United States Patent [19]

Blair et al.

[11] **3,765,335**

[45] **Oct. 16, 1973**

[54] **TARGET DISCRIMINATING DEVICE**

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[73] Assignee: **The United States of America as represented by the Secretary of the Navy,** Washington, D.C.

[22] Filed: **Apr. 21, 1972**

[21] Appl. No.: **246,345**

[52] **U.S. Cl.** ..... **102/62,** 102/53, 102/92.2, 188/1 C

[51] **Int. Cl.** **F42b 13/00**

[58] **Field of Search** ..... 102/4, 62, 73, 88; 188/1 C

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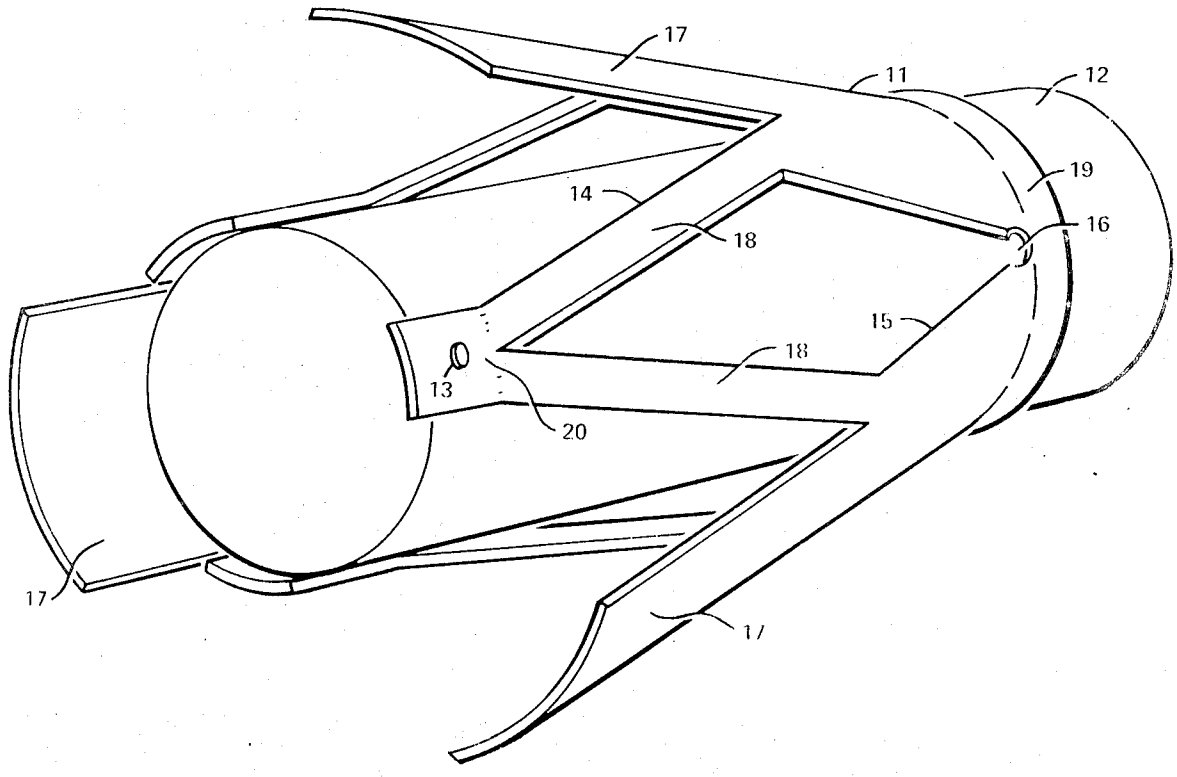
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[57] **ABSTRACT**

A target discriminating device which is attached to the forward end of a projectile such as a bomblet and which spreads to keep the projectile from sinking too deeply if the projectile strikes a soft target such as soft earth but which is wiped off of the projectile if the projectile strikes a hard target.

4 Claims, 4 Drawing Figures



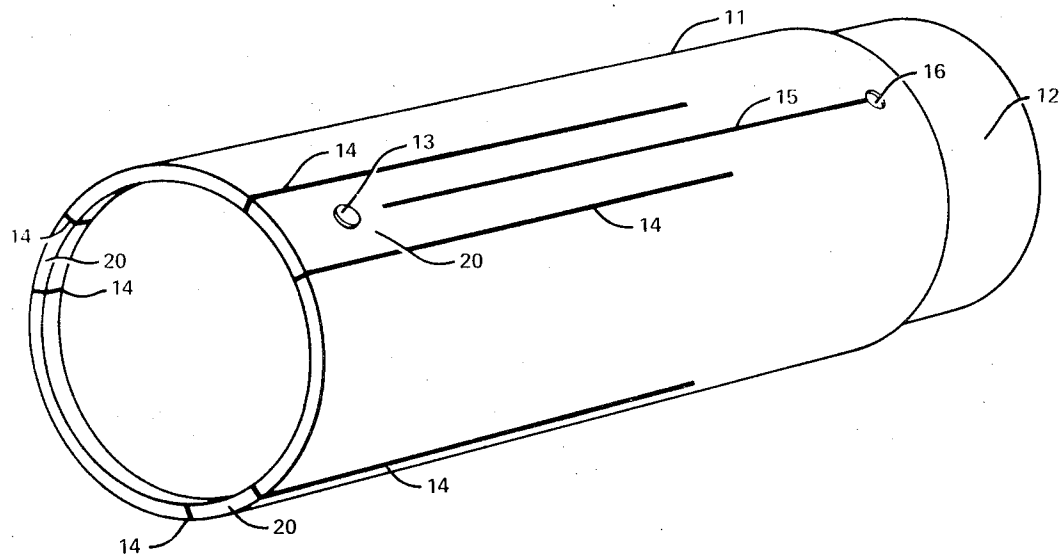

11
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Fig.1

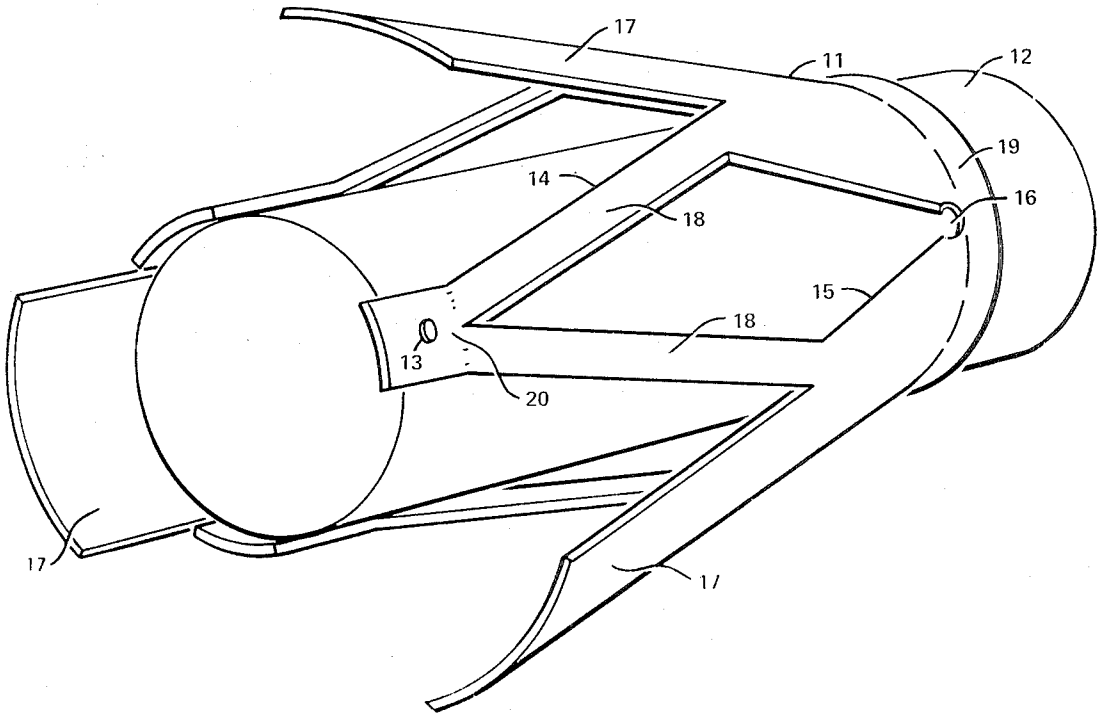

17
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12
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Fig.2

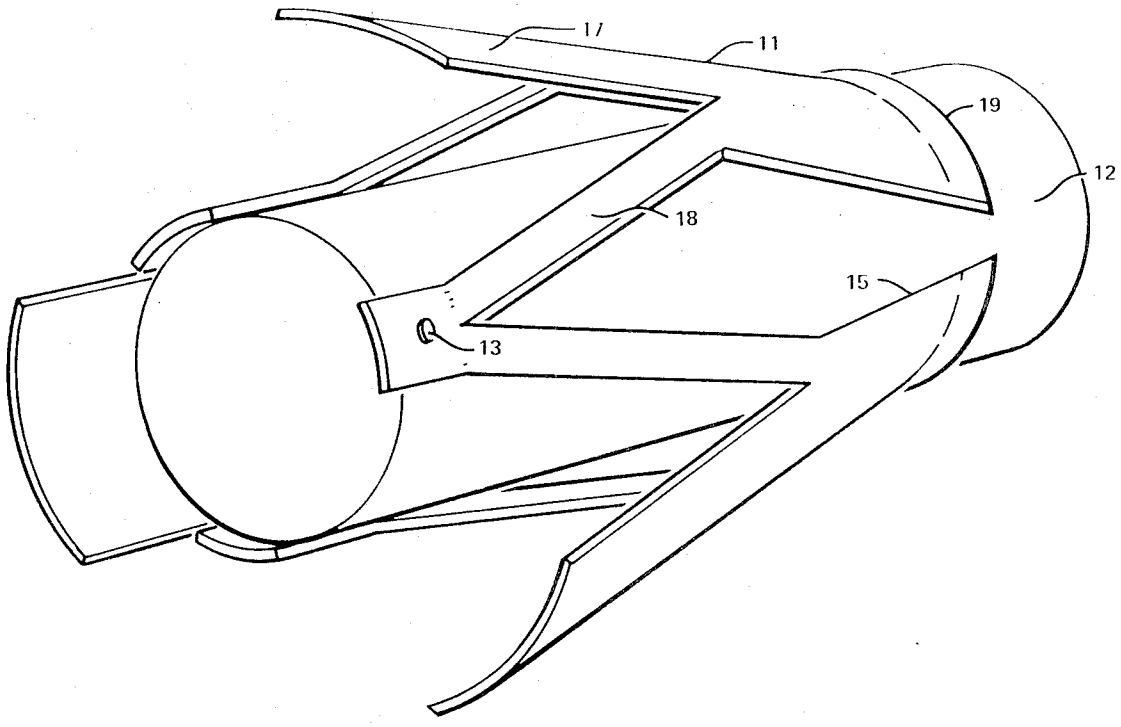


Fig. 3

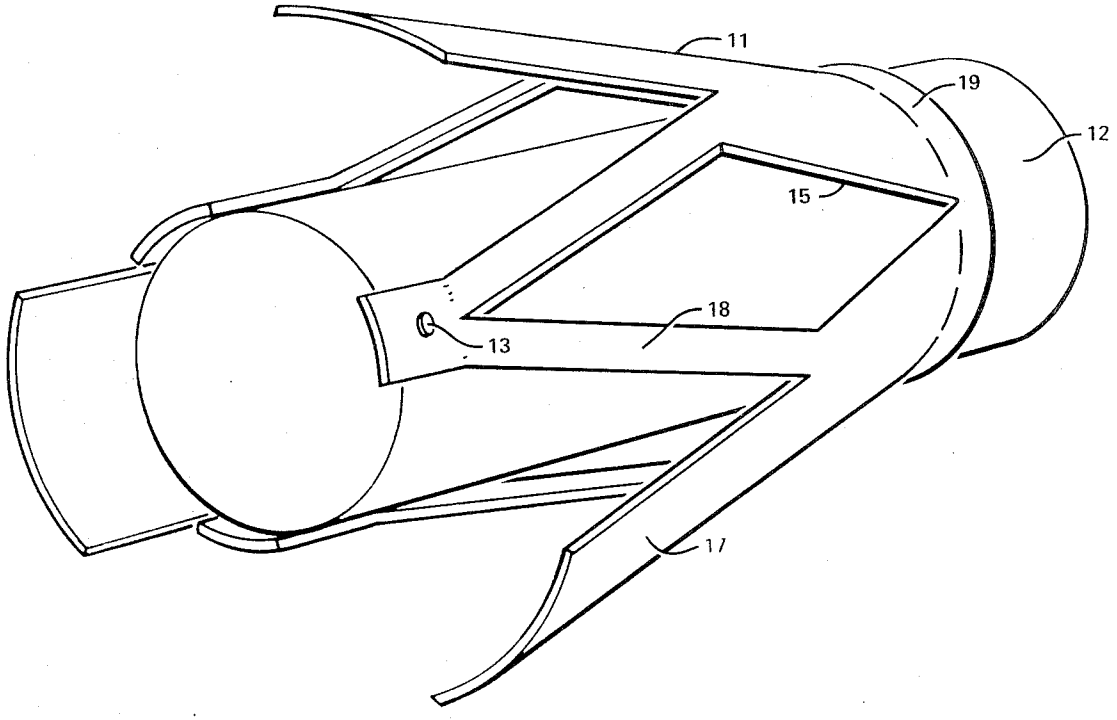


Fig. 4

TARGET DISCRIMINATING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to devices to control penetration of a projectile. More particularly, this invention relates to devices which keep projectiles such as bomblets from sinking too deeply when they strike soft targets such as soft dirt but still allow projectiles to penetrate through hard targets such as roofs.

2. Description of the Prior Art

The use of spreading arms on projectiles for various purposes is known. For example, projectiles with spread arm-like projections have been used to cut through wire, masts, rigging and the like. As another example, expanding wings or arm-like appendages have been used in efforts to prevent projectiles from sinking too deeply into dirt. The prior art devices, whether used for the purpose of cutting through wires or the like or the purpose of quickly stopping projectiles when they strike dirt, have two drawbacks in common. Firstly, the device is usually attached to the tail of the projectile and does not begin to impede motion until the projectile is buried if a soft target is struck. Secondly, the projecting arms impede the motion of the projectile when a hard target is encountered.

Another problem associated with prior art devices of the type under discussion is that, in general, they are made up of several parts all of which must operate smoothly together in order to produce the desired results. If one or more parts fail to operate properly, the desired results are not obtained. For example, in certain prior art devices spring loaded arms are utilized to obtain the desired results. If the springs fail to move the arm properly, the entire purpose of such a device is defeated.

Consider an incendiary bomblet. When an incendiary bomblet is dropped, its purpose is to start a fire. If the bomblet strikes the roof of a building, it is desirable that the bomblet pass through the roof, gain entrance to the building, ignite and start a fire. On the other hand, if the bomblet strikes the ground it is desirable that it not penetrate too deeply where the incendiary flame would be snuffed out or negated. Rather, it is preferable that it remain at or near the surface where the incendiary flame has an opportunity to strike any inflammable target which happens to be in the vicinity. When prior art devices utilizing arm-like projections are attached to incendiary bomblets, they may either (1) assist the bomblet in penetrating through a hard target or (2) assist the bomblet in stopping if a soft target is struck but, because of their design, they are incapable of performing both functions. Since it is impossible to tell, prior to dropping, whether an incendiary bomblet will strike a hard or soft target; it would be advantageous if some device which could both assist in the penetration of hard targets and assist in preventing penetration of soft targets could be attached to the bomblet.

SUMMARY OF THE INVENTION

In the preferred embodiment of this invention a device which is capable of discriminating between hard and soft targets is fabricated from a single metal tube and fastened to the forward end of a projectile by rivets or by welding. The single metal tube is cut in a manner which permits it to spread and act in a spade-like fashion to prevent deep penetration of the projectile if a soft target such as soft dirt is struck. On the other hand the rivets or welds fastening the device to the projectile are sheared off and the device is wiped off of the projectile if a hard target such as concrete is struck. Thus, the device does not hinder the projectile from penetrating through concrete roofs.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a device according to this invention in closed position.

FIG. 2 is a perspective view of the device of FIG. 1 in spread position.

FIGS. 3 and 4 are perspective views showing different ways in which devices similar to that of FIG. 1 may be cut.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Going first to the drawing in which like numerals are used to indicate like parts, FIG. 1 is a perspective view of a device according to this invention as it looks when it is attached to a projectile such as a bomblet and descending through the air toward a target. The device is generally indicated by the numeral **11.** A rivet **13** is depicted as the means for attaching the device to the bomblet **12** though a strip **20.** Two other like rivets (not shown) are used in like strips dispersed between six spade cuts **14** around the device. The rivets may be replaced with welds along the forward ends of strips **20.** Three spreader cuts **15** (two of which do not appear on the drawing because of the type of view) are made in strips **20** between spade cuts **14.** At the aft end of each spreader cut are circular openings **16** (one shown — two not shown) which are drilled through the wall of the device primarily to facilitate making the spreader cuts but which also act to facilitate spreading. In addition, the openings act to reduce stress.

FIG. 2 depicts the device of FIG. 1 as it appears after a bomblet **12** to which the device is attached has struck a soft target such as soft dirt. Upon striking the target, spades **17** begin spreading along spade cuts **14,** and spreader cuts **15** start spreading away from circular opening **16.** Upon spreading of the device, struts **18** form between spades **17** and strips **20.** The spades act to stop the device and the bomblet or other projectile contained by the device from penetrating deeply into the target. As the spades move outward they are forced to move together by the band of metal **19** left at the aft end of the target discriminator.

On the other hand, if a projectile carrying the device strikes a hard target such as a concrete roof the device will be ground away by the action of the concrete and the forward attachment point of the bomblet. Impact and shearing of the rivets or welds occur, for all practical purposes, simultaneously if a hard target such as concrete is struck and, consequently, the spades do not have a chance to begin spreading. Once the rivets or welds have been sheared in the absence of spreading, the device merely slides harmlessly towards and off of the rear of the projectile offering no hinderance to penetration of the projectile through the target.

FIGS. 3 and 4 depict different ways in which the spreader cuts **15** may be made. The Figs. are shown in perspective with the device spread as it would look after striking a soft target and are self explanatory.

A target discriminating device according to this invention may be fabricated from almost any piece of tubular metal having a diameter suitable for the projectile to which the device is to be attached. Fabrication is easily and quickly carried out by making cuts as indicated in the drawing. It is preferred that the thickness of the tube wall be in the range of from about 0.1 to about 0.2 inch in order to permit quick spreading but prevent extremely easy bending and possible breakage.

In one test, three simulated incendiary bomblets weighting 6 ¼ lbs, two with target discriminating devices and one without, were fired at about 300 ft/sec into a large box containing loose sand. The round without a discriminator penetrated 36 inches into the sand without jarring the box. The second round (with discriminator) jarred the box violently and penetrated only 20 inches. The rivets holding the discriminator pulled out during penetration. However, the fact that the bomblet only penetrated 20 inches indicated that the discriminator did its job. The third round had a discriminator welded to the bomblet at the forward attach points (along the forward edges of strips **20**). When it entered the sand filled box it jarred it so violently that it tipped over. It was not possible to measure penetration depth. However, the violent jarring action coupled with the fact that the device was spread and did not come off indicated that the welded on device would stop the bomblet in 20 inches or less.

In other tests, simulated bomblets which had no devices attached and which were fired at speeds approximating those attained by bomblets dropped from aircraft (about 300 ft/sec) penetrated 6 feet or more in soft sand. Also, tests indicated that grinding action brought about by broken up concrete will quickly shear rivets or welds at or near the forward end of a bomblet striking concrete and cause an attached discriminator to be wiped off. Exactly what occurs when a bomblet strikes a concrete roof is not known. However, it appears that a cup shaped pocket of broken up concrete is created immediately in front of the bomblet and that the broken up concrete acts as an abrasive grinding off either rivets or welds.

While the above discussion is primarily in terms of the use of devices of this invention with bomblets and other projectiles, it should be realized that the devices have other potential uses. For example, the devices could be used to anchor fence posts set by machine. For this use, a device would be welded to the bottom end of a metal fence post and the post would be driven into the ground in the usual manner. Since the devices spread to about maximum efficiency at about **20** inches of depth, fence posts could be driven into the ground that deeply and the devices would act as anchors.

We claim:

1. A target discriminating device for attachment to the forward end of a projectile, said device comprising:

a. a tube;

b. a plurality of parallel spade cuts in said tube, said spade cuts beginning at the forward end of said tube and running toward the rear thereof to divide the tube into a plurality of spades and strips, each strip being flanked laterally on both sides by a spade; and

c. a plurality of parallel spreader cuts running from at or near the rear end of said tube to points between and forward of the rear termination points of said spade cuts to divide the rear portions of said strips into approximately equal sized struts,

d. shear means connecting the forward end of each of said strips to the forward end of said projectile whereby the device will be removed from the projectile if a hard target is encountered and whereby the device will remain attached to the projectile and the spades will spread laterally and act as a brake if a soft target is encountered.

2. A target discriminating device according to claim **1** having three spades and three strips.

3. A target discriminating device according to claim **1** wherein said spreader cuts start from the forward edges of circular openings drilled near the rear of said tube and extend forward therefrom.

4. A target discriminating device according to claim **1** wherein said spread cuts extend forward from the extreme rear of said tube.

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