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(54) **Base plug for artillery projectiles.**

(57) The base plug comprises a main element (1) and a secondary element (3) constrained to one another so that the secondary element (3) can move within predetermined limits (6,7) with respect to the main element (1).

When the projectile is still or in flight, prior to the splitting up, the two elements (1,3) form an assembly whose center of gravity is on the spin axis of the projectile.

At the time of ejection of the useful load, the two elements move away from one another because of the centrifugal force and make the center of gravity eccentric with respect to the trajectory of the useful load. In this manner the base plug is deviated laterally to said trajectory and, since it always remains a single assembly without parts separating from it, there is no danger that some of these parts (1,3) interfere with the trajectory of the useful load ejected from the projectile.

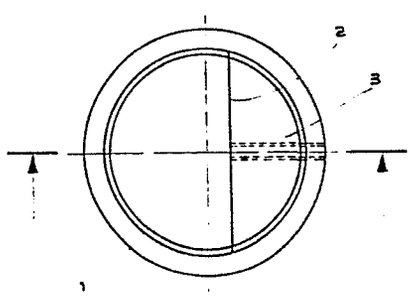

FIG. 2

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Base plug for artillery projectiles

The present invention relates to base plugs for artillery projectiles provided with a spin motion and intended to eject a useful load, said base plug consisting of two or more mobile elements stably connected to one another so that the assembly is symmetrical with respect to the axis of the projectile and at the time of splitting up said elements, by moving the one with respect to another, cause a misalignment of the center of gravity of said system by moving it away from the trajectory of the useful load.

It is well known that when an artillery projectile is fired, simultaneously a translation and spin movement is imparted to it by the pression exerted by the combustion gases of a propellant explosive, which pressure is transmitted through the base plug applied on the tubular portion of said projectile. Said base plug must be separable from the projectile when its purpose is to bring on a predetermined target a useful load, for example an illuminating or smoke producing canister, which is ejected from said projectile at the time of splitting up and falls to ground generally suspended to a parachute.

It is therefore desirable that the base plug, once separated from the projectile does not go to interfere with the trajectory of the useful load, because in such a case the load could be damaged. As a result, arrangements have been provided and are well known to avoid that such a disadvantage may occur.

Thus, it is for example known the provision of a base plug with an eccentric structure which, by utilizing the spin of the projectile around its axis of symmetry, at the time of splitting up is moved away from the trajectory of the useful load by the centrifugal force deriving from the asymmetry of the masses. It has been, however, noted that the asymmetry of the base plug required for assuring this deviation makes the whole projectile instable and jeopardizes its performance. In fact, in order to withstand the high pressures of the gases of the impulse charge, the base plug must have a solid structure, which causes an eccentricity of the whole projectile which spins therefore about an axis different from the axis of symmetry. This fact is sensed particularly by the ogival portion of the projectile and therefore also by the time fuse secured to its end; and it is well known that a defective operation of a fuse can have as a result failure of ejection or an ejection at a wrong time of the useful load.

It is also well known that composite structure base plugs have been provided comprising a separable centering element inserted in a cavity provided in the base plug itself. This assembly has a symmetrical distribution of the masses and therefore does not cause any

misalignment of the projectile in a not split up condition, which is thus stable on its trajectory. At the time of splitting up,the components of the base plug are thrown each in a different direction by the centrifugal force and go out from the trajectory of the load. Also in this case, however, there is not excluded the possibility that, being the two components per se comparatively light, they interfere with the functional element of the useful load, for example the parachute.

It is an object of the present invention to eliminate this disadvantage.

More particularly it is an object of the invention a base plug for artillery projectiles, characterized in that it consists of a main substantially cylindrical element and one or more secondary elements, stably connected to the main element by means of a fastening device which allows their movement with respect to said main element and/or the one with respect to another along a predetermined path defined by two limit stops, said secondary elements being disposed in recesses provided in the main element and forming therewith an assembly which is coaxial to the projectile prior to its splitting up.

A so constructed base plug has the advantage that it has a symmetrical distribution of the masses prior to the splitting up and after the splitting up has a center of gravity eccentric with respect to the spin axis of the projectile, thus making possible its mowing away with respect to the trajectory of the useful load.

The advantage is thus achieved to have a single heavy element moving in air and to reduce in this way the danger of interference in flight with the useful load.

The invention will be better understood from the following detailed description, given merely as an example and therefore in no limiting sense, of an embodiment thereof, referring to the accompanying drawings, in which:

Fig. 1 is an axial cross-sectional view of a base plug according to the invention;

Fig. 2 is a top plan view of the base plug of Fig. 1, and

Fig. 3 is a cross-section, to an enlarged scale, taken along line 3-3 of Fig. 1.

Referring to said figures, the base plug consists of a main plate 1 forming the main element, in a recess 2 of which a movable crescent plate 3 is disposed forming the secondary element, single in the present case. Secured in the plate 3 is a hexagonal-head screw 4 which engages, by means of its portion projecting from the plate 3, a slot 5 with a T cross-section provided in the main plate 1 and defined by two limit stop abutments 5 and 7.

The described base plug operates as follows:

With the projectile still and during its trajectory prior to the splitting up, the parts 1 and 3 have the

position shown in the figures, in which the center of gravity of the assembly is on the spin axis of the projectile. At the time of ejection of the useful load the base plate moves away from the projectile and because of the centrifugal force due to the spin of the base plug as a result of the spin imparted to the projectile at firing, the plate 3 has the tendency to get detached from the plate 1 and to move away from the axis of the assembly in the direction of the slot 5 guided in its travel by the engagement of the screw 4 in the slot 5. As a result of this movement the center of gravity of the assembly plate 1 - plate 3 is shifted with respect to the spin axis of the assembly. At the end of its moving away travel the screw 4 is stopped by the limit stop 6 whereby the two parts remain permanently constrained to one another. However, because of said shift of the center of gravity of the assembly, the latter is deviated laterally with respect to the trajectory of the useful load ejected from the projectile and, since it is integral, there is no danger that some part there of interferes in flight with the useful load.

In the described example the relative motion of the two parts is linear. Nothing prevents, however, from making the guide provided in one of the two parts so as to obtain a non linear relative motion.

Generally, while but one embodiment of the invention has been illustrated and described, a number of changes and modifications can be made without departing from the scope of the invention.

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Claims

1. Base plug for artillery projectiles provided with a spin motion and intended to eject a useful load, for example an illuminating or smoke producing canister, characterized in that it consists of a main substantially cylindrical element and one or more secondary elements, stably connected to the main element by means of a fastening device which allows their movement with respect to said main element along a predetermined path defined by two limit stops, said secondary elements being disposed in recesses provided in the main element and forming therewith an assembly which is coaxial to the projectile prior to the splitting up.

2. Base plug as claimed in claim 1, characterized in that the fastening device between the main element and one or more secondary elements consists of a pin secured to one of said elements and engaging a slot provided in the other element and defined by two limit stops.

3. Base plug as claimed in claim 2, characterized in that the pin consists of a shaped-head screw and the slot has a T cross-section.

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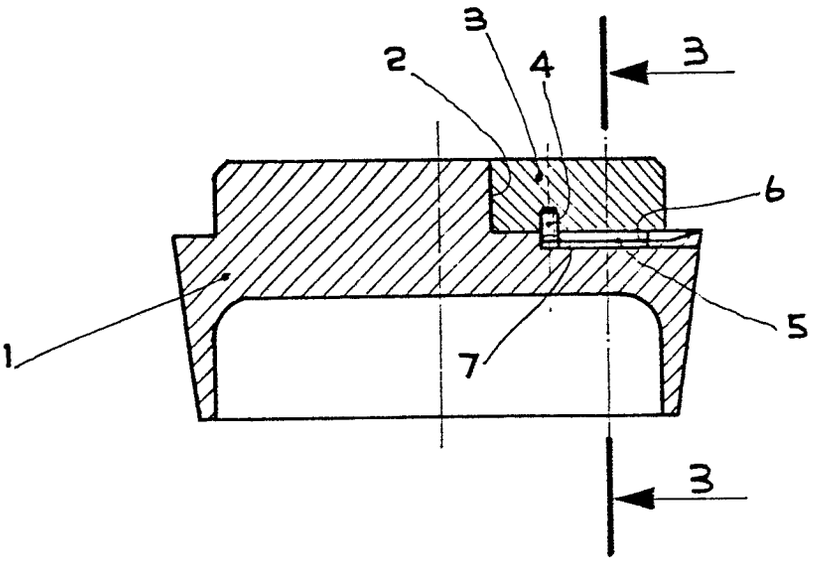

FIG. 1

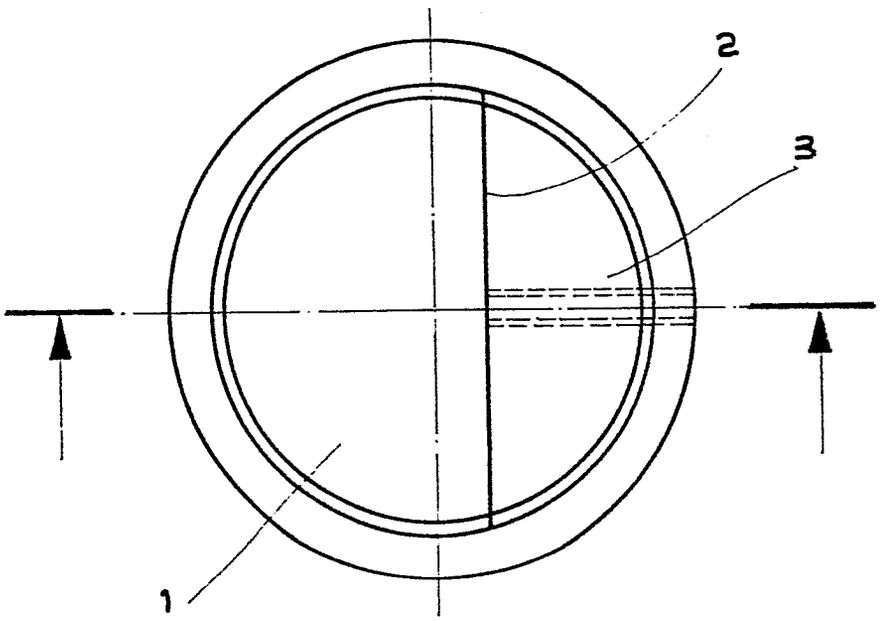

FIG. 2

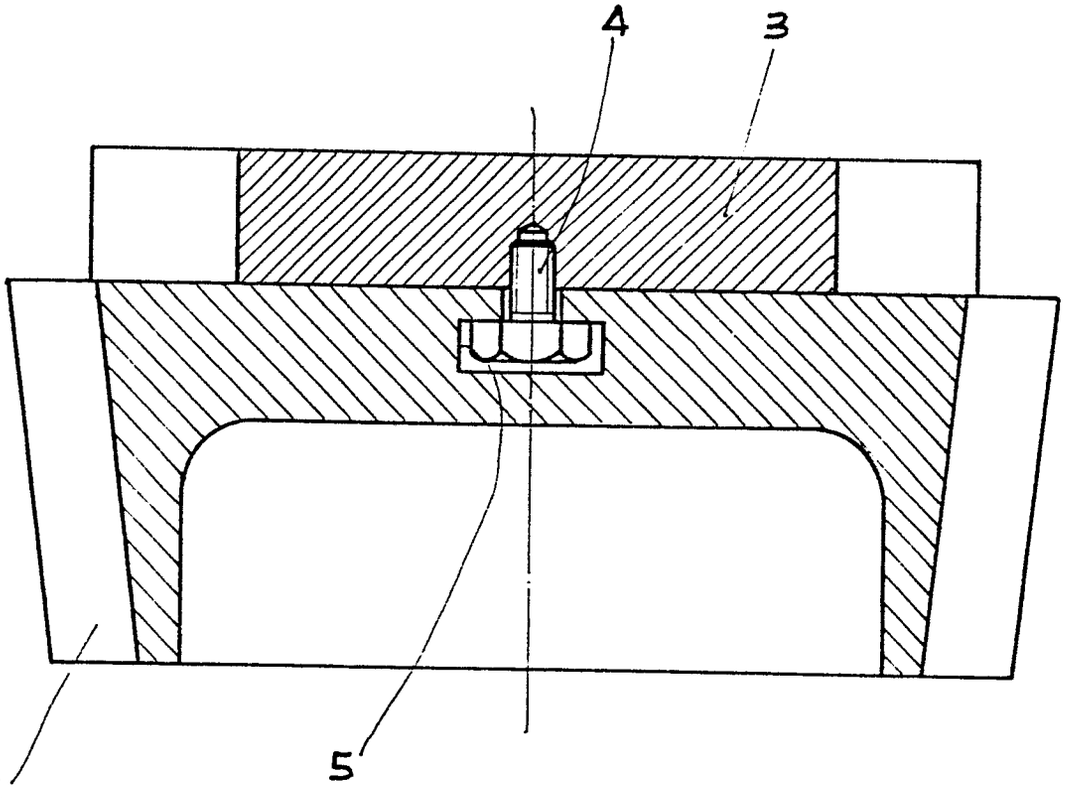

FIG. 3