Sept. 23, 1969 S. HERSH ET AL 3,468,213

MISSILE CUTTING DEVICE

Filed Aug. 18, 1966 2 Sheets-Sheet 1

FIG. 1

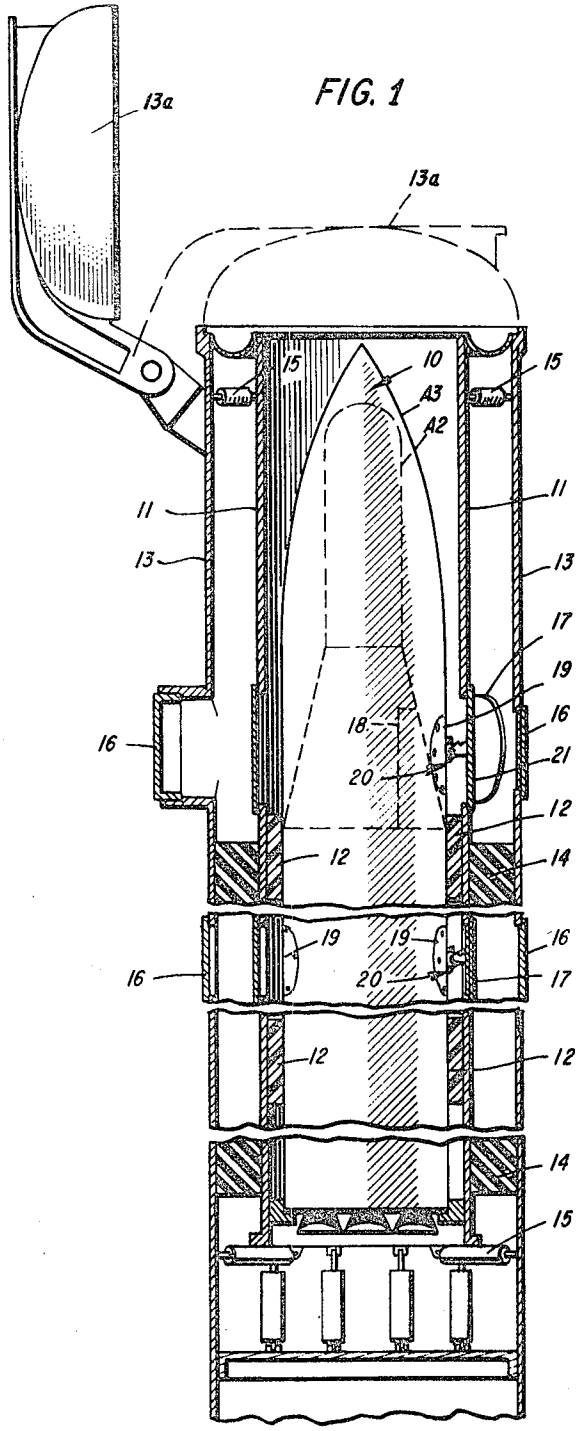
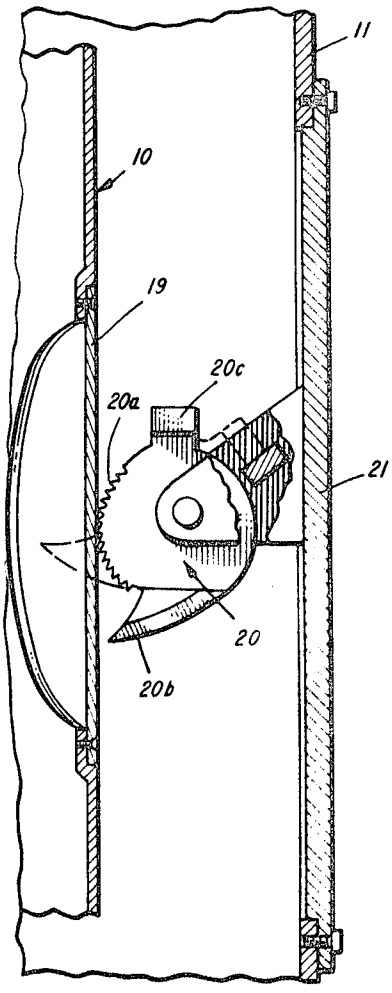


FIG. 2



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FIG. 3

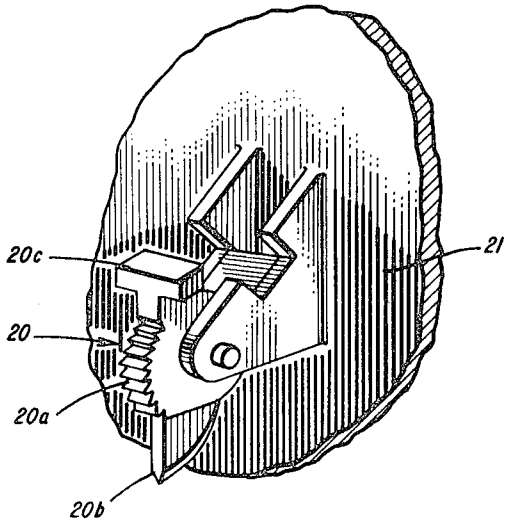
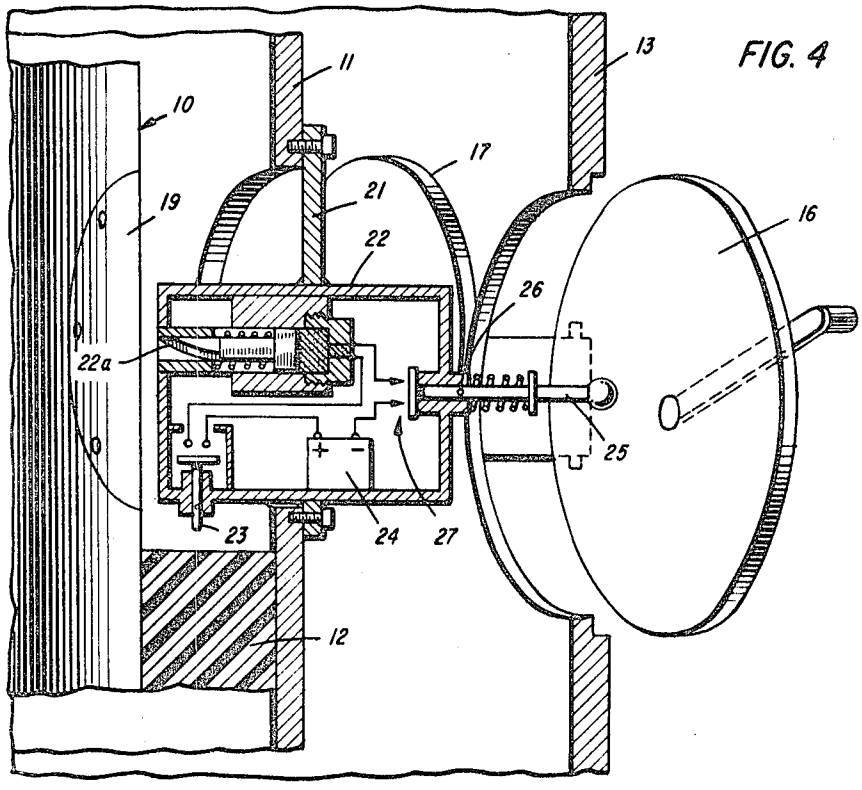


FIG. 4



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MISSILE CUTTING DEVICE

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U.S. Cl. 89—1.8 7 Claims

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates generally to missile launchers and, more particularly, to a means for disabling a missile from flying a trajectory path in case of in-launcher inadvertent ignition.

Missiles are commonly supported on some launch vehicle in a ready-launch position so as to facilitate immediate launch with little or no pre-launch preparation. In the case of the Polaris missile of the A2 or A3 version mounted in a typical SSBN launcher, muzzle hatches covering each launch tube opening remain closed at such times when missile launch is neither contemplated nor intended. These hatches are made to open when missile launch becomes desirable. However, when the launch vehicle is in port or at tender, the muzzle hatches on the SSBN launcher are normally open leaving no positive protection against the possibility of inadvertent launch taking place.

Accordingly, it is an object of the present invention to provide a means for preventing a missile from flying into a trajectory after being inadvertently ignited.

Another object of the present invention is to provide a means to cut open a missile if unintentional ignition takes place.

A further object of the present invention is to provide a means for cutting open a missile, upon inadvertent ignition, to allow its propellant force to be dissipated and thereby prevent the missile from being launched.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a vertical elevational view of a missile mounted in its launch tube with the muzzle hatch opened;

FIG. 2 is a partial side view of the present missile-cutting device shown in its relation to the missile;

FIG. 3 is a perspective view of the cutting device of FIG. 2; and

FIG. 4 is a view similar to FIG. 2 showing another embodiment of the invention.

In FIG. 1 of the drawings, an A3 type Polaris missile **10** is shown mounted within an inner launch tube **11** in the normal manner as by suitable launching shoes **12**. An outer launch tube **13** supports tube **11** therewithin in the conventional manner as by foam supports **14** and suitable spring means **15**. Tube **13** is provided with a muzzle hatch cover **13***a* and with access doors **16** through which admittance to tube **11** may be made. Inner tube **11** also is provided with access doors **17** which are in axial alignment with doors **16**. Upper door **17** is located in the proximity of the electronic missile guidance mechanism **18** situated in the first stage of missile **10**. Lower doors **17** are located on opposite sides of a portion of the missile's second stage. All the doors then, facilitate access to the first and second stages of the missile, for purposes of maintenance, inspection, etc., through suitably disposed, removable plates **19** on the missile body. When the doors **17** are closed, an indicator switch, not shown, at each door port is actuated thereby signaling to the panel operator the closed position of each door. When access doors **17** are closed and when muzzle hatch cover **13***a* is opened, the missile is in condition for firing. However, when the launch vehicle is in port or at tender, it may be desirable for hatch cover **13***a* to remain opened and for access doors **16** and **17** to be disengaged for purposes of servicing or inspecting portions of the missile through covers **19**. At such times, protection against an inadvertent firing of the missile must be provided in order to avert an incident which may be caused by the actuation of the nuclear warhead.

This protection is afforded by the missile-cutting device of the present invention which includes a cam **20** (see FIGS. 2 and 3) having serrations **20***a* along a portion of its arcuate face, a knife **20***b* projecting toward missile **10** and a stop element **20***c* projecting upwardly. Cam **20** is mounted in a suitable manner, on a plate **21** simulating the access door **17**. Plate **21** is installed into the openings of access doors **17**, in any suitable manner, thereby closing off the openings and at the same time in a manner such that the "door-closed" indicator switches are not operated. These switches relay to the panel operator the open-door position of doors **17**, thereby preventing the cutting device to be inadvertently left in place when its use is not needed, as when in tactical patrol operation.

Upon the accidental or unintentional firing of the missile with cover **13***a* opened and the plate **21** installed, cams **20** will be made to rotate in a clockwise direction as their serrations **20***a* contact the body of missile **10** upon upward movement thereof. Missile motion will force and cam knife **20***b* into a horizontal position, self-locking itself by means of stop element **20***c* engaging a stop recess formed in the cam support. The knife will thereupon puncture the covers **19** and as the missile continues upwardly, will cut the missile wall at both the first and second missile propellant stages below covers **19** allowing gas to escape and thus prevent trajectory travel of the missile.

In FIG. 4 of the drawings, another embodiment of the invention is shown wherein a box **22** containing an explosively driven plunger knife **22***a* is substituted for cam **20** and its knife **20***b*. Normally, knife **22***a* is in a retracted position within the box **22**. A firing microswitch **23** extends downwardly from box **22** in vertical alignment with shoe **12**, such that upon missile upward motion, the shoe **12** will make contact with switch **23** which will close the electric circuit with a battery **24** to the explosively driven plunger knife **22***a*. Explosive powder is contained within box **22** behind knife **22***a* in a suitable manner.

As an added safety feature of this embodiment, and before the circuit can be fully closed, a plunger rod **25** is provided in the outer face plate of box **22** and held in position by means of a shear pin **26** projecting therethrough. The rod **25** extends outwardly of door **21** a distance greater than the space between tubes **11** and **13**. Rod **25**, on its other end extending inwardly of door **21** is provided with an arming switch **27**. Upon closing outer door **16**, rod **25** is pushed inwardly, breaking shear pin **26** and thereby actuating switch **27**. Until door **16** is closed, plunger knife **22***a* cannot be explosively driven inadvertently during the handling or installing of box **21**. If, after door **16** is closed and microswitch **23** is nevertheless accidentally actuated, the effectiveness of the missile will not be destroyed by knife **22***a* because of cover plates **19** located directly in front of knife **22***a*. These plates can be easily replaced if punctured.

When outer door **16** is opened and inner door **17** is opened (because plate **21** has been installed in the door opening) and the missile is inadvertently fired, plunger knife **22***a* will be explosively driven into plates **19**. As the missile continues to move upwardly, a knife **22***a* will cut the wall just below plates **19** in the same manner as in the embodiment of FIG. 2, thereby allowing gas to escape and thus prevent trajectory travel of the missile.

It should be understood that the explosive plunger knife embodiment is not limited to the configuration shown in FIG. 4. As an alternative, box **22** could be disposed so that the outer surface of its inner face plate be coplanar with the inner face of tube **11**. A toggle switch disposed within the inner face plate would extend into the space above shoe **12**. Actuation of knife **22***a* would then be effected in the same way as hereinafter described as shoe **12** contacts the toggle switch. Such an alternative design would allow box **22** to remain intact upon inadvertent movement of the missile.

A second embodiment, not shown in the drawings, may be employed as a missile-cutting device. It includes simply a horizontal knife substituted for the cutting devices heretofore mentioned, mounted on plate **21** and projecting into the missile after covers **19** are removed therefrom. Upon an upward movement of the missile, the horizontal knife will cut that portion of the missile body just below the area of cover **19**. The disadvantage of this type device over the other above-mentioned devices is the possibility of neglecting to replace covers **19** after the cutting device has been removed.

The cutting devices heretofore described have all been in relation to the A3 Polaris missile as shown in FIG. 1 of the drawings. The cutting device of the present invention is also adapted for use with the A2 Polaris missile shown dotted in FIG. 1. In this type missile, the horizontal knife type cutting device becomes more feasible for the first stage since cutting will take place along the sloping surface of the missile wall without the necessity of removing any plate.

From the foregoing, it is evident that a missile-cutting means has been devised for preventing a missile from flying into a trajectory and possibly create an incident after being inadvertently ignited, the missile-cutting means additionally being simple and easy to manufacture, inexpensive and easy to install.

Obviously many modifications and variations of the present invention are possible in 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. A missile-cutting device in combination with a missile mounted within an inner launch tube and an outer launch tube, each of said tubes having a pair of axially aligned access doors in the vicinity of the first and second stages, respectively, of said missile, said device comprising:

an access door adapter plate disposed within each opening of said inner tube access doors;

missile penetrating means operatively mounted on each of said plates in the proximity of said missiles; and

means for actuating said penetrating means to move said penetrating means into said missile as it moves upwardly out of said launch tubes after inadvertent ignition takes place, said penetrating means thereafter cutting said missile upon continued movement thereof.

2. The combination of claim **1** wherein said actuating means comprises an eccentric disc having serrations along a portion of its perimeter in contact with said missile whereby the upward movement of said missile causes said disc to revolve and said knife to penetrate said missile.

3. The combination of claim **2** further comprising a stop means on said disc for self-locking said penetrating means into said missile.

4. The combination of claim **1** wherein said actuating means comprises:

an explosive charge; and

electrical circuitry for firing said charge thereby causing movement of said penetrating means into said missile.

5. The combination of claim **4** wherein said electrical circuitry includes:

an arming switch; and

a firing switch both of which must be closed in order for the firing of said charge to occur.

6. The combination of claim **5** further including a rod in combination with said arming switch, said rod being perpendicularly disposed in each of said adapter plates and extending beyond said outer tube access doors, whereby said arming switch may be closed upon the closing of said outer tube access door.

7. The combination of claim **5** further including lateral extensions on the body of said missile, said extensions serving as the means for mounting said missile within said inner tube, said firing switches being disposed in vertical alignment with said extensions whereby said firing switches may be closed upon contact of said extensions therewith.

No references cited.

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U.S. Cl. X.R.

89—1.812; 102—49.3