Nov. 9, 1965 M. P. BEARCE 3,216,354

LAND MINE

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Fig. 1.

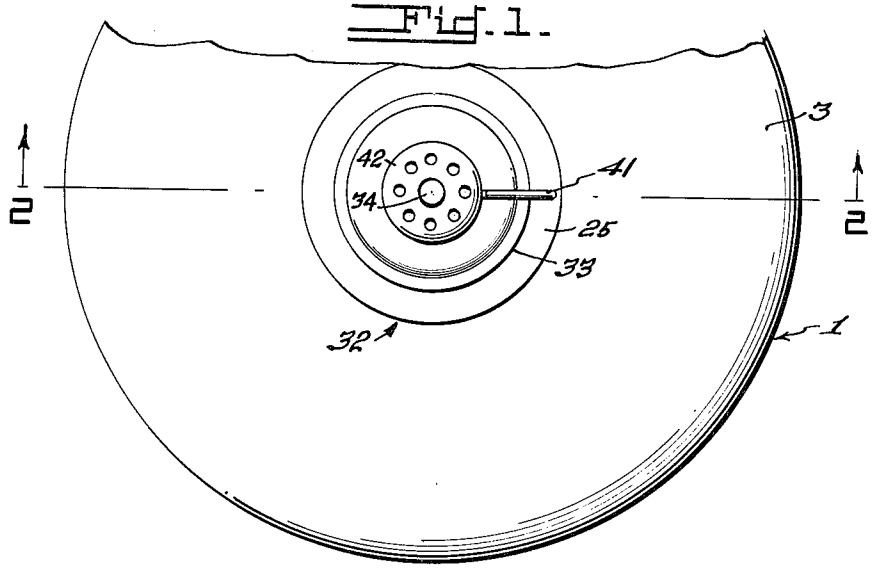
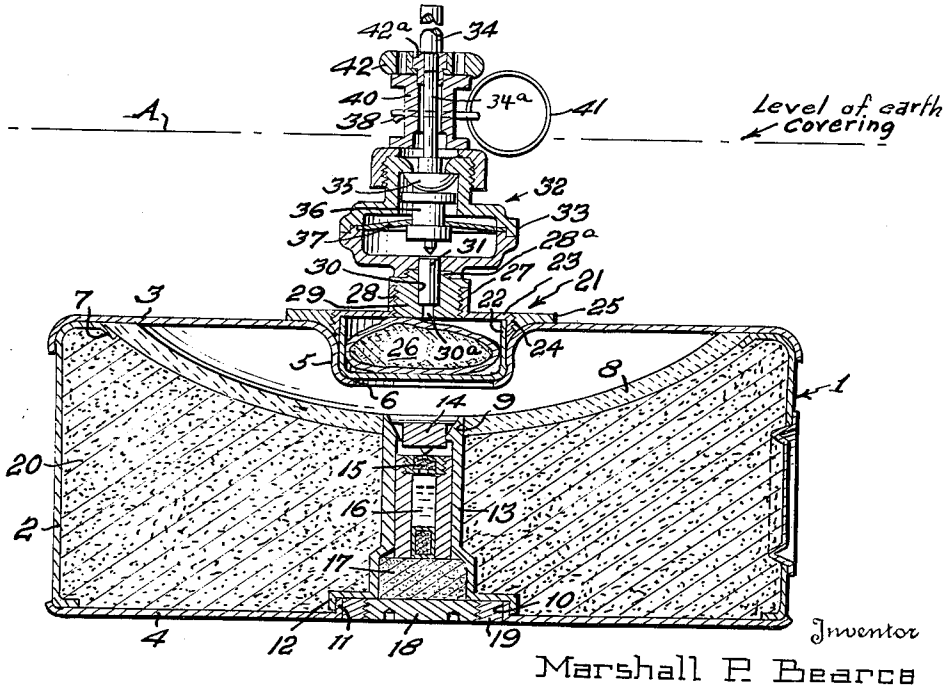


Fig. 2.



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LAND MINE

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

This invention relates to improvements in land mines and more particularly to such a mine adapted to be concealed and camouflaged by being buried beneath the surface of the earth and is actuated upon contact with a vehicle by a fuze attached to the mine.

The high explosive charge in a mine of the type disclosed in this description is usually shaped for armor-piercing in accordance with a shaped charge effect. Previous tests have proven that even a small amount of earth covering the mine can result in failure of the charge to penetrate even a small thickness of armor. By the use of a mine constructed in accordance with this invention the effectiveness of the mine is retained even when concealed or covered with a layer of earth of substantial thickness.

It is a primary object of this invention to provide a small preliminary or clearing charge just below the cover of the mine which will be ignited a short time ahead of the high explosive charge, to clear away the earth covering the mine to allow the full unobstructed effect of the main charge.

It is a further object to increase the effectiveness of the mine against armor and the like.

The specific nature of the invention as well as other objects and advantages thereof, will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

FIGURE 1 is a fragmentary top plan of a mine embodying the invention; and

FIGURE 2 is a vertical section taken along lines 2—2 of FIGURE 1.

Referring more particularly to the drawing wherein like reference characters designate like or corresponding parts throughout the different views, 1 designates the mine generally in its entirety and which includes a cylindrical high explosive charge container formed by a side wall 2, a top wall 3 and a botom wall 4. Side wall 2 is flanged downwardly at its upper edge to form a support 7 for a dish-shaped plate or cover member 8, usually of frangible or malleable material, and which forms a retainer or liner for the high explosive shaped charge 20. Top wall 3 is centrally depressed as at 5 to form a well which is provided with an opening 6 at its bottom for a purpose to be hereinafter described. Bottom wall 4 is provided with a central opening 10 in axial alignment with an opening 9 in plate or liner 8. The plate 4 is struck up at its control opening to form a flange 11. A fuze well 13 is positioned centrally within the mine body, one end of which fits snugly within opening 9 while the other end is flared and flanged as at 12 to fit tightly over flange 11 in bottom wall 4, thus forming a closed container for the high explosive charge 20. Contained within the fuze well 13 are the operating elements of the detonator consisting of a firing pin or member 14 adapted to strike upon pressure, a primer 15. A delay element 16 and a booster charge 17 complete the firing train. These elements are held within the fuze well by a threaded cap 18 threaded into a bushing 19 fitted into the flanged portion 11 of bottom wall 4.

Fitted snugly within the well 5 of the top wall 3 is a container element designated generally by 21 comprising a cup-like container 22 closed by a tight fitting cover or cap

23 externally threaded for engagement with a sealing ring 25 to form a tight container for a small powder charge 26. Ring 25 is secured as by soldering to wall 3 coaxially of the opening therein. Provided centrally of the cap 23 is an annular flange 27 internally threaded as at 28 to receive a threaded plug 29 provided at its upper end with an externally threaded boss 28*a*. The plug 29 is centrally bored at 30 to receive a primer 31 and a flash passage of reduced diameter opening into the container 22.

Threaded upon the boss 28*a* is a detonator indicated generally by 32 which may be of a well-known construction of the type used to detonate anti-tank or anti-personnel mines. The housing 33 of detonator 32, encloses the head 35 of an operating rod 34*a*. As shown upon FIGURE 2, head 35 is in contact with a firing pin member 36, which member is urged upwardly and held with its depending pin just above primer 31, by a Belleville spring 37. This spring has its periphery clamped between the two halves of housing 33, as clearly shown.

Rod 34*a* extends upward through a central aperture in the top part of housing 33 and thence through a central bore in a radially slotted safety clip 40 which rests upon, but is not attached to, an apertured cap threaded onto the upper part of housing 33. A safety pin 38 extends through aligned transverse holes in clip 40 and rod 34*a* to prevent premature actuation of the mine and has a ring 41 to facilitate withdrawal of the pin to effect arming of the mine.

A ring 42 is fixed to the top end of rod 34*a* coaxially thereof. This ring has a plurality of circumferentially-spaced holes as clearly shown upon FIGURE 1 to enable the attachment thereto of one or more radially-extending trip wires, when and as desired. The ring is fixed to rod 34*a* by a bushing 42*a* which provides a socket to removably receive an elongated tilt rod 34. This rod may be of the order of several inches in length and, when in position on a mine, will be engaged by a tank or other object passing thereover, to effect tilting of rods 34, 34*a* and head 35 to detonate the mine, as subsequently described. Line A, FIGURE 2 indicates the approximate level of earth when the mine is properly placed.

In operation, after the mine is buried to the approximate depth indicated, safety pin 38 is withdrawn and clip 40 is removed to arm the mine. When a vehicle or other moving objects strikes rod 34 to tilt it from its vertical position the rod is cammed downwardly by the action of head 35 conjointly with the annular shoulder of the upper part of housing 33. This movement forces firing pin 36 downwardly, flexing spring 37 until the latter snaps into downward position thus driving the firing pin into primer 31 to initiate clearing charge 26. The blast of this preliminary or clearing charge (1) blows off the concealing layer of earth, cover 3 and the parts carried thereby and (2) drives firing member 14 downwardly into primer 15 to initiate the same. Delay train 16 is then set off, followed by booster charge 17 and main charge 20. As the main charge now has a clear, unobstructed path to the object, the full force of the shaped charge is effective upon the vehicle or other object and maximum destructive effect is obtained. The chances of crippling or destroying the vehicle or other object are thereby greatly increased. The delay train 16 determines the time period between initiation of preliminary charge 26 and is so prepared that main charge 20 will be detonated after the covering earth and wall 3 with parts carried thereby, have been blown out of the way.

I have thereby provided a land mine which is therefore highly effective against armored vehicles but which, at the same time, may be adequately concealed while giving the increased destructive effect to the vehicle for the weight and type of charge utilized.

While I have shown the preferred form of the invention as now known to me, various modifications and substitutions of equivalents will occur to those skilled in the art after a study of the foregoing disclosure. Hence, the disclosure should be taken in an illustrative rather than a limiting sense; and it is my desire and intention to reserve all modifications within the scope of the subjoined claims.

Having now fully disclosed the invention, what I claim and desire to secure by Letters Patent is:

1. In a land mine, a bottom, side walls and cover member united to form a closed container, a main explosive charge in said container, percussion firing means exposed through an opening in said cover member and in detonating relation with said main charge, a preliminary explosive charge, means mounting said preliminary charge over said percussion firing means in fixed percussive relation therewith, and means fixed with said container for firing said preliminary charge only in response to passage of a target thereover.

2. In a land mine, a closed container including an apertured cover member, a main explosive charge in said container, percussion firing means in said container in detonating relation with said main charge and including a delay train, a preliminary explosive charge, means mounting said preliminary charge over said percussion firing means in fixed percussive relation therewith, and contact firing means fixed with said container in superposed relation over said preliminary charge and in detonating relation therewith, detonation of said preliminary charge clearing the earth covering the mine and providing a clear path between the main charge and target.

3. In a land mine, a closed container including an apertured top member, a main explosive charge in said container, a detonator having a pressure-responsive firing means exposed through said aperture and in detonating relation with said main charge, said detonator including a delay train and a booster, a preliminary clearing charge, means mounting said clearing charge in fixed relation over said pressure-responsive firing means in percussive relation therewith, a contact firing device, and means mounting said contact firing device in fixed position on said container and in detonating relation with and superposed over, said preliminary charge.

4. A land mine comprising a closed container including a top wall, an upwardly-facing shaped explosive main charge within said container, a preliminary explosive charge carried by said top wall above said main charge, an impact-operated fuze carried by said top wall in superposed detonating relation with respect to said preliminary charge, and a fuze in said container in detonating relation with said main charge and including a firing member responsive to the blast of said preliminary charge.

5. A land mine as recited in claim **4**, said last-named fuze including a delay train between said firing member and main charge.

6. In a land mine, side, bottom and top walls united to form a closed container, an upwardly-facing main explosive shaped charge fixed in said container, a frangible liner fitting said shaped charge and having a central opening, a central well in said top wall having an aperture in its bottom over and in vertically spaced relation from the opening in said liner, a preliminary explosive charge confined in said well, an impact fuze carried by said top wall in superposed position over said preliminary charge to detonate said preliminary charge in response to pressure of an object passing thereover, a second fuze fixed within a central vertically disposed passageway in said main charge, said central second fuze including a detonator exposed through said opening and actuated in response to detonation of said preliminary charge, and a delay train and booster interposed between said detonator and main charge, detonation of said preliminary charge acting to blow away the earth concealing the mine to provide an unobstructed path between said main charge and object.

7. In an explosive unit, such as a land mine, for concealment below ground, a main explosive charge, a preliminary explosive charge, means mounting said charges with said preliminary charge in superposed relation with said main charge, a detonator in superimposed relation to said preliminary charge for initiating said preliminary charge in response to passage of a target thereover, and means disposed beneath said preliminary charge responsive to detonation of said preliminary charge to detonate said main explosive charge after a predetermined minimum time.

8. In a land mine, comprising a closed container having a dish-shaped high explosive charge received therein, a frangible liner engaging the top surface of said explosive charge, a first fuse including a delay train received in said container in detonating relation with said explosive charge, means in said container in superposed spaced relation with said first fuse for initiating action of said first fuse, a clearing charge supported by said container in spaced relation above said initiating means, and a second fuse carried by said container, in superposed position over said clearing charge and initiated by a passage of an object thereover to detonate said clearing charge, said first fuse initiating means being movable to fuse detonating position by the blast from said clearing charge, detonation of said clearing charge acting to blow away earth concealing said land mine to provide an unobstructed path between said lined high-explosive charge and said object.

9. In a land mine, comprising a closed container having a dish-shaped high explosive charge received therein, a frangible liner contacting the upper surface of said charge, a first fuse including a delay train in said container in detonating relation with said explosive charge, an axially movable firing pin in said container in superposed spaced relation with said first fuse for initiating action of said first fuse, a clearing charge supported by said container in spaced relation above said firing pin, a second fuse carried by said container in superposed position over said clearing charge and initiated by the passage of an object thereover to detonate said clearing charge, said firing pin being movable to fuse detonating position by the blast from said clearing charge, detonation of said clearing charge acting to blow away earth concealing said land mine to provide an unobstructed path between said lined high explosive charge and said object.

10. In a land mine, comprising a container formed by a side wall, a top wall and a bottom wall, a high-explosive charge in said container having a concave upper surface, a detonating fuse including a delay train embedded centrally within said high-explosive charge, said top wall being centrally depressed to form a well having an opening in its bottom, a firing pin in said container in superposed spaced relation with said detonating fuse and lying below said opening, a clearing charge within said well, and a fuse supported by said top wall in superposed relation above said clearing charge and initiated by the passage of a target thereover to detonate said clearing charge, said firing pin being movable to position to initiate action of said detonating fuse by the blast from said clearing charge.

11. A land mine according to claim **10**, and including a frangible liner for said concave surface, detonation of said clearing charge acting to blow away earth concealing said mine to provide an unobstructed path to said target for said liner and high-explosive charge.

12. A land mine according to claim **10**, and including a cup-like container in said well for receiving said clearing charge, a lid adapted to be fitted over said cup-like container, said lid having an externally threaded upper peripheral edge, and a sealing ring threadably engaging said externally threaded lid and providing a seal between said cup-like container and said top wall.

13. A land mine according to claim 10, there being a central opening formed in said lid and having an upstanding internally threaded wall integral with said lid, an insert screw-threadedly received by said upstanding wall and having an upwardly-extending threaded tenon, there being an axial bore formed in said insert for receiving a primer, there also being a continuation of said axial bore communicating at one end with said primer and at its other end with said clearing charge, and an upstanding housing screw-threadably engaging said tenon, there being a firing pin in said housing actuable to detonate said primer, said last-named firing pin and said primer comprising said target responsive fuse for detonating said clearing charge.

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