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EXPLOSIVE SIGNAL AND TRAINING DEVICE

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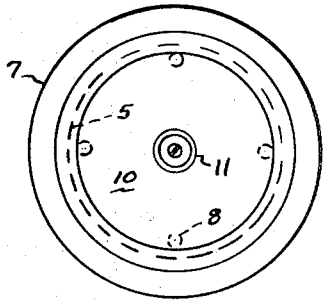


Fig-1

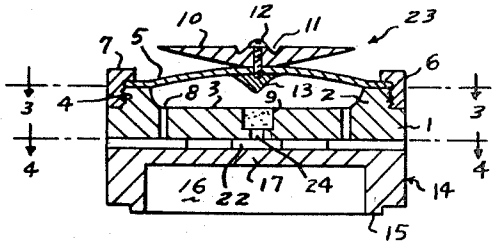


Fig-2

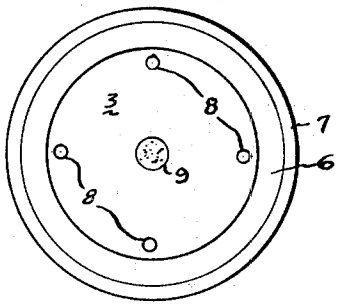


Fig-3

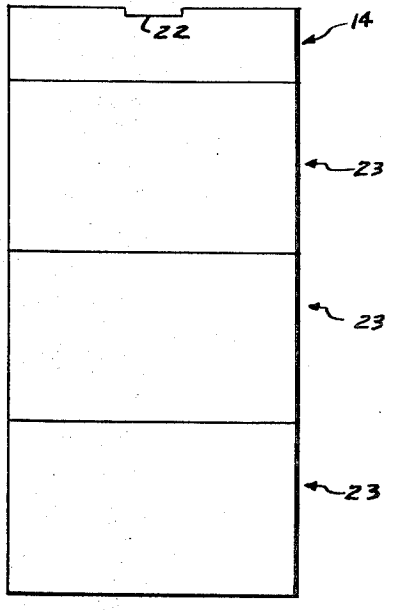


Fig-5

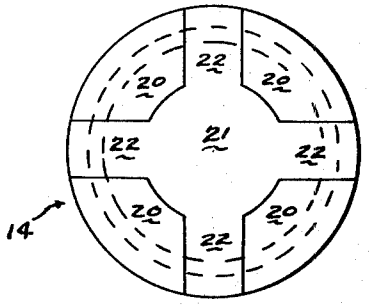


Fig-4

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EXPLOSIVE SIGNAL AND TRAINING DEVICE

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U.S. Cl. 35—25 7 Claims

ABSTRACT OF THE DISCLOSURE

A trainer mine formed of two circular plastic plates, one on top of the other and separated by a plastic membrane. The assembly is secured together by a suitable epoxy or phenolic resin. The upper plate is provided with a series of apertures arranged in a circular path and there is a recess or cavity with vent hole in the top surface at the center of the plate. A pellet of explosive material is pressed into the recess. A snap action diaphragm is positioned over the recess and the apertures. The diaphragm carries at the center, a firing pin which is poised just above the explosive pellet. A pressure plate is secured to the outside surface of the diaphragm. The bottom plate provides a number of radially extending passageways which communicate with the apertures in the upper plate. When the pressure plate is snapped by the shoe of a soldier, the diaphragm causes the firing pin to detonate the explosive pellet and the explosion gases rush through the vent hole and the passageways to provide a tell-tale noise of loud character.

BACKGROUND OF THE INVENTION

The invention relates to exposive devices of a training character. In the training of troops, in anticipation of crossing enemy mine fields, it is customary to place trainer mines throughout an area over which the troops are required to travel. These mines are usually exploded on contact with a soldier's foot, or sometimes by mere foot pressure on the ground near the mine. On occasion, a single mine or a group of mines may be electrically exploded by an operator who observes the closeness with which a soldier or group approaches the mine field.

Usually these mines, when tripped, or otherwise set off, cause a minor explosion, too small to injure those careless of foot but still, sufficiently large to produce scare and to be observed by those conducting the test. Mines of this character may not only be employed in the training of troops but also as a warning signal against intruders or trespassers during combat operations.

SUMMARY OF THE INVENTION

While mines of the type described operate satisfactorily, they are open to the objection of being complicated in structure and necessarily expensive. The matter of the structure and attendant expense is extremely important when it is considered that a thousand or more mines may be required for sowing over a single field by airplane since the mines are usually deposited close to one another. In order to thoroughly protect a given location, the number sowed must also be increased to take care of the duds and those which lacked the proper direction during the sowing operation. Finally, the mines after being sowed and used once during the training period represent a total monetary loss, regardless of whether they have been sprung, because none of the parts are ordinarily retrievable.

An object of the invention is to provide an explosive signal or training device which simulates an antipersonnel mine and may be made of inexpensive material, using the minimum number of parts and which lend themselves to quantity production on automatic machines.

Another object is to provide a device of the type mentioned and of high explosive sensitivity, yet rugged in construction to withstand the impact upon being dropped from a plane.

Still a further object is to provide a device which is capable of being dispensed or sowed from an aircraft which is provided with standard forms of munition dispensers.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 illustrates a plan view of the improved device which simulates an antipersonnel mine for troop training;

FIG. 2 represents a vertical section of the device shown in FIG. 1;

FIG. 3 is a view taken along line 3—3 in FIG. 2, looking in the direction of the arrows;

FIG. 4 represents a view taken along line 4—4 in FIG. 2; and

FIG. 5 shows diagrammatically a number of the improved mines stacked together for shipment or for introduction into a standard munition dispenser of an airplane.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, reference numeral **1** represents a circular plate, preferably of a thermosetting or a high melting point plastic material having a circular boss **2** well out toward the periphery to leave a flat well portion **3** at the center. The external periphery **4** of the boss may be threaded. A diaphragm **5** of light spring steel, known as "Belleville spring" is employed which normally has an outwardly curved or bowed configuration and a diameter as to stop just short of the outer periphery of the boss. A holder ring **6** of plastic material and having an angular configuration may be employed to hold the outer annular portion of the diaphragm in position. This ring has a threaded downwardly extending portion which engages the threads on the boss **2** and also has an inwardly extending portion **7** which overhangs the diaphragm. If desired, the ring may be cemented directly to the plate **1** and thus eliminate the necessity for the screw threads.

As shown in FIGS. 1 and 3, there are four symmetrically positioned apertures **8** drilled through the recess portion **3** of the plate, the purpose of which will be explained hereinafter. A small, round recess or cavity **9** is provided at the center of the plate **1** with a smaller concentric vent hole **24** beneath. Secured to the center of the diaphragm there is a pressure plate **10** of plastic material, the plate being thin at the outer edge and thicker in the middle. The rear or underneath side of the pressure plate is preferably rounded while the upper side contains one or more concentric grooves **11**. The central area of the pressure plate is secured to the diaphragm by a screw **12** which passes through a small opening in the

diaphragm and is sufficiently long to be screw threaded into the flat base of a firing pin **13**. The latter has a conical shape, sharpened to a point, and made of hardened steel. Thus, the screw **12** secures the pressure plate to one side of the diaphragm and also secures the pin **13** to the other side of the diaphragm.

The lower portion of the device is constituted of a cylindrical plate **14** made of the same material as the upper plate **1** and of the same diameter. The plate **14** is provided with a shoulder **15** of relatively small depth and having an outside diameter slightly less than the internal diameter of the inwardly extending portion **7** of the holder ring **6**. The purpose of this shoulder will be explained hereinafter. The plate **14** is provided with a deep and large recess **16** which enters from the lower surface of the plate to leave the margin of plastic material at the shoulder **15**, and leaving also a thick wall **17** which forms the bottom of the recess. The top and bottom plates **1**, **14** are separated by small slots **22** in the bottom plate, shown generally in FIG. 4, and are secured to each other by a suitable cement on the four quadrants **20**. The latter extend toward the center into a circularly shaped body **21**, having a diametral size considerably less than the diameter on which the openings **8** are located. The slots or passageways **22** are quite important in assuring free passage of the gases which pass through the vent hole **24** and apertures **8** to the exterior as will be made more clear hereinafter.

The trainer mine is completed by wedging a small pellet of any highly sensitive explosive mixture, such as potassium chlorate or lead azide in pressed form and waterproofed in any suitable and well known manner, into the recess **9**. The pellet is exploded by the application of a quick-acting downward force on the pressure plate **10**, sufficient to cause the firing pin **13** to detonate the explosive material. The generated gas, under considerable pressure will fill whatever space is left between the depressed diaphragm and the plate **1**, and under great pressure and high velocity will pass through the vent hole **24** and openings **8** and the passageways **22** to the peripheral exterior of the mine. The escaping gas will cause the usual explosion noise. Thus, if the soldier or intruder traversing the mine field should accidentally step on the pressure plate, the care exercised by the soldier in attempting to avoid a mine can be determined accurately by the presence or absence of the noise of the explosion.

As stated hereinbefore, the most practical way of distributing the mines over a large training area, is to sow them from an airplane which may make a number of passes over the field. The shape of the mine is such, particularly its circular configuration and the presence of the large recess **16** in the bottom plate **14**, that the mines can be stacked together for packaging or for ready insertion in the stacked condition into various standard and well-known munition dispensers on planes. A stack of complete mines **23** is shown in nested condition in FIG. 5. It will be noted that the recess **16** is sufficiently large to receive the pressure plate **10** and the diaphragm of the adjacent mine which abuts the lower surface of the lower plate **14** of each stacked unit **23**. FIG. 5 also shows the manner in which the pressure plate and the diaphragm of the top mine of the stacked pile can be adequately protected by the use of a single plate **14** which can serve as a cap over the pressure plate and diaphragm of the top mine of the stack. This end is thus protected against damage and accidental detonation.

It will be further noted that the circular shape of the plates **1** and **14** and the overall thinness of the complete mine virtually prevents the device from standing on edge as it lands on the ground after being sown by the airplane. Moreover, the mine would be equally as potent if it were deposited with the pressure plate resting on the ground, i.e., in the supside down position, because a soldier's foot, pressing down on the plate **14**, would also cause the firing pin **13** to pierce the explosive pellet and

there would be no escape for the gas to the exterior except through the vent hole **24** and the passageways **22**. The underside of the pressure plate **10** is curved to allow it to roll along the surface of the diaphragm in case the foot of the soldier happened to press against the edge of the plate, instead of squarely on top of the plate. The peripheral venting of the explosion gases provides a much louder signal without injury as compared to a structure in which the gases are emitted contiguous to the shoe sole of the person stepping on the device.

It is also evident that a mine of the type described can be made inexpensively and has the minimum number of parts, such as the two plastic plates **1**, **14**, and the necessary detonation equipment including the explosive pellet and foot-operated pressure plate. The cost of these parts is extremely small and their shape and size lend them to quantity production methods. Yet, the complete mine is extremely rugged and the pellet is virtually shielded from moisture so that the mine can be stored for long periods of time without any loss of potency.

I claim:

1. A trainer mine comprises a pair of plates located on top of one another and secured together, a plurality of radially extending passageways across at least one of the abutting surfaces of the plates, a vent hole and a plurality of equidistantly spaced openings extending through the upper plate and communicating with said passageways, a recess in said last-mentioned plate and centrally located with respect to said openings, said recess being on that side of the plate opposite from said passageways, an explosive mixture in the recess, a snap action diaphragm extending across the top surface of the upper plate, and a firing pin attached to the diaphragm for detonating said explosive mixture when the diaphragm is snapped downwardly, the gas generated by the exploded mixture being caused to pass through said openings into the radially extending passageways so as to give rise to a loud noise which would indicate that the mine had been exploded.

2. A trainer mine according to claim **1** and in which the passageways between the abutting surfaces of the plates are constituted as to leave radially extending slots, said snap action diaphragm being secured at its edges to the top surface of the upper plate to hold the firing pin directly over the explosive mixture.

3. A trainer mine according to claim **2**, said plates being formed of plastic material, the diaphragm and firing pin being constituted of metal.

4. A trainer mine according to claim **2** and in which a pressure plate is secured to that side of the diaphragm opposite from the firing pin.

5. A trainer mine according to claim **2** and in which a diaphragm is secured to the upper plate by means of a plastic holder ring, a part of which extends horizontally over the diaphragm, and a second part which extends vertically downward over the periphery of the upper plate and is secured by screw threads to the upper plate whereby rotation of the ring causes the diaphragm to be clamped to the upper surface of said plate.

6. A trainer mine according to claim **4** and in which a circular recess extends upwardly into the lower plate, said recess being sufficiently large to receive the entire pressure plate and the immediately adjacent parts of the diaphragm in order that a number of mines can be stacked together in abutting relation for shipment and loading in aircraft dispensers.

7. A trainer mine comprising a pair of upper and lower plates secured together, the surfaces of the upper plate having a recess which receives explosive material, a snap action diaphragm bowed outwardly and positioned over said explosive material, a firing pin secured to said diaphragm and adapted to detonate said explosive material when the diaphragm is pressed inwardly toward said recess, a pressure plate secured to the exterior surface of said diaphragm for snapping the diaphragm, said upper

plate having a vent hole and equidistantly spaced openings therethrough, the bottom plate being provided with radially extending passageways which are in communication with said openings and vent hole whereby when the pressure plate is depressed to drive said pin into said explosive material, the explosion gases are caused to pass through said vent hole and through said passageways, whereby the escaping gas emits a lound sound to indicate physical contact with the mine.

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U.S. Cl. X.R.

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