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DOVETAIL LOCKING DEVICE

Filed May 25, 1964

FIG. 1

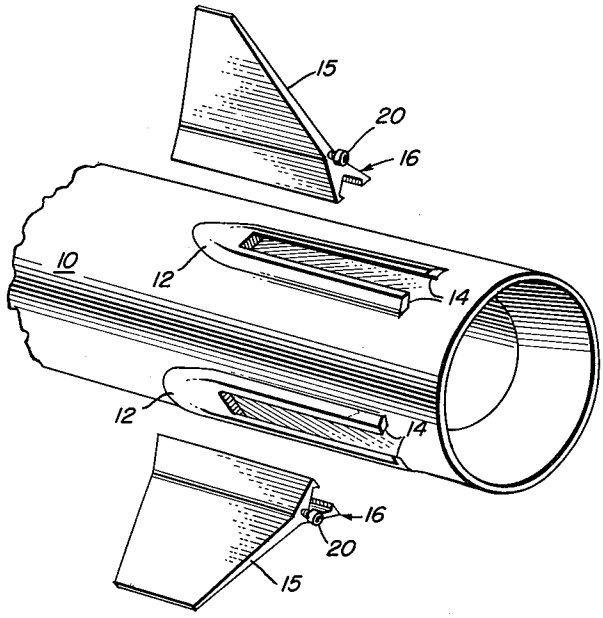


FIG. 2

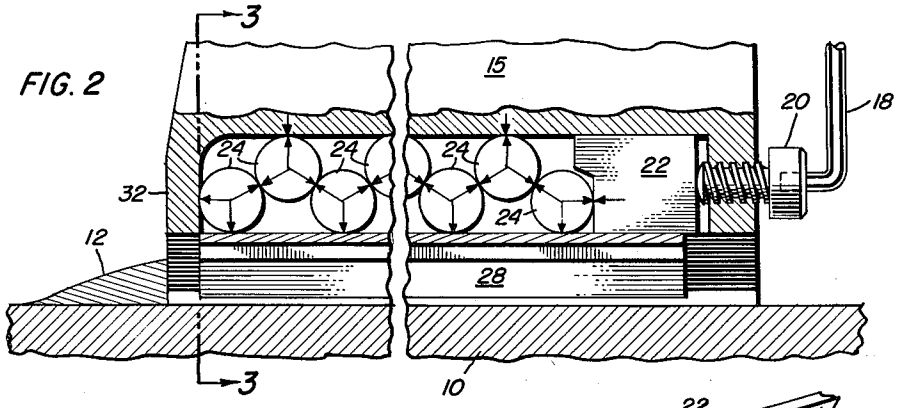


FIG. 3

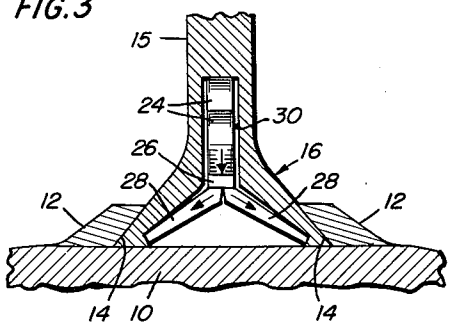
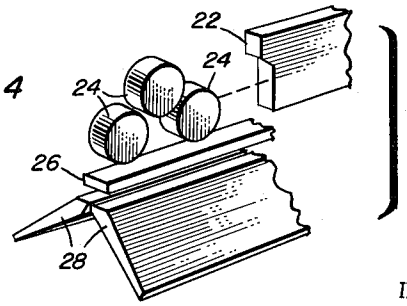


FIG. 4



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DOVETAIL LOCKING DEVICE

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5 Claims. (Cl. 102—50)

The present invention relates to a dovetail locking device and more particularly to a dovetail locking device which is quick locking and combines the features of low friction and high mechanical advantage.

There presently exists a need for a locking device which is readily manufactured, consisting of a minimum number of parts and possess a high mechanical advantage. Prior art devices do not possess the above-mentioned features and to a large degree the presently used devices are high friction locks, thus making it very hard to mate two components and securely lock them together in a minimum amount of time.

An object of the invention is the provision of a locking mechanism which is quick locking.

Another object of the invention is to provide a locking mechanism which combines the desirable features of low friction and high mechanical advantage.

A further object is to provide a locking mechanism in which the forces are evenly distributed throughout the entire length of the device.

Still another object of the invention is the provision of a locking mechanism which provides a friction lock between the two components to be secured together.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 shows an end view of a missile, with fins removed, employing a preferred embodiment of the invention.

FIG. 2 shows a sectional view taken through the center of the locking device.

FIG. 3 is a sectional view of the device taken on the line 3—3 of FIG. 2.

FIG. 4 is an exploded view of the working parts of the locking device.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1, illustrating a particular application of the invention, the tail end of a missile **10**. Fixedly secured to the missile **10** are a plurality of spaced bosses **12**. Any suitable form of attachment may be used such as welding. Each boss **12** is provided with a dovetail slot **14** which extends substantially the full length of the boss **12**. For each boss **12**, there is a fin **15** which is provided with a dovetail portion **16** that is received by the dovetail slot **14**. It is to be noted that although the locking device illustrated is embodied in a fin to missile environment, applicant does not wish to be limited to the specific structure shown. It is obvious that the subject invention has many other applications in addition to the one illustrated.

There is shown in FIG. 2, which is a sectional view through the locking mechanism, the relationship of the locking mechanism with respect to the missile shell **10** and the fins **15**. It can readily be seen that by turning the Allen wrench **18** the threaded screw **20** will move inwardly thus exerting an axial force upon the actuator **22**. As the actuator **22** moves inwardly it exerts a force upon the first disc **24** which in turn transmits three directional forces, i.e., a force which is normal to the points of contact of the disc **24**. Likewise, the second disc **24** transmits three directional forces and so on down the line to the last disc **24**. The downward force transmitted by each of the discs **24** acts upon the bearing plate **26**. Bearing plate **26** transmits forces to each of the isosceles linkages **28** which engage dovetail **16** and urge the legs of dovetail **16** outwardly. It is apparent that when the fin **15** is properly inserted into dovetail slot **14**, the turning of Allen wrench **18** will result in exerting downward pressure on bearing plate **26** which causes the isosceles linkage **28** to expand and spread the dovetail legs apart. An outward movement of the dovetail legs provides a friction lock between the dovetail **16** and the dovetail slot **14**.

It is to be noted that all contacts with discs **24** are rolling friction except the two end discs **24** and thus the overall mechanical advantage is a function of the number of discs **24** which are used in the locking mechanism.

Referring to FIG. 3, there is shown the channel **30** which runs substantially the full length of the dovetail **16** and houses the discs **24** and their actuator **22**. The end of the channel **30** is closed by an end portion **32** of the dovetail **16**, thus preventing the discs **24** from rolling out the other end as the Allen wrench **18** is turned exerting pressure on actuator **22**.

FIG. 3 also serves to present a clear picture of the manner in which a downward force of the disc **24** acts through bearing plate **26** thus expanding the isosceles linkage **28** and spreading the legs of dovetail **16** apart urging them into tight engagement with dovetail slot **14** and providing a quick and very effective means of securing the fins **15** to the missile body **10**.

FIG. 4 illustrates the relationship of the various working parts of the locking mechanism. The manner in which the various elements of the locking device is assembled is as follows:

The fin **15** is turned upside down, the actuator **22** and discs **24** are placed in their proper position within the channel **30**. The bearing plate **26** is then placed in position and the isosceles linkages **28** are placed in position with their lowermost end engaging the inner end of the legs of the dovetail **16**. After these elements have been assembled, the fin **15** can be turned right side up and weight of the discs **24**, bearing plate **26**, and actuator **22** will urge the isosceles linkages **28** downward and prevent the elements from dropping out.

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 claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In a missile having a plurality of spaced guiding fins extending outwardly from its skin and locking means for securely attaching said fins to said missile wherein the improvement comprises:

a plurality of bosses fixedly secured to the skin of said missile;

a dovetail slot in each of said bosses extending substantially the full length of said boss;

a fin having a dovetail portion which is received by each of said bosses;

a channel portion centrally located within the upper portion of said dovetail portion of said fin;

said dovetail portion having two downwardly extending legs;

a plurality of force transmitting members in said channel;

an actuator positioned at one end of said members to impart force to said force transmitting members;

means for moving said actuator along an axail path within said channel;

a bearing plate mounted immediately beneath said

force transmitting members and in contact with said force transmitting members;

spreading means beneath said bearing plate in contact with said dovetail legs urging said legs apart whereby said dovetail legs are forced against the dovetail slot thus securely attaching said fins to said missile skin.

2. In a device of the character described in claim 1 wherein said means for moving said actuator comprises:

a threaded aperture in said fin;

said threaded aperture in alignment with said channel portion;

a threaded bolt inserted into said aperture;

said bolt contacting the end of said actuator thus moving said actuator along an axial path as said bolt is threaded into said aperture.

3. In a device of the character described in claim 1 wherein:

said spreading means comprises a pair of isosceles links which are in contact with said bearing plate at one end thereof;

the other end of said links contacting said dovetail legs.

4. A locking mechanism for securely fastening a first member to a second member comprising:

a boss having a dovetail slot therein fixedly secured to said first member,

a dovetail portion having two legs fixedly secured to said second member,

a channel disposed in said dovetail portion opening toward said legs,

spreading means mounted in said dovetail portion for urging said legs into contact with said dovetail slot when a force is exerted upon said spreading means, said spreading means comprising:

a bearing plate positioned in said dovetail portion between said legs,

means for exerting a downward force on said bearing plate, and

first and second oppositely positioned isosceles members engaging said dovetail legs and the upper ends of said isosceles members contacting said bearing plate, whereby said isosceles members will move outward in response to the downward force on said bearing plate.

5. A locking mechanism for securely fastening a first member to a second member comprising:

a boss having a dovetail slot therein fixedly secured to said first member,

a dovetail portion having two legs fixedly secured to said second member,

a channel disposed in said dovetail portion opening toward said legs,

spreading means mounted in said dovetail portion for urging said legs into contact with said dovetail slot when a force is exerted on said spreading means, and

means for exerting a force upon said spreading means comprising:

a bearing plate positioned in said dovetail portion between said legs,

a plurality of discs mounted in contact with each other within said channel, said discs being supported by said bearing plate,

an actuator mounted at one end of said discs whereby axial movement of said actuator causes a three component force to be exerted by each of said discs,

one of said three components being normal to the upper surface of said bearing plate thus forcing said bearing plate and said isosceles members toward said dovetail legs outwardly into contact with said dovetail slot to securely fasten said first member and said second member together.

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