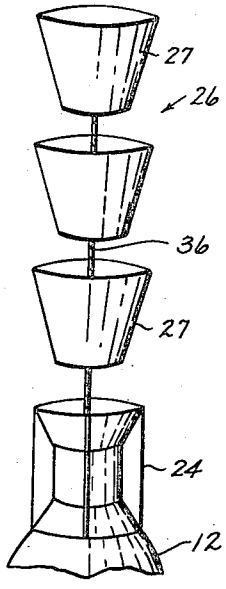

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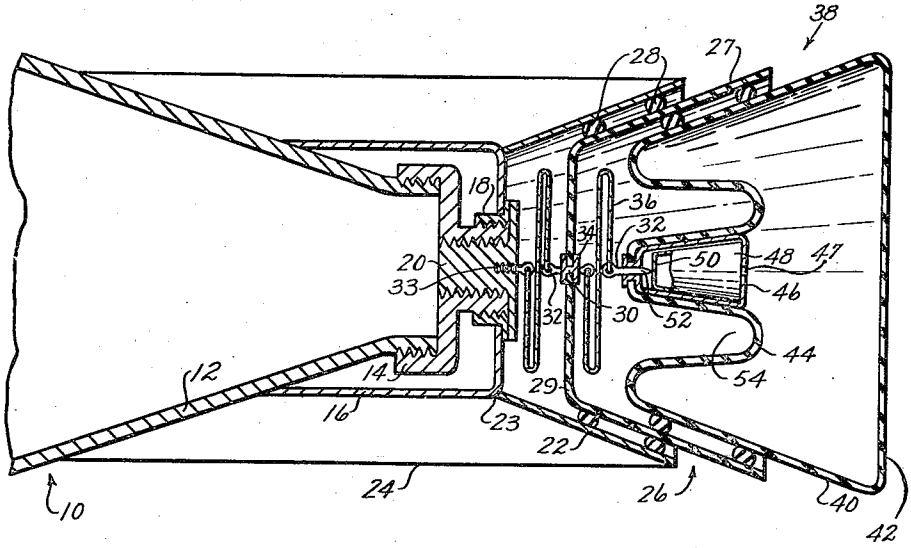
FIG. 3



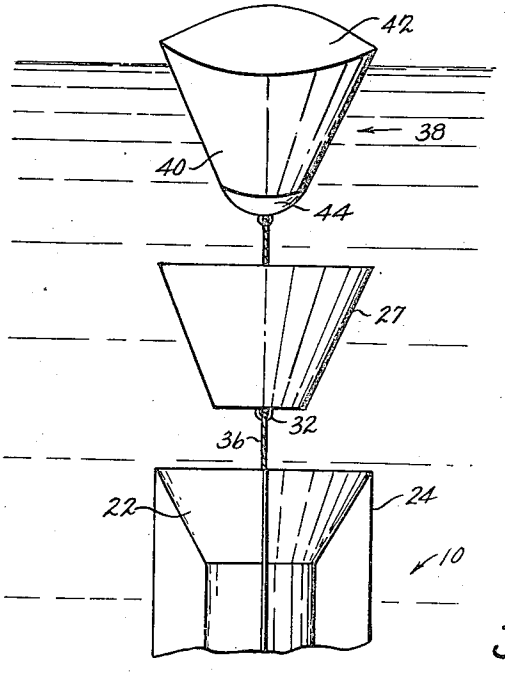


FIG. 4

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FIG. 5

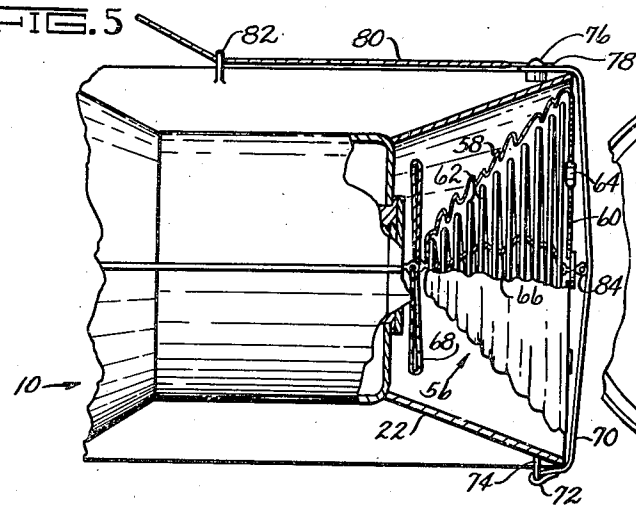


FIG. 6

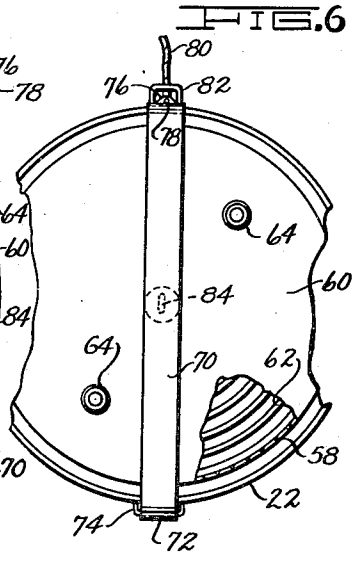


FIG. 7

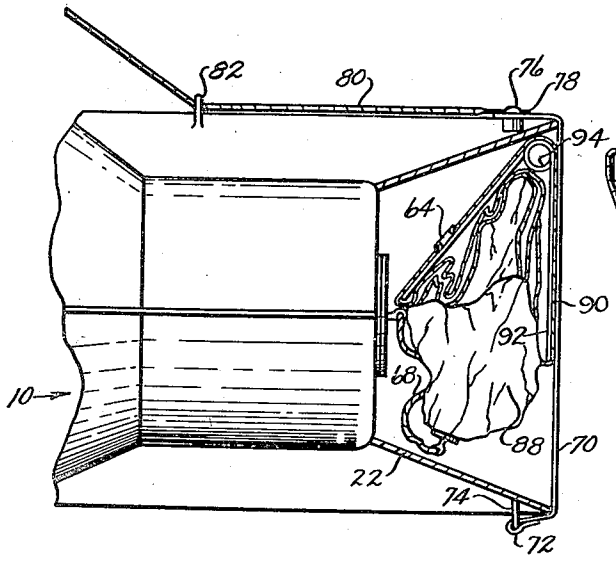
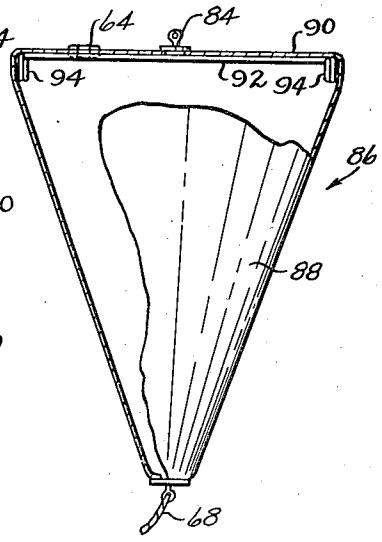


FIG. 8



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Patented Jan. 30, 1945 2,368,258

UNITED STATES PATENT OFFICE

2,368,258

STABILIZING RETARDER FOR BOMBS

Frank G. Manson and James J. Maskey,
Dayton, Ohio

Application February 4, 1942, Serial No. 429,518

3 Claims. (Cl. 102—4)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to us of any royalty thereon.

This invention relates to bombs, and particularly to means to facilitate the proper launching of bombs by aircraft.

An object of the invention is to provide means which will not only retard the descent of a bomb through the air, but will stabilize its movement.

Another object is to provide means which will greatly retard the descent of a bomb after it strikes a body of water, whereby it sinks below the surface at a much slower rate of speed and may therefore be timed more accurately for detonation at a selected depth.

Another object is to provide floatation means which will not only retard the speed and depth of penetration of the bomb in the water, but will quickly return the bomb to a position near the surface where it may act as a mine when that is desirable.

Another object is to provide a simple means for inflating the floatation means which becomes operative by the inertia effect of the bomb's striking the water.

More specifically, the device, in its simplest form, comprises a cone or a frustum of a cone for retarding and stabilizing the descent of a load which is attached thereto, the attaching means being in such form as will draw the device after the load small end first.

Other objects and advantages will appear as the invention is further described with reference to the drawings, wherein:

Fig. 1 is an axial section through a device having a plurality of interconnected stabilizing and retarding means attached to a bomb.

Fig. 2 shows the device Fig. 1 in descent.

Fig. 3 is an axial section through a device wherein a part of the stabilizing and retarding means is made to act also as a floatation means.

Fig. 4 shows the device Fig. 3 in descent.

Fig. 5 is a side view, partly in section, of a simple form of the invention.

Fig. 6 is an end view of Fig. 5.

Fig. 7 is a side view, partly in section, of another simple form of the invention.

Fig. 8 shows the apparatus of Fig. 7 as it appears in descent.

Like numerals refer to like parts throughout the drawings.

Referring particularly to Fig. 1, a bomb 10 comprises a case 12 and a cap 14 enclosed by a drum 16 which is held in place by a nut 18, the end of the cap being closed by a center plug 20. A frusto-conical shell 22 is fastened, preferably by welding, to the drum 16 at 23. The usual stabilizing fins 24 are fastened in a similar manner in circumferentially spaced relation to the case 12, drum 16, and shell 22.

Nested in the frusto-conical metal shell 22 are a series of molded shells 26, the sides 27 of which may be relatively stiff and the bottoms 29 more flexible, the material preferably being natural or synthetic rubber or an equivalent. The molded shells 26 are nested one in the other, but, in order that they may not stick together too firmly, small button-like spacers 28 are interposed therebetween. The parts 26 are, properly speaking, of frusto-conical form, but for convenience and brevity may be referred to as shells or as truncated cones.

Centrally disposed in the bottom of each molded shell 26 is a pin 30 which has an eye 32 at each end. The pins 30 are preferably molded in place in the bottoms and reinforced by washers 34. An additional pin 33 is supported in the plug 20 for attachment of one end of a cable. Additional lengths 36 of cable, secured in the eyes 32, hold the shells 26 in the spaced relation shown in Fig. 2 during descent.

Before the bomb is released, the shells are nested as in Fig. 1 but are drawn out aerodynamically as the bomb drops, acting to some extent as retarders and, along with the fins 24, acting also as stabilizers. When the bomb strikes the water, retardation is much more pronounced, penetration of the water being, on the average, at not more than one-fourth the speed of common practice. It follows, of course, that where a time device is employed to detonate at a selected shallow depth, the depth at which detonation takes place may be controlled much more accurately when the bomb is moving slowly than when it is moving fast.

In Fig. 3 the invention is shown further developed to adapt it for use as a floating mine. This further development consists in substituting, for one of the shells, a floatation means 38 which comprises a molded hollow conical float, made of natural or synthetic rubber or its equivalent, having relatively stiff side walls 40 with flexible ends, the larger flexible end 42 being normally in the form of a flat disk and the smaller end being formed by pressing the apex toward the base to provide a diaphragm-like closure 44.

Within the hollow floatation cone 38 is a frusto-conical receptacle 46 which is fastened at its smaller end to the inside of the closure 44, the

bottom of the receptacle being perforated as at **47**. A cartridge **48** containing a compressed gas, preferably CO_2, is loosely held within the receptacle **46** and has some freedom of endwise movement therein. A puncturable disk **50** closes the small end of the cartridge, and a puncture pin **52** extends centrally through the closure **44** and is sealed therein, an eye **32** being formed on the outer end of the pin for holding one end of a cable **36**.

Before the bomb is released, the shells are nested as in Fig. 3, but are drawn out aerodynamically as the bomb drops. The shells retard descent through the air to some extent, but, together with the fins **24**, are of greater value as stabilizers at this time. When the bomb strikes the water, the shells are more effective in assisting retardation, and the speed and depth of penetration are both materially lessened.

During aerial descent, the closure **44**, although of flexible rubber, may preferably, although not necessarily, be stiff enough to retain the diaphragm-like shape in which it appears in Fig. 3, even after the shells **26** and **38** are aerodynamically drawn apart and held spaced by a cable **36**, so that when the closure **44** strikes the surface of the water the upward impact in the pocket **54** and the inertia of the cartridge **48** will cause the piercing pin **52** to pierce the disk **50**, and the CO_2 will be released to inflate the shell **38** whereby the end **42** will be forced outwardly to a convex surface and the closure **44** will also bulge outwardly (see Fig. 4).

Where the device is to be used as a mine, the charge of CO_2 in the cartridge **48** had preferably be so governed that the floatation shell **38** will be at least slightly submerged, the desirable depth being in a measure determined by the detonation means on the bomb.

The modification shown in Figs. 5 and 6 is used in conjunction with the same bomb **10**, having the same shell **22** within which the cone is confined before launching. The cone **56** in this case is made of a flexible fabric **58**, with a base member **60** of the same or similar material.

A conical coil spring **62** within the fabric cone is provided for extending the cone to its full length. Small check valves **64** admit air into the cone as it is being extended. A short cable **66** may be placed within the cone and fastened to the ends to limit axial extension, so as to limit the strain on the fabric. The small end of the cone is held to the bomb by a short cable **68**.

To hold the cone within the confines of the shell **22** an elastic strap **70** is fastened at one end **72** to a ring **74** on the bomb, the free end being provided with an eyelet which is placed over a cone **76** which is welded or similarly secured to the bomb. A pull pin **78** extends through a hole in the cone to hold the strap in place, the pin being attached to the end of a short cable **80** which extends through a ring **82** and thence to a fastening means on the fuselage of the craft.

Obviously when the bomb is launched, the cable **30** and pin **78** stay with the craft, the pin being withdrawn from the cone **76**, whereby the strap **70** may swing away and allow the cone **56** first to be expanded by the spring **62**, which draws in air through the valve **64**, then drawn out aerodynamically to the limit allowed by the cable **68**.

A single cone only is shown in Figs. 5 and 6, but it will be readily seen that the cone **56** could be flattened enough more than the amount shown to allow several cones to be held in their compressed state, one upon the other, under the strap **70**. An eye **84** is centrally disposed on the base member **60** for attaching the cable **68** of the next succeeding cone.

The modification shown in Figs. 7 and 8 also is used in conjunction with a bomb **10** having the shell **22** for confining the cone prior to launching. The cone **86** has sides **88** and base **90** of flexible material, the base being held in the shape shown in Fig. 8 by a spring wire ring **92**. At opposite points on the ring the wire may be given one or more turns to form hinge coils **94** such as are found at the closed end of a safety pin, the coils being normally constrained to bring the ring to the form shown in Fig. 8, but being yieldable to allow the ring to be folded one half upon the other as shown in Fig. 7. The ring **92** may preferably be stitched to the base **90**. One or more valves **64** may be placed in the base **90** for admitting air into the cone. A short cable **68** connects the small end of the cone to the bomb. The parts **70**, **72**, **74**, **76**, **78**, **80**, and **82** are the same in construction and in operation as like parts in Figs. 5 and 6.

One cone only is shown held in collapsed condition in Fig. 7, but obviously several cones could be joined in tandem and held in their collapsed condition, one upon the other, under the strap **70**. Eyes **84** are provided for joining several cones in tandem relation.

Having described our invention, we claim:

1. The combination of a bomb, adapted to be launched from an aircraft, and a retarding and stabilizing means comprising a hollow shell in the form of a truncated cone having both ends closed and the small end attached by a flexible linkage to the bomb, the shell being of flexible material and collapsible, a housing carried by the bomb to hold the collapsed shell prior to launching, means to release the collapsed shell made operative by relative movement between said aircraft and said shell upon launching, means to extend the collapsed shell upon release, and a valve to admit air into the shell when it is being extended.

2. The combination, in a device of the character described, of a bomb, a series of frusto-conical shells each having side walls and an end-enclosing wall in the small end, relatively short lengths of cable connecting the center of the tail end of the bomb to the center of one of said end-enclosing walls, and connecting the centers of said end-enclosing walls one to the other, whereby said cones may be nested one in the next, and button-like spacers carried on the side walls of the shells to prevent too close nesting, said side walls being of relatively rigid material and said end-enclosing walls of more flexible material.

3. The combination, in a device of the character described, of a bomb, at least one frusto-conical retarding shell having an end-closing wall in the small end, and at least one frusto-conical flotation shell having an end-closing wall in each end, the smaller ends of the shells being the leading ends, a relatively short length of cable connecting the center of the tail end of the bomb to the center of the end-closing wall of the retarding shell, and another relatively short length of cable connecting interfacing end-closing walls of adjacent shells together, a gas cartridge within the flotation shell, and impact means to puncture said cartridge, said shells being made of molded material with side walls which are less flexible than the end walls.

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