United States Patent [19]

Rabinow

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[45] **Jan. 7, 1975**

[54] **THERMAL ARMING SYSTEM**

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[73] Assignee: **The united States of America as represented by the Secretary of the Army,** Washington, D.C.

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[21] Appl. No.: **222,124**

[52] **U.S. Cl.** ..... **102/70.2 R,** 102/76 R

[51] **Int. Cl.** **F42c 15/00**

[58] **Field of Search** 102/70.2, 70, 78, 76

[56] **References Cited**

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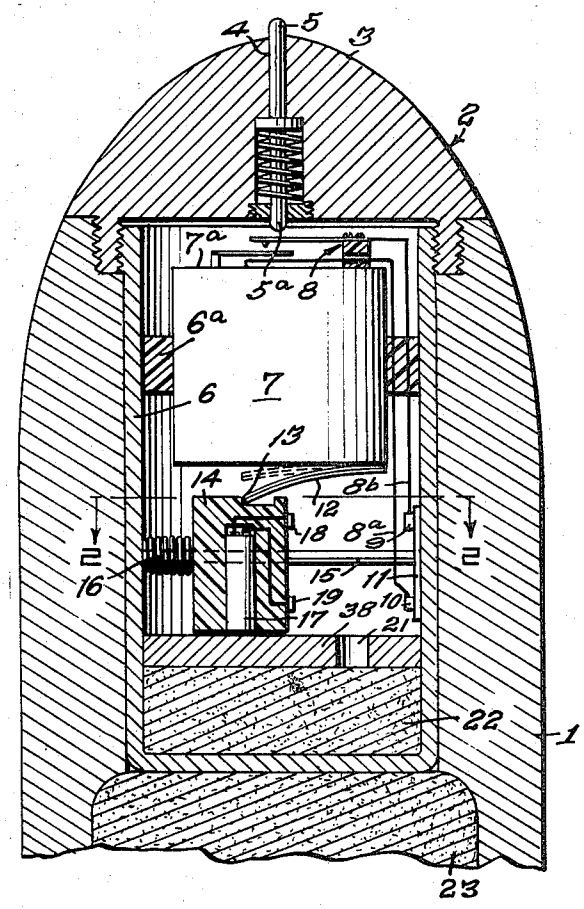
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EXEMPLARY CLAIM

1. An improved arming mechanism for use in a missile comprising: a nose member affixed to a cylindrical housing member, a spring loaded striker slidably mounted in said nose member, the first end of said striker protruding from the outermost surface of said nose member, the second end of said striker extending into said housing, a battery positioned in that end of said cylindrical housing member adjacent said nose member, a switch positioned between said second end of said striker and said battery and affixed to one end of said battery, said switch being so arranged as to be contacted and closed by said second end of said striker when said first end of said striker is pressed against said spring, a booster charge in the opposite end of said housing, a barrier adjacent the booster charge, a flash port in said barrier, an arming rotor having an arm extending therefrom, said rotor positioned intermediate said barrier and said battery, a detonator in said arm provided with leads connecting it to a pair of contacts on one surface of said arm, a pair of contacts connected to said switch, the pair of contacts on the arm surface being in circular alignment with the pair of switch contacts, a spiral bimetallic heat-responsive member having one end anchored to said battery and the other end anchored to said rotor, said spiral member unwinding in response to heat and causing said rotor to rotate, the rotation of said rotor arming said fuze by aligning said detonator with said flash port and pressing the pair of contacts on said arm into engagement with the switch contacts, said spiral member winding upon subsequent cooling and causing rotation of said rotor back to the position where the detonator is out of alignment with said flash port, said fuze thereby being disarmed.

1 Claim, 5 Drawing Figures



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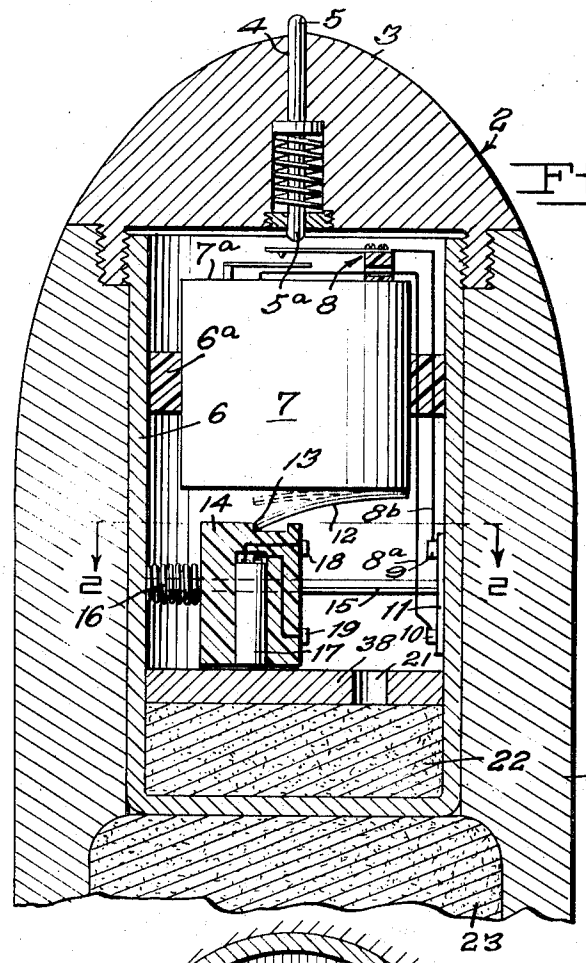


Fig. 1.

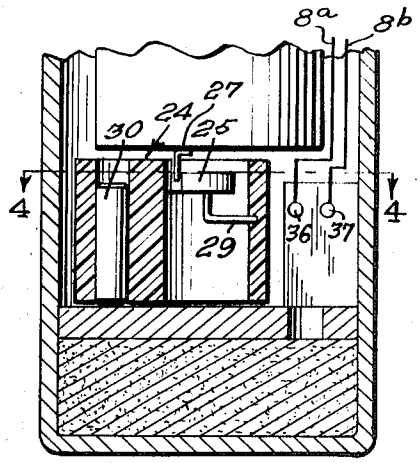


Fig. 3.

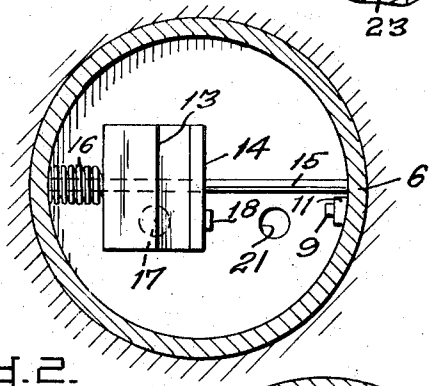


Fig. 2.

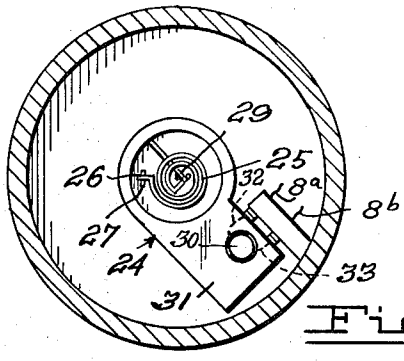


Fig. 5.

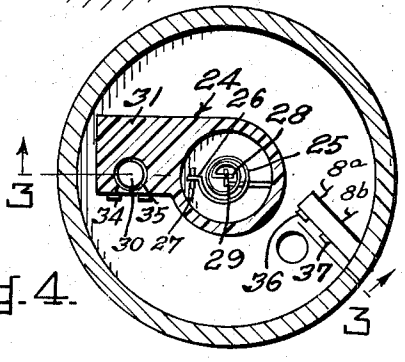


Fig. 4.

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THERMAL ARMING SYSTEM

This invention relates to fuses and especially to a thermal arming device for fuses.

An object of the invention is a fuse having thermal delay means therein to prevent premature firing.

Another object of the invention is a fuse having a bimetalic delay means in conjunction with a thermal battery to obtain arming delay.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from the following description and accompanying drawings in which:

FIG. 1 is a longitudinal cross section of one embodiment of the invention wherein a thermal cell and thermal arming delay means are employed in combination with a point detonating means.

FIG. 2 is a cross sectional view taken along the line 2 — 2 of FIG. 1.

FIG. 3 is a fragmentary longitudinal cross sectional view of a modification of the invention taken along line 3 — 3 of FIG. 4.

FIG. 4 is a cross sectional view taken along the line 4 — 4 of FIG. 3.

FIG. 5 is a view similar to that of FIG. 4, but showing the fuse in armed position.

Referring to FIG 1, there is shown an explosive missile 1 with the fuse 2 of the invention affixed thereto. The nose 3 of the fuse has a longitudinal bore 4 in which is positioned a spring balanced striker 5. A heat activated battery 7 of the type disclosed in the patents to Kitsee U.S. Pat. No. 713,652 or Gyuris U.S. Pat. No. 2,081,926, or by Vinal "Primary Batteries" pp. 324–329 (1950), is supported in the housing 6 by means of an annulus 6*a* or by any other suitable means so that the top 7*a* of the battery is spaced from the end 5*a* of the striker 5. A switch 8 is mounted on the top of the heat activated battery in cooperative relationship to striker 5. Leads 8*a* and 8*b* connect the switch 8 with the contacts 9 and 10 which are mounted on a strip of insulation 11 fastened to the inside wall of the housing. Mounted on the bottom of battery 7 is a bimetallic bar 12, one end of which is normally in engagement with a notch 13 of an arming block 14. The arming block is slidably mounted on a rod 15 and is urged into arming position by means of a spring 16 also mounted on the rod 15. The arming block has positioned therein a detonator 17 which is connected to two contacts 18 and 19 in one surface of the block. The contact members 18 and 19 are aligned with contacts 9 and 10. A partition 38 inside of the housing, adjacent the bottom thereof, retains a booster charge 22 in the housing and is provided with a flash passage 21.

When the projectile is fired, the burning compound in the heat activated battery is ignited through means operable by the forces of set back or electrical means, not shown. The heat produced by the burning compound causes a rise in the external temperature of of the battery whereupon the bimetallic bar 12 flexes and withdraws from the notch 13.

The arming block is then urged, under the influence of the spring 16, towards the opposite side of the housing to align the detonator with the flash passage and engage the contacts, placing the heat activated battery, detonator and switch in series. Upon impact of the missile with a target, the striker 5 is driven inward closing the switch 8. When switch 8 is closed an electric current flows from the heat activated battery through the series circuit to actuate the detonator. Action of the detonator is transmitted through the flash passage to the booster 22 and then to the bursting charge 23 causing the missile to explode.

FIG. 3 shows a modification of the invention wherein an arming rotor 24 and a spiral bimetallic member 25 are substituted for the block 14 and bimetallic bar 12 of the fuse shown in FIG. 1. The spiral member has one end 26 affixed to the bottom of the heat activated battery as indicated by 27 and its other end 28 to the rotor as indicated by 29. A detonator 30 is positioned in the arm 31 of the arming rotor 24 so that it will be in alignment with the flash passage when the fuse is armed. Leads 32 and 33 connect the detonator with contacts 34 and 35 which are positioned in arm 31 to register with contacts 36 and 37. The contacts 36 and 37 are connected to the switch 8 by means of leads 8*a* and 8*b*.

When the burning compound in the heat activated battery is ignited by means described in conjunction with FIG. 1 and when the heat from the battery has activated the spiral bimetallic member, either by conduction or radiation, the unwinding torsion of the member causes the arming rotor to rotate in a clockwise direction to arm the fuse as shown in FIG. 5. In the event that the striker does not make contact with the target, the rotor is caused to rotate in a counterclockwise direction by the spiral member winding as it cools and thus places the fuse in unarmed or safe condition, shown in FIG. 4.

I claim:

1. An improved arming mechanism for use in a missile comprising: a nose member affixed to a cylindrical housing member, a spring loaded striker slidably mounted in said nose member, the first end of said striker protruding from the outermost surface of said nose member, the second end of said striker extending into said housing, a battery positioned in that end of said cylindrical housing member adjacent said nose member, a switch positioned between said second end of said striker and said battery and affixed to one end of said battery, said switch being so arranged as to be contacted and closed by said second end of said striker when said first end of said striker is pressed against said spring, a booster charge in the opposite end of said housing, a barrier adjacent the booster charge, a flash port in said barrier, an arming rotor having an arm extending therefrom, said rotor positioned intermediate said barrier and said battery, a detonator in said arm provided with leads connecting it to a pair of contacts on one surface of said arm, a pair of contacts connected to said switch, the pair of contacts on the arm surface being in circular alignment with the pair of switch contacts, a spiral bimetallic heat-responsive member having one end anchored to said battery and the other end anchored to said rotor, said spiral member unwinding in response to heat and causing said rotor to rotate, the rotation of said rotor arming said fuze by aligning said detonator with said flash port and pressing the pair of contacts on said arm into engagement with the switch contacts, said spiral member winding upon subsequent cooling and causing rotation of said rotor back to the position where the detonator is out of alignment with said flash port, said fuze thereby being disarmed.

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