

[54] **SPRINGMINE**

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[58] Field of Search..... **102/8, 67, 7.2, 2; 89/1 F**

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[57] **ABSTRACT**

An anti-personnel mine adapted, when activated, to be propelled into the air before exploding, and having a shatterable body the lower part of which is hemispherical in shape to increase the component of mine fragments which are directed downwardly when the mine explodes. The mine is formed with a launching device comprising a base plate which carries a vertical plunger adapted to be received in a corresponding bore in the mine body, a propellant charge being disposed at the upper end of the bore.

2 Claims, 5 Drawing Figures

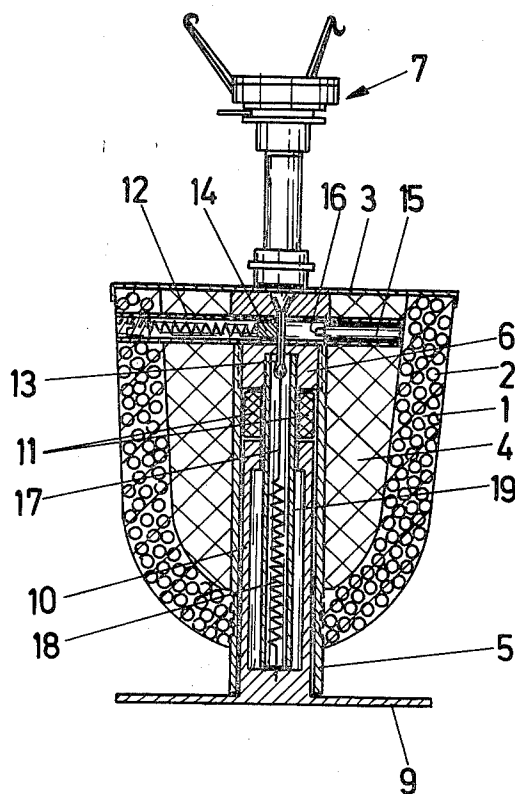


Fig.1

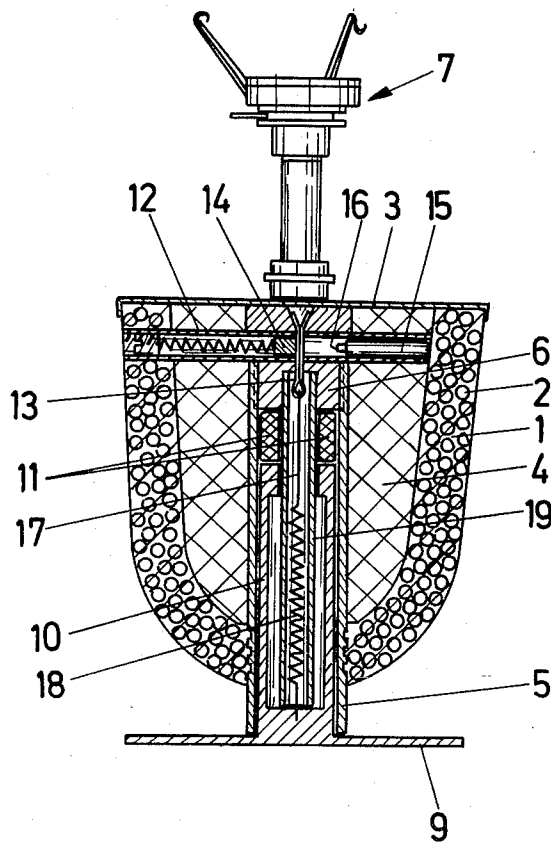


Fig. 2

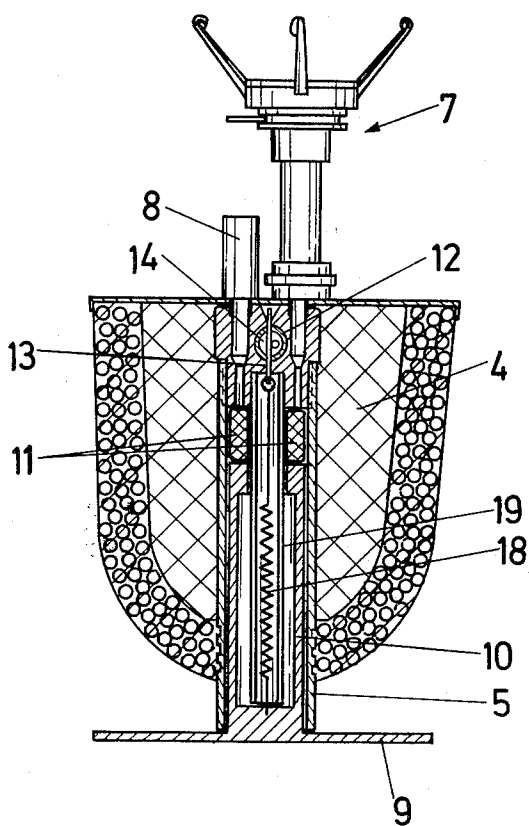


Fig. 3

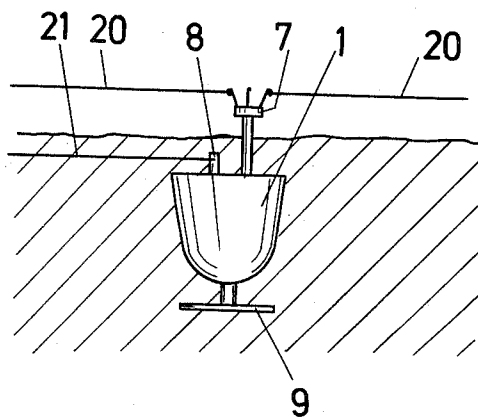


Fig. 4

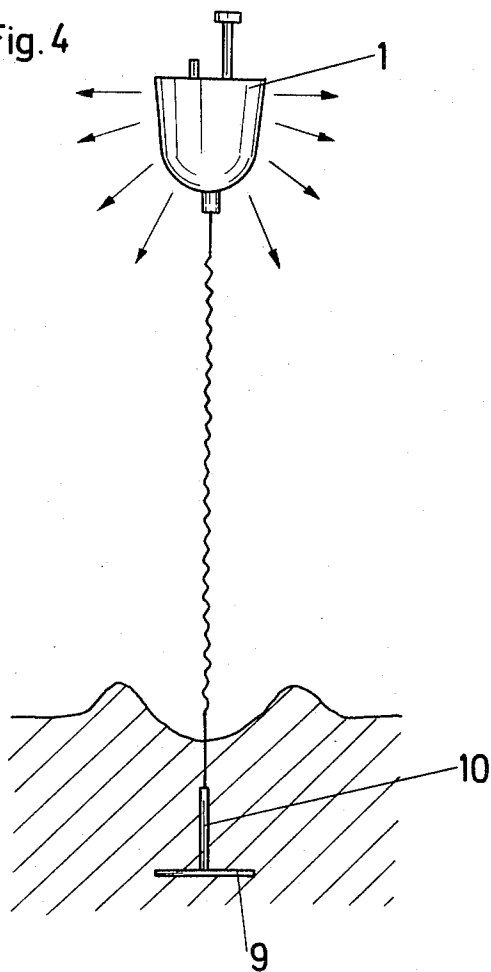
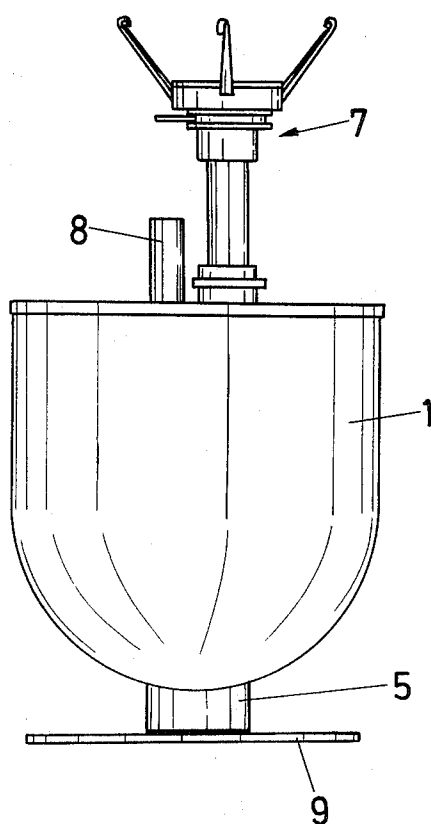


Fig. 5



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SPRINGMINE

The invention relates to a spring mine with a mine body which can be disintegrated into fragments under the effect of a detonating explosive charge.

Spring mines which can be ejected from a projection chamber or container by means of an ejector charge are known, which consist of a cylindrical casing constituted by two concentric tubes enclosing an annular chamber between them, a cover and a base. Prepared fragments are disposed in the annular chamber between the two concentric tubes. The bursting charge is located within the inner tube. When the ejector charge is caused to fire through a release device, for example through a mechanical or electrical detonator, the spring mine is ejected from the projection container under the action of the propelling gases of the charge. After reaching a given height above the ground level, the detonation of the bursting charge of the spring mine and the scattering of the fragments disposed in the annular chamber of the mine occurs.

When such a spring mine is ejected vertically upwards from the projection container in the manner provided for, then a predominantly horizontal scattering of the fragments results. However, the known spring mines referred to only possess a small "ground action" that is, the fragmentation action directed towards the ground in the vicinity of the point of detonation is slight. Moreover irregularities occur in the fragmentation action with known spring mines, since as a result of inadequate guidance in the projector the spring mine is not always ejected exactly vertically upwards, but an inclination of its axis to the vertical often occurs.

It is consequently an object of the invention to produce a spring mine which exhibits by comparison with the known spring mines an improved fragmentation action, but in particular an improved scatter effect with a pronounced ground action, thus with a considerable downward-directed component of the fragment distribution, through which also irregularities in the fragmentation action become largely avoided.

This is primarily attained in accordance with the invention through the fact that the bottom part of the mine body is arched downwards, and is substantially hemispherical in shape.

The form of the bottom part of the mine in accordance with the invention causes a roughly hemispherically shaped fragmentation scatter downwards, since the scatter of the fragments takes place substantially normal to the surface of the mine body. The upper part of the mine body provides for the substantially horizontal fragmentation scatter (in order also to attain a fragmentation action more remote from the point of detonation), and is desirably formed cylindrical or slightly conical. A particularly uniform fragmentation distribution is attained when the mine body consists of prepared metal particles embedded in a plastics material. In this preferred case, when the mine body is disintegrated those metal particles are available as fragments to a predetermined extent. However the scatter effect in accordance with the invention also occurs in principle when the mine body is for example an homogeneous cast metal part.

It is thus important for the uniform occurrence of the scatter effect sought for that at the instant of detonation the spring mine occupies its normal attitude, thus that the arched lower part of the mine body is actually

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directed downwards and the axis of the mine body (or the axis of its cylindrical or conical upper part) is vertical. In order to attain this, the spring mine must in the first place be buried in its normal attitude, that is, with this axis vertical in the ground. But it must further be ensured that the spring mine does not tilt out of its normal attitude either when the ejection charge is released or during the firing process and upward flight or jump.

Because of the arching of the lower part of the mine body in accordance with the invention this problem cannot be solved with the help of the customary projection container for the launching of spring mines. Instead a base plate is provided as a launching device which carries a plunger standing normal to the base plate, which enters into a central vertical bore of the arched lower part of the mine body. The ejector charge is located in this bore above the plunger of the base plate. When the ejector charge is fired the spring mine is thrust upwards under the action of the powder gases, and the plunger of the base plate serves as a guide and the base plate anchored in the ground ensures a stable location of the guide plunger.

The invention is diagrammatically illustrated, by way of example, with reference to the accompanying drawings in which:

FIG. 1 is a vertical section of a spring mine in accordance with the invention;

FIG. 2 is a vertical section of the same spring mine turned through 90° relative to FIG. 1;

FIG. 3 shows a spring mine buried in the ground;

FIG. 4 a spring mine fired upwards, and

FIG. 5 shows a variation in shape of the mine body.

The spring mine according to FIGS. 1 and 2 has a body 1 which consists of metal particles 2 embedded in a plastics material. The mine body 1 has a convex arched form in its lower part, substantially constituting a hemisphere and is made slightly conical (a truncated cone) in its upper part. The mine is enclosed at the top by a flat cover plate 3.

The bursting charge 4 is located in the interior of the spring mine. A vertical central tubular cylinder 5 is also located within the spring mine and is connected to the mine body. At its upper end the cylinder tube 5 receives a firing head 6 with a mechanical igniter 7 and an electrical igniter 8. The firing head 6 is rigidly joined to the cylinder tube 5. A plunger 10 fixed to a base plate 9 penetrates into the bore of the cylinder tube 5 from below. The ejector charge (driving charge) 11 is disposed between the plunger (or piston) 10 and the firing head 6. The ejector charge 11 is formed as a ring and the two igniters 7 and 8 are disposed diametrically opposite to one another above the front face of the annular ejector charge 11. Since both igniters 7 and 8 act upon the same ejector charge 11, the same launching conditions are always present, whether the ignition is electrical or mechanical when effected.

A further igniter (or detonator) 12 is provided for the bursting charge 4. The detonator 12 for the bursting charge 4 has a spring-loaded striker 14 secured by a pin 13 and also a booster charge 15 with a primer 16. Attached to the pin 13 is a cable 17 which is anchored through an interposed spring 18 in the base plate 9. The cable 17 and the spring 18 are enclosed in a tube 19 which is rigidly connected to the firing head 6 and protects the cable 17 and also the spring 18 from the powder gases when the ejection charge 11 is fired.

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FIG. 3 shows the spring mine buried in the ground. Only the mechanical igniter 7 protrudes above the ground and is connected to trip wires 20. A firing cable 21 is connected to the electrical igniter 8.

The ejector charge 11 is fired through actuation of one of the two igniters 7 or 8. The spring mine is driven upwards, thrusting against the plunger 10, through the powder gases of the ejector charge 11. This causes the spring 18 to be extended in length and finally the pin 13 is torn out of its means of retention. This releases the striker 14; this strikes against the primer 16 of the booster charge 15 and the bursting charge 4 is caused to detonate. This occurs at a predetermined height (for example 1 meter) above the ground, according to the dimensions of the drawing means (cable 17 and spring 18). It is also possible for other measures to be taken than the drawing means anchored in the base plate described above for the firing of the bursting charge 4 at a predetermined height above the ground, for example a detonation delay assembly which is released through the detonator of the ejector charge.

FIG. 4 shows the spring mine fired upwards. It can be seen from FIG. 4 that on ejection the base plate 9 and the plunger 10 remain buried in the ground. Arrows are also drawn around the mine body in FIG. 4 to indicate the directions of the fragmentation scatter. As can be seen, the fragmentation scatter occurs normal to the surface of the mine body. By virtue of the form of the mine body in accordance with the invention, a scatter effect consequently occurs both horizontally and directed towards the ground. Only upwards does virtually no fragmentation scatter occur, and this is because the upper side of the spring mine is only covered by a flat cover plate, which does not contain metal particles made effective by fragmentation, nor is it disintegrated into effective fragments through the detonation.

The scatter effect demonstrated in FIG. 4 only occurs when the spring mine is not inclined in the buried con-

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dition before launching or during the launching compared to the attitude illustrated in FIGS. 3 and 4. This is attained with the spring mine in accordance with the invention through the good anchoring of the base plate 9 in the ground and also through the guidance between the plunger 10 and the bore of the cylinder tube 5 disposed inside the mine.

FIG. 5 shows diagrammatically one variation of form of a spring mine in accordance with the invention. By comparison to FIGS. 1 and 2 the spring mine of FIG. 5 differs only in the fact that the upper part of the mine body 1 is not formed conically but cylindrically.

I claim:

1. A spring mine including a mine body disintegratable into fragments under the action of a detonating bursting charge, a lower part of the mine body being formed arched downwardly so as to be substantially hemispherical and an upper part joined to the hemispherical lower part being formed generally cylindrical, said mine body consisting of metal particles embedded in a plastics material, a central, vertical bore in said mine body and being open in the region of the arched lower part, a guide plunger which is fixed to a base plate being received in said vertical bore, an ejector charge being disposed in the bore above the guide plunger, a drawing means is provided for detonating the bursting charge, said drawing means extending along the vertical central axis of said mine body, one end of said drawing means being anchored in the center of the base plate and the other end being connected to a securing element of a detonator for the bursting charge.

2. A spring mine as claimed in claim 1, comprising a vertically depending tube connected to said mine body extending within said guide plunger, said drawing means extending through said tube so as to be protected thereby.

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