

[54] FUSE FOR NON-GYRATORY MISSILES

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[75] Inventors: Robert Simmen; Olivier Chabloz,
both of Geneva, Switzerland

Primary Examiner—Samuel W. Engle
Attorney, Agent, or Firm—Emory L. Groff; Emory L.
Groff, Jr.

[73] Assignee: Mefina S.A., Fribourg, Switzerland

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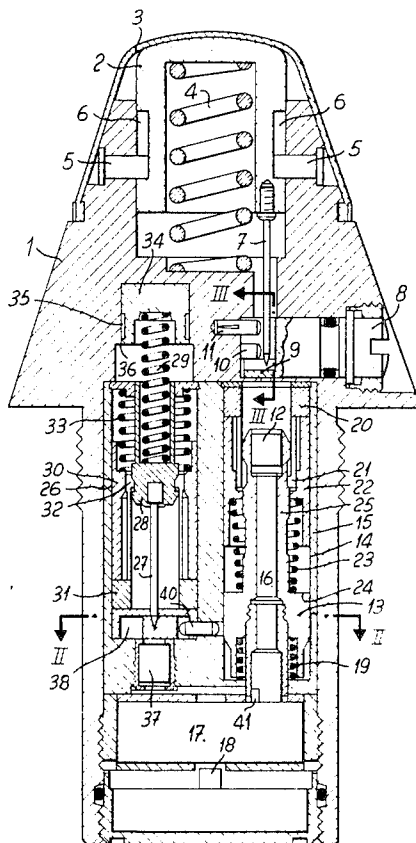
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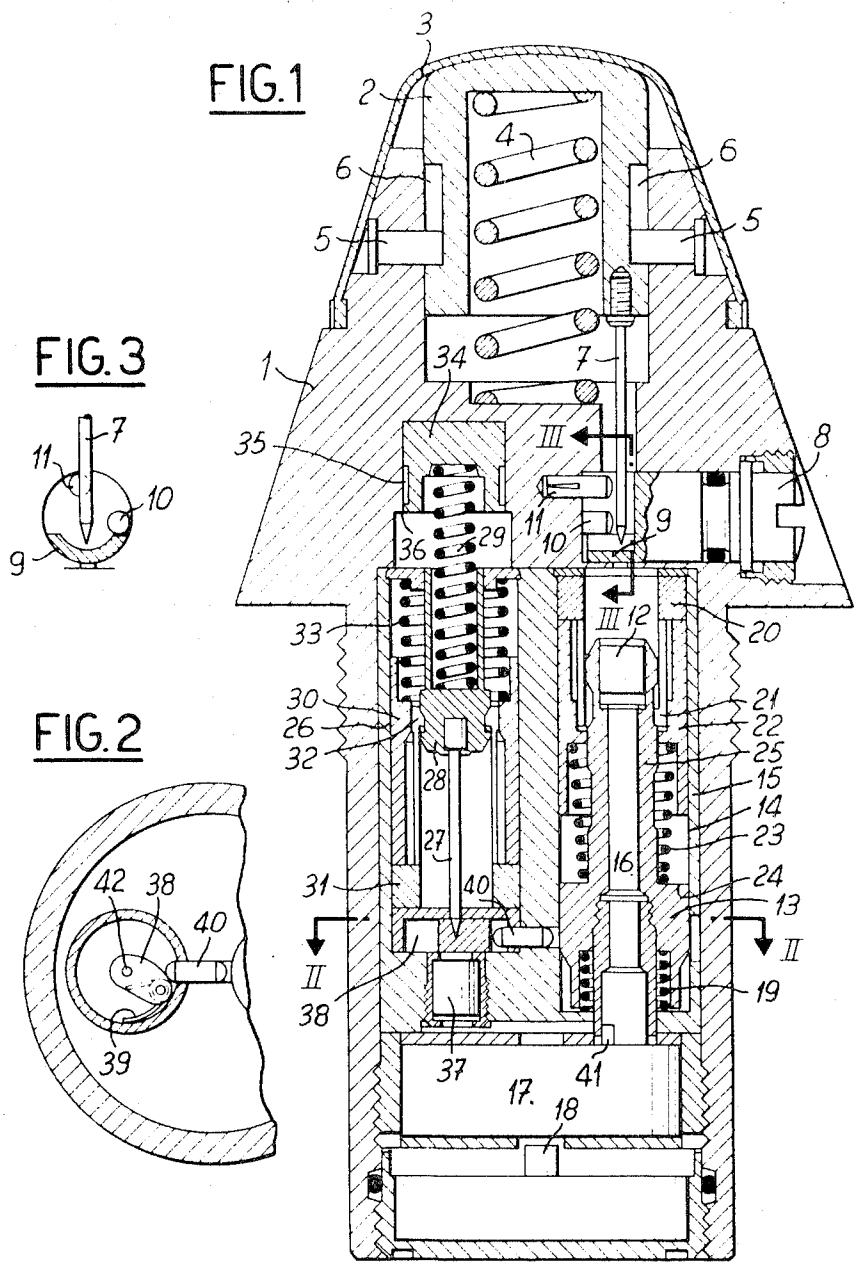
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[57] ABSTRACT

A fuse provided with two striker-and-detonator systems, one of which operates upon impact against a target and may be manually locked against operation and the other operates only with a predetermined lag after impact. The first system is adapted to be brought in all cases into a ready-for-operation condition at the moment of the firing of the missile, in which condition the member carrying the detonator of the first system is brought within reach of the corresponding striker while it simultaneously releases a safety interceptor extending between the striker and detonator of the system operating with a lag.

5 Claims, 3 Drawing Figures





FUSE FOR NON-GYRATORY MISSILES

Fuses for non-gyratory missiles are already known, which include a striker operating upon hitting of the target, a detonator adapted to move from a position for which it is beyond reach of the striker into a position for which it lies across the path of the striker, and a system providing delayed ignition.

The delayed ignition system is intended to allow the missile to enter to a more or less considerable extent into the target and possibly into the ground before exploding. In all known missiles, the delay is obtained by means of a load of powder inserted between the detonator and the primer and the combustion of which serves for igniting the primer. However, the delay provided by such arrangements is not uniform and varies in particular with their ageing.

The present invention has for its object a fuse the delayed ignition of which is independent of the ageing of the fuse and of the storing conditions provided for said fuse.

According to the invention, the improved fuse for non-gyratory missiles is provided in its delayed-ignition system with an auxiliary striker adapted to act with a lag on a second detonator while locking means are adapted to prevent operation of the main striker operating immediately upon impact on the target, if it is desired to delay the explosion of the missile.

The accompanying drawings illustrate by way of example an embodiment of the fuse improved in accordance with the invention. In said drawings:

FIG. 1 is a longitudinal cross-section of the fuse.

FIG. 2 is a fragmentary cross-section through line II-II of FIG. 1.

FIG. 3 is a cross-section of a detail through line III-III of FIG. 1.

The fuse illustrated includes a casing 1 the front section of which carries a longitudinally sliding head 2 covered by a readily deformable cap 3 made for instance of plastics. The head 2 is subjected to the action of a spring 4 which urges it against two guiding studs 5 which serve as abutments for the rear ends of the guiding grooves 6 formed in the sliding head 2. To said head 2 is also rigidly secured a main striker 7 adapted to produce instantaneously ignition of the main detonator up to hitting of the missile against the target.

Across the path of the main striker 7, there is fitted a locking mechanism constituted by a hand-operable rotary member 8 housed inside a bore extending radially through the wall of the casing 1. The outer end of said member 8 is in the shape of a screw head while its inner end forms an arcuate projection 9 which enters, according to the angular position given to the rotary locking member 8, a position either crossing the path of the striker 7 or else a position free of said path. The locking and releasing positions of the locking member 8 are defined by two studs 10 and 11 (FIG. 3) forming abutments for the corresponding ends of the arcuate projection 9. The main striker 7 serves for igniting the missile through action on the detonator 12 fitted inside a tubular member 13 slidably carried inside a longitudinal bore 14 formed inside a support 15 fitted in the casing 1. The tubular member 13 is provided with an axial bore 16 leading the flame from the burning detonator towards a safety device 17 the detail of which is not illustrated since it is well known per se. Said safety device is provided with at least one channel connect-

ing, when the missile is cocked, the end of the bore 16 with a primer 18 adapted to ignite the missile. A primer may in fact be fitted inside such a channel in the safety device 17.

The sliding tubular member 13 is subjected to the pressure of the spring 19 which urges it forwardly, so as to bring the detonator 12 into the vicinity of the main striker 7, so that it may be hit by the latter immediately the missile impinges on the target. However, the sliding of the tubular member 13 is prevented by a further locking mechanism constituted by an annulus 20 carrying elastic longitudinally directed tongues 21, the rear free ends of which engage on one side a peripheral groove in the tubular member 13 and, on the other side, a groove in the inner periphery of a sliding sleeve 22 located to the rear of the annulus 20 round the tubular member 13. Said sliding sleeve 22 is normally held with reference to the member 13 in the position illustrated in FIG. 1 by a spring 23.

When a shot is fired, the axial acceleration of the missile causes the sleeve 22 to move rearwardly by reason of its inertia with reference to the body of the missile against the pressure of the spring 23. The sleeve 22 impinges thus against a shoulder 24 formed on the rear end of the tubular member 13, whereby the tongues 21 are released and are shifted downwardly together with the annulus 20 while expanding outwardly, so to move past the peripheral bead 25 at the lower end of the groove in the tubular member 13. At the end of said axial acceleration, the tongues 21 are held in their shifted position to the rear of said peripheral bead 25 by the sleeve 22. Consequently, the tubular member 13 is no longer locked in the position illustrated and can move forwardly inside the missile together with the annulus 20 and the sleeve 22 under the action of the spring 19. The detonator 12 is then within operative reach for the striker 7, provided the arcuate projection 9 is set in the position for which it allows the striker to move.

The fuse includes, on the other hand, a delayed ignition system of a mechanical type, which system is housed inside a longitudinal bore 26 parallel with the bore 14. This mechanical delayed ignition system forms a structure very similar to the safety mechanism associated with the detonator 12. It includes an auxiliary striker 27 carried by a support 28 subjected to the action of a spring 29 which is normally in a non-tensioned condition. Said support 28 is held in the forward position illustrated by a sleeve 30 and an annulus 31 provided with elastic longitudinal tongues 32 clamped between the sleeve 30 and the support 28 in a manner similar to that disclosed for the tongues 21 of the safety mechanism illustrated on the right hand side of FIG. 1; the sleeve 30 is subjected similarly to the pressure of a spring 33.

The spring 29 acting on the support 28 engages the bottom of a recess formed in a cylindrical block 34 sliding inside the casing 1 and provided with a peripheral groove housing an elastic ring 35. Said sliding cylindrical block is urged rearwardly through inertia upon firing of a shot, whereby the spring 29 is stressed. When the cylindrical block has thus receded, the ring 35 expands elastically and moves past the shoulder 36 defining the recess housing the block 34, which latter is thus locked in a position for which the spring 29 remains stressed.

The auxiliary striker 27 is adapted to cooperate with an auxiliary detonator 37 the combustion of which produces a flame which starts the ignition of the primer 18 through a second channel in the safety device 17.

When the fuse is at rest, it is impossible for the auxiliary striker 27 to reach the auxiliary detonator 37 since it is held against rearward motion by an interceptor constituted by a pivoting flap 38 clearly shown in FIG. 2. Said flap is subjected to the action of a spring 39, but it is prevented from moving by a transverse pin 40 slidably carried in a radial bore formed in the support 15.

The operation of the fuse is as follows, when it is desired to make use of the delayed ignition system:

Firstly, the locking member 8 is set in the position illustrated, so as to cause the striker, when the missile impinges against the target, to abut against said locking member and to prevent it from reaching the detonator 12.

When the shot has been fired and as already described, the tubular member 13 carrying the main detonator 12 is released and urged forwardly by the spring 19. During this movement, it releases a stud 41 locking the safety device 17, whereby the channels in the latter are brought into a position for which the primer 18 communicates both with the bore 16 leading to the main detonator 12 and with the auxiliary detonator 37.

When the shot is fired and as already mentioned, the spring 29 of the delaying system is also stressed by reason of the rearward movement of the block 34. Upon subsequent impinging of the missile against the target, the sleeve 30 of the delaying system moves forwardly against the action of the spring 33 and releases the elastic tongues 32. As soon as this occurs, the annulus 31 also moves forwardly with the latter. After said annulus 31 has been thus shifted, the support 28 moves also forwardly with the striker 27 towards the front of the missile. The free end of the striker 27 passes then out of a housing 42 provided for it in the interceptor 38, so that it is now possible for said flap 38 to collapse laterally under the action of the spring 39 (FIG. 2), since the radially shiftable pin 40 may then move in its radial bore opening towards a longitudinal bore 14 in the tubular member 13 of the main ignition system. As soon as the longitudinal acceleration produced by the arresting of the missile is reduced to zero, the support 28 is urged rearwardly by the spring 29 and the striker 27 hits the detonator 37 and produces the desired ignition of the missile.

The fuse described hereinabove is wholly reliable since it can be cocked only after the shot has been fired and only then can the axial acceleration be sufficiently high and last a sufficiently long time for it to provide for the release of the sliding tubular member 13. As long as the latter has not been shifted, the delayed ignition system cannot operate; in fact, even if the front end of the missile impinges against a hindrance with an energy sufficient for it to release the support 28 of the auxiliary striker 27, the latter cannot reach the auxiliary detonator by reason of the presence of the flap 38, while furthermore the spring 29 is not tensioned.

We claim:

1. In a fuse for a non-gyrotory missile, the combination of a main striker, a main detonator, means for bringing the detonator into a position within reach of

the main striker at the moment of the firing of the missile, said means including a longitudinally slidable carrier for the main detonator, a spring urging said carrier member towards the main striker, at least one longitudinally shiftable locking member holding said carrier member in an inoperative position and adapted upon firing of the missile to be shifted into a position releasing said carrier member, means causing the main detonator to be struck by the main striker upon impact of the missile against a target, hand operable means insertable between the main striker and the main detonator to thereby prevent said striker from operatively striking said detonator, an auxiliary striker, an auxiliary detonator, means causing said auxiliary striker to strike the auxiliary detonator with a predetermined time lag after said impact, missile-igniting means actuable by either detonator and a safety device extending to the rear of the two detonators and released by said locking member when the latter is shifted upon firing of the missile.

2. A fuse as claimed in claim 1, including an interceptor inserted between the auxiliary striker and the auxiliary detonator, means whereby the slidable carrier member locks said interceptor in its operative position and means controlled by said carrier member when released whereby said interceptor is shifted out of its operative position to allow operation of the means causing the striking of the auxiliary detonator by the auxiliary striker.

3. A fuse as claimed in claim 1, including a pivoting flap extending between the auxiliary striker and the auxiliary detonator, a spring urging said flap into an inoperative position allowing the auxiliary striker to strike the auxiliary detonator, a pin slidable transversely of the fuse and holding the flap in position against the tension of said spring, said means for bringing the detonator within the reach of the main striker including means operable upon firing of the missile to shift the carrier member into a position whereby detonator is within reach of the striker and said carrier member releases the slidable pin to allow operation of the auxiliary striker.

4. A fuse as claimed in claim 1, wherein said means causing said auxiliary striker to strike the auxiliary detonator includes at least one member adapted to lock the auxiliary striker against movement towards the auxiliary detonator and to be shifted through inertia at the moment of the impact into a position releasing the auxiliary striker and elastic means urging the auxiliary striker when released towards the auxiliary detonator.

5. A fuse as claimed in claim 1, wherein said means causing said auxiliary striker to strike the auxiliary detonator includes at least one member adapted to lock the auxiliary striker against movement towards the auxiliary detonator and to be shifted through inertia at the moment of the impact into a position releasing the auxiliary striker, elastic means urging the auxiliary striker when released towards the auxiliary detonator and a longitudinally slidable block against which said elastic means bear and which is shifted rearwardly at the moment of the firing of the missile to thereby stress said elastic means and provide it with the energy required for the striking of the auxiliary detonator by the auxiliary striker.