Oct. 27, 1953 J. DUMAS 2,656,792

ANTITANK MINE

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Fig. 1

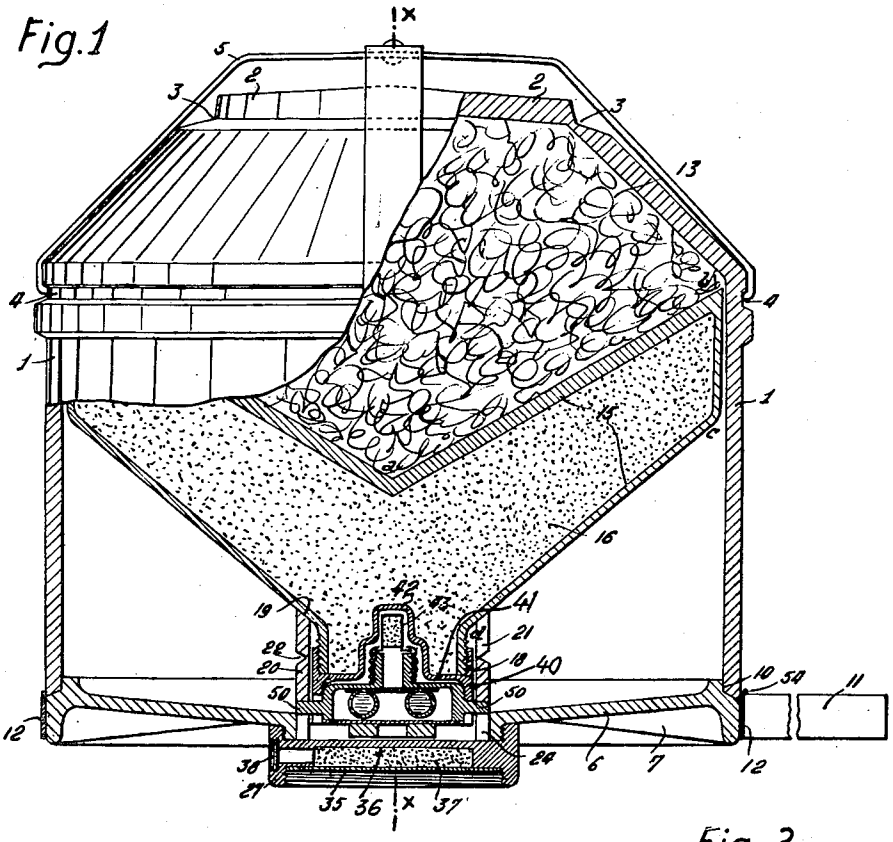


Fig. 2

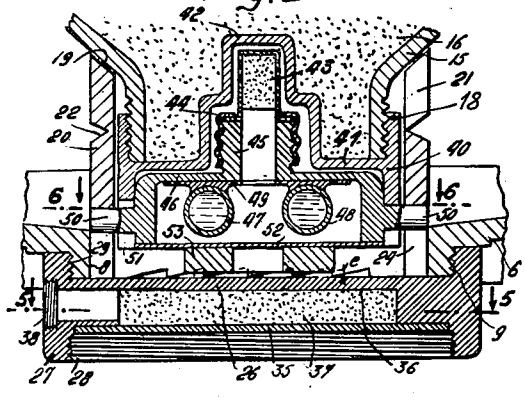


Fig. 3

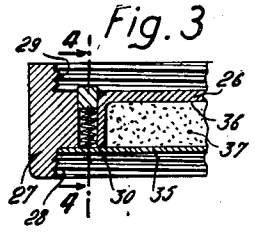
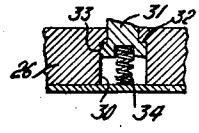


Fig. 4



INVENTOR
JACQUES DUMAS
BY Richardson and David
ATTYS

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Fig. 7

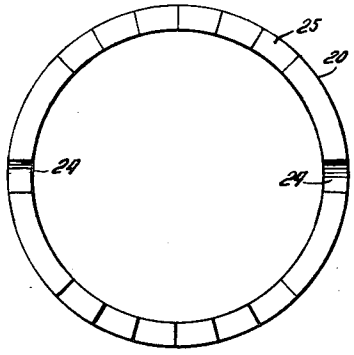


Fig. 8

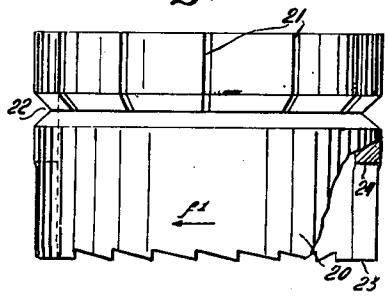


Fig. 5

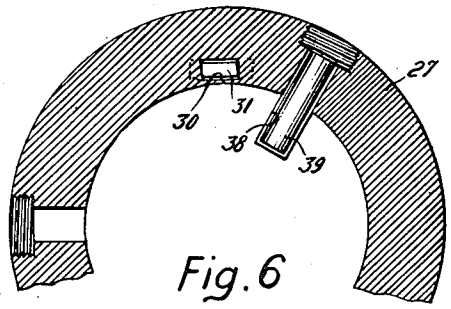


Fig. 9

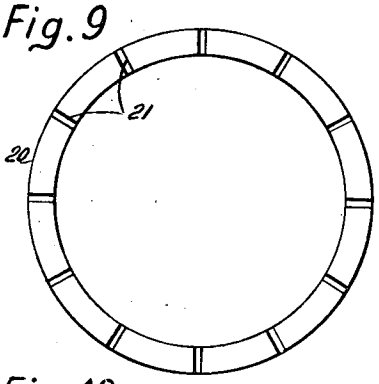


Fig. 6

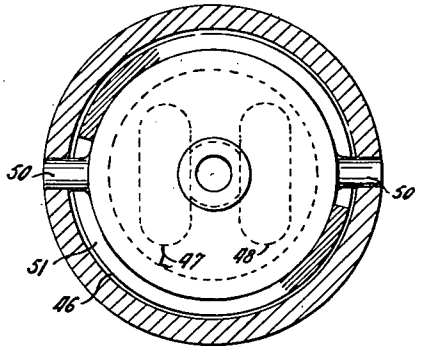
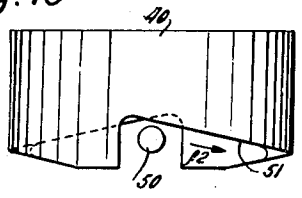


Fig. 10



INVENTOR
JACQUES DUMAS
By Richardson and David
ATTYS

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2,656,792

ANTITANK MINES

Jacques Dumas, Paris, France, assignor to Etablissements Edgar Brandt, Paris, France, a French company

Application January 25, 1949, Serial No. 72,560
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7 Claims. (Cl. 102—8)

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The present invention has for its object an improved anti-tank mine which is of simple construction so that it can be mass-produced from readily obtainable materials, is very easy to manipulate and operate, is very efficient and which, furthermore can be set as a trap, is undetectable and, if desired, undismantleable.

Said mine comprises in combination a stationary main firing device and an explosive charge which is movable with respect thereto.

The invention also has for its object a mine of this type wherein an externally controlled auxiliary firing device is provided.

The firing of the charge can therefore be effected either directly by the relative movement of the charge and of the main firing device, produced by a partial crushing of the mine by an endless-track of a tank, or from a distance by means of the auxiliary firing device. The mine can therefore operate indiscriminately either under one of the endless-tracks of a tank (direct firing) or between said tracks (indirect firing).

Other features will become apparent from the ensuing description.

In the accompanying drawings, which are given solely by way of example:

Fig. 1 is a longitudinal section of an improved anti-tank mine according to the invention;

Fig. 2 is a vertical section of the lower portion of said mine;

Fig. 3 is a fragmentary vertical section of the lower plug with its auxiliary firing device;

Fig. 4 is a fragmentary transverse section along the line 4—4 of Fig. 3;

Fig. 5 is a horizontal section along the line 5—5 of Fig. 2;

Fig. 6 is a similar section along the line 6—6 of Fig. 2;

Fig. 7 is a bottom plan view of the spacing sleeve which supports the charge when inoperative;

Fig. 8 is an elevational view of the lower end of said sleeve;

Fig. 9 is a top plan view thereof;

Fig. 10 is an elevational view of the plug in which the main firing device is housed.

According to the embodiment illustrated, the anti-tank mine according to the invention comprises a body 1 of cylindro-frusto-conical shape, the axis of which is XX and which is made of a non-metallic substance, for example glass or synthetic material, or of any material impregnated with bituminous substances for example.

Said body 1 is provided with a top 2 which is moulded integral therewith. A groove 3 is provided all round the periphery of said top 2, thereby producing an annular section, the strength of which is reduced to the desired value.

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The cylindrical portion of the body 1 is provided, adjacent its upper end, with a groove 4 in which the end of a protecting spider 5 (Fig. 2) is adapted to be engaged resiliently, said protecting spider being intended to prevent any impacts against the top 2 while the mine is being manipulated.

The body 1 is provided with a bottom 6 (Fig. 1) which is rendered very rigid by means of radial ribs 7 and is provided with a central hole 8 (Fig. 2) surrounded by an externally screw-threaded flange 9. Said bottom 6 is fixed to the body 1, after the internal elements, which will be described hereinafter, have been mounted therein, by inter-fitting and cementing at 10. A handle 11 made of fabric is provided at the base of the body 1, opposite the bottom 6, to enable the mine to be manipulated, said handle being secured to a band 12 which surrounds said bottom.

Inside the body 1 thus constructed, is arranged, from top to bottom, first a cellular mass 13 for example of ebonite sponge or any other spacing device adapted to transmit the pressure of the top 2. Said mass (or other spacing device) which may be cemented to the top 2 bears downwards in the upper conical cavity *ab* of a vessel 15 containing an explosive charge 16. The upper cone *ab* of said vessel 15 is connected by a lateral surface *bc*, which may be cylindrical or slightly frusto-conical and the dimensions of which very nearly correspond to the internal dimensions of the body 1, to a lower frusto-conical surface *cd* which is extended at its lower end by a screw-threaded coupling 18. The vessel 15 is made of a non-metallic material, for example glass, porcelain, or synthetic material.

The vessel 15 adapted to contain the explosive mass 16 bears by means of its frusto-conical surface *cd* against the likewise frusto-conical upper edge 19 of a spacing sleeve 20 concentric to the axis XX. Said sleeve 20 (Figs. 1, 7, 8, 9) is provided at the upper part thereof with longitudinal slits 21 and a circular groove 22 which is intended to form the lines of fracture for the tongues provided between the longitudinal slits 21.

Extending from its lower edge 23 (Fig. 8) the sleeve 20 is provided with two diametrically opposite slots 24 (Figs. 1, 7 and 8) and, on two sectors at 90° with respect to said slots, said lower edge

of the sleeve 20 is provided with inclined teeth 25 (Figs. 7 and 8).

By means of its edge 22 the spacing sleeve 20 bears downwards on the body 26 (Figs. 1 and 2) of a plug 27. Said plug 27 is provided, on either side of its body 26, with two screw-threads 28 and 29 which enable it to be screwed into the screw-threaded coupling 9 of the bottom 6 in either of two positions which are reversed with respect to one another.

In the body 26 are provided two mortises 30 (Figs. 3, 4 and 5) in each of which is engaged a projection forming a pawl 31. Each pawl is provided with a shoulder 32 (Fig. 4) which is adapted to bear downwards against a shoulder 33 provided in the mortise 30, by the action of a spring 34 or a resilient pad. Said spring is adapted to bear against a stop plate 35 housed in the bottom of the bore 28 of the plug 27. Each projection 31 forming a pawl projects from the opposite face of the body 26 in such a manner as to engage between the teeth 25 of the spacing sleeve 20 when the plug 27 is screwed on the screw-threaded coupling 9 by means of its screw-thread 29 as shown in Fig. 10.

The body 26 of the plug 27 is provided with a cavity 36 which, for this position of the plug, is directed downwards. Said cavity 36 contains an explosive charge 37 which is held in position by the plate 35: said plate may, for example, be cemented round the cavity 36 on the periphery of the corresponding face of the body 26.

The plug 27 is provided radially with a number of holes 38 (Figs. 1 and 5) each of which is adapted to accommodate a detonator 39 that penetrates into the explosive mass 37. The system comprising the explosive mass 37 and the detonators 39 therefore form an auxiliary firing device. The detonators 39 are adapted to be connected to a trap device or to an actuating device remote from the mine.

The mine is completed by a main firing device which is intended to operate in the case in which the mine is crushed. Said device comprises a plug 40 (Figs. 1 and 2) with a central body 41 and a screw-threaded portion which is adapted to screw on the screw-threaded coupling 18 of the vessel 15 for the explosive mass 16. The body 41 forms, in the central portion thereof, a cavity 42 adapted to accommodate a detonator 43. Said detonator is fixed by means of a screw-threaded bush 44 on a screw-threaded nipple 45 provided at the centre of a capsule 46. Said capsule 46 is housed in the cavity formed by the plug 40. It contains two bulbs 47 and 48, made of glass or other fragile material and containing two products adapted to react on one another and form flames (for example ethyl nitrate and sodium and/or potassium). The bulbs 47 and 48 are for example fixed on a plate 49 of cellulose acetate cemented to the bottom of the capsule 46. Said capsule 46 is provided on the outside with two diametrically opposite projections 50 (Figs. 1 and 6) of such a length that they can engage in the longitudinal slots 24 of the spacing sleeve 20. The projections 50 furthermore engage in notches 51 which form helical ramps and which are provided in the plug 40 (see Fig. 10). The relative orientation of said ramps and of the teeth 25 of the spacing sleeve 20 is such that when said sleeve 20 tends to be rotated in the direction of the arrow f^1 (Fig. 8) by unscrewing the plug 27, the projections 50 are carried along by the slots 24 of the sleeve 20 and move relatively to the ramps 51 in the direction of the arrow f^2 (Fig. 10).

The cup 46 is closed by a plate 52 which is cemented on the lower edge thereof and under said plate is fixed, by cementing or otherwise, a ring or disc 53 which, after mounting as shown in Fig. 1, is located a short distance e from the body 26 of the plug 27.

As will be understood, the assembling of the various elements of the mine is effected with the body 1 placed upside-down with its top 2 resting on any support. The mass 13 is first placed in position, then the vessel 15 containing the hollow explosive charge 16 provided with its plug 40 is mounted, and the spacing sleeve 20 is engaged over said plug.

The bottom 6 is then placed in position by fitting it at 10; if necessary, said bottom may be welded or cemented to the body 1 at 54 (Fig. 1). There only remains to screw the lower plug 27 which is then in the reverse position to that shown in Fig. 1, the plug being screwed by means of its screw-thread 28.

When the mine is being laid, the plug 27 is unscrewed and the main firing device comprising the detonator 43 and the capsule 46 with its bulbs 47 and 48 is placed in position.

The plug 27 is screwed on again after having turned it upside-down, i. e. into the position shown in Fig. 1, so that the projections 31 thus engage upwards in the teeth 25 of the spacing sleeve 20.

The detonators 39 are connected to the outside firing device according to the known technique for setting anti-tank mines. The safety spider 5 is removed and the mine is camouflaged.

Under these conditions, when an endless-track of a tank passes over the mine, the pressure exerted on the top of same (said pressure having to be at least of the order of 150 kg. or more) causes the body 1 to fracture at the groove 3 and the top 2, the mass 13 and the vessel 15 containing the explosive mass 16 to move downwards.

The lower frusto-conical face *cd* of the vessel 15 then exerts a force on the conical upper edge 19 of the sleeve 20 of which the blades formed between the grooves 21 break opposite the weakened point formed by the groove 22, thereby allowing said vessel 15 to continue its downward movement.

Said vessel carries with it the plug 41 and the capsule 46 together with the plate 52 and the ring 53. After the travel e (Fig. 2) said ring abuts against the body 26 of the plug 27. As the movement continues, the plate 52 breaks and the ring 53 soon crushes the bulbs 47 and 48; the products contained in said bulbs come into contact with one another and, by reacting, produce flames which fire the detonator 43 and then fire the explosive charge 16.

If, on the other hand, the tank does not crush the mine as hereinbefore mentioned, but actuates an adjacent firing device comprising an igniter of any type, the detonators 39 fire the auxiliary charge 37 and said charge in turn fires the mine by means of the main firing device. In this case the mine enables the tank to be attacked between its endless-tracks. It should be noted that the holes 38 also enable trapping igniters to be mounted.

It should be observed that it is impossible to dismantle the mine in order to unprime it, since if an attempt is made to unscrew the plug 27 when same is in the position of Fig. 1, said plug

carries with it the spacing sleeve 20 by means of the projections 31 and said sleeve in turn rotates the capsule 46 about the axis XX by means of the slots 24 and the projections 50. During this rotation, the projections 50 have to slide in the direction of the arrow f^2 (Fig. 10) along the ramps 51 of the plug 40, thereby producing a relative downward movement of the capsule 46 with respect to said plug and, by encountering the ring 53 and the body 26 of the plug 27, causing the bulbs 47 and 48 to break; this causes the mine to be fired if the rotary movement of the plug 27 is sufficiently continued.

It should be noted that it is only necessary, on the other hand, before the mine is placed in position, to remove the spacing sleeve 20, in order to render the mine perfectly dismantleable without danger.

In this case, the movable assembly inside the body 1 bears directly against the body 26 of the plug 27 by means of the ring 53 and it is naturally necessary for the plate 52 to be sufficiently strong to prevent the mine from being fired by the action of the weight of said assembly.

As can be seen, the mine hereinbefore described has numerous advantages. From the standpoint of an arm proper, it enables, as hereinbefore explained, tanks to be attacked both in their endless tracks and between said endless-tracks, thereby making it a particularly efficient arm.

This efficiency is very high, since the body of this mine and the mechanism described are of comparatively light weight, thereby making it possible, for a given weight, to have a large hollow explosive charge 16.

It should be noted, on the other hand, that after laying and screwing the plug 27 right home, the mine is absolutely water-tight so that it can operate reliably even after a long stay in moist ground.

It should also be noted that the two faces of the plug 27 can be marked quite differently, for example with an inscription, so that a fused mine cannot be mistaken during manipulation for a non-fused mine.

This mine can be readily manipulated owing to its light total weight and its handle 11 which is so arranged that two mines placed opposite one another by their bases can be carried at once.

It is easy to operate: the main and auxiliary firing devices can be readily placed in position and can be fixed with absolute safety by an operator.

Since the body 1 of the mine and the vessel 15 are made of non-metallic materials, the metal portions are considerably decreased so that they are practically undetectable by means of the usual magnetic methods.

On the other hand, it may be repeated that:

The mine cannot be unprimed when the spacing sleeve 20 has been retained inside the mine;

It is moreover simple to manufacture; the products of which it is composed can be readily obtained on a restricted market as may be the case in time of war, all the parts used are obtained directly by moulding, so that it is possible with a very small industrial equipment to effect the mass production thereof and so ensure a very low cost of manufacture.

Naturally, the invention is in no way limited to the embodiment illustrated and described which has only been chosen by way of example.

Thus, the explosive charge contained in the plug 27 can be replaced by a small charge of the detonator type connected by means of any fire transmission device to the holes 38 of the plug 27.

Similarly, said plug 27 can obviously be modified in such a manner that the holes 38 are opposite the cylinder that forms the body of the mine.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. Anti-tank mine comprising in combination: a rigid water-proof hollow outer body formed of a side portion, a top connected to said portion by means of a weakened line adapted to break under the load of a tank and a rigid bottom provided with a central opening, a removable plug secured in said opening, a rigid vessel which is slidably mounted in said side portion under said top and which is provided with a convex bottom having a central aperture, an auxiliary plug secured in said aperture, an explosive charge located in said vessel and in contact with said auxiliary plug, a spacing tube which is interposed between said convex bottom and said removable plug and which is provided with lines of fracture so as to break when said vessel and its charge are urged towards said removable plug by said top detached from said body by a tank passing over the mine and a main firing device located in said spacing tube between said plugs and comprising, from said auxiliary plug to said removable plug, a detonator located in said auxiliary plug, and two devices which are spaced apart from one another and adapted to produce flames by their mutual contact.

2. Anti-tank mine as claimed in claim 1 wherein said devices are constituted the one by two fragile bulbs containing two substances adapted to react on one another and produce flames and the other by a fracturing abutment member for breaking said bulbs when they are moved towards said member.

3. Anti-tank mine as claimed in claim 1 in which said removable plug is provided with two screw-threads on either side of a central body provided with several cavities, an auxiliary firing device, which comprises an explosive charge and at least a detonator, being housed in said cavities, so that said auxiliary firing device may be arranged either inside said hollow outer body in a safety position, the main firing device being then removed, or outside said hollow body in the operative position.

4. Anti-tank mine as claimed in claim 3 further comprising means for causing the mine to burst if an attempt is made to remove said removable plug when it has been secured to said hollow body in the operative position.

5. Anti-tank mine comprising in combination: a rigid water-proof hollow outer body formed of a side portion, a top connected to said portion by means of a weakened line and a rigid bottom having a central opening; a removable plug screw-threaded in said opening; pawls carried by said plug inside said body; a rigid vessel slidably mounted in said side portion and provided with a convex bottom having a central aperture; an explosive charge in said vessel; an auxiliary plug secured in said aperture and provided with helical ramps; a spacing tube which is interposed between said convex bottom and said removable plug and which is provided, on the one hand, with lateral lines of fracture and longitudinal grooves and, on the other hand, at the end of contact with said removable plug, with

teeth engaging said pawls and a main firing device located in said tube and comprising, from said auxiliary plug to said removable plug, a detonator located in said auxiliary plug, a movable capsule provided with radial projections each of which enters one of said helical ramps of said auxiliary plug and one of said longitudinal grooves of said spacing tube, two fragile bulbs located in said capsule and containing two substances adapted to react on one another and produce flames and a fracturing abutment member in contact with said removable plug for breaking said bulbs when said capsule is moved towards said member either under the action of the explosive charge urged towards the bottom of said body by a tank passing over the mine or when an attempt is made to unscrew the removable plug, the pawls rotating then said spacing tube and the grooves thereof moving, in combination with the ramps of the auxiliary plug, said capsule towards said abutment member.

6. Anti-tank mine comprising in combination: a rigid water-proof hollow outer body formed of a side portion, a top connected to said side portion by means of a weakened line adapted to break under the load of a tank and a rigid bottom, a rigid vessel provided with a concave top and a substantially frusto-conical bottom, slidably mounted in said side portion and containing an explosive charge, an inert mass housed in said hollow body between the tops of said vessel and of said hollow body, a spacing tube interposed between said frusto-conical bottom of said vessel and said rigid bottom of said outer body, said spacing tube being provided with longitudinal slits extending from the end which is in contact with said bottom and with a circular breaking groove at the base of said slits, so as to break when said vessel and its explosive charge are urged towards said rigid bottom by said inert mass and the top of said body after said body has been broken by a tank passing over the mine, and a main firing device located in said tube and comprising two parts spaced apart from one another.

7. Anti-tank mine according to claim 6, wherein a removable protecting spider for protecting the mine during the manipulations thereof covers the top of said body, to which it is fixed by means of a groove provided in the wall of said body.

JACQUES DUMAS.

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