

[54] **ARMING DEVICE FOR ROCKET TYPE PROJECTILE LAUNCHING TUBE**

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[58] Field of Search 89/1.8, 1.806, 1.807, 1.808, 89/1.814

[56] **References Cited**

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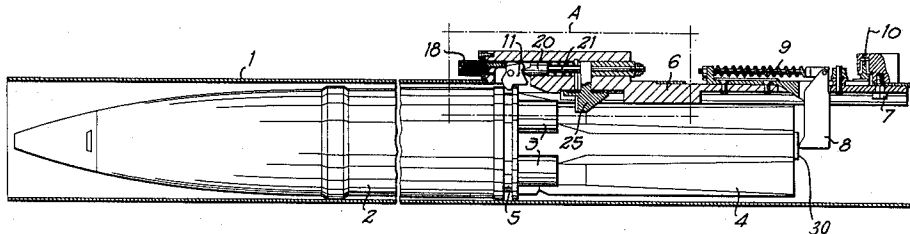
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[57] **ABSTRACT**

The invention pertains to an arming device for rocket type projectile launching tube, including the combination of a firing device, a withholding-releasing device and a common support, said device forming an interchangeable, respectively reusable unit.

4 Claims, 11 Drawing Figures



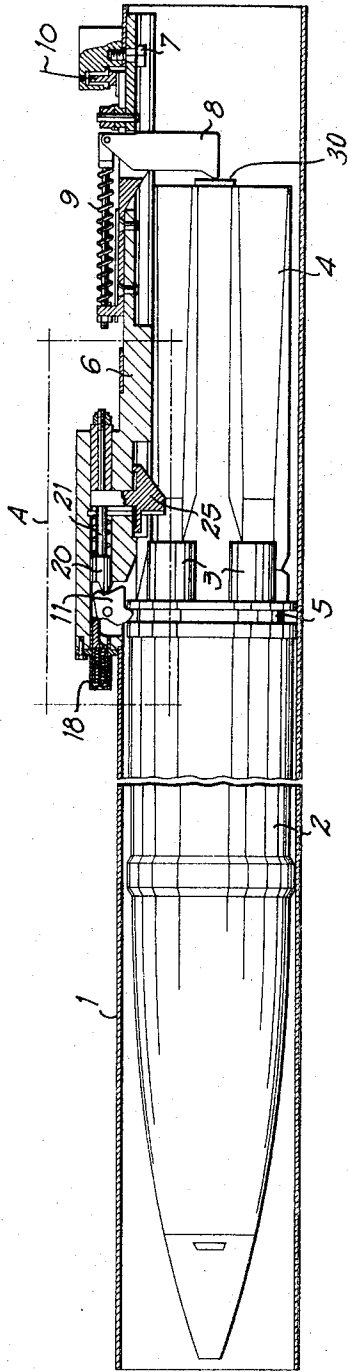


Fig. 1

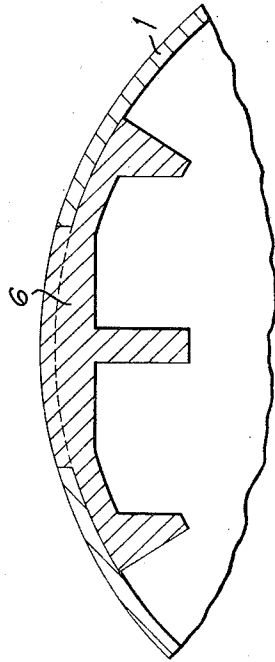
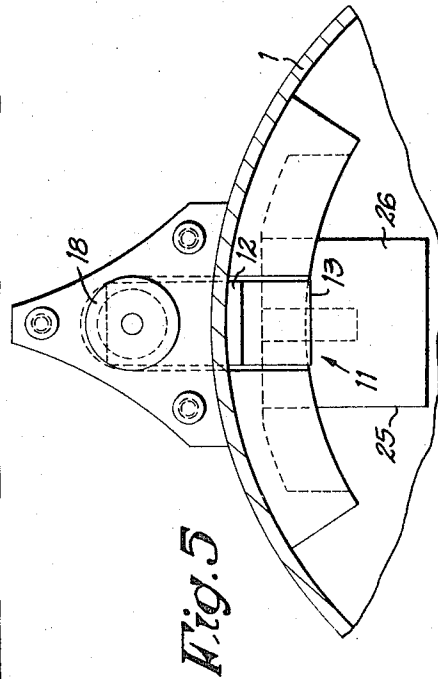
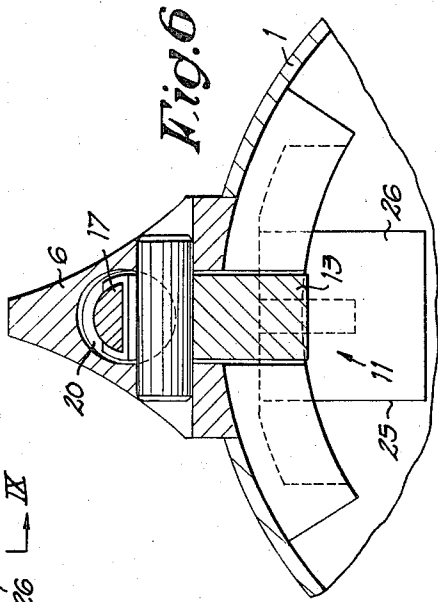
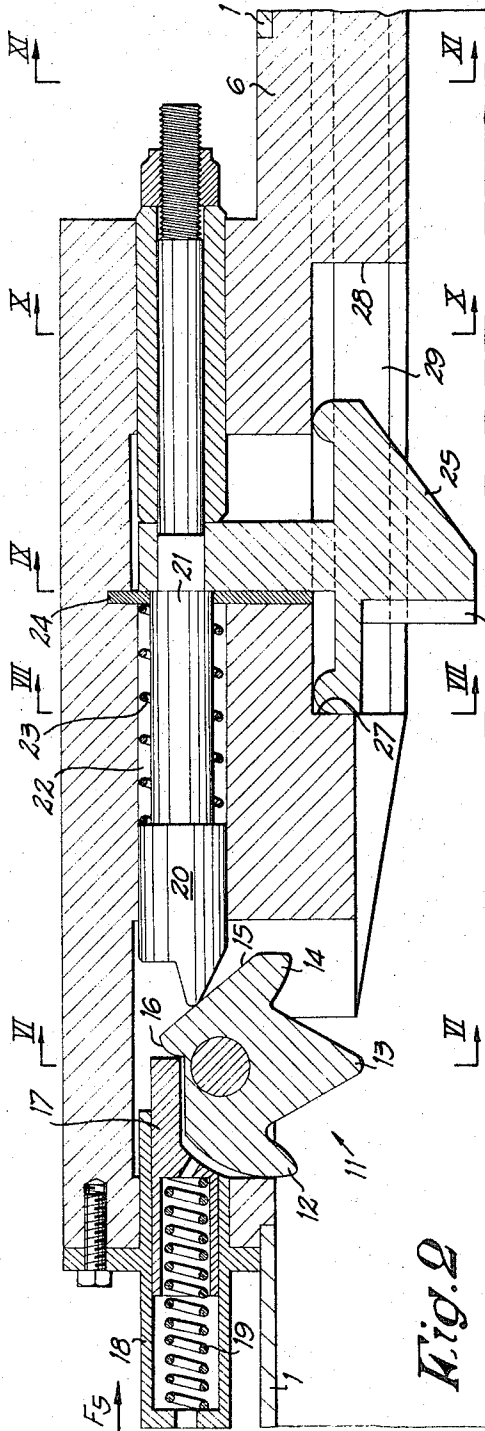


Fig. 11



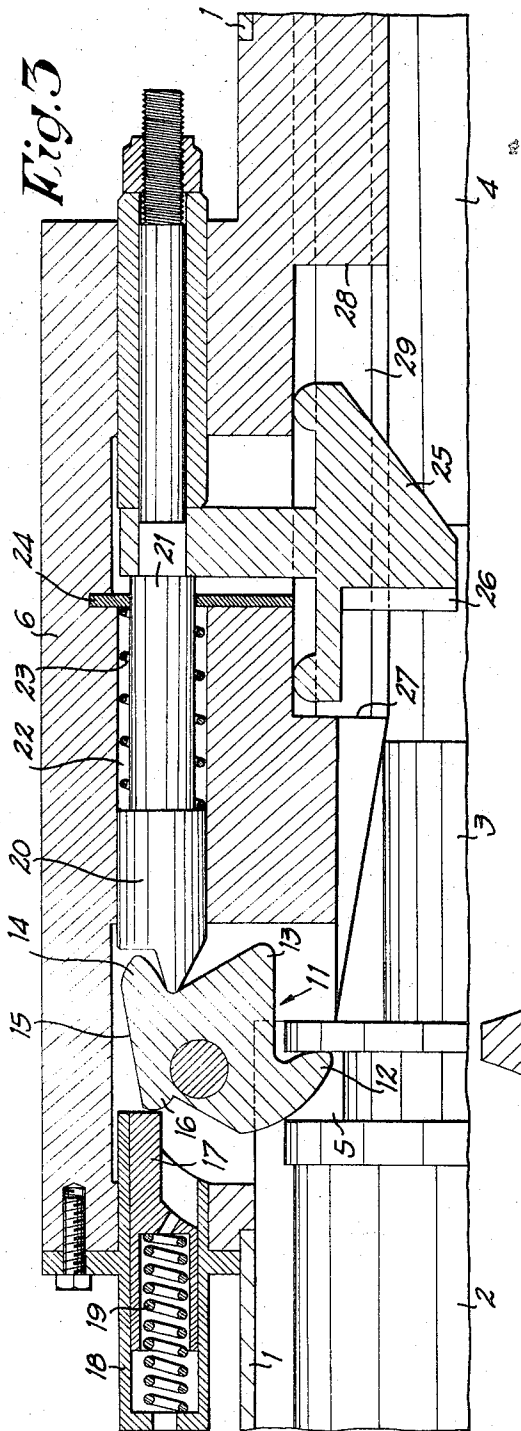


Fig. 3

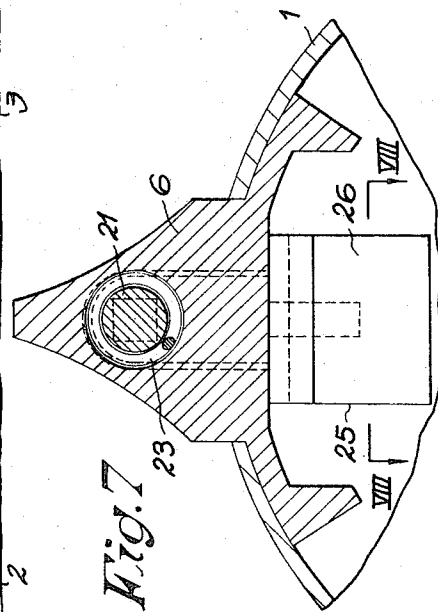


Fig. 7

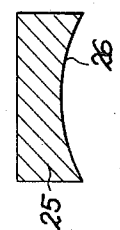


Fig. 8

ARMING DEVICE FOR ROCKET TYPE PROJECTILE LAUNCHING TUBE

This invention pertains to launching tubes for rocket type projectile, more especially but not exclusively for 5 2 inches 75 rockets.

It is well known that the now available means for withholding, respectively releasing, the projectile within a launching tube as well as for the firing of said projectile, have marked disadvantages. First, with respect to safety, it has been found that such withholding/ 10 releasing devices were relatively unreliable, breakages having been noticed as well as premature releases, so that the expanding gas flow within the tube was considerably modified.

Another drawback of presently used devices is that of being integral with the tubes, thereby preventing a reuse of said devices which, under certain circumstances, may considerably increase the cost of the armaments.

The purpose of the present invention is to furnish, as a substitute to actually used means, an arming device of a new conception providing for a practically total safety as well as, for the first time, for the interchangeability or the possibility of reusing said device.

In order to achieve this purpose, the object of the invention is a particularly designed arming device, which is compact, highly resistant, failsafe and interchangeable, respectively reusable.

Such an arming device for rocket type projectile launching tubes according to the invention includes the combination of a firing device, a withholding/releasing device and a common support for said devices such that said arming device forms an interchangeable, respectively reusable unit.

Effectively, this arming device is designed to constitute a unit, directly connectable to the rear end of a tube without addition of any complementary elements, said compact unit being in itself complete and in full working condition.

The withholding/releasing device of this invention comprises a multi-lobed pivoted catch element engageable with a rocket to be launched to secure the same in the launcher against forward motion, and a catch retaining means normally being resiliently biased towards the catch to prevent its rotation towards a rocket releasing position. The catch retaining means furthermore is operatively connected to a rocket thrust gas pressure responsive actuator that retracts the retainer away from the catch when the rocket is ignited to release the catch for rotation towards the rocket release position. The actuation of the catch retainer may be accomplished by rotary, translatory or combined motions. The catch itself is formed so that a first lobe engages the rocket to be held in the launcher, a second lobe engages the retainer for locking the catch in its rocket securing position, and a third lobe engages the rocket as it is loaded in the launch tube in a camming relationship whereby the loading motion cocks the catch means about its pivot from its at rest position to its rocket securing position. The catch furthermore includes an abutment engageable with a safety biasing means for constantly urging the catch means towards its rest position, or rocket release position, thereby placing the catch means in the ready position for loading another rocket after a firing sequence. The safety biasing means also holds the catch in firm engagement 65

with the retainer means while it is in its rocket securing position. As to the firing device, it substantially comprises a contactor, one fixed contact of which being directly fixed on said common support, whilst its mobile contact is indirectly carried by said support, via its guiding means.

These various features may of course lead to different embodiments without therefore departing from the scope of the invention.

By way of non limitative example, one embodiment is described more in detail hereinafter, reference being made to the appended drawings, wherein:

FIG. 1 in an axial section of a launching tube equipped with an arming device according to the invention, a projectile being inserted within the tube,

FIG. 2 is an enlarged scale view of the part of the arming device indicated at A on FIG. 1, this device being at rest;

FIG. 3 is a view similar to that of FIG. 2, the device being shown in active position;

FIG. 4 shows the device according to FIG. 3, upon departure of the projectile;

FIG. 5 is a view according to arrow F5 of FIG. 2;

FIGS. 6, 7, 9 - 11 are sections according to lines VI-VI, VII-VII and IX-IX to XI-XI respectively of FIG. 2; and

FIG. 8 is a section according to line VIII-VIII of FIG. 7

As shown in FIG. 1, the arming device according to this invention is intended to equip a launching tube 1 for a projectile 2, in this instance a 2inch 75 rocket having nozzles 3 and foldable fins 4. This projectile shows, in the vicinity of said nozzles 3, a peripheral groove 5 allowing to withhold the projectile within the tube up to the moment of firing, as described more in detail hereinafter.

The arming device according to the invention is mounted on a single support 6, partially engaged through an aperture feature in the wall of the tube 1 such as double slots provided to this effect in tube 1, and is connected to the latter by any adequate means, such as a screw 7.

At the rear of said support 6, a pivoting contact finger 8 is provided, said finger being urged by a spring 9 and being fed, when firing, by a conductor 10.

The rocket withholding-release device comprises a catch element 11, a rigid catch retaining finger element 20, and a rocket thrust gas pressure responsive release actuator 25. The catch element 11 is shown in its at rest position in FIG. 2 and in its rocket securing position in FIG. 3. Catch element 11 is seen to be supported for pivotal motion about a central axis on support member 6 and radially extends into the rocket launcher tube 1 from a pivot position outside the tube. Likewise, the catch retaining finger element 20 and the gas pressure response release actuator 25 are supported on the unitary support means 6, with the actuator 25 extending radially into the launch tube through the aperture feature therein. The catch element 11 includes three lobes 12, 13 and 14, an abutment 16 and an override sloping surface 15 between the abutment 16 and lobe 14. A safety finger element 17 resiliently biases catch element 11 by means of spring 19 in support 18 towards its at rest position, which, in FIG. 2, is in a clockwise direction.

The device being at rest, the catch retaining finger 20 abuts slope 15. This finger 20 is carried by one extrem-

ity of a rod 21 extending through a bore 22 of said support 6, this rod being urged towards catch 11 by a spring 23 extending between said finger 20 and a wall 24 traversed by said rod 21.

Beyond wall 24 with respect to finger 20, said rod 21 carries a rocket thrust gas pressure responsive pusher 25 projecting downwardly within tube 1 and having one surface 26 facing the front end of the tube. This pusher 25 may move parallel to the axis of the tube 1, between two extreme positions delimited by the opposite walls 27 and 28 of a recess 29 in support 6.

The above described device functions as follows: the device being at rest or in the rocket release position (FIG. 2), a projectile 2 is inserted in the tube, from the front end of the latter. The rear edge of the motor tube of projectile 1 pushes back lobe 13 of the catch 11 by a camming action. The latter flips around its pivot towards its rocket securing direction, the slope 15 pushing back finger 20 against its return spring 23 to cause retaining finger 20 to override lobe 14, whilst the abutment 16 pushes back the safety finger 17, against its return spring 19. Lobe 12 penetrates into the peripheral groove 5 to secure the rocket against forward motion whilst the ignition or firing relay 30, provided at the extremity of fins 4, abuts against finger 8 (FIG. 1). When catch 11 is fully rotated to its rocket securing position, the lobe 14 is in positive engagement with the retaining finger 20, with finger 20 extending between lobes 13 and 14 of catch 11. The latter is thereby positively locked (FIG. 3) in the rocket securing position. Upon firing, the gases discharged from nozzles 3 hit the surface 26 of pusher 25, which is forced rearwardly, drawing along rod 21 and, therefore, finger 20. The catch 11 is thereby freed and may pivot towards its at rest position as a result of the forward motion of the projectile 2, to free the groove 5 (FIG. 4) and release the rocket from the tube. Finger 20 is then returned to its initial position by its spring 23, the catch device being then returned to its initial position, ready for receiving and firing a new projectile.

Should the tube 1 be damaged or worn out, the arming device according to the invention may easily be recuperated and placed on a new tube. This operation is rendered particularly convenient due to the provision of the single support 6.

It is obvious that modifications may be brought to the above described embodiment, without therefor departing from the scope of the invention.

What I claim is:

1. In an arming device for a rocket launcher including a launch tube having an aperture feature in the tube wall, a rocket withholding-release means, and a rocket firing means spaced axially rearwardly on the launch tube with respect to said rocket withholding-release means; the improvement comprising

a. a unitary support means for the rocket withholding-release means and the rocket firing means, said support means being removably secured to said launch tube in the area of the said aperture feature in the launch tube, said rocket withholding-release means and said firing means extending radially into the launch tube through the said aperture feature;

b. said rocket withholding-release means comprising a multi-lobed catch element pivotally mounted on said unitary support means for rotation about a central axis outside the rocket launch tube and ra-

dially extending into said tube for positively engaging a rocket to be launched when said catch means is rotated in a first rocket securing direction, said catch means having a first lobe for positively engaging a rocket to be launched in said tube, and a second lobe;

c. a releasable catch retaining means comprising a rigid finger element movably mounted on said unitary support means and means normally resiliently biasing said finger element in an extended position towards the catch means and engageable in a positive manner with said second lobe for preventing rotation of said catch means in a second reverse rocket release direction; and

d. a rocket thrust gas pressure responsive actuator element supported by said unitary support member and extending radially into said launch tube, said actuator element being subject to rocket thrust gas pressure and operably connected to said finger element for causing retraction thereof away from engagement with said catch means for thereby releasing said catch means for rotation in a rocket releasing direction upon firing of the rocket by said firing means.

2. The improvement in an arming device for a rocket launcher as recited in claim 1 including the further improvement wherein said catch element includes a third lobe, the third lobe being engageable with a rocket to be launched in a camming relationship when such rocket is loaded in the launch tube whereby motion of the rocket being loaded causes pivotal movement of said catch means in the rocket securing direction.

3. The improvement in an arming device for a rocket launcher as recited in claim 2 including the further improvement comprising resilient biasing means for constantly urging said catch means towards the rocket releasing direction.

4. An arming device for a rocket launcher comprising:

a. a launch tube having a pair of apertures in its wall;

b. a rocket firing means;

c. a rocket withholding-release means; and

d. a unitary support means releasably secured to said launch tube for supporting said firing and withholding-release means axially spaced from each other on said launch tube, said support means extending across said apertures to close said apertures, and said firing and withholding-release means extending radially through said apertures into said launch tube for engaging a rocket to be launched within said tube;

1. said rocket firing means comprising an electrical contact finger engageable with a firing relay of a rocket to be launched in said tube;

2. said withholding-release means comprising:

a. a pivoted catch element having an at-rest and a rocket securing position, and having circumferentially spaced thereabout first, second and third lobes, an abutment between the first and second lobes, and a sloping override surface between said abutment and said second lobe;

b. a catch retaining means comprising a rigid finger element resiliently biased towards said catch element and normally engaging the said sloping override surface of said catch element

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when said catch element is in its at-rest position and positively engageable with said second lobe of said catch element when said catch element is rotated to its rocket securing position to prevent rotation of said catch element towards its at-rest position, the finger element sliding over said sloping override surface of said catch element when said catch element is rotated from its at-rest position to its rocket securing position;

c. a release actuator comprising means responsive to rocket thrust gas pressure connected to said finger element for retracting said finger element away from engagement with said second lobe of said catch means when the rocket to be launched is fired;

d. said third lobe of said catch element being en-

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gageable with a rocket to be launched as it is loaded in the launch tube in camming relationship therewith for rotating said catch element towards its tocket securing position from its at-rest position;

e. a safety finger element in constant contact with said abutment of said catch element resiliently biased to urge said catch element towards its at-rest position whereby said catch element is resiliently retained in its at-rest position when the launch tube is empty, and said second lobe is resiliently urged into contact with said rigid retaining finger element when said catch means is in its rocket securing position.

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