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2,825,112

TENSION RELEASEABLE FASTENING DEVICE

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FIG 1

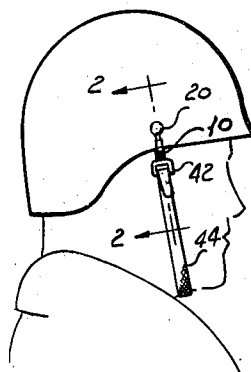


FIG 2

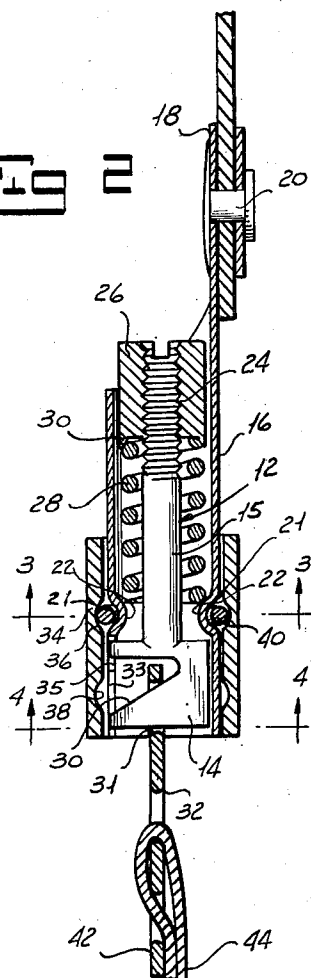


FIG 3

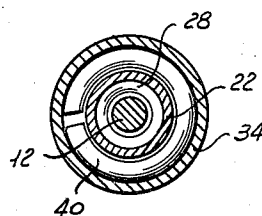
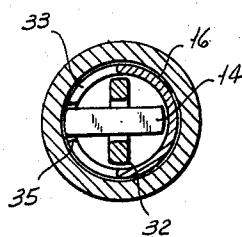


FIG 4



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TENSION RELEASABLE FASTENING DEVICE

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3 Claims. (Cl. 24—239)

Our invention relates to an improved tension releasable fastening device which is automatically released or unlatched when under a predetermined tension.

One object of our invention is to provide a fastening device which will be automatically released when under a predetermined tension.

Another object of our invention is the provision of a tension releasable fastening device wherein adjusting means is provided so that the tension at which the fastener will be released can be set at the desired amount.

A further object of our invention is the provision of a tension releasable fastening device which is simple in construction, economical to manufacture and certain in operation.

Other and further objects of our invention will appear from the following description.

In general our invention contemplates the interposition of a normally inoperative releasable connection in a securing means which is provided with a conventional fastener such as a buckle or the like. Our releasable connection is adapted to operate when the securing means, such as a strap or the like, is subjected to a predetermined tension. Our construction is such that the conventional fastener remains fastened under the tension and the strap is freed through our tension releasable fastening device when a predetermined tension is reached. Our fastener may, if desired, be released manually at will and hence may be employed alone to act at once both as a conventional fastener and as a tension releasable fastener.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views:

Figure 1 is a perspective view of our improved fastening device as it appears when used to retain a crash helmet on the wearer's head.

Figure 2 is a sectional view drawn on an enlarged scale taken generally along the line 2—2 of Figure 1.

Figure 3 is a sectional view taken along the line 3—3 of Figure 2.

Figure 4 is another sectional view taken along the line 4—4 of Figure 2.

More particularly, referring now to the drawings, a pistonlike member 12 having a flattened head 14 and a shank 15 is mounted within a tubular member 16. The member 16 has a lug or flange portion 18 by means of which it is retained on the helmet through the medium of a rivet 20. The interior of the tubular member 16 is also provided with an annular bead 22. The shank 15 of pistonlike member 12 is provided with a threaded portion 24 on which is adjustably mounted a nut 26, which in turn is provided at its lower end with an annular flange 30. A spring 28 is disposed within member 16 such that one end bears against nut 26 and is held in position by flange 30. The other end of spring 28 bears against bead 22. Thus it will be seen that member 12 is resiliently retained within member 16. It is so mounted, however, for only limited movement therein. Spring 28, when extended, has

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a diameter approximately equal to the outer diameter of the sleeve member at 22. When compressed, the spring has a diameter approximately equal to the outer diameter of nut 26 which in turn is approximately equal to the inner diameter of member 16, and the piston and spring assembly will not be completely withdrawn by the tension on the strap.

The head 14 is flattened as can be seen in Figure 4 and formed with a notch 30 for the reception of the eye 31 of buckle member 32 of the chin strap 44. In order that the eye 31 may be latched into this notch, member 16 is provided with an opening 33, the top of which is continued as a slot 35 for a short distance. Head 14 is eccentrically mounted with respect to the shank of member 12 so that the degree of eccentricity is equal to the gauge thickness of the tubular encasement wall and such that the upper portion of the head will ride in the slot 35 extending above the opening 33.

It will be noted that the bottom of notch 30 slopes downwardly so that the eye 31 will slide out of the notch if no means are provided to retain it. As a retaining means, we provide a knurled sleeve 34, mounted for limited sliding movement with respect to member 16. Two annular grooves or scores 36 and 38 are formed in the inner surface of the sleeve 34. A snap ring 40 is carried in recess 21 formed on the outer surface of member 16 and serves to retain the sleeve in either of two positions by virtue of its engagement with either groove 36 or groove 38. When the sleeve is in the upper position; that is, when ring 40 engages groove 38, the eye of buckle 32 is free to slide out of engagement with head 14. When in the lower position; that is, when ring 40 engages groove 36, sleeve 34 will cover or shield notch 30 so that buckle 32 cannot free itself from the head.

In operation, to secure the tension releasable fastening device to the buckle, sleeve 34 is slid to its upper position, and the eye 31 of buckle member 32 is engaged with notch 30 through the opening 33 in member 16. The sleeve is then slid to its lower position to secure buckle member 32 to our improved fastening device and chin strap 44 passed through buckle portion 42 to secure the helmet firmly to the wearer's head. The force exerted by spring 28 may be adjusted to the desired degree. This tension is determined by the spring constant of spring 28 and can be adjusted within limits by moving nut 26 up or down along the threaded portion 24. In this particular application it has been found that the degree of force varies between twenty pounds to forty pounds, according to the comfort desired by the individual aviator. In the event that a sudden blast of air or any other force tending to pull the chin strap free is encountered, the tension will tend to pull the piston head below the lower edge of sleeve 34 and allow the buckle to slide free. If the force is sufficient, it will pull the piston to a point where the eye can free itself. The proportion of the parts is such that when the spring is compressed, the notch 30 will be all the way out of sleeve 34 when the sleeve is in its lower position.

We may, if desired, completely eliminate buckle member 32, since our improved fastening device will operate as a conventional fastener as well as a tension releasable fastening device. A suitable means could be permanently attached to the end of strap 44 for engagement with head 14 and the helmet removed or donned by sliding sleeve 34 up or down. The strap could be cut to the desired length or suitable length, adjusting means provided and the necessity for lacing the strap through the buckle with each wearing eliminated.

It will be seen that we have accomplished the objects of our invention. We have provided a fastening device, simple in construction, economical to manufacture and certain in operation, in which provision is made for auto-

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matic release of a securing means when under a predetermined tension. In addition, we have provided an adjustment such that this predetermined tension may be adjusted within limits as desired.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is therefore to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. A tension releasable fastener including in combination a housing formed with an opening, a piston positioned in said housing for axial movement into and out of the housing, a stop for limiting the movement of the piston into the housing, a buckle, a slot formed in the piston for receiving the buckle, a spring for urging said piston against said stop to position said slot adjacent said opening, a movable member independent of said piston for selectively blocking the opening whereby selectively to retain said buckle attached to said piston and means mounting said member for movement on said housing,

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the arrangement being such that said piston is withdrawn from the housing against the action of said spring to release the buckle automatically from the piston when a predetermined pull is applied to the buckle.

2. A tension releasable fastener as in claim 1 wherein the member for selectively blocking the opening is a sleeve, and wherein said mounting means mounts said sleeve for limited axial movement with respect to the housing.

3. A tension releasable fastening device as in claim 1 including means for adjusting the force exerted by the spring in urging the piston against the stop.

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