Jan. 27, 1959 F. HERRMANN 2,870,677

MISSILE RETAINING DEVICE

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Fig. 1.

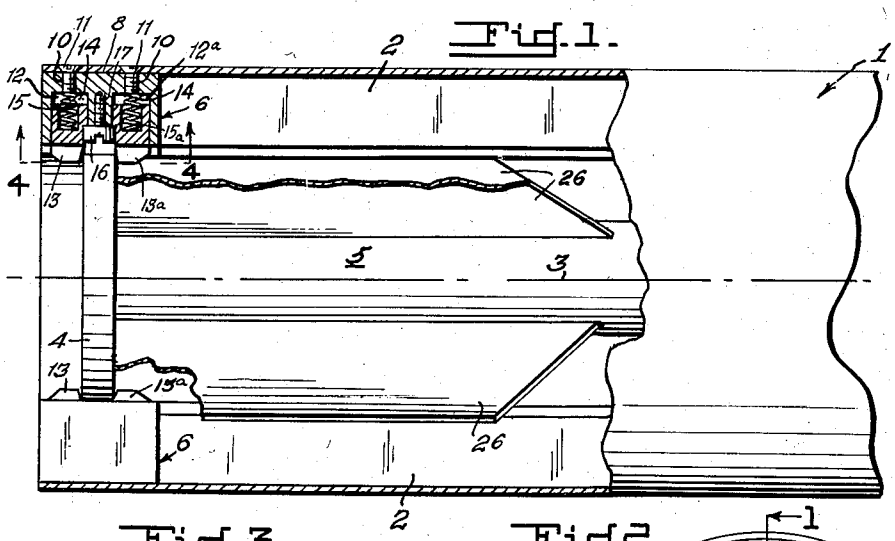


Fig. 3.

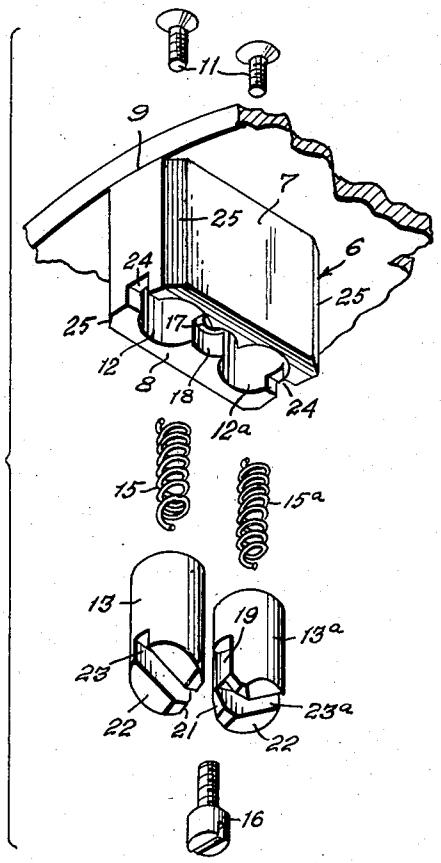


Fig. 2.

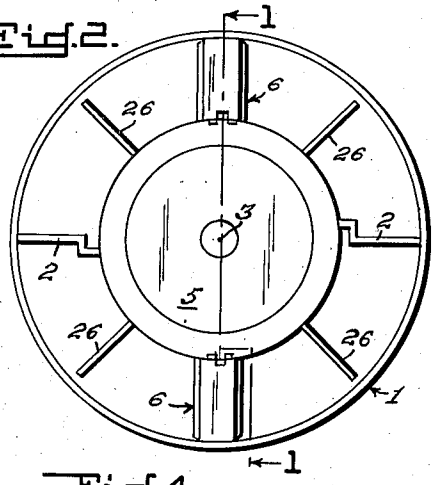
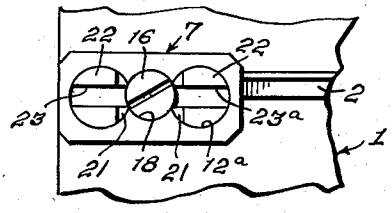


Fig. 4.



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MISSILE RETAINING DEVICE

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6 Claims. (Cl. 89—1.7)

This invention relates to a missile retaining device more specifically to a device for retaining a missile such as a rocket in its firing position in a launching tube.

It is a primary object of this invention to provide a missile retaining device of symmetrical design, compact and easily attached to a launching tube.

A further object of the invention is to provide a retaining device possessing substantially the same durability and life as the launching tube itself and having a high "break loose" yet requiring only a low initial force to load.

Another object of the invention is to provide a retaining device completely automatic in operation.

A still further object is to provide a retaining device cheaply constructed and easy to service.

Other objects and advantages will become apparent during the course of the following description and upon examination of the accompanying drawing in which:

Figure 1 is a longitudinal sectional view of a retaining device constructed in accordance with the invention and applied to a launching tube as shown in a plane identified by line 1—1 of Figure 2,

Figure 2 is an end view of the missile launching tube illustrated in Figure 1,

Figure 3 is an exploded perspective view of the various components of the retaining device, and

Figure 4 is a plan view of one retaining device taken in the plane 4—4 of Figure 1 and looking in the direction of the arrows.

Referring now more particularly to the drawings, reference character 1 denotes generally a launching tube provided with a series of longitudinally disposed fins 2 integral with the inner periphery of the tube and extending radially inwardly towards its axis 3 to a distance such that their free edges are separated a distance equal to the outside diameter of the bourrelet ring 4 of the booster portion of a missile 5. Legs 2 normally extend to the rearmost edge of tube 1 and afford guiding means for launching the missile. A missile retaining device is generally indicated by 6, two of which are shown on the drawing. As best viewed in Figures 1 and 3, the device comprises a substantially rectangular shaped housing 7, one end 8 being of concave contour to fit the outer periphery of the bourrelet ring 4 of missile 5 and the opposite end 9 being of convex contour to fit the inner periphery of the launching tube 1. The end 9 of the housing 7 is provided with a pair of longitudinally aligned threaded taps 10 to receive screws 11 whereby the housing is attached to the inner periphery of the rearward edge of the tube to prevent rotation of the housing and to securely fasten it to the tube 2. The housing 7 is provided with a pair of longitudinally aligned wells 12 and 12*a* bored from the concave end 8 to a distance deep enough to completely contain a pair of locking plungers 13 and 13*a*. The plungers 13 and 13*a* are axially bored at their upper ends as at 14 to provide a receptacle for coil springs 15 and 15*a* which act, in an obvious manner, to urge the plungers radially inwardly of the tube 2. Means for retaining the plungers 13 and 13*a* in the respective wells are provided by cap screw 16 which is engaged in a threaded tap 17. As shown upon Figure 1 the head of screw 16 fits within a counterbore 18 extending axially with tap 17. Both tap 17 and counterbore 18 are located centrally between wells 12 and 12*a* and the well 18 is of a diameter greater than the separation of bores or wells 12 and 12*a* so that the head of screw 16 when threaded into tap 17 overlaps bores 12 and 12*a* whereby the plungers are retained in their respective wells against the thrust of springs 15 and 15*a*. For this purpose concave notches 19 are formed on the lower part of the inner sides of plungers 13 and 13*a* as best seen in Figure 3. When the plungers are in their position in the respective wells and the cap screw 16 is threaded into assembled position, the head of screw 16 will rest in milled out spaces 19, and, in a manner obvious from inspection of Figures 1, 3 and 4, the plungers are retained in their respective bores and also prevented from turning therein. Due to springs 15 and 15*a* the plungers are urged towards the bourrelet ring 4. The relative radial dimensions of bores 12 and 12*a* and plungers 13 and 13*a* are such that the latter may be completely contained within the bores upon passage of the bourrelet ring 4 under them. As best viewed upon Figures 1 and 3, the plungers 13 and 13*a* are provided with beveled surfaces 21 and 22. The planes of bevels 21 make a smaller angle with the axis of the respective plunger than the planes of bevels 22 thus making it easier to push the bourrelet ring 4 of missile 5 into position between the fingers 13 than to release it from such position. Bevels 21 will therefore prevent accidental dislodgement of the bourrelet ring 4 from between the plungers 13 and 13*a* when the missile 5 is in firing position. Also, the plungers are provided with longitudinal slots 23 and 23*a* (see Figures 1 and 3) so that when the component parts of the retaining device 6 are in assembled relation these slots are coplanar with one another and also with notches 24 cut in housing 7 to thereby define a continuous passage longitudinally of the tube. This affords means to reduce any recoil of the housing due to blow-back gases from firing of the missile 5 in the tube. To further reduce resistance of the housing 7 to gases, suitable chamfers 25 have been cut on the edges of the housing. (See Figure 3.)

While only two retaining devices 6 have been illustrated diametrically positioned within tube 2, more can be added if desired, in which event they will be equiangularly spaced about the inner periphery of the tube. The tubes are preferable made of stainless or other corrosion resistant steel.

In order to mount a retainer on a launching tube, the fins 2 are cut away at their rearward ends over a length equal to the length of a retaining device to be mounted. Screws 11 are then inserted through holes drilled in the tube and into taps 10. The springs 15 and fingers 13 are then inserted into the wells 12 and the cap screw 16 is threaded into place.

The operation of the device is completely automatic. The missile 5 is inserted into the tube 1 in a rotational position which will let the fins 26 clear the retaining devices and fins 2 (see Figure 2), and then the missile is pushed in the tube until the bourrelet ring 4 snaps between plungers 13. When the rocket is fired, the thrust developed is sufficient to cam the forward plungers 13*a* inwardly and thus effect release for launching movement down the tube. A loaded missile can be withdrawn from the tube with facility by a pull coupled, if necessary, with a radially outward push on plunger 13.

It will be apparent from the foregoing that I have provided a simple, yet dependable retaining device which is positive and reliable in operation and extremely easy to repair, service and replace. All plungers are duplicates and hence interchangeable. Hence it is not necessary to replace the entire assembly as any part can be quickly and easily replaced. The only tool required is a screw driver.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangements of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

I claim:

1. In a mechanism for releasably retaining a self-propelled missile in launching position within a tube, a housing adapted for rigid securement to the inner periphery of said tube, there being a pair of bores radially disposed in spaced relation in said housing with their axes in a common plane through the axis of the tube, said housing having a notch in the wall between each said bore and the respective forward and rearward face thereof, a pair of plungers each fitting a respective bore, each said plunger having a slot in its inner end said slots being disposed in coplanar relation with one another to form a continuous passage with said notches in said housing longitudinal of said tube, a coil spring in each bore urging each plunger radially inwardly, and a cap screw fixed with said housing between said bores and engaging both said plungers to prevent rotation of said plungers and limiting radial inward movement thereof under urge of said coil springs.

2. In a device for releasably retaining a self-propelled missile having a bourrelet ring fixed coaxially about its rearward end, a launcher tube of greater diameter than the bourrelet ring, a housing rigidly secured to the inner periphery of said tube at the breech end thereof, there being first and second bores in said housing disposed radially of said tube with their axes in a common plane through the axis of said tube, said housing having a notch in the wall between each said bore and the respective forward and rearward face thereof, a pair of plungers each slidably mounted in a respective bore, each said plunger having a slot in its inner end, said slots being disposed in coplanar relation with one another to form a continuous passage with said notches in said housing longitudinal of said tube, spring means carried by said housing and urging each plunger radially inwardly, and a cap screw fixed with said housing and engaging both said plungers to prevent rotation and limit radial inward movement thereof, said ring releasably fitting between said plungers when the missile is in launching position within said tube.

3. In a device for releasably retaining a self-propelled missile having a bourrelet ring fixed coaxially about its rearward end in radially spaced relation therewith, a launcher tube of greater diameter than said ring, at least one housing rigidly fixed to the inner periphery of said tube at the breech end thereof, there being a pair of spaced bores in said housing with their axes in a common plane through the axis of said tube, said housing having a notch in the wall between each said bore and the respective forward and rearward face thereof, a pair of plungers each slidably fitting a respective bore, each said plunger having a slot in its inner end, said slots being disposed in coplanar relation with one another to form a continuous passage with said notches in said housing longitudinal of said tube, a spring in each bore urging its plunger radially inwardly, and a single screw threaded into said housing between said bores and having a head overlapping said bores, said head fitting recesses in said plungers whereby said plungers are prevented from rotation and limited in outward movement, said ring releasably fitting between said plungers when the missile is in firing position in said tube.

4. In a missile retaining device for indexing a missile in firing position in a launching tube comprising, a housnig rigidly secured to the inner wall of said tube, a pair of spring-biased indexing plungers slidably mounted within a pair of spaced bores in said housing disposed radially to the longitudinal axis of the launching tube, said housing and said plungers having aligned slots along their inner faces to form a continuous passage longitudinal of said tube, and a cap screw fixed with said housing and disposed medially between said bores and retaining said plungers in said bores and limiting their radial travel therein, said plungers being completely contained in said bores when biased outwardly by the passing thereunder of a bourrelet ring of a missile to be launched and releasably engaging opposite edges of said ring when the missile is in launching position.

5. The combination with a rocket launcher tube having a plurality of equiangularly-spaced, longitudinally and radially-inwardly extending guide fins whose longitudinal inward edges define a circle of substantially the same diameter as a rocket to be launched therefrom, at least two of a pair of diametrically opposed fins being cut away at their rearward ends to accommodate a pair of housings rigidly secured to said tube and having dimensions in the radial direction not greater than the corresponding dimension of said fins, there being a pair of axially spaced bores in each housing having their axes radial to the axis of said tube each said housing having a groove in the wall between the respective forward and rearward face thereof, a pair of plungers each slidably fitting a respective bore each said plunger having a groove in its inner end and being disposed in coplanar relation with each other to form a continuous passage with said grooves in said housing longitudinal of said tube, a cap screw threaded into said housing between said bores and having its head overlapping each bore, said plungers being cut away at their radially inward ends to accommodate the head of said screw, whereby said plungers are prevented from rotation in said bores and limited to translation from a first position entirely housed within said bores, to a second position projecting a short distance only therefrom.

6. The combination with a rocket launcher tube having a plurality of equiangularly-spaced, longitudinally and radially-inwardly extending guide fins whose longitudinal inward edges define a circle of substantially the same diameter as a rocket to be launched therefrom, at least two of a pair of diametrically opposed fins being cut away at their rearward ends to accommodate a pair of substantially rectangular housings having a concave inner face rigidly secured to the inner periphery of said launching tube, each said housing having a pair of spaced bores disposed radially of said tube there being a groove in its inner face communicating between each said bore and the respective forward and rearward end of said housing, a plunger in each said bore said plunger having a groove in its inner end disposed in longitudinal alignment with the corresponding groove in the adjacent plunger, said grooves in said housing forming continuous passage parallel with the axis of said tube, a coil spring in each said bore, normally urging said plungers inwardly, said plungers being beveled on their outer ends in two angularly related planes, said planes intersecting in a line perpendicular to the axis of said tube, the confronting bevels of said plungers being at a lesser angle to the axis of the plungers than the second bevels, and retaining means for limiting movement of said plungers in said bores in said housings comprising a single screw threaded into said housing between said bores and in longitudinal alignment therewith, said screw having an enlarger head overlapping said bores and nesting in recesses provided in said plungers.

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