May 4, 1948. F. SHORT 2,440,702

ANTIPERSONNEL MINE

Filed Jan. 9, 1945

Fig. 1.

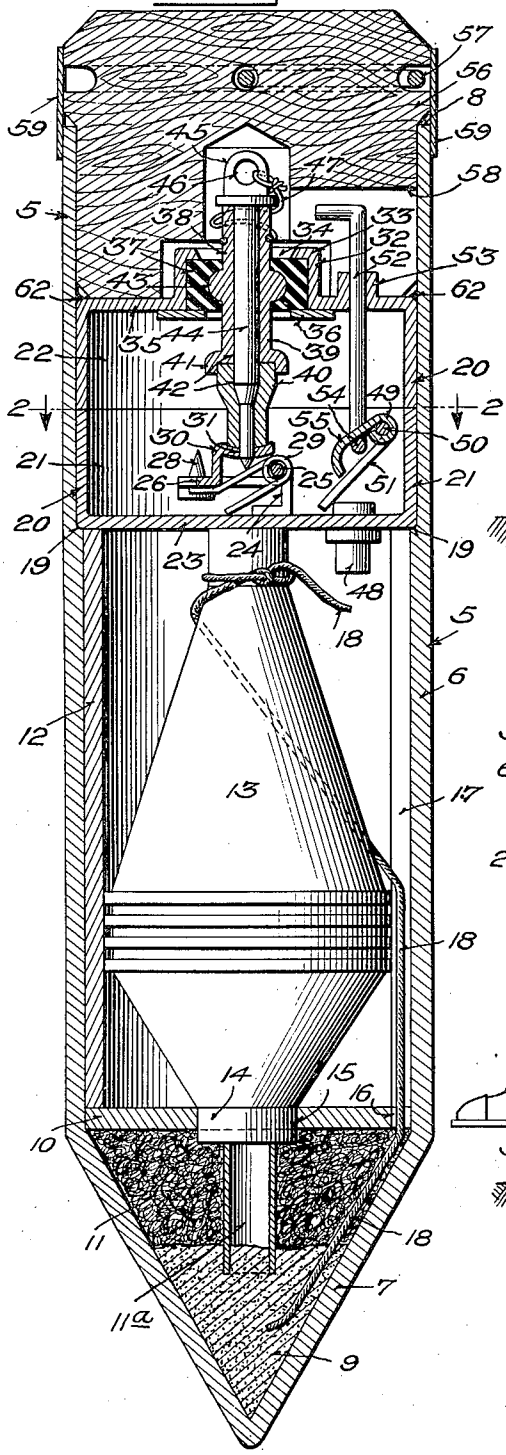


Fig. 2.

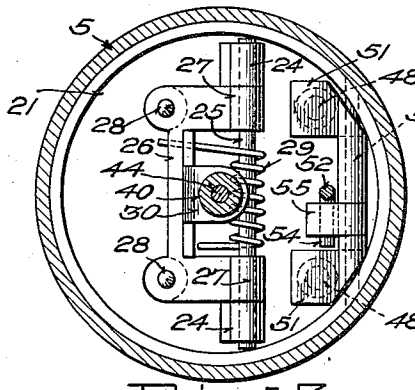


Fig. 3.

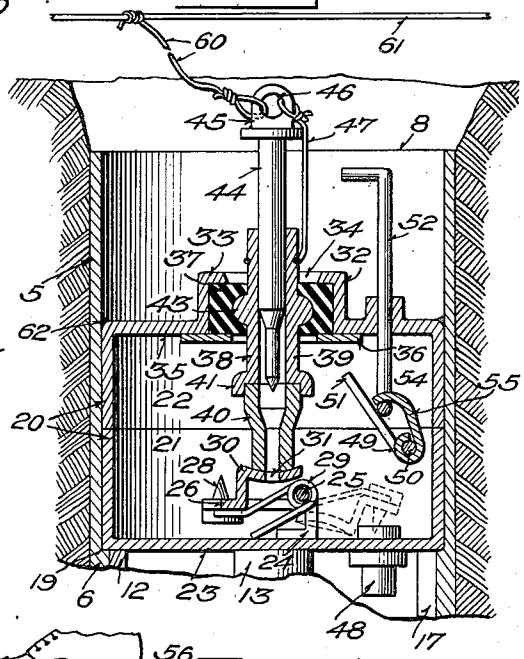
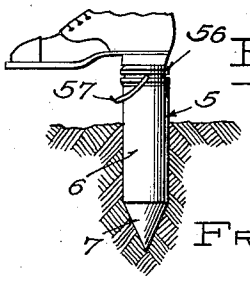


Fig. 4.



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ANTIPERSONNEL MINE

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6 Claims. (Cl. 102—8)

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1

The 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 anti-personnel mines and more particularly to mines of the German "S" type or United States "M-2" type, wherein the mine is concealed and camouflaged by being buried beneath the surface of the earth; such mines being equipped with a frangible shell, containing a high explosive, which explodes above but close to the surface of the earth, and means contained within the mine body or housing for propelling the shell upwardly therefrom when the mine is actuated or set off in any well known, conventional manner.

Anti-personnel mines of the type above referred to have proved much more effective than anti-personnel mines of the type which are intended for and only adapted to be placed above the surface of the earth, due to the fact that it is more difficult to conceal and camouflage the mines of the latter type and consequently such mines are more readily detected by the enemy and can be more easily disarmed and removed, resulting in such mines frequently being reused by the enemy against our own troops.

The principal disadvantage of the anti-personnel mines, of the type which are buried in the ground, has, until the present, resided in the fact that it requires considerable time and skill to bury, conceal and camouflage these mines which can be accomplished only with the use of a shovel or similar tool. Further, in using a shovel for digging a hole in which to bury the mine, it is necessary to provide a hole of considerable diameter in order to provide a flat bottom which will afford a firm support for the mine to maintain the mine positively in an upright position, when the mine is covered with the earth. This produces a large area that must be camouflaged in order to conceal the fact that the earth has been recently disturbed, which, if not efficiently accomplished, is an immediate warning to the enemy of the presence of a mine, and is one of the most common means used to detect mines.

It is therefore a primary object of this invention to provide an anti-personnel mine which can be readily buried in the ground without the use of a shovel or other tool and which can be buried in a hole of much smaller diameter, than that required for mines now in use, so that the area at the earth's surface to be camouflaged, is thereby greatly reduced.

2

More particularly, this invention provides an anti-personnel mine having a housing or body which is cylindrical in shape and which has a tapered, closed lower end capable of being readily driven into the ground, so that, in most instances, the mine can be readily buried by the pressure of a man's heel thereon, and in most any case by any readily available impact or driving member.

An important advantage of the invention thus resides in the fact that not only can the mine, comprising this invention, be more quickly and more readily buried and camouflaged, due to features of its construction which are novel in the art, but also, it is not necessary to fill in the earth around the mine to prevent it from overturning, because, in driving the mine into the earth, the earth closely surrounding the mine securely anchors it and retains it in an upright position.

Another object of the invention is to provide a removable closure or plug for the open end of the mine body which will seal said end, until removed when the mine is prepared to be used, and which extends above the upper end of the mine body to be engaged for driving the mine into the earth, so that when said plug is removed the mine will be disposed beneath the surface.

A further aim of the invention is to provide an anti-personnel mine having a novel construction of fuse or firing device which is so constructed that it can be slidably mounted in the mine body, above the projectile, to be expelled therefrom by the outwardly moving projectile, thus enabling all parts of the mine to be contained within the cylindrical housing, thereby materially reducing the overall size of the mine.

Still a further object of the invention is to provide a novel construction of fuse or firing device, especially adapted for use with and essential to the present invention, but having novel features of construction and operation, constituting improvements on the prior art, and which is readily adapted for use with either anti-personnel or anti-tank mines in place of conventional types of fuses or firing devices now in use.

Other objects and advantages of the invention will hereinafter become more readily apparent from the following description of the drawing which illustrates a preferred embodiment of the invention and wherein:

Figure 1 is a longitudinal, substantially central sectional view of the anti-personnel mine;

Figure 2 is a cross-sectional view thereof taken

substantially along the plane of line 2—2 of Fig. 1;

Figure 3 is a fragmentary longitudinal, substantially central sectional view of the upper portion of the mine and showing the closure removed and the fuse parts in a cocked position; and

Figure 4 is a side elevational view on a reduced scale showing the mine partly embedded in the earth and being driven therein by the pressure of a man's heel on the closure.

Referring more particularly to the drawing, wherein like reference characters designate like or corresponding parts throughout the different views, 5 designates generally the anti-personnel mine in its entirety comprising the invention, and which includes a cylindrical walled housing 6 having a tapered closed end 7 and an opposite open end 8.

The hollowed tapered end 7 contains a propelling charge of explosive 9. The disk 10, of cardboard or other suitable material, is disposed in the lower part of the cylindrical portion of housing 6 and provides a closure for the cavity of the tapered end 7, which also contains cotton or paper packing 11, which is disposed between the explosive 9 and the disk 10. A tube 12, of cardboard or the like, slidably engages the cylindrical portion of housing 6 and rests upon the disk 10. A projectile 13, of conventional construction and of the type which is adapted to be activated by a delay action fuse, not shown, is disposed within the tube 12 and has a restricted annular lower portion 14 which extends through an opening 15 in disk 10. One or more strands of quick match 18 extend from within the explosive 9 upwardly through a notch 16 in disk 10 and through a longitudinal slot 17 in tube 12 into the upper portion of said tube where the opposite end thereof is anchored around the upper part of the projectile 13, for a purpose which will hereinafter be described.

As best seen in Fig. 1, the bore of the cylindrical portion of the housing 6 is slightly enlarged from the upper end of the tube 12 to its open end 8 to form an annular seat 19 which cooperates with the upper edge of the tube 12 to support a fuse housing 20 in the mine housing 6. Fuse housing 20 comprises a lower cup shaped section 21 and an upper inverted cup shaped section 22 the open ends of which sections bear against each other to provide the annular walled housing 20. The bottom 23 of the housing 20 is substantially flat and in addition to engaging and being supported by seat 19 and tube 12 also rests upon the upper end of the projectile 13.

The housing 20 contains brackets 24 which project upwardly from its bottom 23 and in which the ends of a shaft 25 are secured or journaled. A yoke-shaped member 26 is provided with corresponding loop ends 27 which rotatably engage the shaft 25. Yoke 26 is provided with corresponding firing pins 28 which project outwardly therefrom, and which are remotely disposed relatively to each other and to the loop portions 27. A spiral spring 29 is wound upon the shaft 25 and has one end thereof bearing against bottom 23 and its opposite end bearing against yoke 26 to urge yoke 26 to rotate in a clockwise direction, as seen in Figs. 1 and 3. Yoke 26 includes an upwardly offset, concave seat 30 having an opening 31 therethrough for a purpose which will hereinafter become apparent.

The top 35 of the housing 20 is provided with an integral upwardly projecting, cylindrical portion 32 having an inturned flange 33 at its upper

end, forming an opening 34 in the top 35 of the housing 20. A ring 36 is secured to the under side of the top 35 and extends into the opening 34 to combine with the annular wall 32 and the flange 33 to form an annular inwardly opening seat for a resilient gasket 37 of rubber or the like.

A hollow stem, designated generally 38, comprises an upper section 39 and a lower section 40, detachably connected by the socket joint 41, and having aligned communicating bores 42 the lower end of which is formed in the section 40 and is restricted. Stem section 39 extends through the opening 34 and through a central opening of the annular gasket 37, and the portion of stem section 39 which is in engagement with gasket 37 is provided with an annular enlargement 43 which is seated in gasket 37 for anchoring stem 38 therein and for mounting the stem for universal movement relatively to housing 20. The openings of flange 33 and ring 36 are substantially greater in diameter than stem 38 to accommodate the stem for its universal movement.

A pin 44 slidably engages the stem bore 42 and has a restricted lower end which extends through the restricted lower end of wall 22 and through the opening 31 of seat 30, when the pin 44 is in its fully projected, lower position, as seen in Fig. 1. Pin 44 is provided with a head 45 which rests upon the upper end of stem 38, when the pin is in a fully projected position, and said head 45 is also provided with an eye 46 to which is attached one end of a flexible connector 47, the opposite end of which is anchored around the upper part of the stem 38. Flexible connector 47 provides a limiting means for limiting the upward movement of pin 44 in stem 38 to prevent disengagement of the pin and stem, when the pin is moved to a retracted position, as seen in Fig. 3.

Two primers or percussion caps 48 are disposed in bottom 23 and have their heads located in housing 20 and their discharge ends opening into the compartment formed by tube 12, disk 10 and bottom 23 and, as seen in Fig. 1, a portion of the quick match is located beneath and adjacent the primers 48. Primers 48 have their heads located, with respect to shaft 25, so that when yoke 26 is swung or rotated in a clockwise direction by spring 29 each of the primers 48 will be struck by a firing pin 28 for exploding the primers.

A positive safety for the fuse is provided by the shield 49 which is rotatably mounted on the shaft 50 which is anchored in the side wall of the housing 20 and which is provided with plates 51 which normally project downwardly at an angle to form covers over the primers 48 to positively prevent firing pins 28 from engaging the primers 48, when the plates 51 are disposed in their operative positions, as seen in Fig. 1. A rod 52 slidably engages an annularly flanged opening 53 in the top 35 and has a hook shaped lower end 54 which engages under an ear 55 of the shield 49. The upper, handle end of the rod 52 is adapted to be manually operated for raising and lowering shield 49 from its lowered, operative position of Fig. 1, to its raised, inoperative position of Fig. 3. Sufficient frictional contact exists between the flanged opening 53 and rod 52 to retain rod 52 and shield 49 in either of the positions, as seen in Figs. 1 and 3.

A closure or plug, formed of any suitable material, preferably wood, extends into and closes the open upper end 8 of the housing 6, above the fuse, and projects outwardly from housing 6 and has

its exposed portion enlarged to seat on the open end 8, for a purpose that hereinafter will become apparent. A flexible loop or bail 57 extends through the upper enlarged part of plug 56 and is preferably contained in an outwardly opening recess thereof, as seen in Fig. 1, said bail being utilized for removing the plug 56 from the housing 6. Plug 56 is recessed at seen at 58 to accommodate the parts of the fuse which project above the cover or top 35. The mine 5 is preferably sealed by means of a water proof tape 59 which is removably disposed around the upper end of the housing 6 and the upper portion of the plug 56 and which likewise forms a closure for the recess containing the flexible bail 57, as seen in Fig. 1.

From the foregoing, detailed description of the drawing, it will be readily apparent that the anti-personnel mine 5 is capable of being readily driven into the earth, as illustrated in Fig. 4, by the pressure of a person's heel on the plug 56. The tapered end 7 will readily penetrate the earth in the same manner as a stake under the weight of a normal adult standing on the plug 56 to embed the mine 5 so that the top of the plug 56 is flush with the surface, to thereby position the open end 8 at the depth as shown in Fig. 3. Should the earth or mass into which the mine 5 is intended to be embeded be too hard to receive the mine, in the manner aforedescribed, the earth can be loosened sufficiently with a bayonet, or any driving or impact member available could be used for driving the mine into the ground.

The parts of the mine 5 are shown in their disarmed positions in Fig. 1, and the mine, as thus shown, is in the condition in which it will be for shipment or storage prior to use. Preparatory to use, the tape 59 is removed after which the mine 5 is embedded in the manner aforedescribed and as shown in Fig. 4, to a depth corresponding to the position of the mine relatively to the earth's surface, as illustrated in Fig. 3. The plug 56 is then removed by means of the bail 47. A lateral or lead wire 60 which has previously been anchored at one end to a trip wire 61 is then attached at its opposite end to eye 46 after which pin 44 is drawn or retracted upwardly to the limit of the flexible member 47, as illustrated in Fig. 3, to thus move the lower, restricted end of pin 44 out of engagement with the opening 31 of seat 30 to enable the stem 38 to be moved relatively to seat 30 and thereby disengaged therefrom, for releasing the yoke 26. It will thus be apparent that pin 44 functions as a safety pin when in its position of Fig. 1. When the pin 44 has thus been raised, the fuse of the mine 5 is still rendered safe by the shield 49 which is still in its position of Fig. 1, and in order to fully arm the mine 5, ready to be fired, rod 52 is pulled upwardly to position it and the shield 49 in the positions, as illustrated in Fig. 3. Should the fuse be defective, so that the yoke 26 is released from its cocked position, as shown in Fig. 1, when the pin 44 is retracted, said yoke would then be rotated clockwise but the firing pins 28 would strike the plates 51 and thus be held out of contact with the primers 48, to prevent the mine 5 from being prematurely discharged. Should this happen, the spring 29, acting upon the firing pins 28 through the yoke 26, would resist the movement of the shield 49 from its operative to its inoperative position and thereby indicate to the soldier who is arming the mine, that the mine is defective and should be discarded. If, as in most cases, this does not occur, then the rod 52 is manually raised to move the shield 49 to its inoperative position, as seen in Fig. 3, to thereby fully arm the mine. The mine 5 having thus been armed, all that remains to be done is to camouflage the mine which is readily accomplished by filling in the top of the hole formed by the mine with loose dirt and suitably camouflaging the surface of the earth and the wires 60 and 61 to prevent visible detection of the mine by the enemy.

From the foregoing, it will be readily apparent that an enemy soldier striking the trip wire 61 or the lateral wire 60 will thereby exert a pull on the wire 60 to either pull the stem 38 upwardly or rock it relatively to the housing 20, by means of the resilient support or gasket 37 which, as previously described, resiliently mounts the stem 38. This movement of stem 38 will cause the lower end of stem section 40 to move out of engagement with seat 30 to enable the spring 29 to act upon the yoke 26 to move the yoke and firing pins 28 from their full line to their dotted line positions of Fig. 3, to thereby fire the two primers 48. Stem section 40 is detachably mounted in the socket at the lower end of the stem section 39, so that should the stem 38 not be moved far enough to completely clear the path of movement of the yoke 26, said yoke will strike section 40 and kick it out of engagement with the socket of section 39 to thereby permit the yoke 26 to continue its movement to a released position. When the primers 48 are thus fired by the firing pins 28 the flash therefrom will ignite the quick match 18 which, due to its quick burning properties will instantaneously ignite the propelling charge 9. Charge 9 will propel the projectile 13 upwardly from the housing 6 driving the housing 20 ahead of it. The projectile 13 is provided with a conventional delay action fuse, not shown, and forming no part of this invention, which will cause the projectile 13 to explode at the desired distance above the surface of the earth, preferably at about 6 feet, where it will possess the greatest casualty effect. Frequently, in the past, mines have failed to function due solely to a faulty primer or percussion cap. By providing two primers or percussion caps instead of one, as in fuses now in use, the possibility of a failure of the mine to function is greatly minimized.

In order to keep the explosive 9 and the other parts in the lower portion of the mine dry, while the mine is embedded in the earth, a seal 62 of wax or the like is placed between the housing 20 and the housing 6. This seal or joint 62 will not interfere with the parts being propelled out of the housing 6 by the propelling charge 9.

Various modifications and changes are contemplated and may obviously be resorted to provided they fall within the spirit and scope of the invention, as hereinafter defined by the appended claims, as only a preferred embodiment of the invention has been illustrated and described.

I claim:

1. An anti-personnel mine comprising an elongated hollow housing having a tapered closed end to be driven into the earth, a projectile slidably mounted in the housing, the opposite end of said housing being open, a propelling charge disposed in the housing, between its closed end and the projectile, a firing mechanism slidably mounted in the housing between the open end thereof and the projectile for igniting the propelling charge, and a removable plug disposed in the open end of the housing for closing said

open end and for providing an impact receiving head adapted to be struck by a driving member for driving the mine into the earth.

2. An anti-personnel mine comprising a housing having an open end and a closed end, a projectile slidably mounted in the housing, a propelling charge contained in the housing, between its closed end and said projectile, a mechanical type fuse or firing device located in said housing above said projectile and means actuated by said fuse or device for igniting the propelling charge when the fuse is actuated, said fuse including a spring actuated rotatably mounted striker; a yieldably mounted rocker type detent, for engaging and holding the striker in a cocked position, said detent being arranged to be actuated, by a force exerted thereon from a plurality of directions, for moving the detent out of engagement with the striker, to cause the striker to be moved to a released position by said spring; and a primer disposed in the path of the striker to be exploded thereby.

3. A fuse for land mines comprising a pivotally mounted striker, a seat thereon, spring means bearing on the striker for urging it toward a released position, a rocker type detent normally disposed on said seat for holding the striker in a cocked position against the action of said spring means, a yieldable means for mounting said detent for movement out of said seat on said striker by force exerted on the detent from any of a plurality of directions, a primer disposed in the path of the striker to be discharged when the striker moves to a released position and a safety pin slidably mounted in the detent, said striker having a portion for engaging the pin, when the pin is in an operative position, to prevent the detent from being moved out of the path of the striker, and said pin being slidable away from and out of engagement with the striker portion to arm the fuse.

4. A fuse for land mines comprising a pivotally mounted striker, a seat thereon, spring means bearing on the striker for urging it toward a released position, a rocker type detent normally disposed on said seat for holding the striker in a cocked position against the action of said spring means, a yieldable means for mounting said detent for movement out of said seat on said striker by force exerted on the detent from any of a plurality of directions, a primer disposed in the path of the striker to be discharged when the striker moves to a released position and a safety element movable into and out of engagement with the striker for holding the detent against movement relatively to the striker, when said element is in engagement with the striker, and a safety device mounted for movement into and out of the path of movement of the striker and located, when in the path of movement of the striker, to hold the striker out of engagement with the primer.

5. A fuse for land mines comprising a pivotally mounted striker, a detent disposed to normally engage and hold the striker in a cocked position, a primer located in the path of movement of the striker to be engaged thereby when the striker moves from a cocked to a released position, a spring engaging the striker and urging it toward a released position, and yieldable means for mounting the detent to permit universal movement of the detent relatively to the striker, said detent including an elongated body member having one end disposed to normally engage the striker when the latter is in a cocked position, trip wire actuated means connected to the opposite end of the detent, said yieldable mounting means including a support mounting the detent intermediate of its ends, and a yieldable member interposed between the detent and support to provide for the universal movement of the detent relatively to the support.

6. A fuse for land mines comprising a pivotally mounted striker, a detent disposed to normally engage and hold the striker in a cocked position, a primer located in the path of movement of the striker to be engaged thereby when the striker moves from a cocked to a released position, a spring engaging the striker and urging it toward a released position, and yieldable means for mounting the detent to permit universal movement of the detent relatively to the striker, said striker having two integral striker heads, and a second primer, one of the primers being disposed in the path of movement of one of the striker heads, and the other primer being located in the path of movement of the other striker head.

FRANK SHORT.

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