United States Patent

[11] 3,557,697

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[73] Assignee **To the United States of America as Represented by the Secretary of the Navy**

[54] **RAILROAD RAIL BREAKING BOMB**
3 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **102/2,** 102/4, 102/24, 102/56
[51] **Int. Cl.** **F42b 25/00**
[50] **Field of Search** 102/1, 2, 3, 4, 7, 7.2, 20, 56, 22, H6; 102/1, 2, 3, 7, 4, H6, 56

[56] **References Cited**

UNITED STATES PATENTS

2,409,848	10/1946	Gruelick	102/56
2,797,892	6/1957	Ryan	102/20
2,918,006	12/1959	Zborowski	102/20
2,935,020	5/1960	Howard et al.	102/H.C.
2,973,164	2/1961	Grill	102/H.C.
3,016,827	1/1962	Boyd	102/3
3,092,025	6/1963	Hradel et al.	102/24
3,064,568	11/1962	Ainslie et al.	102/4

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ABSTRACT: An aerial bomb for breaking railroad rails comprising, in combination: an elongated casing having a longitudinal axis disposed generally horizontally in the operative position of the bomb; a flat vertical guiding vane attached to the rear of said casing; an explosive charge within said casing, said charge having V-grooved portions facing outwardly to the sides of the casing and symmetrical with respect to the plane of said vane, said V-grooved portions upon detonation of said charge serving to direct concentrated jets laterally outwardly of said casing; and an elongated detonator in said charge between said V-grooved positions and generally in the plane of said vane.

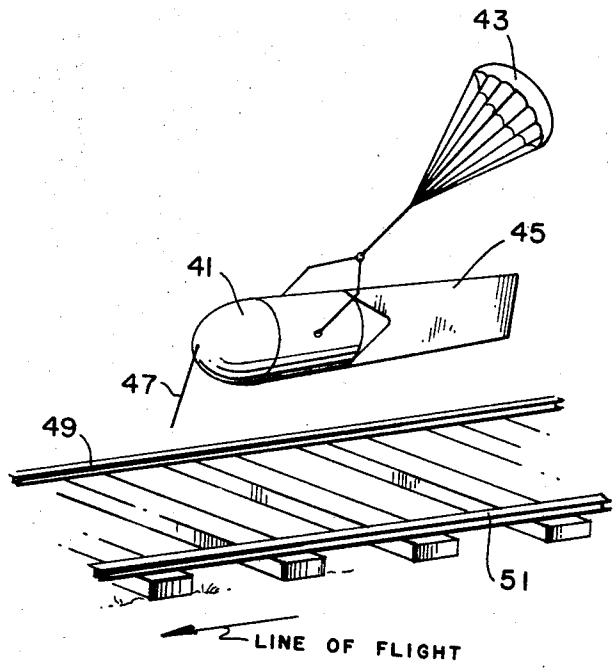


FIG. 1.

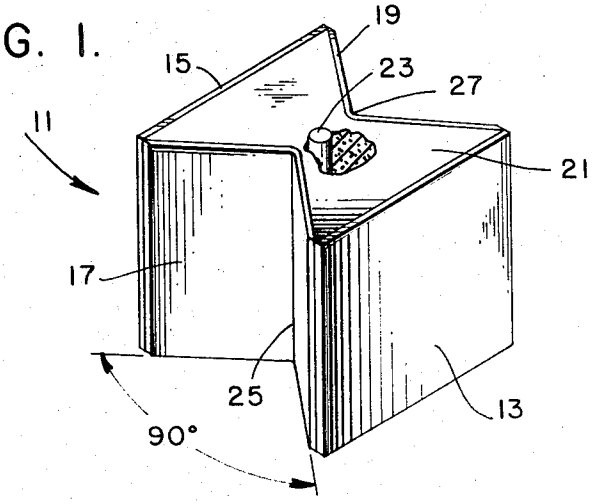


FIG. 2.

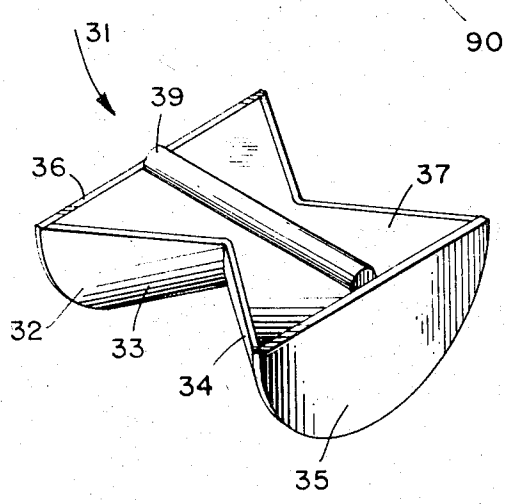


FIG. 3.

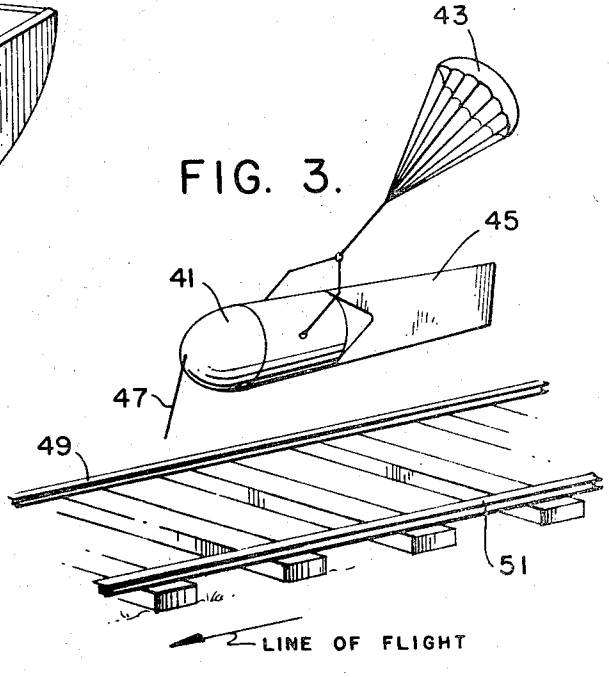
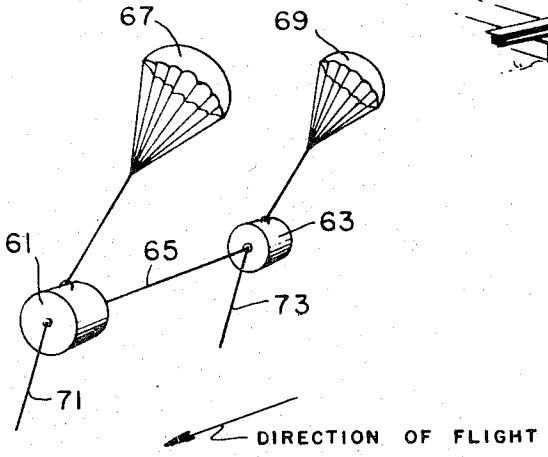


FIG. 4.



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RAILROAD RAIL BREAKING BOMB

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 present invention relates to a light bomb; and more particularly to a light bomb designed and shaped to destroy railroad track by cutting the rails thereof.

In the past, conventional heavy bombs and rockets have been used to destroy railroad tracks for cutting the lines of communication. Such bomb or rocket gives a blast which overwhelms rather than cuts the target and had the disadvantage that an excessively heavy conventional bomb or rocket and a virtual direct hit are required to assure damage to the rails of the track. Also, the weight of the necessary bombs or rockets greatly limit the extent of damage a single aircraft can hope to inflict on the railroad track.

The present invention overcomes the aforementioned disadvantages by providing a light bomb which employs the lined shaped-charge principle in a small bomb, about 10 pounds in weight, which is designed to direct a concentrated metallic jet to cut the railroad rails.

It is therefore an object of the present invention to provide a light bomb which is designed to cut railroad rails.

Another object is the provision of a light bomb employing the lined shaped-charge principle for the purpose of cutting railroad rails.

A further object is to provide a light bomb which is shaped to direct the explosive force thereof in a manner to direct a metallic jet to cut effectively the rails of a railroad track.

A further object is to provide an aerial bomb carrying a shaped charge or charges for cutting railroad rails.

Other objects, features and many of the attendant advantages of this invention will become readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of one embodiment of the present invention having the shape of a double wedge;

FIG. 2 is a perspective view of another embodiment of the invention having the form of a semiannular, double frustoconical shape;

FIG. 3 is a perspective view of an aerial form of the bomb shown related to the railroad track it is designed to destroy; and

FIG. 4 is a perspective view of another form of aerial bomb.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 an embodiment of the present invention comprising a double-wedge charge bomb 11. The bomb 11 comprises a pair of spaced apart, generally parallel plates 13 and 15 and a pair of V-shaped liners 17 and 19 closing off the ends of the end plates with the apices 25 and 27 of the liners directed inwardly, the plates and liners thereby defining a space of double-wedge configuration which is filled with a suitable explosive charge 21. Located substantially centrally of the explosive is an elongated igniter or detonator 23, the axis of which is generally parallel to the apices 25 and 27 of the liners 17 and 19, respectively. The detonator may take any suitable form and contains the usual explosive firing train, initiated in any one of several conventional ways, as desired.

Turning now to FIG. 2, the form of the bomb 31 shown therein is of semiannular, double frustoconical shape and comprises a liner 32 having a surface defined by a pair of semiannular, frustoconical surfaces 33 and 34 joined at the frustums thereof and forming a V in cross section. The outer ends or bases of the frustoconical surfaces of the liner are closed off by a pair of generally parallel end plates 35 and 36, the space defined by the liner and end plates being filled with a suitable explosive charge 37, thus giving the explosive a semiannular shape. An igniter or detonator 39 is disposed generally along the axis of the bomb for setting off the charge.

The bombs 11 and 31 are designed to be positioned relative to the railroad track so the liners are approximately at right angles to the rails thereof and at a small height above the ground; a few inches in the case of the wedge charge 11 and about 1 to 2 feet in the case of the semiannular charge 29.

Ideally for greatest effectiveness, the charges should be positioned at the optimum height and relationship with respect to the rails as by setting them in place, as by hand. However, the bombs may be effectively delivered by aircraft or guided missiles in low level attacks from 10 to 100 feet, as by the weapons system shown and described in application Ser. No. 211,917, filed Jul. 23, 1962, by Taylor B. Joyner et al. for "Weapons System for Destroying Railroad Tracks", the charges being enclosed in a suitable light bomb case to assist in delivery thereof. The aerial bomb may take the form shown in FIG. 3 in which a bomb charge of the double-wedge type or the semiannular type is enclosed in a bomb casing 41 to which is attached a drag chute 43 and guiding vane 45. The aerial form of the bomb is dropped as the carrying aircraft or guided missile is in flight over the railroad tracks, the flight of the bomb generally paralleling the tracks and the dropping of the bomb being retarded by the drag chute 43 until the bomb drops to the optimum distance above the ground. The optimum height above the ground may be determined by a proximity fuze or by the length of an initiator probe 47 which is related to the detonator of the bomb in such manner as to detonate the bomb when the lower end of the probe contacts the ground. On detonation of the shaped charge within the casing, the metallic jet from the bomb is directed to the sides of the bomb to impinge upon the rails 49 and 51 for effectively cutting the same. The initiator probe may be of the type that upon distortion closes a firing circuit or otherwise "triggers" the detonator.

For more effective cutting of the rails, use may be made of a pair of bombs 61 and 63, linked in tandem as shown in FIG. 4, in which the bombs are connected together by means of a flexible member such as a cord 65, bomb 61 being supported by a drag chute 67 and bomb 63 by drag chute 69. Bomb 61 is detonated by contact of initiator probe 71 with the ground and initiator probe 73 performs the same function for bomb 63. For very low level attacks a minimum of stream lining of the bombs is necessary. For higher attacks it may be desirable to pack the tandem charge into a single streamlined container to be opened by a delay device a short distance above the tracks.

There has thus been provided a light bomb which has the advantage of directing a concentrated metallic jet at the target and thus permitting a small amount of explosives to produce the highly effective cutting and penetrating action.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

We claim:

1. An aerial bomb for breaking railroad rails comprising, in combination:

an elongated casing having a longitudinal axis disposed generally horizontally in the operative position of the bomb;

a flat vertical guiding vane attached to the rear of said casing;

an explosive charge within said casing, said charge having V-grooved portions facing outwardly to the sides of the casing and symmetrical with respect to the plane of said vane, said V-grooved portions upon detonation of said charge serving to direct concentrated jets laterally outwardly of said casing; and

an elongated detonator in said charge between said V-grooved portions and generally in the plane of said vane.

2. The bomb of claim 1, wherein said charge comprises:

a pair of V-shaped liners spaced apart with the apices thereof generally parallel to each other and vertical;

a pair of generally parallel end plates having opposite side edges contiguous to the outer edges of said V-shaped liners, respectively, and defining therewith a double-wedge space;

an explosive material filling said space; and

said detonator disposed within said explosive material midway between said apices of the liners and generally parallel thereto.

3. The bomb of claim 1, wherein said charge occupies the lower portion of said casing and comprises:

a liner formed with a pair of semiannular frustoconical surfaces joined together at the frustums thereof;

a pair of parallel plates of half-circle form each closing off the base of one of said frustoconical surfaces, respectively, with the diametrical edges of the plates disposed in a plane;

an explosive material filling the space defined by said liner and plates; and

said detonator disposed generally perpendicular to said plates at the midpoints of the diametrical edges thereof.