Oct. 4, 1966 J. B. BELL 3,276,377

FIN LOCKING DEVICE

Filed Nov. 3, 1964

FIG. 1.

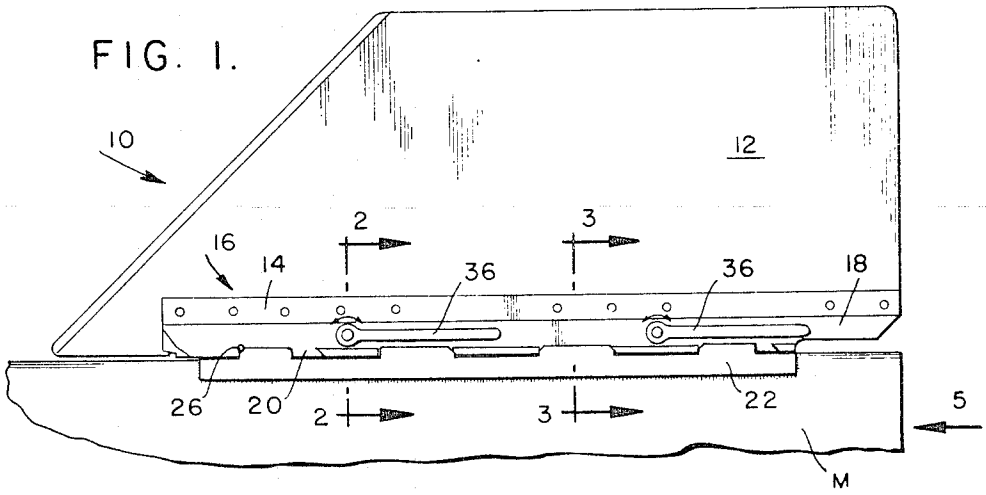
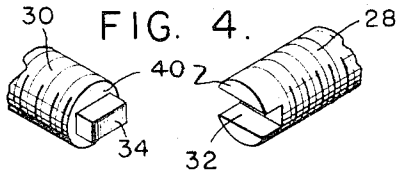


FIG. 4.



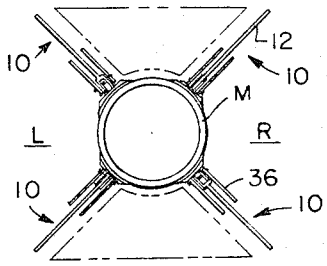


FIG. 5.

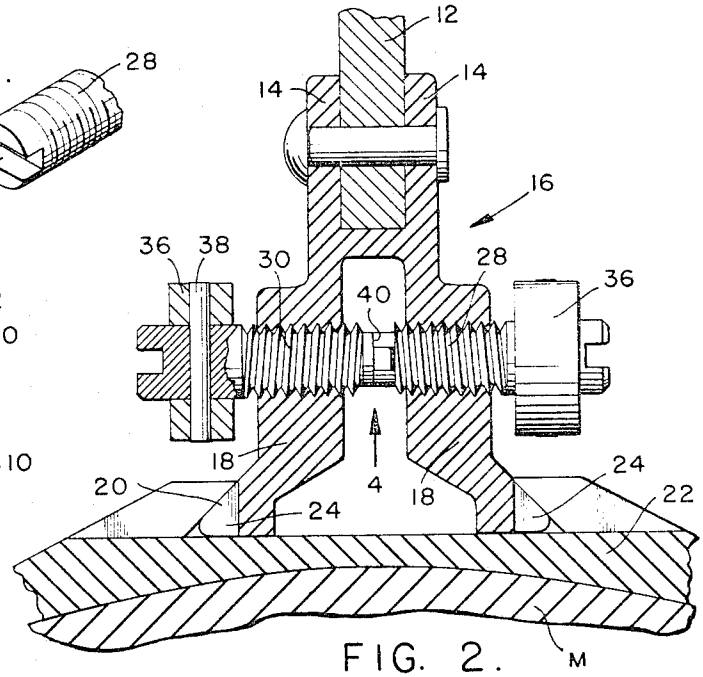


FIG. 2.

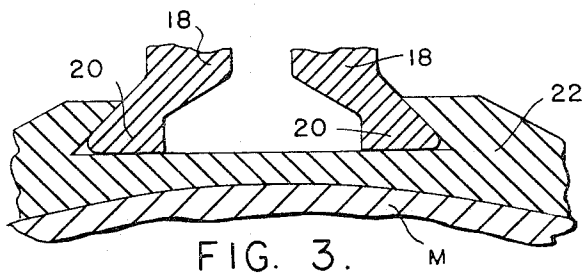


FIG. 3.

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3,276,377
Patented Oct. 4, 1966

3,276,377

FIN LOCKING DEVICE

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Filed Nov. 3, 1964, Ser. No. 408,709
1 Claim. (Cl. 244—3.24)

This invention relates to rocket motors and more particularly to improvements in detachably securing stabilizing fins to same.

An exemplary environment for the present invention is in the ASROC missile disclosed in patent application Serial No. 15,769, filed March 17, 1960, for Rocket Thrown Weapon by Miles H. Hamilton. As disclosed in such patent application the rear end of the missile is provided with four equiangularly spaced fins **27** which stabilize it during flight.

The ASROC missile has also been adapted for launching from the "TERRIER" launcher which was not originally designed for launching the ASROC missile. In this adaptation each ASROC missile is provided with an adapter rail which receives the ASROC launching lugs, the adapter rail and missile being bodily received, in turn, by the TERRIER launching rail. Prior to attaching or ramming the adapter rail onto the TERRIER launching rail the adapter rail and missile are disposed in a ready room where it is necessary to attach the fins. This operation is performed by two operators, one on each side of the missile. As illustrated in FIG. 5, the spaces available for securing the fins are illustrated as R & L (right and left), the spaces shown by broken lines indicating obstructions which prevent the operators from manually operating any fin locking actuator which might be disposed within these spaces.

Again with reference to FIG. 5, it will be apparent that if actuators are provided which are accessible in spaces R and L, fins must be provided with right and left hand actuators. As will be apparent, to provide two different types of fins complicates production and is undesirable from a logistic standpoint. It becomes desirable, accordingly, that all fins be identical, yet be provided with locking actuators which are accessible from available spaces regardless of which of the four positions on the missile to which a fin would be attached.

One of the objects of the invention is to provide a missile fin which may be attached to any of the four orthogonal positions on a missile and locked to it by actuators which are accessible in only two opposite quadrants.

Another object is to provide dual actuators, one on each side of a fin, and either of which may be independently operated for locking a fin to a missile.

Another object is to connect the dual actuators to novel locking mechanism.

Still further objects, advantages and salient features will become more apparent from the description to follow, the appended claim, and the accompanying drawing in which:

FIG. 1 is a fragmentary side elevation of a rocket missile with one of its four orthogonally arranged stabilizing fins;

FIG. 2 is an enlarged section taken on line **2—2**, FIG. 1;

FIG. 3 is a like section taken on line **3—3**, FIG. 1;

FIG. 4 is an exploded detail as viewed in the direction of arrow **4**, FIG. 2, and;

FIG. 5 is an end elevation as viewed in the direction of arrow **5**, FIG. 1 illustrating obstructions, previously referred to.

Referring now to the drawing, fin **10**, of which there are four, as shown in FIG. 5, comprises a plate **12**, the inner

edge of which is riveted between parallel outwardly extending flanges **14** of an extruded H-shaped fin base **16**, the inner flanges **18** of which are formed as longitudinally extending male dovetail members **20**. A securing base **22**, welded to the missile M, is provided with a like female dovetail slot **24** which slideably receives the male dovetail. Portions of the dovetails in each member are milled away at spaced intervals, best shown in FIG. 2, so that the fin may be moved laterally into the base member and thence moved longitudinally to effect engagement of the dovetail members. The connection is thus what might be termed a dovetail bayonet joint or connection in which the longitudinal engaging movement is only the movement of the length of one cut-away in the dovetails. This is necessary since certain obstructions prevent longitudinal movement the full length of the dovetails as is the practice in applying the fins when the missile is being readied for the ASROC launcher. Also, as will be apparent this affords more rapid attachment of a fin to the missile. After a fin is so applied and moved to final position, which may be controlled by any sort of stop pin **26**, legs **18** must be expanded laterally so that the male dovetails tightly engage the female dovetail slot.

The expanding apparatus comprises a pair of right and left hand threaded screws **28, 30** which threadedly engage flanges **18**. As best shown in FIG. 4, the inner end of screw **28** is provided with a transverse slot **32** and screw **30** is provided with a mating key or tongue **34**. Each screw **28, 30** is provided with a lever **36** which is secured to it by a pin **38**.

Since the manner of assembly of the right and left hand screws may not be readily apparent, a description of this invention may be in order. Screws **28, 30** are screwed into their respective threads from opposite side of the base member until their inner abutting ends **40** are spaced substantially equi-distant from the central plane of flanges **18** and with tongue **34** about to enter slot **32**. Further rotation of the screws in the same direction will next engage tongue **34** in slot **32** after which further rotation will effect abutment of ends **40** of the screws. Any further rotation in the same direction will now expand or spread flanges **18** laterally and effect tight engagement of the dovetail members.

It is desirable that all fins be locked to their bases with the same frictional force and with the levers **36** pointed toward the rear of the missile, as shown in FIG. 1. To achieve this end, each base member **18** is disposed, during production, in a suitable master dovetail fixture and the screws **28, 30** are adjusted to attain the desired force. Levers **36** are then secured to the screws by pins **38** in the locked position. As will be apparent, when the levers are swung counterclockwise 180° from that shown in FIG. 1 to the unlocked position the dovetail will be free to permit assembly.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

What is claimed is:

In a missile fin of the type having a base member disposed along a longitudinal edge of the same, said base member having a pair of spaced walls terminating in opposed outwardly directed male dovetails adapted to slideably engage between mating female dovetails disposed on a missile and be locked to the same when said male dovetails are spread apart, the improvements comprising:

(a) a first screw extending through one of said walls and threadedly engaging the same with a right hand thread,

(b) a second screw extending through the other wall and threadedly engaging the same with a left hand thread,

(c) said screws being axially aligned with their inner ends abutting within the space between the walls,

(d) one of said screws having a transverse slot adjacent its inner end,

(e) the other of said screws having a transverse tongue adjacent its inner end engaging within the slot, whereby both of said screws may be simultaneously rotated by the outer end of either screw, and

(f) a lever secured to the outer end of each screw, either of which levers may be operated for rotating both screws.

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