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(54) Method for separating warheads.

(57) The invention relates to a method for separating an actuation part (3) from a non-spin-stabilized missile, for example a winged shell or the like, by means of first removing the front or rear part of the missile. Thereafter, the remaining missile part (4) together with the actuation part (3) rolls, in which respect the actuation part is slung off from the missile part by the centrifugal force and is positioned to the side of the trajectory of the missile part. Also described are arrangements for facilitating the separation method.

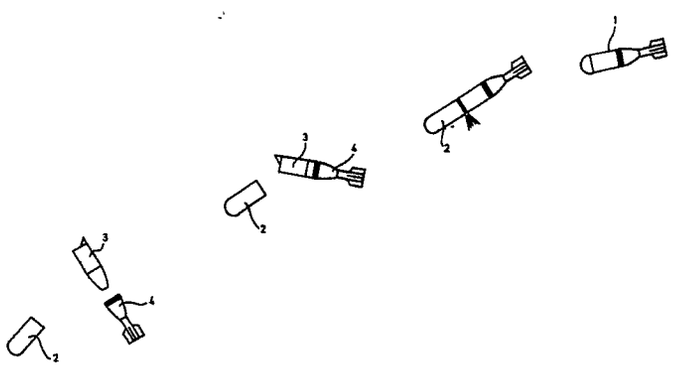

FIG 1

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SEPARATION METHOD FOR ACTUATION PARTS

The present invention relates to a method and arrangement for separating an actuation part from a non-spin-stabilized missile, for example a winged shell or the like.

When an actuation part is to be separated from a non-spin-stabilized missile, for example a winged shell, the actuation part will be positioned to the side of the trajectory of the missile so as not to collide with other missile parts.

This separation can be carried out in several ways. When the missile is divided into a front and rear part, one known method involves the actuation part being positioned to the side of the trajectory by means of a band being secured via a receiving element on the front part and pulled round behind the actuation part and attached to the front edge of the rear part of the missile. When the front and rear parts of the missile are separated, the actuation part is lifted by the steel band out of the rear part and, in the final stage when the band is stretched, acquires a velocity perpendicular to the direction of flight.

The disadvantage of the method described is that it is sensitive to variations in the strength and design of the components included.

When the missile has been divided into a front and rear part, another known method is to let a rocket motor lift the actuation part out of the rear part of the missile.

The disadvantage of this method is that the actuation part is not positioned to the side of the missile trajectory in a controlled manner.

Another known method for smoke shells is to have the actuation part and the rear part of the missile constitute one unit. Following an impulse from a rocket motor, which turns the missile, the front body is separated from the rear part of the missile, after which a parachute is released from the separation section of the rear part and lands the actuation part at a suitable, low velocity.

The disadvantage of the above method is that it requires a special rocket motor for turning the missile, and the construction is difficult to apply to illuminating shells.

The aim of the present invention is to provide a separation method and arrangement for an actuation part in non-spin-stabilized missiles which in a simple manner positions the actuation part to the side of the trajectory of the missile. The characteristic features of the invention emerge from patent claim 1.

The invention will be described in greater detail below with reference to the attached drawings, in which

Figure 1 shows the separation method

Figure 2 shows the actuation part with an oblique front end surface

Figure 3 shows the actuation part with a guiding fin at the front end

Figure 4 shows the actuation part with a laterally directed impulse transmitter.

Figure 1 shows a missile 1 commencing a separation procedure in the top right-hand corner of the figure. The missile can be, for example, a winged shell which has been fired from a shell thrower in a conventional manner in a stable ballistic trajectory, that is to say the centre of gravity of the missile lies with an adequate margin in front of the common point of impact of the air forces, the centre of pressure, so that the shell seeks to fly with its longitudinal axis in the direction of the trajectory tangent. The actuation part can be a lighting unit for illuminating the target area.

The separation procedure begins when the front part 2 of the missile is caused to separate from the rest of the missile, consisting of the actuation part 3 and the rear part 4 of the missile, for example by means of an internal overpressure from a pyrotechnic charge. By designing these parts in a suitable manner so that the centre of pressure is in front of the centre of gravity after the front part of the missile has been removed, according to the prior art the actuation part and the rear part of the missile become unstable and roll round. If the centre of gravity of the actuation part lies in front of the centre of rotation, the actuation part 3 is slung off from the rear part 4 of the missile by the centrifugal force and ends up to the side of the missile trajectory.

If a body is exposed to an impinging medium, in this case air, it is subject to external forces. The rolling of the actuation part and of the rear part of the missile can be achieved or reinforced by means of a special design of the actuation part.

By means of the front end surface 5 of the actuation part being made oblique, see Figure 2, when the front part 2 of the missile has been removed it is possible, by means of impinging wind, to achieve a transversal force which acts counter to the direction of flight and which gives rise to a tipping moment on the actuation part and the rear part of the missile. With correctly adjusted stability, the actuation part and the rear part of the missile roll round and the actuation part is thrown out from the rear part and the common trajectory.

The same effect as described above is achieved with a forward-directed guiding fin 6 sitting on the actuation part, see Figure 3.

The asymmetrical front ends of the actuation part as described also acquire an impulse, coop-

erating with the air forces, from the internal gas pressure separating the missile, if such is used. The impulse arises at the moment when the separation of the front body is completed and it is emptied of the separating gases.

In order to achieve a tipping moment on the actuation part and the rear part of the missile, a pyrotechnic charge or rocket motor 7 can also be used, which gives an impulse directed transverse to the trajectory, see Figure 4.

The above description of the invention is based on the assumption that the front part of the missile is first removed and the actuation part thereafter separates from the rear part of the missile during rolling. However, the separation method is equally applicable when the rear part of the missile is the first part to be separated. The arrangements above can also be designed so that they are adapted to this case.

The advantages of the invention are its simple construction and its use of the impinging of the air and, if appropriate, the impulse from the gases separating the missile, or a simple pyrotechnic charge, for tipping the actuation part and rear body and thereby initiating a separation by means of the effect of the centrifugal forces.

Claims

1. Method for separating an actuation part from a non-spin-stabilized missile, for example a winged shell or the like, in which respect the actuation part upon separation is positioned in a trajectory such that it does not collide with other missile parts, characterized in that the separation is achieved by means of first separating the front or rear part of the missile and by means of the fact that the actuation part (3) is thereafter thrown off from the remaining missile part (4) by the centrifugal force during a rolling movement.

2. Method for separating an actuation part according to patent claim 1, characterized in that the exposed end of the actuation part (3) is asymmetrical in relation to the longitudinal axis of the missile, as a result of which the actuation part (3) and the remaining missile part (4) are given a tipping moment by means of air forces.

3. Method for separating an actuation part according to patent claim 2, characterized in that the exposed end surface (5) of the actuation part is oblique relative to the longitudinal axis of the missile.

4. Method for separating an actuation part according to patent claim 1, characterized by a guiding fin (6) sitting on the end surface of the actuation part, by means of which guiding fin the actuation part and the remaining missile part are given a tipping moment by means of the air forces.

5. Method for separating an actuation part according to patent claim 1, characterized in that an impulse transmitter, for example a pyrotechnic charge, sitting on the actuation part gives the actuation part and the remaining missile part a tipping moment.

6. Method for separating an actuation part according to patent claim 1, characterized in that the exposed end of the actuation part is designed in such a way that gas from dividing of the missile by means of internal over-pressure gives the actuation part and the remaining missile part a tipping moment.

7. Actuation part for a non-spin-stabilized missile, for example a winged shell or the like, according to patent claim 1 and designed to be separated from the missile and positioned in a trajectory so that it does not collide with other missile parts, characterized in that the actuation part (3), after separation of the front or rear part of the missile, is designed to be thrown off from the remaining missile part (4) by the centrifugal force during a rolling movement.

8. Actuation part according to patent claim 7, characterized in that the end exposed upon separation is asymmetrical relative to the longitudinal axis of the missile, as a result of which the actuation part and the remaining missile part are given a tipping moment by means of air forces.

9. Actuation part according to patent claim 8, characterized in that its exposed end surface (5) is oblique relative to the longitudinal axis of the missile.

10. Actuation part according to patent claim 7, characterized in that its exposed end surface comprises a guiding fin (6), by means of which the actuation part and the remaining missile part are given a tipping moment by means of the air forces.

11. Actuation part according to patent claim 7, characterized in that an impulse transmitter, for example a pyrotechnic charge (7), is arranged on its exposed end surface in order to give the actuation part and the remaining missile part a tipping moment.

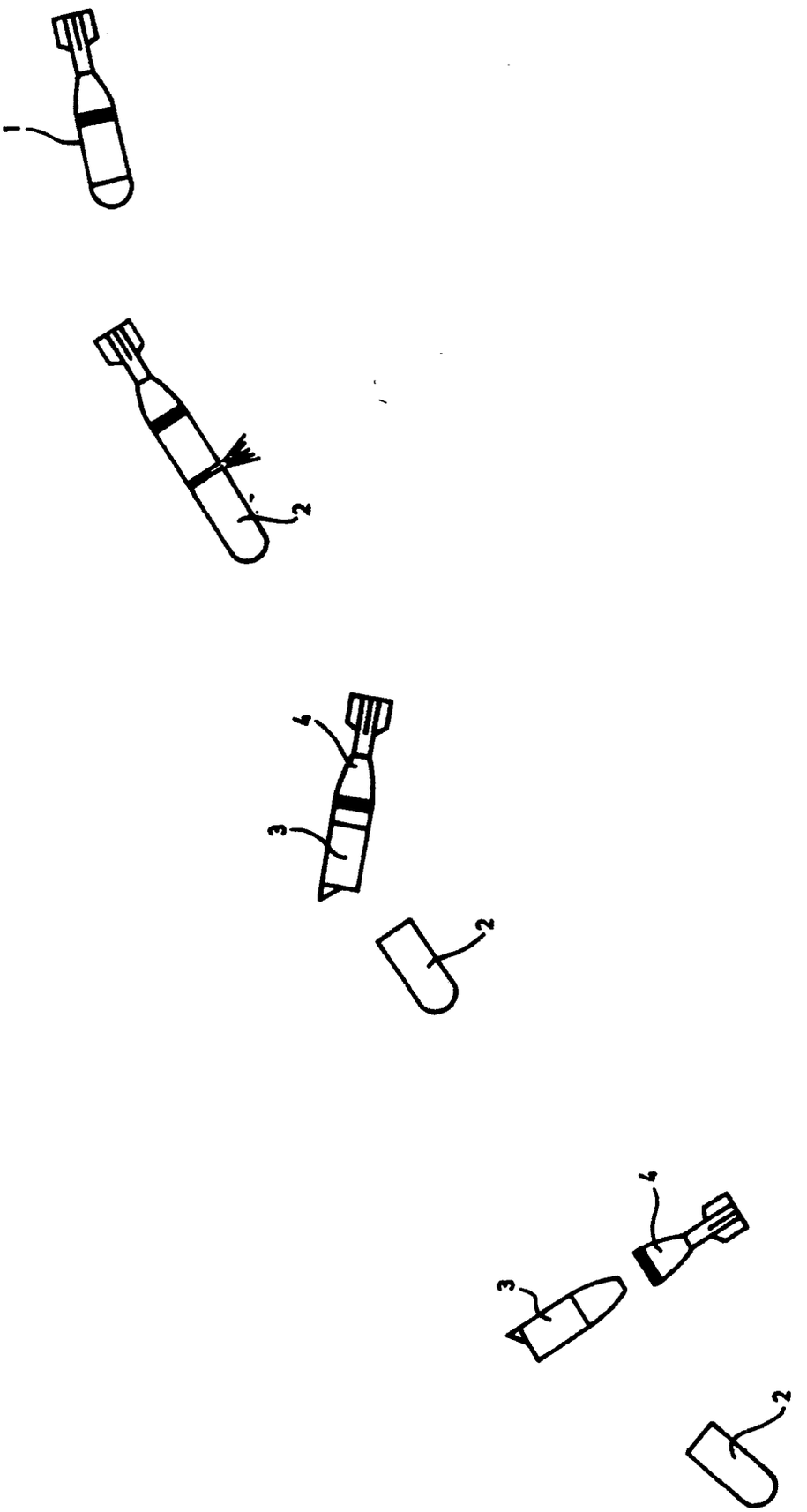

FIG 1

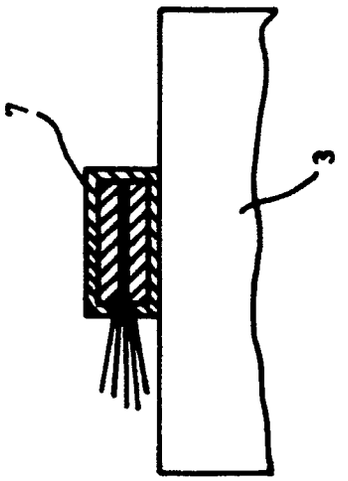

FIG 4

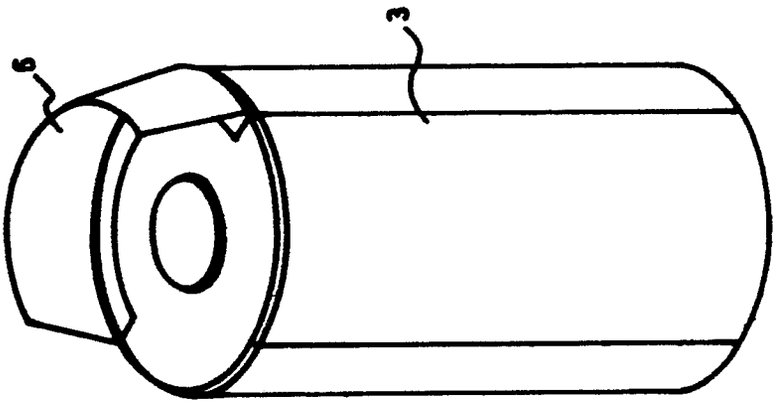

FIG 3

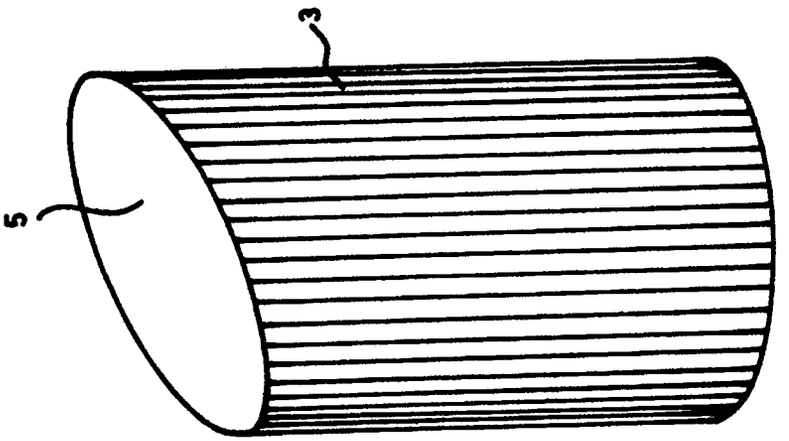

FIG 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 85 0280

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2 189 703 (THE STATE OF ISRAEL) * page 2, line 34 - page 3, line 3; figures 1-3c * * page 3, line 31 - page 4, line 11 *	1-3,6-9	F 42 B 15/36 F 42 B 12/62
X,A	US-A-2 654 320 (R. SCHMID) * column 1, lines 14 - 19; figures 1-10 * * column 2, line 44 - column 3, line 4 @ column 4, lines 7 - 37 @ column 6, lines 12 - 34 *	1-3,5,6,8, 9,11	
A	LU-A-5 624 3 (THOMSON-HOUSTON) * page 4, line 25 - page 5, line 1; figures 1-7 * * page 5, lines 10 - 66 *	11	
A	US-A-3 534 686 (N. WATSON) * column 2, line 62 - column 3, line 6; figures 1, 2 *	11	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) F 42 B

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	08 November 90	VAN DER PLAS J.M.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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