Oct. 30, 1962 J. E. HATFIELD 3,060,537

QUICKLY RELEASABLE BUCKLE FOR SAFETY AND HARNESS STRAP

Filed Oct. 9, 1959 2 Sheets-Sheet 1

Fig. 1.

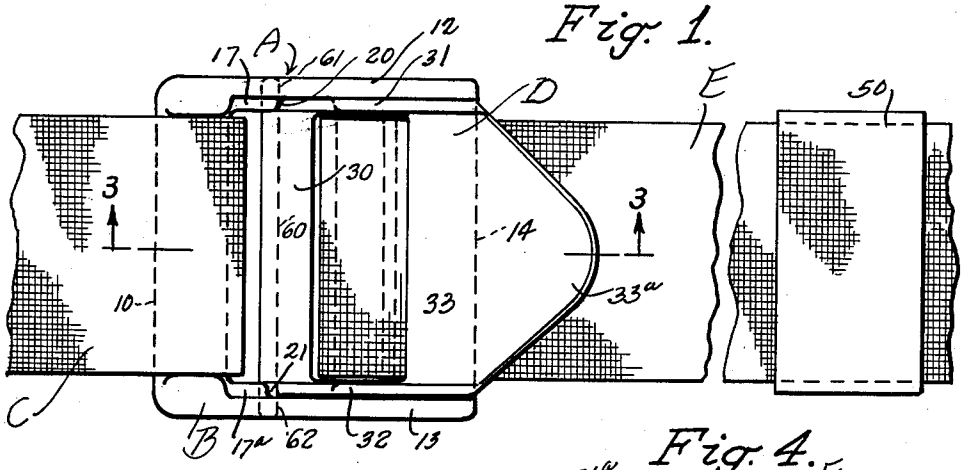


Fig. 2.

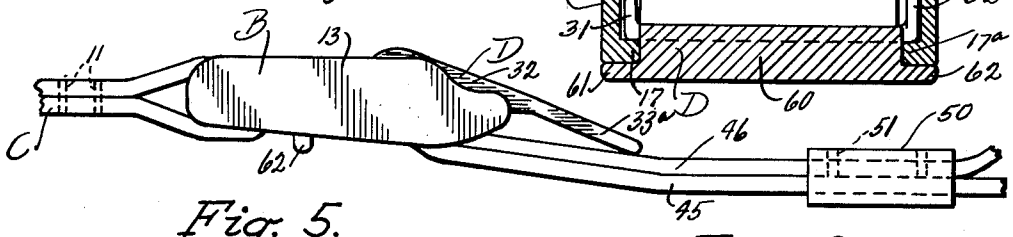


Fig. 4.

Fig. 5.

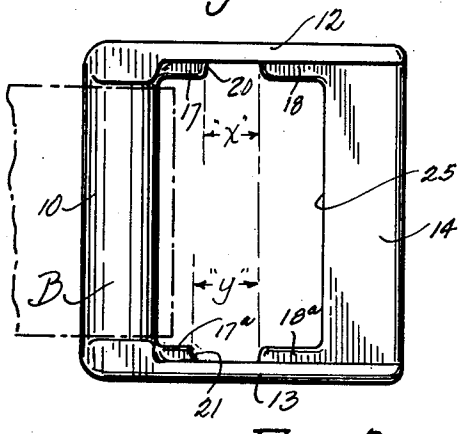


Fig. 6.

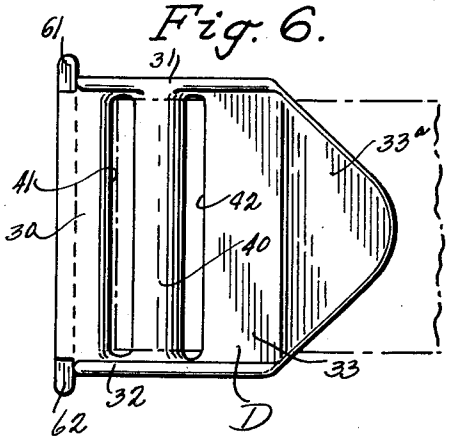
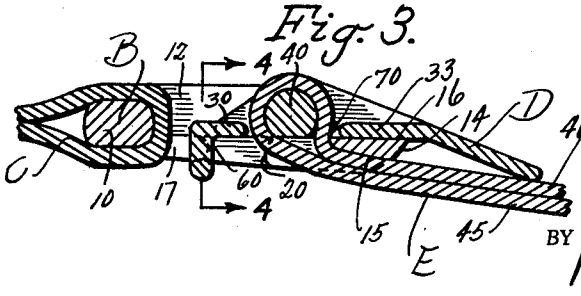


Fig. 3.



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Fig. 7.

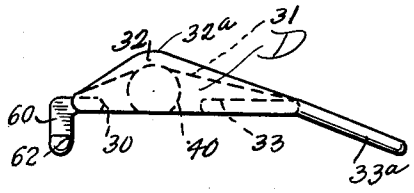


Fig. 8.

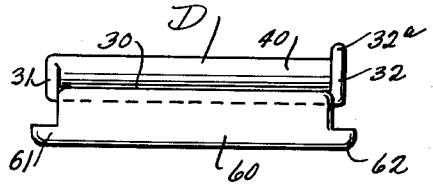


Fig. 9.

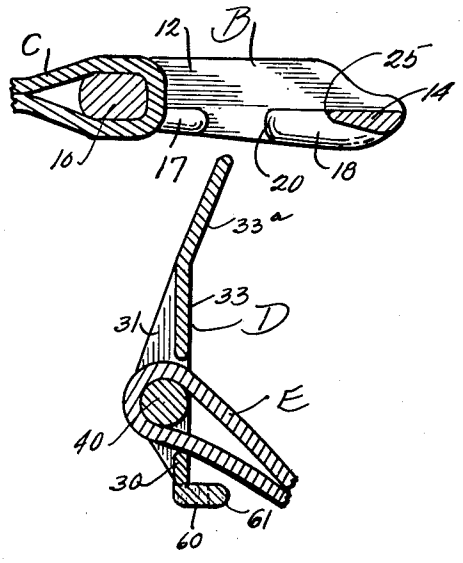
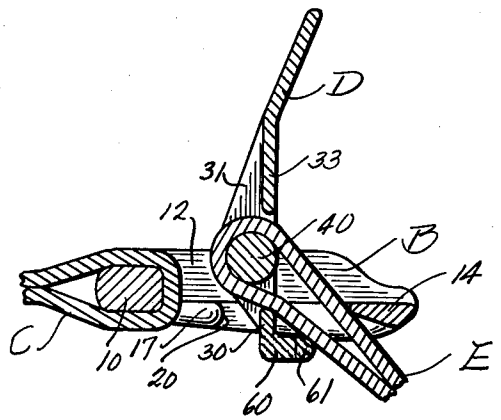


Fig. 10.



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QUICKLY RELEASABLE BUCKLE FOR SAFETY AND HARNESS STRAP

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9 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 the other 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 buckles have not proven satisfactory in all circumstances, owing to the fact that the insertable buckle portion can be inserted through the other buckle portion with the two buckle portions in a variety of different relative positions although there is only one relative position in which proper interengagement can be effected. There is danger therefore that the buckle parts may be incorrectly assembled with the result that when the connected straps are under strain the adjustable strap end merely slides and does not hold fast with respect to the buckle portion to which it is connected.

According to the present invention, there is provided a buckle or coupling for releasably interconnecting two strap or webbing ends, including two portions one of which is adapted to be connected to one strap end and the other of which is adapted to be adjustably connected to the other strap end, the buckle portion for adjustable connection to a strap end being transversely insertable into an opening in the other buckle portion and then being rockable into a position in which it can then slide longitudinally wtih respect to said other buckle portion characterized in that the insertable part of the one buckle portion and the receiving opening in the other buckle portion are so designed that the insertable buckle portion can only be properly inserted into the other buckle portion to a position where the inserted portion can be rocked towards the face of the said other portion.

It is usually desirable to provide for easy adjustment of the strap ends interconnected by the aforesaid buckle and this can be done by passing the strap or webbing end associated with the insertable buckle portion slidably around a bar constituting a part of said buckle portion and leaving a free end for pulling around said bar. In such cases however there might be a possibility of a user threading the free end through the other buckle portion during assembly thus again preventing proper interengagement. According to a further feature of the present invention even this possibility is prevented by slidably securing the free end of the said strap to the standing portion thereof for instance by means of a bandage secured to the strap end and slidably encircling the standing portion of the strap.

The aforesaid buckle portions may be fabricated in any convenient way but they are advantageously in the form of pressings or stampings.

In order that the present invention may be well understood one preferred embodiment will now be described in application to a car safety belt and with reference to the accompanying drawings in which:

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 straps or webbing portions.

FIGURE 6 is a plan view of the other 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 in order to interconnect the coupling parts.

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.

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 part 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 movement of the insertable coupling part to the position shown in FIGURE 3.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the letter A may generally designate the buckle or coupling. It includes a 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. This 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 top flat 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 side of the bar **12** there are provided inwardly extending relatively spaced shallow flanges **17** and **18** which lie in the plane of the bar **14** for only a portion of the height of the bar **12**. Similarly the inner sides of the bar **13** are provided with shallow right flanges **17a** and **18a**. The flanges **17** and **18** at their facing ends terminate short of

each other to provide an inserting way, recess or slot **20** which is of a width "x" shown in FIGURE 5. The flanges **17a** and **18a** are similarly spaced at their facing ends for a distance "y," to provide an inserting recess or slot **21**. It will be noted that the recess **20** is shorter in length than the recess **21** for the purpose of insuring that the coupling part B can only be accurately assembled in inserted relation in the opening **25** of the buckle part B.

It will be noted from FIGURE 5 that the end edges of the flanges **18** and **18a** are in transverse alignment but that the end edges of the flanges **17** and **17a** defining the recesses **20** and **21** are out of transverse alignment.

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 **33a**. 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 **31a** and **32a** (see FIGURE 4) respectively, in right angle from the plane of the bars **30** and **33**. The transverse extensions of these flanges **31** and **32** above the top surfaces of the bars **30** and **33**, at **31a** and **32a** are for 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 the 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 the 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 band **50** stitched 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 ends 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 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 **33a** 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 flange **31** to outer side of the flange **32** is such that the buckle D may be inserted through the opening 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 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 **17**, **18**, **17a**, **18a** 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 **46** 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 **33a** 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 letting it drop 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 location 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 **17**, **17a**, **18**, **18a** 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 buckle D slide, as shown in FIGURE 3.

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 slidable band **15**, the strap E cannot be improperly assembled upon the cross bar **40** of the buckle portion D.

Various changes may be made to the shape, size and arrangement of parts of 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 rigid buckle portion having a webbing attaching cross bar, parallel side bars rigidly connected at the ends of the webbing attaching cross bar in right angled relation therewith, and a 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, said last mentioned cross bar and the side bars having surfaces lying in the same plane to define a slideway, a second buckle portion comprising a pair of relatively spaced parallel cross bars and spaced side bars secured at the ends of the cross bars, a webbing attaching bar secured to the side bars in the space between facing edges of the second buckle cross bars, said side bars of the second buckle portion being so spaced that the outer surfaces thereof will clear the inner surfaces of the cross bars of the first mentioned buckle portion when the second buckle portion is inserted in the opening of the first mentioned buckle portion, and projecting means on the second mentioned buckle portion extending beyond the outer surfaces of the side bars of the second buckle portion to prevent slipping of the second mentioned buckle portion entirely through the inserting opening of the first mentioned buckle portion as said buckle portions are being assembled and to

enable fulcruming of the second buckle portion upon the under surfaces of the side bars of the first mentioned buckle portion when the said buckle portions are in relatively assembled relation.

2. A quickly releasable buckle for use in connection with safety straps comprising a coupling part having means thereon for connection of strap webbing thereto, said coupling part having an opening therethrough bounded by a cross bar, an insertable coupling part having an opening therein and a cross bar extending along the opening for attaching of a second strap webbing in adjustable relation thereon, said insertable coupling part being of a width to permit it to be inserted through the opening of the first mentioned coupling part transversely to the plane of said opening, and extension means on the insertable coupling part laterally projecting from the sides of the insertable coupling part adapted to engage the bottom of the first mentioned coupling part after the insertable coupling part has been substantially fully inserted through said opening to prevent slipping of the second coupling part entirely through the opening of the first coupling part and to assist in bringing the coupling parts into correct position in substantially parallel planes, the cross bar of the insertable coupling part bearing such a relation to the cross bar of the first mentioned coupling part that as the webbing attached to the insertable coupling part is brought under tension it will wedge the said webbing between the cross bar of the insertable coupling part and the cross bar of the first mentioned coupling part.

3. A safety buckle for securing the strap ends of harness webbing together comprising a pair of buckle portions, the first of which is provided with an opening therein for insertably receiving an end of the second buckle portion therethrough in a direction transverse to the general plane of the opening, means at the other end of the second buckle portion for engaging it upon the first buckle portion after having been inserted in the opening of the first buckle portion, said first buckle portion having a cross bar which bounds the opening thereof and upon which the inserted end of the second buckle portion may rest to support the second buckle portion in assembled relation to the first buckle portion, means on said buckle portions for attaching the opposite strap ends of harness webbing thereto, means on said buckle portions for adjustably clamping one strap end between said buckle portions when the webbing is under tension, and means provided upon said buckle portions to insure that the second mentioned insertable buckle portion can be completely assembled upon the first buckle portion only after the second buckle portion has been placed in the correct inserting position in the said opening of the first buckle portion.

4. As an article of manufacture, a quickly releasable buckle for the webbing of safety harnesses and the like, comprising a rigid buckle portion having a webbing attaching cross bar, parallel side bars rigidly connected at the ends of the webbing attaching cross bar in right angled relation therewith, and a 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, said last mentioned cross bar and the side bars having surfaces lying in the same plane to define a slideway, a second buckle portion comprising a pair of relatively spaced parallel cross bars and spaced side bars secured at the ends of the cross bars, a webbing attaching bar secured to the side bars in the space between facing edges of the second buckle cross bars, said bars of the second portion being so spaced that the outer surfaces thereof will clear the inner surfaces of the cross bars of the first mentioned buckle portion when the second buckle portion is inserted in the opening of the first mentioned buckle portion, and projecting means on the second mentioned buckle portion extending beyond the outer surfaces of the side bars of the second buckle portion to releasably engage the second buckle portion upon the under surfaces of the side bars of the first mentioned buckle portion when the said buckle portions are in substantially assembled relation, the side bars of the first mentioned buckle portions each being provided with inwardly extending endwise spaced flanges, the spacing of said flanges on said side bars providing relatively facing slots which communicate with the inserting opening of the first mentioned buckle portion adapted to receive the side bars of the second mentioned buckle portion therethrough, the slots of said side bars being of unequal lengths and the side bars of the second mentioned buckle portion being of unequal heights whereby to insure that the second mentioned buckle portion can be inserted through said slots only when the two buckle portions are in correct relation.

5. 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, and a second cross bar connected to the ends of the side bars remote from the first mentioned cross bar to define therewith an opening, the inner surfaces of each of the side bars being provided with shallow flanges extending into said opening, each side bar being provided with a pair of such flanges relatively endwise spaced to define recesses communicating with the opening through said buckle part, the cross bar second mentioned and said flanges each having top slide surfaces all of which lie in the same plane, the side bars extending upwardly appreciably above the plane in which the top surfaces of said flanges and the second cross bar lie, said recesses being of unequal lengths measured in line with the respective side bars upon which said flanges are positioned.

6. As an article of manufacture, a quickly releasable buckle for the webbing of safety harnesses and the like comprising a rigid buckle portion having a webbing attaching cross bar, parallel side bars rigidly connected at the ends of the webbing attaching cross bar in substantially right angled relation therewith, and a 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 attached bar secured to the side bars in the space between the facing edges of the second buckle cross bars, the side bars of the first mentioned buckle portion each being provided with a recess, the recesses facing each other and communicating with the opening of said first mentioned buckle portion and the said recesses being of unequal lengths, 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 other 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 greater dimensional measurement than the length of the shorter recess.

7. The quickly releasable buckle of claim 6 in which the second mentioned buckle portion at the end thereof remote from the inserting end thereof is provided with lateral extensions projecting outwardly from the outer surfaces of the side bars at a location so that they lie below and engage the lower edges of said side bars of the first buckle portion after the second mentioned buckle portion is substantially fully inserted through the opening of the first mentioned buckle portion whereby to prevent the said second mentioned buckle portion from passing en-

tirely through the inserting opening of the first buckle portion.

8. A safety buckle for securing the strap ends of harness webbing together comprising a pair of relatively detachable buckle portions, the first buckle portion having an opening therein and including side bars connected together at their ends by cross bars to define an inserting opening, the second buckle portion comprising side bars connected together in substantial parallelism by a plurality of cross bars which are relatively spaced from each other, the side bars of the second buckle portion having means to receive harness webbing in threaded adjustable relation therethrough between the cross bars of the said second buckle portion, the spacing of the side bars of the second buckle portion from outer surface to outer surface being less than the spacing between the inner facing surfaces of the side bars of the first mentioned buckle portion whereby the second mentioned buckle portion may be passed into the inserting opening of the first mentioned buckle portion, and means formed upon and as part of the side bars of the two buckle portions to insure that the second mentioned buckle portion can be only correctly inserted in the inserting opening of the first mentioned buckle portion and turned so that substantially all of the second buckle portion lies on the first buckle portion in a correct operative position.

9. A safety buckle for securing the strap ends of harness webbing together comprising a pair of relatively detachable buckle portions, the first buckle portion of said pair comprising spaced side bars and spaced cross bars defining an inserting opening, one of said cross bars being adapted to serve as an attachment for a strap end of harness webbing and the other cross bar being adapted to serve as a stop bar, the second buckle portion of said pair comprising side bars connected together by two relatively spaced cross bars and an intermediate cross bar located in the space between the cross bars of the second buckle portion for adjustable looping therearound of another strap end of harness webbing, the spacing of the side bars of the second buckle portion from outer surface to outer surface being less than the spacing between the facing surfaces of the side bars of the first mentioned buckle portion whereby the second mentioned buckle portion may be passed into and through the inserting opening of the first mentioned buckle portion, the side bars of the first mentioned buckle portion on the inner surfaces thereof being provided with slide flanges projecting into the opening between the side bars of said first mentioned buckle portion, the ends of said flanges being substantially aligned with one another to form a fulcrum upon which the side bars of the second mentioned buckle portion may fulcrum as it is inserted through the inserting opening of the first mentioned buckle portion to enable the assemblage of the said buckle portions by placing the second mentioned buckle portion upon the said flanges and that cross bar or stop bar of the first mentioned buckle portion remote from the webbing attachable bar, the side bars of the first mentioned buckle portion also being provided with flanges projecting inwardly from the side bars thereof but being endwise spaced therefrom, the spacing of the facing ends of said flanges of one bar of the first mentioned buckle portion being greater than that of the facing ends of the flanges of the other side bar of the first mentioned buckle portion and the side bars of the second mentioned buckle portion being of unequal heights, whereby the side bar of greater height when the second buckle portion is inserted through the opening of the first mentioned buckle portion will pass only through the space between the facing ends of those flanges on the cross bar which is greater than the spacing between the facing ends of the flanges on the other side bar of the first mentioned buckle portion.

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