Dec. 5, 1961 G. MOSS ET AL 3,011,405

LAUNCHING SUPPORT FOR ROCKET-PROPELLED MISSILES

Filed Jan. 4, 1960 2 Sheets-Sheet 1

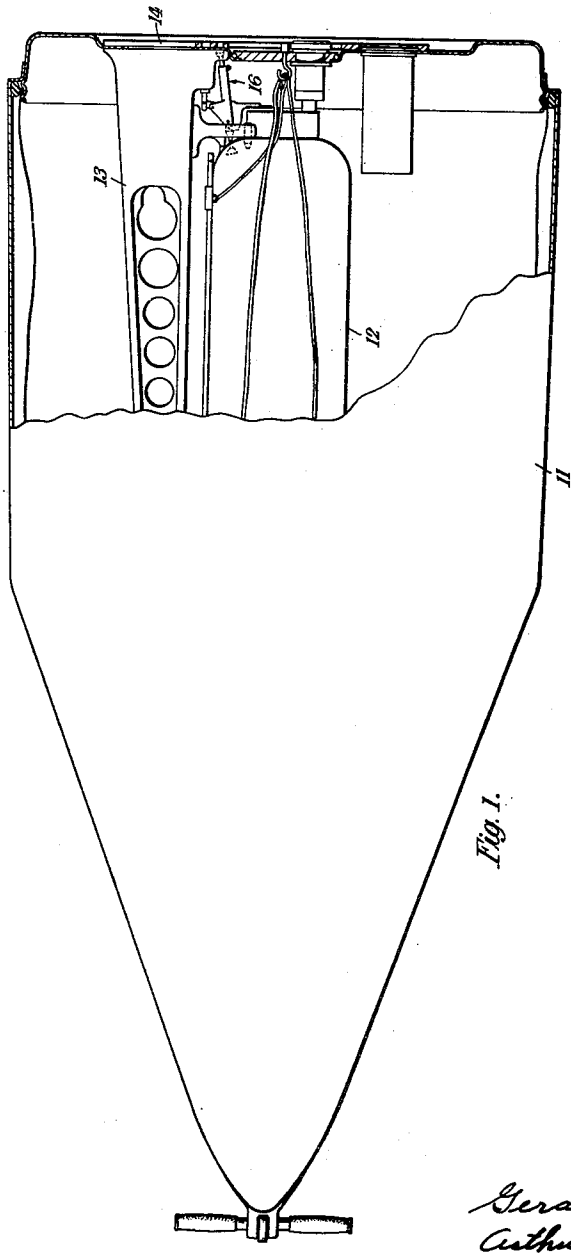

Fig. 1.

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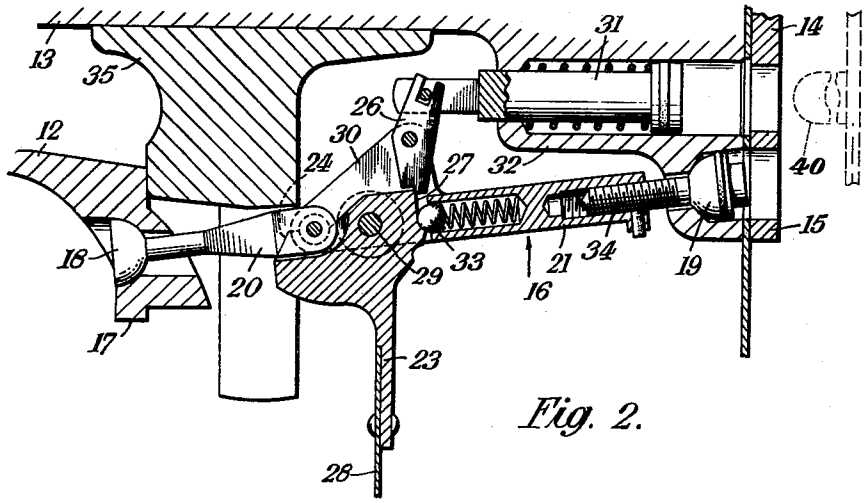

Fig. 2.

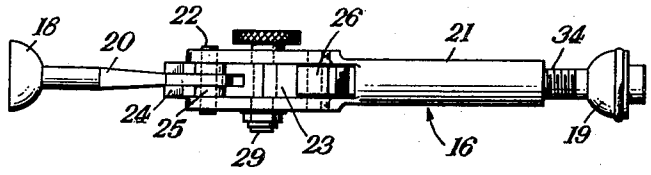

Fig. 3.

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LAUNCHING SUPPORT FOR ROCKET-PROPELLED MISSILES

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8 Claims. (Cl. 89—1.7)

The invention is concerned with launching supports for rocket-propelled missiles, and particularly though not exclusively to supports such as are described in the copending United States application of Richard Sutton Ransom serially numbered 793,840 filed February 17, 1959, wherein the missile is connected to a rigid base-member by a link incorporating a shear pin which, when the propulsion rocket is fired, immediately severs to release the missile. The object of the present invention is to provide in conjunction with such a shear pin an improved arrangement by which (*a*) in the event of inadvertent firing of the rocket motor whilst in store, flight of the missile from its support is prevented, (*b*) the shear pin is protected from undue shock loads until the missile is fired deliberately, and (*c*) the rocket motor blast may be utilised to release the mechanism protecting the shear pin as aforesaid, when the missile is mounted upon the launching support.

A missile launching support in accordance with this invention comprises a beam for suspensory attachment to the missile and adapted to be mounted on a launcher platform, a link for connecting the after end of the missile to the rear end of the beam and incorporating a shear pin, a latch pivoted on the link and movable to a safety position in which the tensile and/or compressive loads in the link are taken by the latch and by-pass the shear pin, a locking member normally adapted to hold the latch in the safety position, and release means for releasing said locking member to free the latch when the missile is positioned on the launcher platform ready for firing.

Said latch is preferably provided with an off-set portion positioned to receive the missile motor blast on firing and re-act to disengage the latch so that the shear pin sustains the full thrust load due to combustion of the rocket charge.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:

FIG. 1 is a part cut-away side elevation of a combined container and missile launcher support according to the invention,

FIG. 2 is a cross-section of a part of the apparatus in FIG. 1, showing an attachment for the missile, and

FIG. 3 is a plan view of the link forming part of the attachment shown in FIG. 2.

Referring first to FIG. 1, the apparatus shown includes a container **11**, the purpose of which is to afford protection for a missile **12** during stowage, and which may be retained in position when the missile is transported to the launching site and also when it is actually mounted upon the platform of the launching apparatus. The container **11** incorporates a cantilever beam **13** disposed longitudinally of the missile **12**, having at one end (not shown) a depending attachment from which the missile may be suspended at a point in the region of the centre of gravity thereof, and provided at the rear end with a base-plate **14** by which the beam and container assembly may be rigidly attached to the platform of the launching apparatus.

Referring now to FIG. 2 the base-plate **14** is formed with an aperture lug **15** arranged to receive and constitute an anchorage for the rear extremity of a tension

link **16**, the forward extremity of which is connected to a suitably robust part **17** of the tail of the missile. The connections of the link **16** at both ends preferably include ball-and-socket joints **18** and **19** permitting a sufficient degree of angular freedom to facilitate the alignment of the parts during assembly. The tension link **16** is composed of two parts **20** and **21** joined end to end by a pivot pin **22** which is of such cross-sectional dimensions and material as to render it capable of serving as a shear pin which, whilst being capable of supporting the static load of the missile **12** on the base-plate **14**, will automatically shear and free the missile **12** from its anchorage to the base-plate **14** when subjected to the thrust load of the rocket motor on firing.

Mounted on the after part **21** of the tension link **16**, with capability of rotation about an axis perpendicular to the length of the tension link **16**, is a latch lever **23** which is fashioned with a hook **24** (see FIG. 3) arranged to engage about a boss **25** provided on the part **20** of link **16** and concentric with the shear pin **22** on each side of the link part **20**. When the latch lever **23** is engaged, as shown, the shear pin **22** is relieved of its load, and the latch lever **23** can be locked in this position by a locking lever **26** which normally engages an abutment **27** on the latch lever **23** so as to prevent the same from rotation. The latch lever **23** also carries an arm **28** upon which is formed a flat surface, referred to as the "palm," which depends opposite the efflux nozzle of the missile motor, so as to receive the full blast thereof when the missile is discharged. The latch lever **23** is preferably mounted upon an eccentric stud **29** which can be rotated for the purpose hereinafter described. The locking lever **26** is pivotally mounted upon an off-set part **30** of the tension link and its extremity is coupled to a spring-loaded plunger **31** which is slidably mounted in a part **32** of the base-plate **14**.

A spring-pressed ball catch **33** is mounted in the tension link and arranged to bear against an arcuate cam-like face of the latch lever **23**, said face being recessed to receive the ball at two angularly spaced points which respectively register with said ball catch (*a*) when the latch lever **23** is in the locked position above referred to, and (*b*) when the latch lever is rotated into an inoperative position.

When the missile is placed into its container **11**, to be supported by the cantilever beam **13** associated herewith, the spring loaded plunger **31** is pressed against the action of its spring so as to rotate the locking lever **26** out of the locking position. The latch lever **23** is now free to be rotated into an inoperative position, where it is yieldably held by the ball catch **33**.

The parts **20** and **21** of the tension link **16** are then brought into alignment and connected by insertion of the shear pin **22**. The latch lever **23** is then rotated to engage the boss **25** on the part **20** of the link; it is held in this position yieldably by the ball catch **33**. Clearances between the latch lever hook **24** and said boss are now taken up by rotating and locking the eccentric stud **29** on which the latch lever **23** is mounted as aforesaid.

The pressure on the spring-loaded plunger **31**, by which the locking lever **26** has been held temporarily disengaged from the latch lever **23**, is now released and the spring of the plunger **31** restores the locking lever **26** to the position in which it locks the latch lever **23** against movement, and tensioning of the assembly may be performed by tightening a screw **34** forming the end of the tension link **16**, whereby the missile **12** is pulled home against a compression pad **35** which forms part of the suspensory beam **13**.

In this condition the assembly is capable of transmitting tension loads between the missile **12** and the base-plate **14** without loading the shear pin **22**, and during

stowage the assembly is intended to remain locked in this condition. Should the rocket motor be fired inadvertently during stowage, movement of the latch lever 23 is prevented by the locking lever 26, which can only be disengaged by a deliberate retraction of the spring-loaded plunger 31 with which the locking lever 26 is connected. Thus the shear pin 22 remains by-passed through the latch lever 23 and is protected against the rocket thrust load.

When mounted on the launching platform, the assembly is automatically unlocked by the presence of a fixed pin 40 (shown in broken lines in FIGURE 2) located on said platform against the end of the spring-loaded plunger 31, causing this to be retracted and thereby releasing the locking lever 26 from locking engagement with the latch lever 23. The blast from the rocket motor on firing reacts against the palm 28 of the latch lever 23, causing the latch lever 23 to be rotated into a position in which its hook 24 is disengaged from the tension link boss 25 and the shear pin 22 is subjected to the full thrust load on the missile of the rocket motor. The shear pin 22 is severed and the missile freed to move under the propulsive effect of the rocket.

If the missile is removed from the launching platform without being fired, the spring-loaded plunger 31 is released and the locking lever 26 is restored to the position in which the latch lever 23 is locked against movement, so that the shear pin 22 being by-passed again, it is safe to remove the missile 12 with the container.

The link assembly may be adapted to sustain compression loads as well as tension loads by substituting a rigid connection to the missile for the ball-and-socket joints hereinbefore referred to, and providing an eccentric screw to draw the missile eyebolt against an abutment; in this arrangement the shear pin would require a large degree of clearance to enable the required adjustment to be made without pre-loading the shear pin.

What we claim as our invention and desire to secure by Letters Patent is:

1. In a missile launching support adapted to carry a rocket propelled missile and be mounted on a launcher platform, the improvement comprising: a beam for suspensory attachment of the missile; a link member for connecting the after end of the missile to the rear end of the beam, said link comprising a first part, a second part, and a shear pin connecting said first part to said second part; latch means detachably connecting said first part to said second part of said link whereby loads implied through said link by-pass said shear pin; locking means normally locking said last-mentioned latch means in a safety position when assuming the loads applied through said link; and release means for releasing said locking means from said latch means when the missile is positioned on the launcher platform for firing whereby said latch means may be released from connecting said first part to said second part of said link.

2. A missile launching support of the character described in claim 1 including means on said latch means operable by a blast of said missile for releasing said latch means from connecting said first part to said second part of said link.

3. A missile launching support of the character described in claim 1 wherein said release means includes a plunger operatively connected to said locking means and a spring biasing said plunger to a position where said locking means locks said latch means, said plunger being movable against said spring to a position freeing said locking means from said latch means.

4. A launching support of the character described in claim 1 wherein said latch means includes a latch pivotally connected to one of said first and second parts, said latch having a hook on its free end, and an enlargement on the other of said first and second parts about which the hook of said latch engages to detachably connect said first and second parts of said link.

5. A missile launching support of the character described in claim 4 wherein said enlargement on the other of said parts is arranged concentric with said shear pin connecting said first and second parts together.

6. A launching support of the character described in claim 1 including an eccentric pin carried by one of said first and second parts, and wherein said latch means includes a latch pivotally connected on said eccentric pin, said latch having a hook at its free end, and an enlargement on the other of said first and second parts about which the hook of said latch engages to detachably connect said first and second parts of said link, said eccentric pin being pivotable with respect to said latch whereby any clearance between the hook of said latch and the enlargement may be taken up.

7. A missile launching supporting adapted to carry a rocket propelled missile and be mounted on a launcher platform, the improvement comprising: a container; a beam mounted on one end of said container for suspensory attachment of the missile within the container; a link member for connecting the after end of the missile to the rear end of the beam, said link comprising a first part, a second part, and a shear pin connecting said first part to said second part; latch means detachably connecting said first part to said second part of said link whereby loads implied through said links by-pass said shear pin; locking means normally locking said last-mentioned latch means in a safety position when assuming the loads applied through said link; and release means for releasing said locking means from said latch means when the missile is in position on the launcher platform for firing whereby said latch means may be released from connecting said first part to said second part of said link, said release means being carried within said container and operable from outside of said container.

8. In a missile launching support adapted to carry a rocket propelled missile and be mounted on a launcher platform, the improvement comprising: a beam for suspensory attachment of the missile; a link member for connecting the after end of the missile to the rear end of the beam, said link comprising a first part, a second part, and a shear pin connecting said first part to said second part; latch means detachably connecting said first part to said second part of said link whereby loads implied through said link by-pass said shear pin; said latch means including a latch element pivotally connected to one of said first and second parts and having a hook on its free end, and an enlargement on the other of said first and second parts about which said hook on the free end of said latch engages; and means for releasing said latch from said enlargement when the missile is fired, said last-mentioned means including an offset portion on said latch positioned to receive and be moved by the blast of said missile on firing whereby the latch is disengaged from the enlargement so that the shear pin sustains full thrust of the load on said link.

References Cited in the file of this patent

UNITED STATES PATENTS

2,440,723	MacDonald	May 4, 1948
2,925,013	Santora	Feb. 16, 1960