

[54] FAX MINEFIELD CLEARING DEVICE	2,535,309	12/1950	Mari.....102/34.4
[75] Inventors: Richard J. Zabelka, Sault Sainte Marie, Mich.; Lloyd H. Smith, China Lake, Calif.	2,771,841	11/1956	De Fino.....102/22
	3,114,316	12/1963	Littleton.....89/1 M
	3,242,862	4/1966	Stegbeck et al.....89/1 M

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

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[52] U.S. Cl. ....89/1 M, 102/6, 102/22, 102/89

[51] Int. Cl. ....F41f 1/00

[58] Field of Search .....89/1, 1.01; 102/34.4, 6, 22, 102/89

[56] References Cited

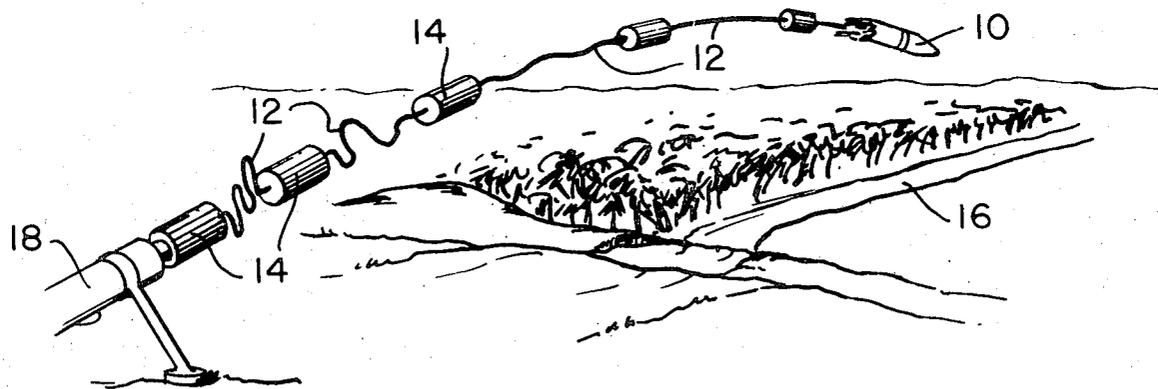
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[57] ABSTRACT

A plurality of fuel containers, series connected together by lines, are deposited along a mine field by a towing projectile, such as a rocket. The containers are then explosively ruptured, forming an elongated fuel-air cloud contiguous to the mine field. Shortly thereafter, the cloud is detonated by a high explosive wave, producing overpressure on the mine field which detonates mines sensitive to such overpressure.

2 Claims, 4 Drawing Figures



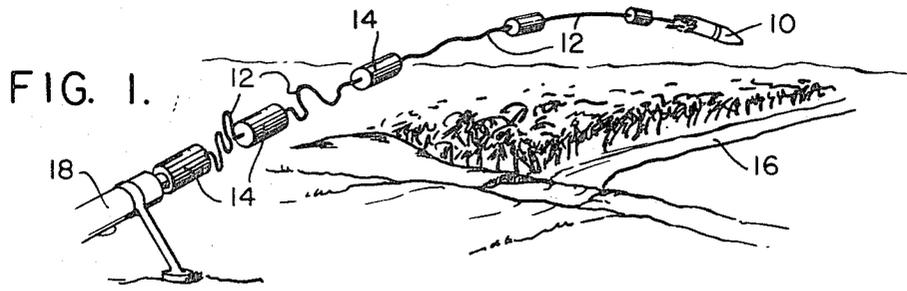


FIG. 1.

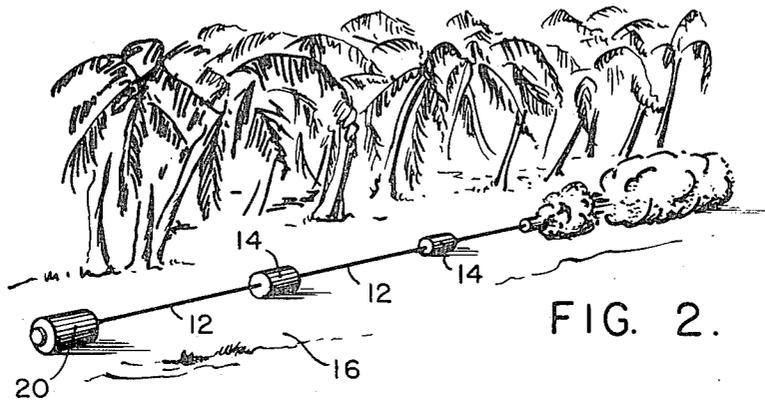


FIG. 2.

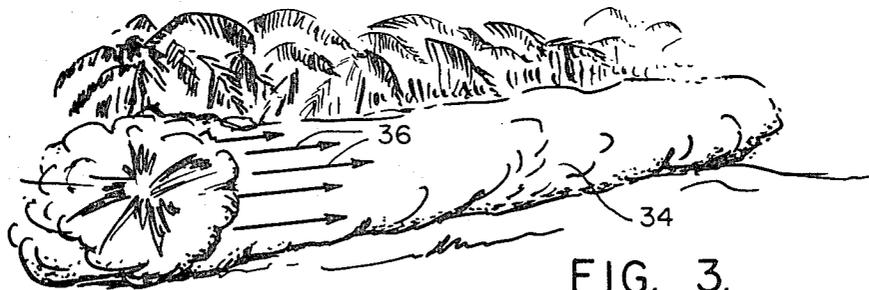


FIG. 3.

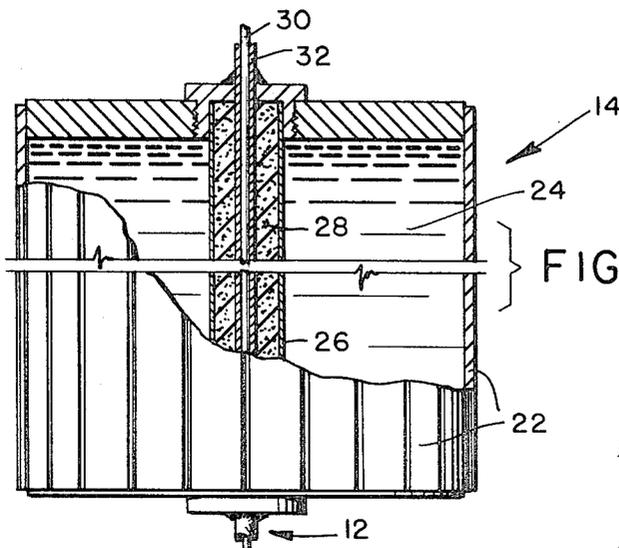


FIG. 4.

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**FAX MINEFIELD CLEARING DEVICE**

The invention described herein 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.

This invention relates to clearing of land areas and more particularly to improvements employing a fuel-air cloud for producing the requisite pressure.

It is common practice in warfare to mine land areas to thus deter the passage of personnel and equipment across such areas. To render such areas passable, many proposals have been made for clearing them, usually by detonating high explosives over the field, or in direct contact with the field, to produce pressure and shock waves intended to detonate the mines. These have not proven to be completely reliable for their intended purpose since the explosives were fully effective only at spaced points in the field, and thus covered it only in a spotty manner. The US. Pat. No. to Stegbeck et al., 3,242,862, is exemplary of the prior art referred to.

One of the objects of this invention is to provide method and apparatus for producing substantially uniform overpressure on a mine field, as distinguished from the variable pressures produced by a plurality of spaced high explosives.

Another object is to produce the overpressure by delivering only a hydrocarbon to the area, and utilizing available atmospheric oxygen to produce an explosive mixture, as distinguished from high explosives which carry both a fuel and oxidizer, thus decreasing the quantity of material to be delivered and also utilizing a material which is relatively inexpensive.

Still further objects, advantages and salient features will become more apparent from the description to follow, the appended claims, and the accompanying drawing in which:

FIG. 1 illustrates method and apparatus for projecting and depositing fuel canisters on a mine field;

FIG. 2 is a like illustration after the canisters have been deposited;

FIG. 3 illustrates the detonation of a fuel-air cloud; and

FIG. 4 is a side elevation, partly in section, of one of the canisters.

Referring now to the drawing, and first to FIG. 1, the apparatus forming the subject of the invention comprises a projectile 10 which is connected by lines 12 to a plurality of canisters 14, the canisters being towed by the projectile during its launch and trajectory to a mine field 16. The projectile may be launched from a mortar or be in the form of a rocket launched from a suitable launcher 18, the patent to Stegbeck being illustrative of suitable apparatus for depositing the canisters in the desired position on a mine field. A cloud detonator 20 is similarly connected to the rearmost canister, the purpose of which will be subsequently described.

The canisters, as shown in FIG. 4, are of generally conventional design comprising a scored cylindrical shell 22, closed at opposite ends, and containing a liquid hydrocarbon 24. A burster tube 26, containing a burster charge 28, is disposed axially of the shell and serves the purpose of bursting the shell and projecting the fuel at high velocity, in the form of highly divided particles, through the air in conventional well known manner such as disclosed in the patent application of Frank G. Crescenzo et al., Ser. No. 551,842, filed May

17, 1966. Each canister may contain an individual burster charge initiated by an electric squib, the squibs being parallel connected by wires extending through lines 12 and connected to a source of electric current, such as a battery, serially connected through a delay fuze. In a simplified embodiment as illustrated, the burster charge is primacord 30, extending through the canister which, when detonated, serves as a detonator for detonating the canisters substantially simultaneously. The primacord is preferably encased within a sheath 32 of sufficient strength to withstand the forces encountered during launch and towing of the canisters to their desired position.

The rearmost device 20 contains a high explosive, a suitable detonator for same, and a fuze for initiating the detonator at a desired time after the canisters have been ruptured. Preferably, its time delay is initiated by the detonation of the primacord so that the high explosive is detonated a fixed time after rupture of the canisters and at a time at which the fuel has mixed with the air to an optimum explosive fuel-air ratio.

In operation, the canisters are projected as illustrated in FIG. 1 and come to rest on the mine field as shown in FIG. 2. At a time later, which normally will not be critical, the primacord is detonated, projecting the fuel into a series of clouds which mingle and form a single elongated cloud 34 in juxtaposition with the mine field. When the cloud has formed to optimum fuel air ratio (40-100 microseconds later), the high explosive in device 20 is detonated producing a detonation wave 36 through the cloud which detonates same and produces overpressure on the mine field (250-300 psi for a duration of several milliseconds), detonating any mines which are sensitive to the overpressure.

While a specific environment of use has been so far described, it will now be apparent that the apparatus and method may also be employed for defoliation of trees and shrubs, antipersonnel operations, defense of advancing troops and breaking of ice jams.

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.

What is claimed is:

1. The process of forming and detonating an elongated fuel-air mixture (FAX) cloud contiguous to an elongated area on the ground comprising the steps of:
  - a. launching a missile to the forward end of said area while towing a plurality of spaced fuel containers by the missile and depositing same on the ground in spaced relation along the length of said area,
  - b. explosively rupturing the containers substantially at the same time after they have been deposited to initially produce a series of spaced fuel-air clouds, which thence mingle to form a single elongated cloud disposed over and contiguous with said area, and
  - c. detonating the single cloud after it has formed to an optimum fuel-air ratio, producing substantially uniform overpressure upon said area.
2. Apparatus for forming and detonating an elongated fuel-air mixture contiguous to an elongated area on the ground which comprises:
  - a. a rocket and launcher for same,
  - b. a plurality of fuel containers,

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- c. towing lines for connecting the rocket and containers together so constructed to tow the containers by the rocket in spaced relation to thereby deposit same on the ground in spaced relation along the length of the area.
- d. means for explosively rupturing the containers at substantially the same time after they have been deposited, producing a series of spaced fuel-air

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- clouds which thence mingle to form a single elongated cloud disposed over and contiguous with said area, and
- e. means for detonating the single cloud after it has formed to an optimum fuel-air ratio to thereby produce substantially uniform overpressure upon said area.

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