AUTO SAFETY BELT BUCKLE

FIG. 1

FIG. 2

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This invention relates to a buckle and more particularly to a buckle assembly for use as a safety belt buckle. This invention further relates to a safety belt buckle of a rigid resilient material such as nylon.

Generally speaking, safety belt buckles, as well as other types of belt buckles, are made primarily of metal. This is a particular disadvantage in the case of auto or airplane safety belt buckles because the weight of the metal causes discomfort to the user or passenger. Moreover, these prior art type safety belt buckles are normally designed in such a manner that the stress occasioned as by the stopping short of an automobile or the like is placed upon one portion of the belt buckle and is not distributed throughout the assembly.

It is an object of this invention therefore to provide a belt buckle particularly suitable adaptable for use as an auto safety belt buckle which is of light weight and made of material adapted to distribute various forces occasioned by the short stoppage of a car or the like throughout the members or parts of the buckle thereby relieving the force thereby occasioned on any one member. It is a still further object to provide such safety belt buckle which has a minimum of parts with a maximum amount of attendant safety. It is a still further object of this invention to provide safety belt buckle having its main body portion made of a rigid resilient material, preferably, nylon. It is a still further object of this invention to provide a buckle assembly which can readily be injection molded of nylon. These and other objects and advantages of this invention will be more clearly seen from the following complete description and claims.

This invention contemplates a buckle assembly comprising a unitary body of a rigid resilient material said body having at one end thereof a mouth comprising upper and lower jaws, said body having a roughly elliptical transverse orifice, said upper and lower jaws having reciprocally disposed corrugated teeth adaptable to clamp a belting tongue, i.e., a corrugated tongue or belting material at said mouth, means for rotating a cam bearing on said upper jaw about an axis to force said cam against said upper jaw thereby depressing said jaw to close upon said tongue, said orifice provided with means to restrain passage of said tongue into said orifice, and means movable in said orifice for affixing belting thereto.

Referring to the drawings in which like reference numerals represent like parts: FIGURE 1 is an exploded plan view showing the buckle of this invention and the tongue used in conjunction with the buckle. FIGURE 2 is a side elevation of the buckle and tongue of FIGURE 1 in which the buckle portion has its jaws open. FIGURE 3 is a sectional view of the buckle and tongue of FIGURE 1 taken along line 3—3 of FIGURE 1. FIGURE 4 is a sectional view similar to FIGURE 3 but showing the corrugated tongue in place and the jaws of the buckle clamped thereon. FIGURE 5 is a sectional view of the buckle of FIGURE 1 taken along the line 5—5 of FIGURE 1. Broken lead lines point to parts present but not seen in a particular view.

A preferred form of the buckle assembly of this invention, illustrated in the drawings, has a corrugated tongue 2 through which belting 4 is passed. The buckle portion of the buckle assembly has an upper body portion 16 and joined therewith in a single unit, a lower body portion 18 which form at one end thereof a channel 32 and at the opposite end a mouth 33. At mouth 33 there is provided jaws 5 and 6 and reciprocally disposed upper teeth 7 on the upper body portion 16 and lower teeth 8 on the lower body portion 18. These teeth are on the jaws 5 and 6 of the body portions 16 and 18. The upper and lower body portions form a unitary structure having a roughly elliptical orifice 26 transversely through the middle thereof, allowing bending movement of the body portions to open and close the jaws 5 and 6. Wire frame 13, fitting in groove 17, runs around the jaws as seen by the dotted lines in FIGURES 1, 2, 3, and 4 and as seen in FIGURE 5. Frame 13 forms, across the upper jaw 5, an axis 14. Cup 15 has nested therein cam 12, moveable by lever 10 about axis 14 to depress upper jaw 5 relative to axis 14. Parallel plates 20 are insert molded around frame 13 as shown in FIGURES 2, 3 and 4. Locating brace 22, within orifice 26, just behind jaws 5 and 6, restrains movement of the tongue 2 into the orifice 26. Parallel plates 20 form side pieces of the U-shaped locating brace 22 adjacent to and outside the jaws of the orifice 26. Element 24 is a channel brace moveable in the roughly elliptical orifice 26. On part of the periphery thereof, channel brace 24 is provided with channel brace teeth 28 facing channel 32, which in co-operation with channel teeth 30 of the upper and lower body portions adjacent channel 32 help to hold the belting 4' in place. This channel brace 24 is of sufficient dimensions that it cannot pass out channel 32. The belting 4' as indicated in FIGURES 3 and 4 passes into the roughly elliptical orifice 26, through channel 32, then around channel brace 24, and thence out channel 32. At the sides of the channel brace 24 there is provided on either side thereof lips 34, as seen in FIGURE 1, provided with externally disposed finger grips 36 for ready handling of channel brace 24.

In operation, the tongue 2 about the end which belting 4 has been passed thereby forming one side of the belt is placed within mouth 33 upon lower teeth 8 or alternatively the belting 4 itself may be placed upon lower teeth 8. Passage of tongue 2 or belting 4 through mouth 33, as indicated, is restrained by locating brace 22 enabling the tongue 2 to rest readily upon lower teeth...
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8 of the lower body portion 18. The lever 10 is moved clockwise from its fully open position, as seen in FIG-1

URE 3, about an angle of about 120° thereby rotating cam 12 about axis 14 and placing force upon the upper body portion 16 and upper jaw 5 at cup 18. When the lever has completely rotated about an angle of about 120° it rests adjacent the top of the upper body portion 16 and the cam 12 in position, as in FIGURE 4.

The finger grips 36 enable the channel brace 24 to be moved generally throughout the roughly elliptical transverse orifice 36. This part has been provided so that the belt on the buckle portion may be regulated by moving the channel brace 24 toward mouth 33, thereby releasing the belt from being snugly fit by the channel brace teeth 28 and channel teeth 30 of the upper and lower body portions. The length of the belt 4 may be adjusted by moving the belt in and out of channel 32 and around channel brace 24. The belt 4 passes out channel 32 to a length adjusting means (not shown). The channel brace 24 also serves to secure belt 4 to the buckle portion of the assembly.

When the buckle is employed and a force is exerted against it such as by a sudden stop of an automobile, whereby the user of the buckle is thrust forward in inertia, the channel brace 24 is jammed tightly against the belt 4, encircling the same and the belt is held tightly in place by channel brace teeth 28 and channel teeth 30. The force of the impact is distributed throughout the upper body portion 16 and the lower body portion 18 as is the force upon the tongue 2 distributed at that end of the buckle.

To disengage the buckle and tongue, the lever 10 is rotated counterclockwise about an angle of about 120° thereby releasing force upon upper body portion 16 and permitting jaws 6 to open mouth 33. The tongue 2 or belt 4 is then lifted off teeth 8 of the lower jaw.

As indicated above, the body portion of the buckle portion is constructed of a rigid resilient material as is necessary to allow bending movement of jaws in the unitary body structure employed. This unitary structure is important for distributing suddenly applied forces over the entire body of the buckle. In particular, the body portions 16 and 18 of the belt buckle may be nylon, glass reinforced polyester, rigid resilient polypolypropylene or polycarbonate. Furthermore, the channel brace 24 can be manufactured of lightweight yet strong materials. Of these above materials, however, I prefer nylon, as it can be readily injection molded and lends itself to economical mass production techniques.

In molding the channel brace 24 of nylon or other suitable material, two moldings are made, each of which has one lip 34 with an externally disposed finger grip 36. The two molds are inserted through the roughly elliptical orifice 26 extending transversely through the buckle and they are secured together as indicated in FIGURES 3 and 4 by the cross-hatching of channel brace 24. Similarly, the channel brace 24 may also be molded of nylon or other of the above rigid resilient material and, for ease in assembly is preferably molded in one piece with parallel plates 20 which cover the side of mouth 33 as seen in FIGURE 2.

The tongue 2, preferably constructed of stamped steel, has corrugations on its surface perpendicularly to the line of belt tension and corresponding to the corrugated teeth 7 and 8 on jaws 5 and 6. In the embodiment shown, the corrugations of the tongue 2 and the teeth 7 and 8 are relatively smooth yet, it is to be realized that the angle at which these corrugations rise from the jaws 5 and 6 may vary so long as teeth 7 and 8 of jaws 5 and 6 can clamp tightly upon tongue 2 or the belting 4 itself thereby securing one side of the belt assembly to the other. Furthermore, while the number of corrugations on the tongue 2 is not essential to the invention, I prefer at least two upwardly extending corrugations with a buckle portion having the corresponding requisite number of teeth as this number of corrugations provides a secure fit of the tongue 2 to the buckle portion.

The cam 12 is preferably made so as to snap on the axis 14, the latter of which is preferably a wire or other suitable metallic frame. The lower body portion 18 is molded in the preferred embodiment shown in the drawings to provide a groove 17 through which the wire frame 13 can pass thereby reducing bulk and providing a more streamlined buckle.

It is readily apparent that the instant invention provides a safe, and strong belt buckle particularly suitable for use as a safety belt buckle in automobiles, airplanes and other vehicles. The buckle is preferably nylon or the like which eliminates discomfort previously experienced by users of prior art safety belt buckles. Furthermore, the buckle can readily be assembled using inexpensive materials which lend themselves readily to mass production techniques, e.g. nylon body portions which are readily injection molded.

The foregoing description and drawings of this invention are intended to illustrate the nature of the invention and are not to be construed as limiting the same, since certain modifications or departures from the above disclosure would be obvious to one skilled in the art. For instance, one could construct a buckle assembly having a cam rotatable about an axis by a lever as described above wherein the angle of rotation is not about 120°, as this particular angle is not critical to the invention. This latter buckle would, of course, have differently shaped cams and the like but is contemplated within the scope of this invention. Therefore, the invention should be interpreted in the light of its spirit and scope.

I claim:

1. A buckle assembly comprising a unitary body of a rigid resilient material, said body having at one end a channel and at the other end thereof a mouth comprising upper and lower jaws said body having a roughly elliptical transverse orifice disposed between said channel and said mouth, said upper and lower jaws having reciprocally disposed corrugated teeth adaptable to clamp a corrugated tongue at said mouth, a lever adaptable to move a cam bearing said upper jaw, said lever being rotatable about an axis to force said cam against said upper jaw thereby depressing said jaw to close upon said tongue, said orifice provided with means to restrain passage of said tongue into said orifice and means movable in said orifice for fastening belting thereto.

2. A buckle assembly according to claim 1 wherein the body is of nylon.

3. A buckle assembly according to claim 1 comprising a wire frame fitting in a groove around the jaws which frame provides, across said upper jaw, said axis about which said lever rotates.

4. A buckle assembly according to claim 3 wherein said means to restrain passage of said tongue into said orifice is positioned in said orifice just behind said jaws and is provided with parallel plates forming side pieces therefor adjacent to and outside said orifice and jaws.

5. A buckle assembly according to claim 1 wherein said means movable in said orifice for affixing belting thereto is provided on the sides facing said channel with teeth.

6. A buckle assembly according to claim 5 wherein said upper and lower body portions are provided with teeth adjacent said channel.

7. A buckle assembly according to claim 6 wherein said means movable in said orifice for affixing belting thereto is constructed of nylon and is provided with lips on either end thereof extending over the sides of said upper and lower body portions.

8. A buckle assembly comprising a unitary body of a rigid resilient material, said body having at one end a channel and at the other end thereof a mouth comprising
upper and lower jaws, said body having a roughly elliptical transverse orifice disposed between said channel and said mouth, said upper and lower jaws having reciprocally disposed corrugated teeth adaptable to clamp a tongue at said mouth, a lever adaptable to move a cam bearing on said upper jaw, said lever being rotatable about an axis to force said cam against said upper jaw thereby depressing said jaw to close upon said tongue, and means movable in said orifice for fastening belting thereto.

9. A buckle assembly according to claim 8 wherein said tongue is a corrugated stamped steel tongue.

10. A buckle assembly according to claim 8 wherein said tongue is belting material.