Oct. 13, 1953 G. E. HANSCHE 2,655,105

MOTOR DROPPER

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FIG. 2.

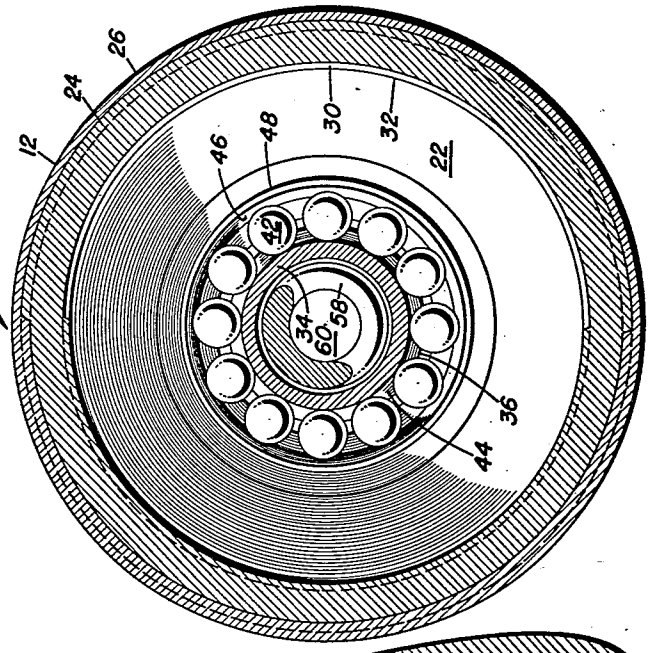
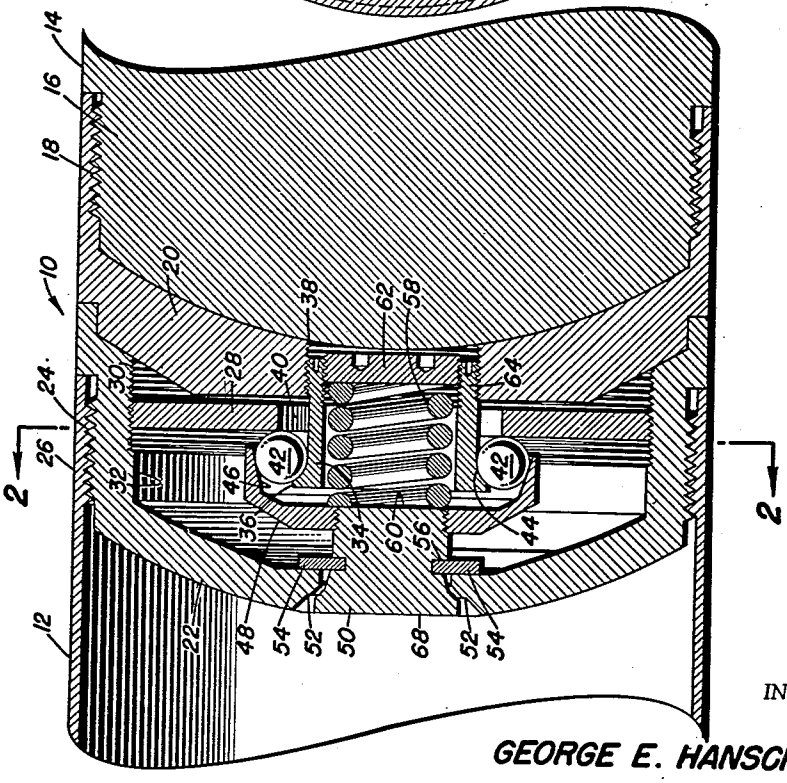


FIG. 1.



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MOTOR DROPPER

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This invention relates to an improved rocket missile of the spinning or rotating type.

A rocket missile or projectile of the spinning or rotating type generally consists of two sections, that is, a warhead section and a rocket motor section. The impulse from the rocket motor section propels the missile until its propellant is completely consumed, after which the projectile warhead section continues along its trajectory by momentum. Due to the fact that the rocket motor section may interfere with proper operation of the projectile warhead section, because of after-burning which leaves ionizing gases and flame, and because of mechanical disturbances to the flying system which prevent the fuze mechanism from functioning properly, it has been found desirable for best operating conditions to release the rocket motor section from the projectile warhead section after the propellant has been fully burned or consumed.

It is one of the objects of the present invention to provide improved means for effecting the separation of the rocket motor section from the missile warhead section after the propellant in the rocket motor section has been consumed.

Still another object of this invention is to provide means for releasing the motor section of a rocket projectile which will be efficient and reliable in operation.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawing, and in which:

Fig. 1 is an axial section of a rocket missile of the spinning or rotating type, showing the releasing means according to the invention; and

Fig. 2 is a cross section on the line 2—2 of Fig. 1.

In accordance with the invention, means are provided for effecting the separation of the rocket motor section from the projectile proper after the propellant has been consumed, for that type of aerial missile designed to spin or rotate in flight. This is accomplished by means of a releasable coupling which is provided between the motor section and the projectile warhead section of the aerial missile. This coupling includes cooperating shoulders on the motor and projectile sections, balls arranged to engage the cooperating shoulders, a tapered cup surrounding the balls and holding them in engagement, and a plunger on the cup which is acted on by the gas

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pressure from the rocket propellant to hold the cup in engagement with the balls.

A spring is also provided for moving the cup away from the balls upon reduction of the gas pressure on the plunger. Detents are provided to prevent action of the spring prior to the firing of the rocket missile. These detents are freed by the action of the gas pressure on the plunger, and they are disengaged by the action of the centrifugal force set up by the rotation or spin of the missile during its course of flight. After the rocket propellant has been consumed, the gas pressure on the plunger decreases until it is overcome by the pressure due to the springs. When this occurs, the cup is forced clear of the balls, thereby permitting them to be thrown clear of the cooperating shoulders by centrifugal force to unlock the coupling means and thus separate the rocket motor section from the missile warhead section.

Referring now to the figures of the drawing, there is shown an aerial missile 10 of the rocket spinning or rotating type which consists generally of a rocket motor section 12 and a warhead section 14. The rear end 16 of warhead section 14 is of reduced diameter and is threaded as indicated at 18. A fitting 20 of hollow shape is screwed onto the reduced end 16 of warhead section 14. Fitting 20 mates with a cup-shaped fitting 22 which is screwed, by threads 24, into the internally threaded forward end 26 of the rocket motor section 12.

A disk 28 is screwed into the threaded portion 30 of a cup-shaped cavity 32 in the motor fitting 22 for a sufficient distance to clear the end of the warhead fitting 20. A tube 34 having a radial flange 36 is secured in a central bore 38 in the warhead fitting 20 and projects through an axial opening 40 in the disk 28.

Steel balls 42 are forced radially inward against the tube 34 and between its shoulder 44 and the disk 28 by the camming action of the inclined inner wall 46 of a cup 48 carried on a threaded plug 50 extending through a tapered axial bore 52 in the motor fitting 22. Detents 54 are inserted in apertures or kerfs 56 in the plug 50 to prevent backward movement of the plug 50 and cup 48 due to the pressure of a spring 58 enclosed in the tube 34 and bearing against the forward end 60 of the plug 50 and against a disk 62 closing the forward end 64 of tube 34.

Balls 42 lock the two sections 12 and 14 together against the separating effect of the spring 58 by reason of their being placed between the disk 28 and the radial flange 36 of the tube 34.

At the same time, the detents 54 are prevented from dropping out of the apertures in the plug 50 because they are forced against the forward wall of the motor fitting 22 by spring 58.

Having described the invention, the operation thereof will now be explained briefly. After the aerial missile 10 has been launched and is in free flight, the gas pressure in the rocket motor section 12 acts against the rear end 68 of the plug 50 and forces it slightly forward, causing it to seat in the tapered wall 52 in the motor fitting 22, and simultaneously releases the detents 54, so that they can be dislodged by centrifugal force set up by the spinning or rotating of the aerial missile 10.

At the end of the burning period of the propellant in the rocket section 12, the gas pressure decreases to a value at which the spring 58 can force the plug 50 and cup 48 rearwardly to release the balls 42, which are then thrown radially outward due to centrifugal force caused by the spinning projectile 10, and thus unlock the disk 28 and the tube 34. The rearward motion of the plug 50 and the cup 48 pushes the plug 50 from the tapered wall 52 of the motor fitting 22, admitting gas pressure to the cavity 32 between fitting 22 and the projectile fitting 20 to force the projectile section 14 and the rocket motor section 12 apart. The projectile or warhead section 14 will then continue along its trajectory or course of flight and motor section 12 will drop earthwardly.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In combination with a pair of separable bodies having cooperating shoulders, a releasable coupling arrangement including means engaging said shoulders, a tapered ring normally retaining said engaging means in engagement with said shoulders, a source of pressure in one of said separable bodies, pressure-operated means retaining said tapered ring in engagement with said engaging means, locking means for said pressure-operated means, and a spring for moving said tapered ring out of engagement with said engaging means, said tapered ring being displaced by said spring upon reduction of the gas pressure below that of the spring pressure to permit release of said engaging means and separation of said shoulders, whereby said separable bodies will be permitted to separate.

2. In combination with a pair of separable bodies having cooperating shoulders, a releasable coupling arrangement including a plurality of balls engaging said shoulders, a tapered ring normally retaining said balls in engagement with said shoulders, a source of pressure in one of said separable bodies, pressure-operated means retaining said tapered ring in engagement with said balls, locking means for said pressure-operated means, and a spring for moving said tapered ring out of engagement with said balls, said tapered ring being displaced by said spring to permit release of said balls and separation of said shoulders, whereby said separable bodies will be permitted to separate.

3. In a spinning aerial missile consisting of two separable sections, a source of pressure in one of said sections, a releasable coupling arrangement between said sections including cooperating shoulders on said sections, means engaging said cooperating shoulders, a tapered cup surrounding said engaging means for holding said engaging means in engagement with said shoulders, said cup being arranged to be acted upon by said pressure from said pressure source, a spring for moving said cup away from said engaging means upon reduction of pressure, and detents engaging said cup to prevent action of said spring prior to the first application of said pressure, as during the assembly and transportation of the missile, said detents being disengaged by application of pressure on the cup in combination with the action of the centrifugal force set up by the spin of the missile in flight.

4. In a spinning aerial missile consisting of two separable sections, a source of pressure in one of said sections, a releasable coupling arrangement between said sections including cooperating shoulders on said sections, balls engaging said cooperating shoulders, a tapered cup surrounding said balls and holding said balls in engagement with said shoulders, said cup being arranged to be acted upon by said pressure source, a spring for moving said cup away from said balls upon reduction of pressure, and detents engaging said cup to prevent action of said spring prior to the first application of said pressure, as during the assembly and transportation of the missile, said detents being disengaged by application of pressure on the cup in combination with the action of the centrifugal force set up by the spin of the missile in flight.

5. In a spinning, rocket-propelled aerial missile consisting of two separable sections, a releasable coupling arrangement for said sections including cooperating shoulders on said sections, balls engaging said cooperating shoulders, a tapered cup surrounding said balls and holding them in engagement, a plunger on said cup and arranged to be acted on by gas pressure of the missile propellant to hold said cup in engagement with said balls, a spring for moving said cup away from said balls upon reduction of the gas pressure on said plunger, detents engaging said plunger to prevent action of said spring prior to the firing of said missile, as during the assembly and transportation of said aerial missile, said detents being freed by action of the gas pressure on said plunger and disengaged by action of the centrifugal force set up by the spin of said aerial missile in flight; whereby when said propellant of said aerial missile is consumed during flight, the gas pressure on said plunger drops until overcome by the spring pressure, which forces the cup clear of said balls, thereby permitting them to be thrown clear of the cooperating shoulders by centrifugal force to unlock said coupling and thus separating said separable sections of said aerial missile.

6. In a spinning, rocket-propelled aerial missile consisting of a projectile or warhead section and a rocket motor section, said sections being separable from each other, a releasable coupling arrangement between said sections including cooperating shoulders on said sections, balls engaging said cooperating shoulders, a tapered cup surrounding said balls and holding them in engagement, an axial bore in the forward end of said motor section, a headed plunger on said cup acted on by gas pressure of the rocket propellant to hold said cup in engagement with said balls and seat said cup in said axial bore, a spring for moving said cup away from said balls upon reduction of the gas pressure on said

plunger, detents engaging said plunger to prevent action of said spring prior to the firing of said rocket, as during the assembly and transportation of said missile, said detents being freed by action of the gas pressure on said plunger and disengaged by action of the centrifugal force set up by the spin of said missile in flight; whereby when the rocket propellant is consumed, the gas pressure on said plunger drops until overcome by the spring pressure, which unseats said plunger and forces said cup clear of said balls, thereby permitting them to be thrown clear of said cooperating shoulders by centrifugal force

to unlock said coupling and simultaneously admitting gas under pressure to the chamber surrounding said locking means forcibly to separate said motor and projectile sections.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,145,507	Denoix	Jan. 31, 1939
2,435,444	Johnsen	Feb. 3, 1948