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READILY RELEASABLE BUCKLE

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2 Sheets-Sheet 2

Fig 2

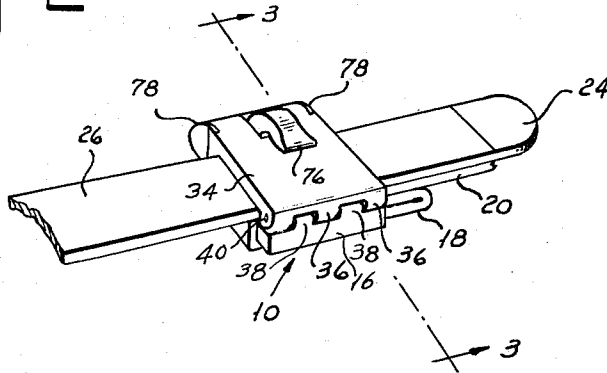


Fig 5

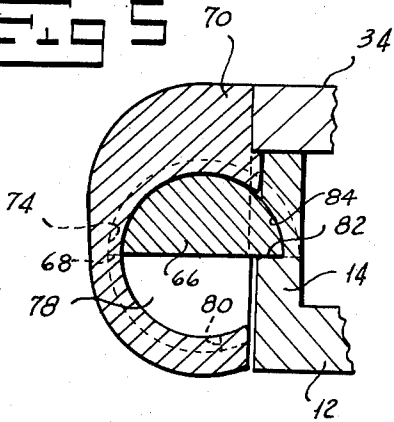


Fig 7

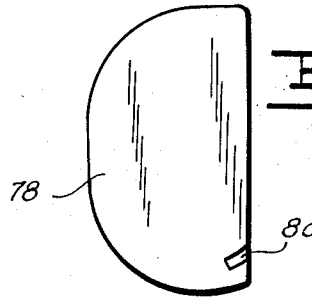
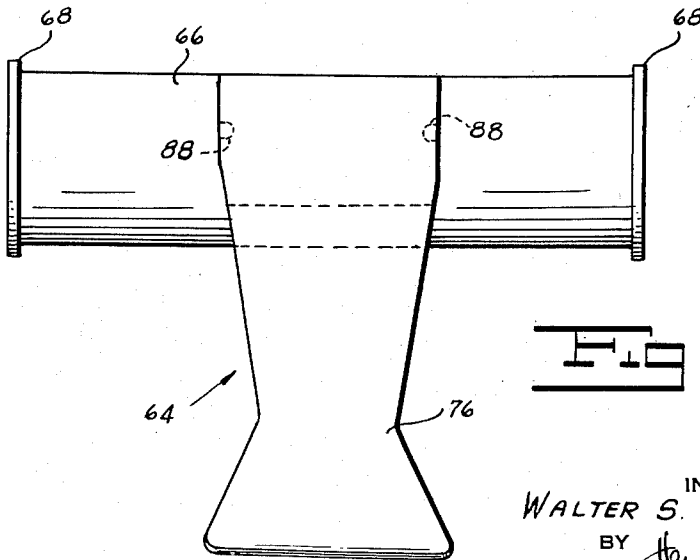


Fig 6

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2,954,594

READILY RELEASABLE BUCKLE

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6 Claims. (Cl. 24—170)

My invention relates to an improved readily releasable buckle for use with a safety belt or the like and more particularly to an improved readily releasable buckle which provides a secure engagement without decreasing the effective tensile strength of the strap or belt secured by the buckle.

A buckle for a safety belt used in an aircraft, automobile, or the like, should provide a firm engagement between the belt ends without creating excessive localized stresses in the belt at the point of securement. The buckle must be readily releasable and easily adjustable to size. Some readily releasable belt buckles of the prior art secure the ends of a safety belt to each other by applying pressure over a limited area to overlapping belt ends. Other buckles of the prior art wedge a portion of the belt adjacent one of its ends between a stationary roller and a slidable roller. Both of these constructions tend to weaken the belt at the point of engagement, since pressure is applied to the belt material over a restricted area. As a result, the belt strength in this area is less than the tensile strength of the material of which the belt is composed. Further, owing to abrasion the life of the safety belt is reduced. Much of the securing force in the buckles of the prior art is carried by their buckle-releasing members with the result that release is difficult.

Buckles of the prior art are customarily provided with means independent of the securing means for adjusting the belt length. These constructions, like the securing means, apply pressure to the belt over only a very limited area. Thus the belt is weakened at this point also.

I have invented a readily releasable buckle for safety belts or the like which joins the ends of a safety belt or the like without decreasing the effective tensile strength of the belt. My buckle creates no excessive local stresses in the belt at the point of securement. My buckle may readily and expeditiously be released, since the entire securing force is not applied to the buckle locking means. My buckle is lightweight and strong. Adjustment of the belt to size is automatically made when the buckle is locked. My buckle permits use of any appropriate length of strap.

One object of my invention is to provide an improved readily releasable buckle for a safety belt which secures the belt without decreasing the effective tensile strength of the belt.

Another object of my invention is to provide an improved readily releasable buckle for a safety belt in which the securing force is distributed over a large area of the belt.

A further object of my invention is to provide a readily releasable buckle in which only a portion of the securing force is applied to the buckle locking means.

A still further object of my invention is to provide an improved readily releasable buckle for a safety belt or the like which is strong and lightweight.

Yet another object of my invention is to provide an im-

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proved readily releasable buckle for a safety belt or the like which automatically adjusts to length when secured.

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

5 In general, my invention contemplates the provision of a readily releasable buckle including a channel-shaped member through which the belt ends to be joined pass axially of the channel. A cover or closure member, hinged to the base, closes over the belt transversely of its length and carries means by which the cover is releasably locked to the base. A spring normally urges a friction plate carried by toggle links on the underside of the cover up against the cover. When the cover closes on the base, the belt tension pulls the plate and the toggle links force the plate against the belt to exert a compressive force over an extended area of the belt. The compressive force exerted by the plate increases as the belt tension increases to provide a firm engagement between the belt ends to be joined.

10 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:

15 Figure 1 is a perspective view of my improved readily releasable buckle in use when securing the ends of a seat safety belt.

Figure 2 is a perspective view of my improved readily releasable buckle when locked to fasten the ends of a safety belt or the like.

20 Figure 3 is a sectional view of my improved readily releasable buckle, drawn on an enlarged scale, taken along the line 3—3 of Figure 2.

Figure 4 is a sectional view of my improved readily releasable buckle, taken along the line 4—4 of Figure 3.

25 Figure 5 is a fragmentary sectional view of my improved readily releasable buckle, taken along the line 5—5 of Figure 4.

Figure 6 is a plan view of the locking member of my improved readily releasable buckle.

30 Figure 7 is an elevation of a blank flange of my improved readily releasable buckle.

35 More particularly referring now to Figures 2 to 4 of the drawings, my readily releasable buckle includes a channel-shaped member, indicated generally by the reference character 10, having a base 12 and a pair of sides 14 and 16. One end 18 of the belt ends to be secured to each other passes around the base 12 in the direction of the axis of the channel-shaped member 10 and is secured to the belt length 20 by any convenient means such as stitching or the like 22. It will be seen that the buckle structure is carried by the belt length 20. The other end 24 of the belt length 26 to be secured to the belt length 20 is passed through the channel-shaped member 10 over base 12 and length 20 between sides 14 and 16 in the direction of the axis of member 10.

40 When the belt to be secured is a safety belt or the like including lengths 20 and 26, the respective belt lengths 20 and 26 may conveniently be secured to the seat 28 of an aircraft or the like by respective U-shaped fittings 30 and 32 secured to the seat 28 by any convenient means as is understood in the art.

45 My buckle includes a top cover or closure member 34 formed with hinge members 36 complementary to hinge members 38 formed on side 16. A hinge pin 40 joins members 36 and 38 to provide a hinge joint, indicated generally by the reference character 42, between cover or closure member 34 and the channel-shaped member 10.

50 Referring now to Figure 4, a pair of toggle links 44 and 46 which are pivoted in respective sockets 48 and 50 formed in the underside of cover 34 carry a friction plate 52. The ends of links 44 and 46 remote from

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sockets 48 and 50 are disposed, respectively, in sockets 54 and 56 in plate 52. A spring 58 formed with up-standing ends 60 by means of which it is mounted on cover 34 normally urges link 46 to pivot in a counterclockwise direction as viewed in Figure 4 to move plate 52 up against the underside of cover 34.

When cover 34 is closed on channel member 10 and lengths 20 and 26 of the safety belt are under tension tending to separate them, the upper surface of length 26 engages the knurled undersurface 62 of plate 52 and draws it to the left as viewed in Figure 4 to pivot links 44 and 46 in a clockwise direction. As the links 44 and 46 so pivot, they force plate 52 down against belt length 26 to exert a compressive force on the belt. As the tension on belt lengths 20 and 26 increases, plate 52 is forced further down to increase the compressive force on belt lengths 20 and 26.

Referring now to Figures 3 and 5 to 7, my buckle includes a locking member, indicated generally by the reference character 64, formed with a laterally extending locking portion 66 having a substantially semicircular cross section. I form mounting flanges 68 on the ends of the portion 66 of member 64. Cover 34 carries at its left-hand end as viewed in Figure 3 a pair of spaced locking member supports 70 joined by a web 72 extending between the supports 70. Each of the supports 70 is counterbored from its outboard surface to provide recesses 74 complementary to the respective flanges 68. Locking member 64 includes an operating handle 76 integrally formed with portion 66. In assembling my buckle I pass handle 76 through an opening in cover 34 between supports 70 over the web 72. Flanges 68 register with recesses 74. In order to retain locking member 64 in its assembled position on cover 34, I fix blank flanges 78 over the respective flanges 68 at the ends of portion 66 and secure the blank flanges 78 to cover 34 by any convenient means such as welding or the like. From the structure just described it will be seen that lock member 64 is mounted for pivotal movement about the axis of the counterbored holes in supports 70. Stops 80 formed on blank flanges 78 limit the pivotal movement of lock member 64 in a counterclockwise direction as viewed in Figures 3 and 5.

I form side 14 with a notch 82 engaged by portion 66 of member 64 when the locking member 64 is pivoted in a clockwise direction as viewed in Figures 3 and 5. Notch 82 is complementary to portion 66. When member 64 is in locking position, the arcuate surface 84 of notch 82 engages portion 66.

In order to prevent the locking member 64 from slipping out of locking position, which is the position shown in Figure 3, I mount respective spring-urged detents 86 in the supports 70. When the member 64 is in locking position, detents 86 engage recesses 88 bored in handle 76 adjacent locking portion 66 of member 64.

In use, to join a pair of lengths 20 and 26 of a safety belt or the like, my readily releasable buckle is carried by belt length 20, the end 18 of which is looped around base 12 and secured to belt length 20 by stitching 22. In order to secure belt length 26 to belt length 20, locking member 64 is pivoted to the broken line position shown in Figure 3 and the cover 34 is raised to the broken line position. In this position of the cover spring 58 pivots link 46 in a counterclockwise direction to urge plate 52 up against the underside of cover 34. I pass end 24 of belt length 26 between the cover and the channel-shaped member 10 and close cover 34 over the belt length. Locking member 64 is then rotated back to the full line position shown in Figure 3 to lock cover 34 in its closed position. In the closed position of cover 34, the knurled surface 62 of friction plate 52 engages the upper surface of length 26. Tension on belt lengths 20 and 26 tending to separate them draws the friction plate 52 to the left as viewed in Figure 4 by reason of the engagement of the surface of belt length 26 with knurled

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surface 62. As plate 52 moves to the left, links 44 and 46 pivot in a clockwise direction as viewed in Figure 4 to force plate 52 downwardly and compress belt lengths 20 and 26 between the plate and base 12. This compressive force increases as the tension tending to separate belt lengths 20 and 26 increases. Only a very limited movement of plate 52 is necessary to produce a high compressive securing force to belt lengths 20 and 26. The shape of the recesses in cover 34 leading into sockets 48 and 50 and the proportioning of the parts are such that links 44 and 46 are not permitted to move beyond bottom dead center under the action of the belt tension.

The length of my safety belt may readily be adjusted by grasping end 24 and pulling it to the right as viewed in Figure 4. Further, it is to be noted that the reaction to the compressive force exerted on the belt lengths 20 and 26 is transmitted through links 44 and 46 to cover 34. This force is not entirely applied to the locking connection provided by the engagement of surface 84 with portion 66 of member 64 but is shared between that connection and the hinge 42. Moreover, this force does not act entirely directly on the locking means to open it but acts in part transversely of the length of the locking joint tending to pivot cover 34 about a line perpendicular to the axis of hinge 42 and the axis of surface 84. Detents 86 engaging recesses 88 prevent accidental release of locking member 64.

When it is desired to release the buckle, handle 76 is pivoted in a counterclockwise direction as viewed in Figure 3 to move portion 66 of member 64 out of notch 82 and permit cover 34 to swing open. Belt end 24 then readily falls away from belt length 20 and the belt is released.

It is to be noted that the compressive force exerted by plate 52 is distributed over a relatively large area of belt with the result that no highly localized stresses are applied to the belt. My construction prevents excessive force from being exerted on the stitching 22 which joins the end 18 with the belt length 20. The tension tending to separate lengths 20 and 26 is resisted by the compressive force between the portions of the lengths under plate 52. Consequently, very little force tends to tear belt length 20 away from end 18.

It will be seen that I have accomplished the objects of my invention. I have provided an improved readily releasable buckle which provides a secure engagement between the ends of a safety belt or the like without decreasing the effective tensile strength of the belt. My buckle creates no highly localized stresses in the belt. It is strong and lightweight. It is automatically adjusted to size when secured. Since the entire force of securing is not applied to the belt locking means, the locking means is readily releasable.

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

Having thus described my invention, what I claim is:

1. A readily releasable buckle for joining the ends of a belt including in combination a body having a base with a surface for engaging a length of said belt, a cover, means mounting said cover for movement about an axis parallel to the axis of said belt length to a position at which said cover lies over said base, a compression member formed with a belt-engaging surface covering an extended area, and a pair of spaced parallel motion toggle links mounting said compression member on said cover for movement between a first position at which said belt-engaging surfaces exert a compressive force on said belt

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length and a second position at which said belt length is free.

2. A buckle as in claim 1 including means normally urging said compression member to said second position.

3. A buckle as in claim 1 including means for locking said cover in a position at which the cover lies over the base.

4. A buckle as in claim 1 including means for limiting the movement of said toggle links.

5. A readily releasable buckle for joining the ends of a belt including in combination a body having a base with a surface for engaging a length of said belt, a cover, means mounting said cover for pivotal movement about an axis parallel to the axis of said belt length for movement to a position over said base, a compression member formed with a belt-engaging surface covering an extended area, parallel motion means swingably mounting said compression member on said cover for movement with the plane of said compression member belt-engaging surface remaining substantially parallel to the plane of said base belt-engaging surface when said cover is closed over said base between a first position at which said surfaces exert a compressive force on said belt length and a second posi-

tion at which said belt length is free, a locking member, means mounting said locking member for pivotal movement on said cover about an axis parallel to the length of said belt, said base being formed with an arcuate notch and an arcuate surface on said locking member adapted to be pivoted into engagement with said arcuate notch when said cover is closed on said base.

6. A buckle as in claim 5 including means for preventing accidental release of said locking member.

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