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Heede et al.

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[54] **SPIN-STABILIZED PROJECTILE**

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[73] Assignee: **Rheinmetall GmbH**, Dusseldorf, Germany

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[52] **U.S. Cl.** **102/69**, 102/7.2, 102/68

[51] **Int. Cl.** **F42b 13/50**

[58] **Field of Search** 102/7.2, 9, 49.4, 102/49.5, 58, 59, 63, 67, 68, 69

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[57] **ABSTRACT**

A spin-stabilized projectile which comprises a casing having a front nose fuse connected with an ejection charge. A thrust plate is disposed at the rear of the ejection charge. A cluster includes at least one stick which is disposed between the thrust plate and the base, and clamping means are provided for holding together the cluster at its rear end and adapted to hold the cluster until leaving the casing.

6 Claims, 8 Drawing Figures

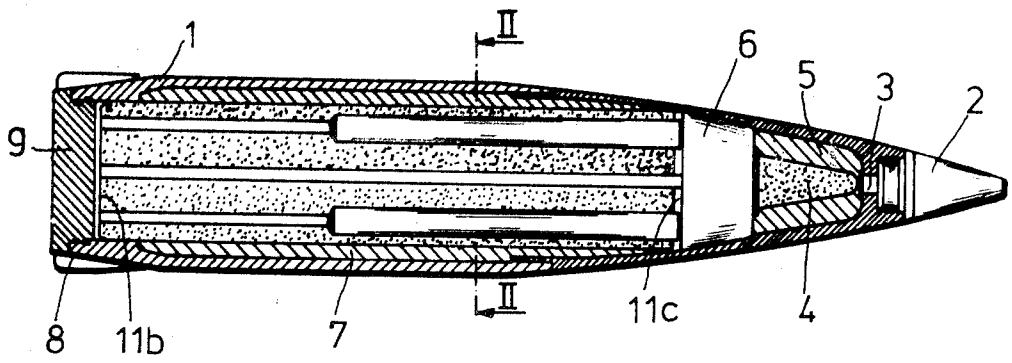


Fig. 2

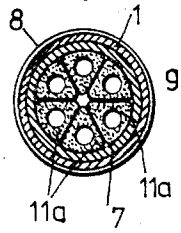


Fig. 1

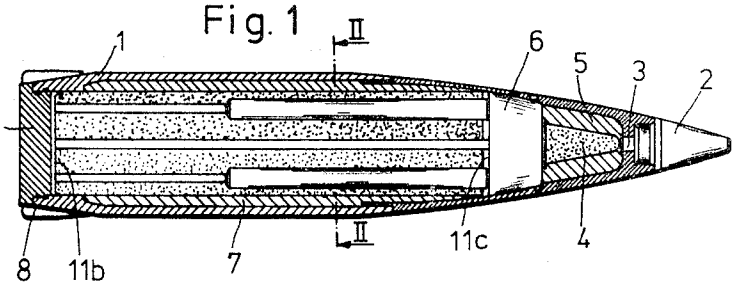


Fig. 3

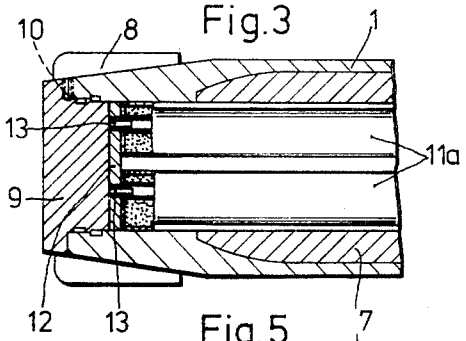


Fig. 4

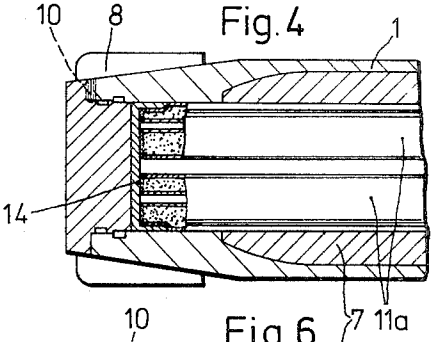


Fig. 5

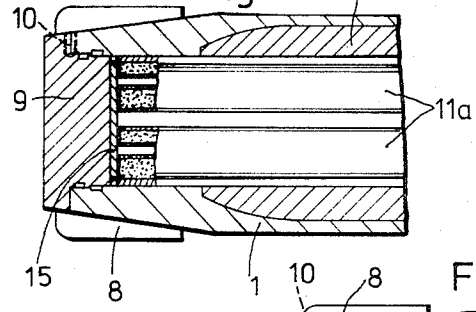


Fig. 6

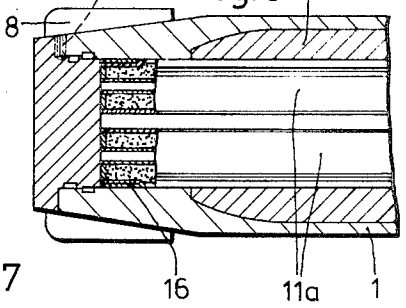


Fig. 7

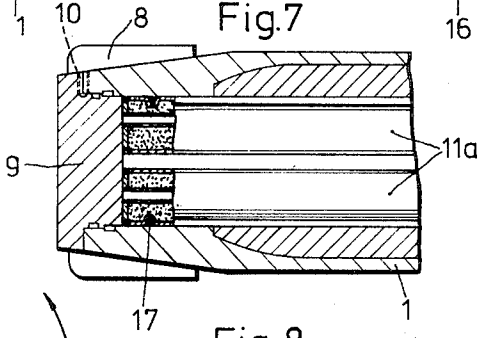
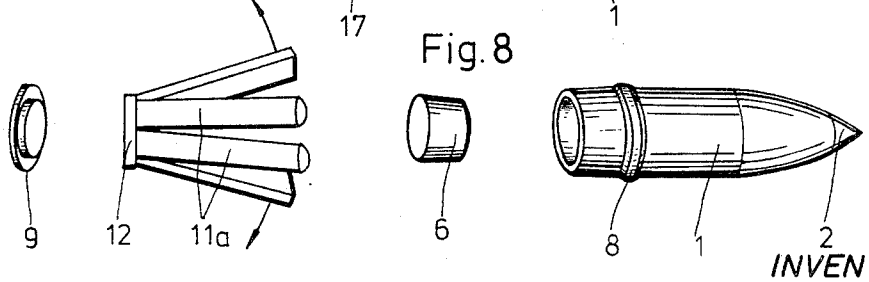


Fig. 8



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SPIN-STABILIZED PROJECTILE

The present invention relates to a spin-stabilized projectile of the type which houses a cluster of stick-like mines with the axes of the mines parallel to the longitudinal axis of the projectile, and in which at a certain point in the flight of projectile, the stick mines are ejected from the tail end thereof, so that the mines are scattered over a target area.

With such projectiles the mines, even though combined in a compact cluster, are subjected to considerable torsional stress on ejection owing to the spin twist of the projectile, and there also is a danger that the mines or some of them will jammed in the projectile casing. It is thus uncertain, whether all the mines of a cluster will be ejected accurately and evenly, so that the required laying configuration in a target area may not be obtained. Further, deformation may occur, rendering the detonators incapable of operating correctly.

It is one object of the present invention, to provide a spin-stabilized projectile with an arrangement by which, when the cluster inside a projectile is ejected at the tail, the torsional stress to which the mines are subjected during the ejection is reduced to a level such that they will leave the projectile casing as a compact cluster without deformation or jamming, and will fall to spread evenly.

It is another object of the present invention to provide a spin-stabilized projectile, wherein the sticks of the cluster are held together by clamping means at their rear ends until the cluster leaves the casing of the projectile.

Thus, when the cluster is ejected, for example by an ejector charge in the projectile, the rear end of the cluster is held together until its front end leaves the casing, when clamping means release, for example due to the spin of the cluster moving same radially outwardly at the front end.

It is still another object of the present invention, to provide a spin-stabilized projectile, wherein a suitable clamping means may comprise a plate, which rests against the rear end surface of the projectile and which is connected by pins, spot welding or an adhesive, with each mine.

It is yet another object of the present invention to provide a spin-stabilized projectile, wherein another form of clamping means may comprise a cover over the rear end of the cluster. The cluster also could be held together by a band or wire surrounding the rear end thereof.

While the rear front end of the cluster is held together during ejection by the clamping means, the front end also maintains the form of a compact cluster so long as it is in the casing. After the cluster has emerged completely from the casing the cohesion of the sticks in the zone of the front end is nullified, so that the cluster opens at this end, individual sticks spreading radially. When the sticks have spread by an angle they become detached from the clamping means simultaneously and fall to the ground.

With these and other objects in view, which will become apparent in the following detailed description, the present invention, which is shown by example only, will be clearly understood in connection with the accompanying drawings, in which:

FIG. 1 is a longitudinal section showing a projectile with a cluster or rod mines;

FIG. 2 is a cross-section along the lines II—II of FIG. 1;

FIGS. 3–7 are fragmentary longitudinal sections of the tail of the projectile, with various forms of clamping means for the mines; and

FIG. 8 are elevations of the projectile and mines after ejection of the mines from the casing of the projectile.

Referring now to the drawing, the casing of the projectile has a front nose fuse 2, connected with an ejection charge 4 via a detonator housing 3. The charge 4 is secured in position by a surround comprising a plastic body 5. At the rear of the ejection charge 4 is a thrust plate 6 of truncated conical shape, which cone completely fills the projectile casing in this location.

At the wider side of the thrust plate 6 is provided a filling piece 7, having a cylindrical internal bore and extending approximately to a guide strip 8. A base 9 of the projectile is secured in position with respect to the projectile casing 1, not only by its square thread with which it is screwed into the casing 1, but also by means of a shear pin 10. These two securing devices are dimensioned so that the base cannot become detached until the ejection operation has been completed.

Between the thrust plate 6 and the base 9 of the missile six stick mines 11*a* are combined to form a cluster 11, which because of their cross-section and the fact that their longitudinal axes are parallel to that of the projectile casing, substantially completely fill the cylindrical cavity in the casing 1. Each mine 11*a* consists of a steel plate or light metal jacket and is filled with an explosive with an embedded fuse. That end surface 11*b* of the cluster 11 towards the base 9 of the missile is wholly or partly covered, as may be seen from FIG. 3, by a plate 12 which, in its turn, is connected with each mine 11*a* by a pin 13.

Another means of clamping the rod-type mines 11*a* on their end surface 11*b* consists of a cover 14, of which the edge is mounted over the outer surface of the cluster 11 (FIG. 4).

Yet a further clamping means is provided by a plate 15 which rests against the end surface 11*b* and which is attached to each mine 11*a* by spot welding or adhesive (FIG. 5).

The cluster 11 can also be held together by means of a steel band 16 or steel wire 17 stretched over the outer surface in the zone of the end face 11*b* (FIGS. 6 and 7).

A common feature of all the clamping means is that they hold the mines 11*a* of a cluster 11, so forming a compact stack or assembly, as long as the front end surface 11*c* of the cluster 11 is within the projectile casing 1.

After the end surface 11*c* of the cluster 11 has left the projectile casing 1, however, the cohesion of the rods 11*a* in the zone of the end surface 11*c* no longer exists so that, owing to the twist of the projectile, the cluster 11 can open up at this end through the action of the sticks which spread radially, as shown in FIG. 8.

When the cluster opens still further and a certain angle of conicity is reached the connections between the clamping means and the rod-type mines 11*a* break, so that the said mines fall individually, but in a certain order, to the ground, to cover a certain pre-selected target area.

The present invention is not confined to the examples shown. For example, more or less than six mines can be used.

The carriers for the mines may also consist of spin-stabilized rockets.

While we have disclosed several embodiments of the present invention, it is to be understood, that these embodiments are given by example only and not in a limiting sense.

We claim:

1. A spin-stabilized projectile comprising

a casing having a front nose fuse connected with an ejection charge and a base,

a thrust plate disposed at the rear of said ejection charge,

a cluster including at least one stick being disposed between said thrust plate and said base,

a plate to which said at least one stick is attached, and

clamping means for holding together said cluster at its rear end and adapted to hold said cluster until leaving said casing.

2. The projectile as set forth in claim 1, wherein said clamping means comprises a plate which rests against the rear end of said cluster ; and

said plate is connected with said stick by pins.

3. The projectile, as set forth in claim 1, wherein said clamping means comprises a plate which rests against the rear end of said cluster ; and

said stick is attached to said plate by spot-welding.

4. The projectile, as set forth in claim 1, wherein said clamping means comprises a plate which rests against the rear end of said cluster ; and

said stick is attached to said plate by adhesive.

5. The projectile, as set forth in claim 1, wherein said clamping means comprises a cover of which the edge is mounted over a part of the outer surface of said cluster, in the zone of the rear end face of the latter.

6. The projectile, as set forth in claim 1, wherein said clamping means comprises a band surrounding said cluster in the zone of the rear end face of the latter.

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