

Jan. 19, 1965

L. L. IRVIN

3,165,802

QUICKLY RELEASABLE BUCKLE FOR SAFETY AND HARNESS STRAP

Filed Feb. 8, 1963

2 Sheets-Sheet 1

Fig. 1.

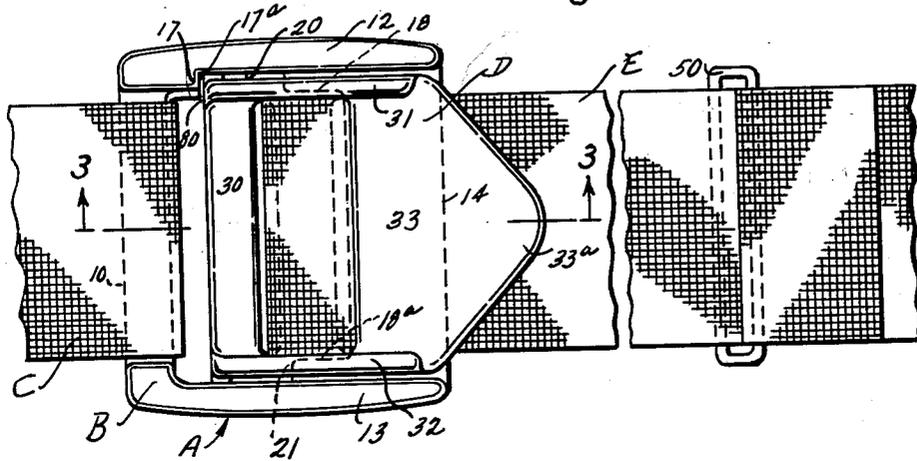


Fig. 2.

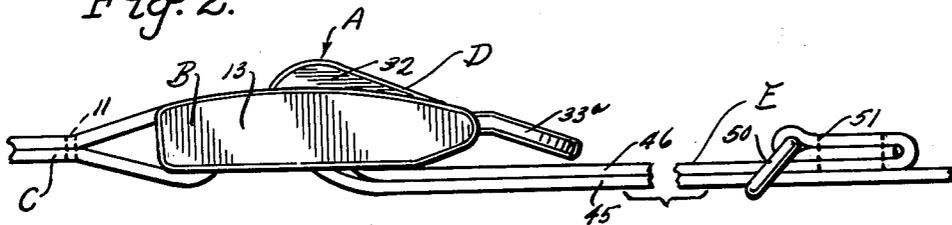


Fig. 5.

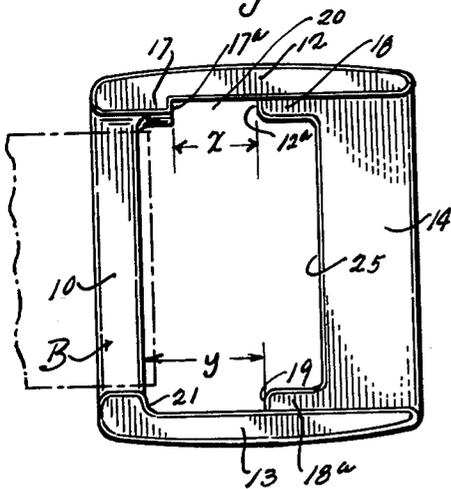
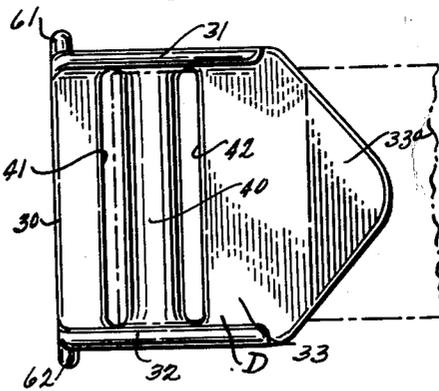


Fig. 6.



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Fig. 3.

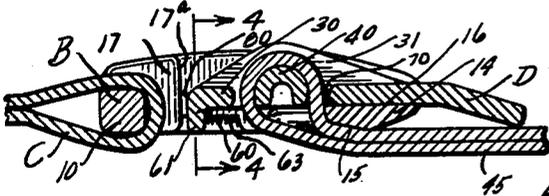


Fig. 4.

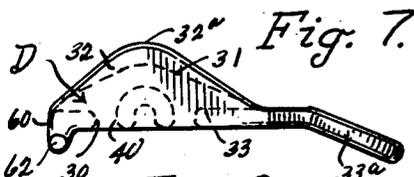
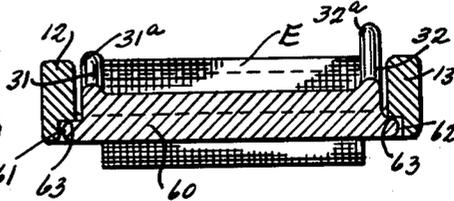


Fig. 7.

Fig. 8.

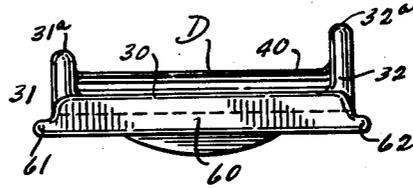


Fig. 9.

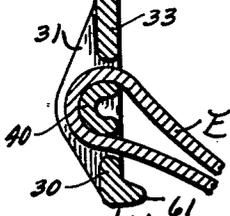
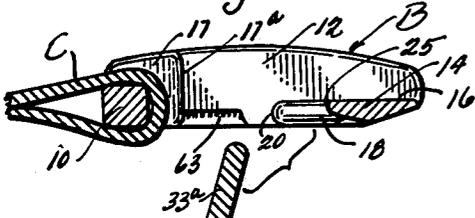
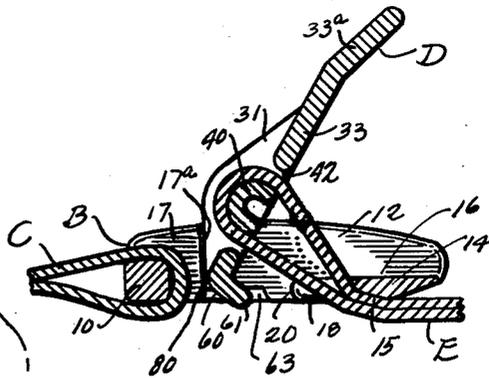
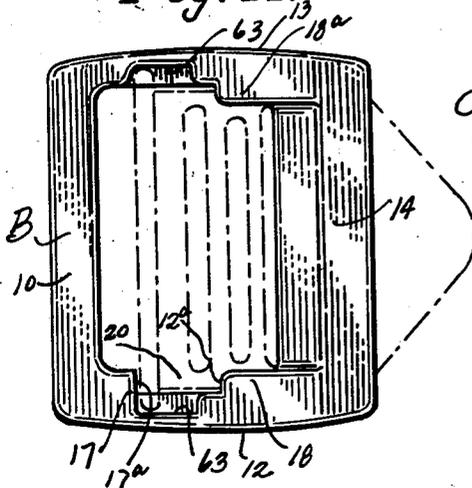


Fig. 10.

Fig. 11.



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QUICKLY RELEASABLE BUCKLE FOR SAFETY AND HARNESS STRAP

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Filed Feb. 8, 1963, Ser. No. 257,324
3 Claims. (Cl. 24-197)

This invention is concerned with improvements in or relating to buckles or couplings for enabling strap or webbing ends to be quickly and easily interconnected and disconnected and is primarily, though not necessarily exclusively, concerned with buckles suitable for interconnecting safety straps for securing an occupant of an automotive vehicle or aircraft in a seat.

Various forms of quick-action buckles or couplings for releasably interconnecting strap ends have already been proposed, such buckles comprising two buckle portions, one of which is permanently connected to a strap end and the other of which is adjustably connected to another strap end, the buckle portion having a strap end adjustably secured thereto being usually endwise insertable through an opening in the plane of the other buckle portion and being adapted after insertion to rest slidably on such other portion so that pursuant to any tension in the interconnected strap ends the two buckle portions slide in a direction tending to lock or wedge the inserted strap against any slipping movement. Such types of buckles are shown in U.S. Patents 2,807,852; 2,983,015 and 3,060,537. With these types of buckles the insertable buckle part has a considerable extent of slidable movement upon the other buckle part because of the provision of ledges or flanges which permit increase of the slidable movement of the buckles when the belts to which they are attached are not under tension. It is a purpose of the present invention to limit the extent of such slidable movement and at the same time retain the safety provisions of U.S. Patent 3,060,537 in that the insertable buckle portion and the other buckle portion are so constructed and arranged that the insertable buckle portion can be properly inserted into the other buckle portion only in a position so that the inserted portion can be rocked towards the face of the other portion. In other words, it is impossible to incorrectly assemble the buckle portions into superposed slidable relation.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention:

FIGURE 1 is a fragmentary view of the outer side of the buckle showing the buckle parts in complementary engaged position for holding the strap or webbing parts or ends in secured relation.

FIGURE 2 is an edge elevation of the buckle parts and strap or webbing ends as shown in FIGURE 1.

FIGURE 3 is a cross sectional view taken substantially on the line 3-3 of FIGURE 1, through the assembled coupling parts and the adjacent portions of the straps or webbing.

FIGURE 4 is a cross sectional view taken substantially on the line 4-4 of FIGURE 3.

FIGURE 5 is a plan view of one of the buckle parts which is adapted to be permanently attached to one of the safety straps or webbing portions.

FIGURE 6 is a plan view of the buckle or coupling part which is adapted to be adjustably connected to the other strap or webbing part, and which will be referred to as the insertable coupling part, inasmuch as it is adapted to be inserted into the opening of the coupling part shown in FIGURE 5.

FIGURE 7 is a side elevation of the coupling part shown in FIGURE 6.

FIGURE 8 is an end elevation of the coupling part shown in FIGURE 7.

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FIGURE 9 is a cross sectional view showing the two coupling parts about to be assembled, with the insertable coupling part positioned below the other coupling part and in line therewith to enable the insertion of the insertable coupling part in the other coupling part.

FIGURE 10 is a cross sectional view of the parts shown in FIGURE 9 but showing the insertable coupling part after it has been inserted through the opening of the other coupling and is about ready to be fulcrumed or rocked on the coupling part in which it is inserted, prior to the closing movement of the insertable coupling part to the position shown in FIGURE 3.

FIGURE 11 is a bottom plane view of the main buckle portion, more particularly showing the undersurface thereof with recesses adapted to receive fulcruming projections of the insertable buckle portion.

In the drawings, wherein similar reference characters designate corresponding parts, the letter A may generally designate the coupling. It includes a main coupling or buckle part B for permanent attachment to one end of a safety strap or webbing portion C and a second part D for insertion in part B to form the assembled buckle. The part D slidably and adjustably receives the safety strap or webbing portion E in order that the safety harness straps C and E may be tightened upon the user.

Referring more particularly to FIGURE 5 which shows the buckle part B, the same includes a strap attaching bar 10 to which the strap C is adapted to be permanently attached as by being looped around the bar 10 and then stitched as shown at 11 in FIGURE 2. Side bars 12 and 13 are rigidly connected in right angled relation at the ends of the cross bar 10 and at their opposite ends they are provided with a cross bar 14 which is provided with a flat top surface 16 and an under surface 15 which slopes convergently with respect to the top surface 16 in the direction of the cross bar 10. The side bars 12 and 13 are rather rectangular in cross section and at the inner sides of said bars 12 and 13 there are provided inwardly extending relatively spaced shallow flanges 18 and 18^a which lie in the plane of the bar 14 for only a portion of the height of the bars 12 and 13. These flanges 18 and 18^a lie adjacent to the bar 14 and their upper surfaces are flush with the top surface 16 of the bar 14. The bar 12 adjacent to the strap attaching bar 10 is provided with an inwardly extending boss or extension 17, shown in FIGURE 5, which extends for the entire height of the bar 12, as shown in FIGURES 3, 9, and 10. The space between the face 17^a of this boss or extension 17 and the facing edge 12^a of the flange 18 defines a recess or slot 20 (see FIG. 5) which is shorter in length than the space from the end surface 19 of the flange 18^a to the inside facing edge of the bar 10. This space defines a recess or slot designated at 21. The width of the recess or slot 20 is designated at X and the width of the recess 21 is designated at Y in FIGURE 5. It will be noted from FIGURE 5 that the end edges of the flanges 18 and 18^a are in direct transverse alignment but the opposite ends of the slots 20 and 21 are not in direct transverse alignment. The recesses 20 and 21 are of unequal lengths to insure that the coupling part D can be inserted in only correct position in the opening 25 of part B.

Referring to the buckle or coupling part D, the same comprises a cross bar portion 30 to which are rigidly attached side bar portions 31 and 32 in right angled relation therewith. At their outer ends the side bars 31 and 32 are integrally connected to a cross bar or plate portion 33 which has extended therefrom a slightly downwardly inclined lift plate or tab 33^a. The cross bars 30 and 33 lie in the same plane and the side bars 31 and 32 extend upwardly from the top surfaces of the bars 30 and 33 as shown at 31^a and 32^a (see FIG. 4) respectively, in right angles from the planes of the bars 30 and 33. The

heights of these flanges 31 and 32 above the top surfaces of the bars 30 and 33, at 31^a and 32^a are of unequal distances. That is, the bar 31 is less in height than the bar 32 as shown in FIGURE 4 of the drawings. The purpose of this will be hereinafter mentioned, but at this time it should be noted that the bar 31 is of such height that it will just freely pass through the recess 20 of the buckle part B with little clearance, and the bar 32 is of such height that it will just slip through the opening or recess 21 but will not pass through the recess 20 should buckle B be reversed during improper assemblage. The purpose of this will be clear, since it insures that the parts B and D can only be properly insertably assembled and positioned in correct attitude.

Referring again to the buckle part D, the same includes a strap attaching cross bar 40 which is integrally connected to the inner sides of the cross bars 31 and 32. It receives the strap or webbing portion E in looped relation thereover; the bars 30, 33 and 40 being relatively spaced to define openings 41 and 42 through which the webbing E may be inserted in order to loop the webbing E upon the bar 40, as shown in the drawings.

The webbing E when looped upon the bar 40 provides a main body portion 45 which extends for attachment to the vehicle and the free end 46 which is used for adjustment purposes and which is provided with an encircling loop 50 secured thereto at 51 and through which the portion 45 slidably extends. This insures that the strap E will be looped about the bar 40 in proper position.

Referring again to the structure of the buckle part D, the same is provided with a right angled flange 60 extending in a direction opposite from the direction in which the bar 40 projects above the plane of the cross bars 30 and 33. This flange 60 at its end is provided with fulcruming or rocking extensions 61 and 62. These extensions 61 and 62 from outer end to outer end define a distance which is greater than the width of the buckle opening 25 at the location of recesses 20 and 21.

Referring to the assembly of the buckle parts B and D with the webbing or strap portions C and E connected thereto, as above described, the user inserts the tab end 33^a through the opening 25 of the buckle part B, starting from the position shown in FIGURE 9. The width of the buckle part B from outer side of the side bar portion 31 to outer side of the side bar portion 32 is such that the buckle D may be inserted through the opening 25 of the buckle part B at the locus of recesses 20 and 21 to the position shown in FIGURE 10. When in this position, the extensions 61 and 62 of the buckle part B engage in recesses 63 provided inwardly of the under edges of the side bars 12 and 13 of the buckle part B to prevent slipping of the inner end of the buckle part D out of the opening 25 of the buckle part B. The operator then moves the buckle part D to the position shown in FIGURE 3 and in doing so the under surfaces of the bars 30, 31, 32 and 33 slide upon the upper surfaces of the extensions 18 and 18^a and bar 14.

If the user desires to tighten the straps C and E upon his body, it is only necessary to pull the free end 45 which will permit the strap to slide around the cross bar 40. As the straps C and E are properly tensioned upon the body of the wearer, the tension upon the strap portion 45 will move bar 40 in the direction of the cross bar 14 and clamp the bight of the strap E at the location 70 as shown in FIGURE 3 against the inner edge of the bar 14.

In order to disengage the coupling parts B and D, it is merely necessary for the user to lift the tab 33^a and swing the buckle D to the position shown in FIGURE 10, and then it can be instantly detached from the buckle part B by dropping it through the slots 20 and 21, to the position shown in FIGURE 9.

The safety harness may be of the types used upon automotive vehicles or aircraft for holding an individual in his or her seat or the buckle may be used in any loca-

tion for connecting the ends of parachute or safety harness straps. Of course, it will be understood that the remote ends of the straps C and E are in some way attached to the vehicle or aircraft as in conventional practice.

It will be noted from the foregoing that the top surfaces of the flanges 18 and 18^a and the cross bar 14 in the position shown in the drawing are in the same plane and define a slideway or surfacing upon which the lower surfaces of the cross bars 30, 33 and 40 of the buckle D have a limited slide movement.

It will be noted that the overall width of the insertable buckle part D is such that it moves when in closed position upon the buckle part B with very little lateral clearance. As an important feature of this invention it will also be noted (see FIG. 1) that the edge 80 of the cross bar 10 where it joins the side bar 12 is in a position so that it can engage the edge 17^a of the boss or extension 17. The clearance between these edges limits the longitudinal play of the buckle parts B and D to a very short distance in contradistinction to the lengthier distance in which the buckle parts may slide relative to each other longitudinally when closed as shown in the Hatfield U.S. Patent 3,060,537.

It can be understood from the foregoing that the action of this type of buckle has been simplified, with sufficient safeguard that the insertable buckle portion may readily be inserted in the other buckle portion with assurance that the insertable buckle portion has a very large surface engagement when in closed position upon the outer buckle portion and with a limited endwise movement so as to prevent accidental opening of the parts.

While only one side bar of buckle part B is shown as having a boss 17 on bar 12, it can be readily understood that such a boss can also be provided on bar 13, although the recess 21 must be longer than recess 20.

It can readily be understood from the foregoing that if any attempt is made to enter the insertable buckle portion B with the bar 30 foremost, such will be prevented by the fulcruming extensions 61 and 62. If, on the other hand, an attempt is made to assemble the buckle components with the insertable portion facing the wrong way around, then insertion is prevented, inasmuch as the wider flange or cheek 32 will register with the narrow recess or opening 20, through which it will not pass. Furthermore, due to the position of the slidably encircling loop 50, the strap E cannot be improperly assembled upon the cross bar 40 of the buckle portion D.

Various changes may be made to the size, shape and arrangement of parts in this invention, without departing from the spirit of the invention or scope of the claims.

I claim:

1. As an article of manufacture, a quickly releasable buckle for the webbing of safety harnesses and the like comprising a first rigid buckle portion having a webbing attaching cross bar, a pair of upwardly extending and parallel side bars rigidly connected at the ends of the webbing attaching cross bar in substantially right angled relation therewith, and an end cross bar connected to the ends of the side bars remote from the webbing attaching cross bar, said cross bars and side bars defining an inserting opening, and a second buckle portion comprising a pair of relatively spaced parallel cross bars, spaced side bars secured at the ends of the last mentioned cross bars, and a webbing attaching bar secured to the side bars in the space between the facing edges of the cross bars of the second buckle portion, the outer side surfaces of the side bars of the second buckle portion being spaced apart less than the width of said inserting opening, the side bars of the first mentioned buckle portion being provided with opposite and inward extensions, the upper surfaces of said inward extensions and the upper surface of the cross bar remote from said webbing attaching cross bar lying in the same plane to define a slideway, each side bar having an inner side recess, the recesses facing each other and communicating with the inserting opening of said

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first mentioned buckle portion and the said recesses being of unequal lengths, said cross bars of the second buckle portion having bottom surfaces adapted to engage the slideway of the first buckle portion, the side bars of the second mentioned buckle portion being of unequal heights whereby to insure that the second buckle portion can be correctly inserted through the opening of the first mentioned buckle portion only by having the side bar of the second mentioned buckle portion which is of greater height than the side bar of the second mentioned buckle portion inserted through the longer recess of the first mentioned buckle portion, the side bar of greater height having a height measurement greater than the length of the shorter recess, the side bar of the first mentioned buckle portion having the shorter recess being provide with a boss extension on the inner side thereof projecting into the inserting opening and defining one end of the shorter recess of said side bar, said boss extension projecting above the plane of the slideway of the first buckle portion to limit the longitudinal collapsing movement of the second mentioned buckle portion within the first mentioned buckle portion toward its webbing attaching cross bar when said buckle portions are in engaged relation, the side bar of said first mentioned buckle portion having the longer recess extending closer to the webbing attaching cross bar than the shorter recess of the side bar having said shorter recess.

2. As an article of manufacture, a buckle part for quickly releasable buckles comprising a webbing attaching cross bar, side bars connected with said cross bar in right angled relation therewith at the ends thereof, a second

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cross bar connected at the ends of the side bars remote from the first mentioned cross bar to define therewith an inserting opening, the inner sides of said side bars adjacent to said second cross bar each being provided with a shallow flange extending into said inserting opening to narrow the width of the inserting opening and define recesses at the inner sides of said side bars communicating with said inserting opening, the said second mentioned cross bar and said flanges having top surfaces all of which lie in the same plane to provide a slideway, said side bars extending appreciably above the plane of the slideway, at least one of said side bars at the inner side thereof being provided with a boss extension projecting into said inserting opening and narrowing the width of said opening, said boss extension projecting upwardly above the plane of the slideway, and said boss extension having an inner surface spaced from the flange on the side bar upon which the boss extension is mounted to established one end of the recess of said side bar.

3. A buckle part as defined in claim 2 in which the side bar opposite the side bar having the boss extension has the length of its recess extending along its side bar for a greater distance than the length of the recess along the side bar having said boss extension.

References Cited by the Examiner

UNITED STATES PATENTS

3,060,537 10/62 Hatfield ----- 24-197

DONLEY J. STOCKING, *Primary Examiner.*