

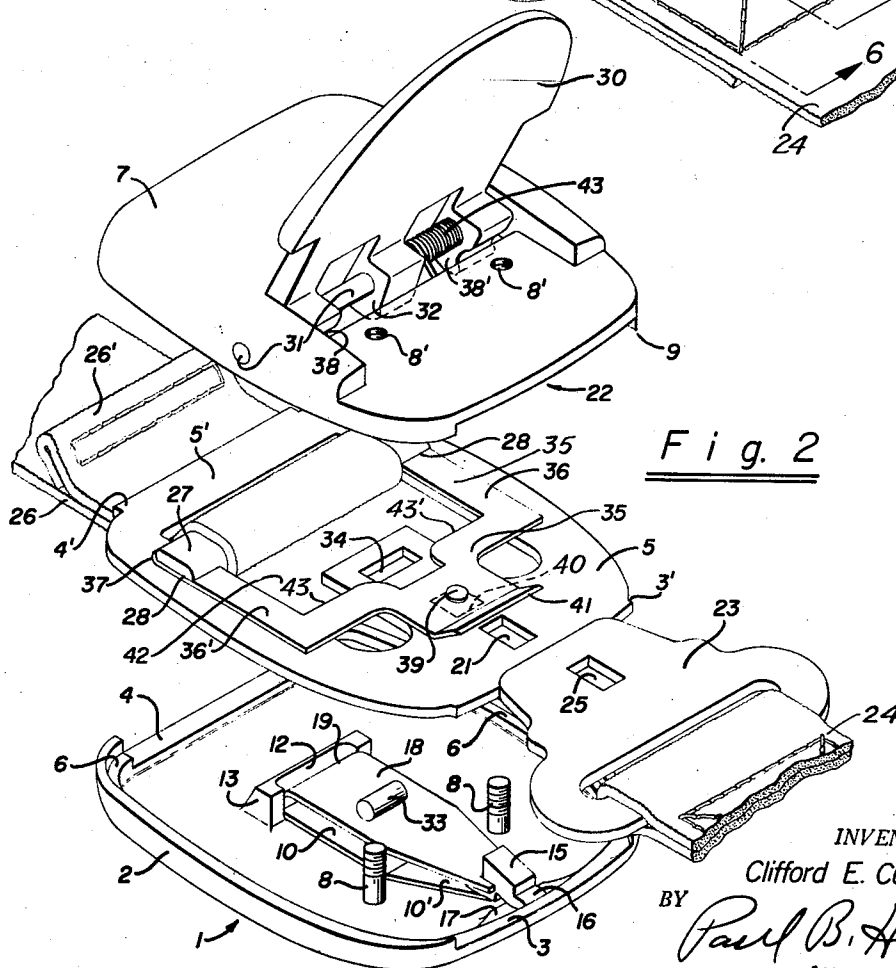
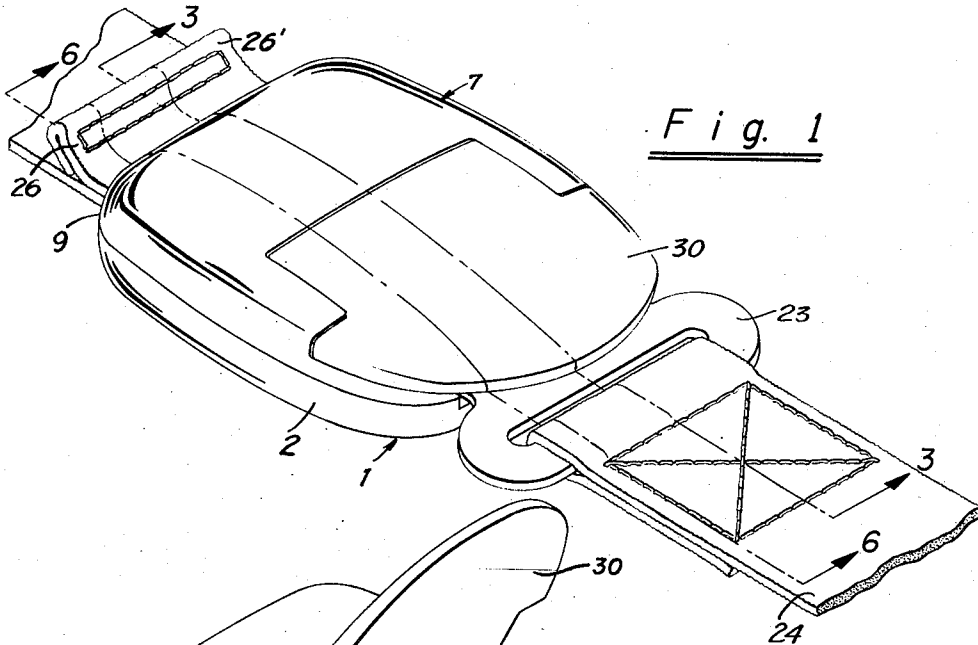
Dec. 2, 1958

C. E. CUSHMAN
SAFETY BELT BUCKLE

2,862,268

Filed July 26, 1956

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3

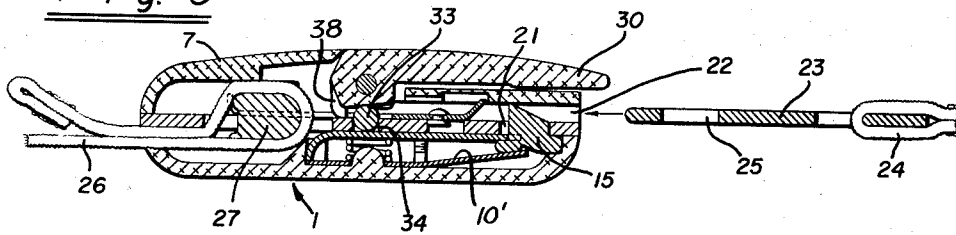


Fig. 4

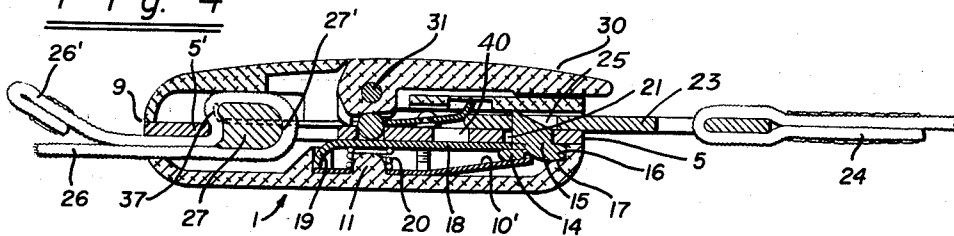


Fig. 5

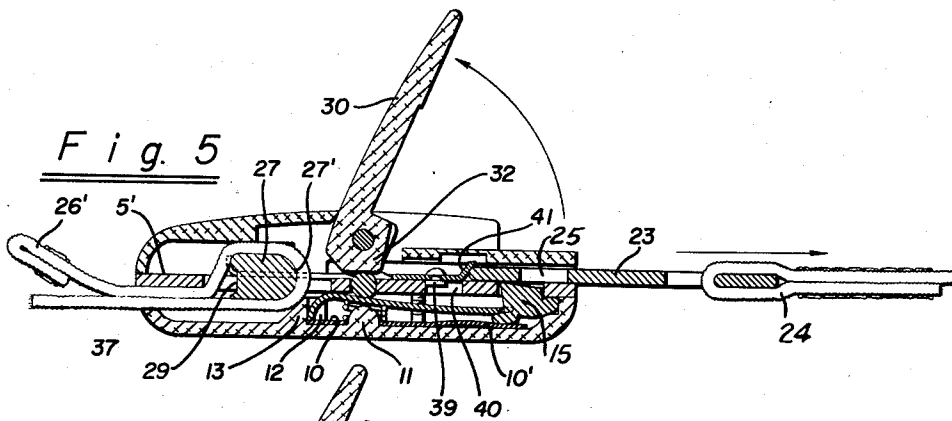
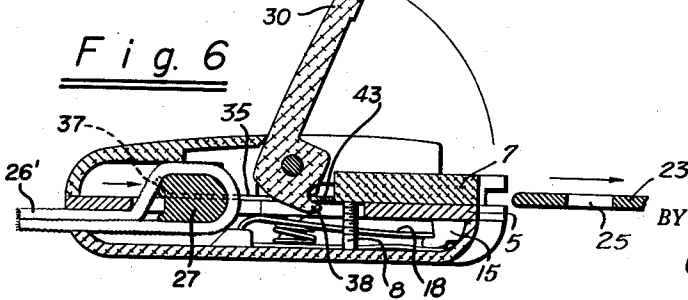


Fig. 6



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1

2,862,268

SAFETY BELT BUCKLE

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Application July 26, 1956, Serial No. 600,226

11 Claims. (Cl. 24—75)

This invention relates, generally, to buckles and the invention has reference more particularly to a novel safety belt buckle adapted to be used in connection with the retention of passengers, such as airplane passengers, in their seats.

Buckles heretofore used on safety belts have not generally been satisfactory because there is a tendency for many of these buckles to allow the belts to yield or slip when excessive pressure is placed on them, since these prior art buckles generally depend upon a limited frictional grip upon the belt to retain the same against slipping. Also, there is a tendency for some of the buckles to open due to decelerating forces upon the sudden stoppage of a plane or automobile in use, the weight of the hinged portion of the buckle tending to throw the same forwardly and release the strap, rendering the safety belt useless.

The principal feature of the present invention is to provide a novel buckle for use with safety belts that is free of the above difficulties and which is of simple, rugged construction and reliable in use, the said buckle serving to positively hold the strap in adjusted position, so that the passenger is retained in his seat regardless of the intensity or magnitude of the decelerating forces.

Another feature of the present invention is to provide a novel safety belt buckle of the above character having a stress plate that transmits the tension from one end of the belt to the other through a locking detent in the shear and through a belt cross-bar which is so positioned and arranged that the tension of the belt serves to lock the same against slipping with respect to the cross-bar and stress plate.

Another feature of the present invention is to provide a novel buckle of the metal type, i. e., wherein a tongue-like metal fitting on one strap end locks into a metal buckle carried on the end of the other complementary strap, and wherein, so long as the buckle is unlocked, the length of the strap which passes through the buckle can be readily varied at will to adjust to body dimensions.

Still another feature of the present invention is to provide a novel buckle of the above character which locks as soon as the metal end fitting is inserted into the buckle, the buckle thereafter serving to prevent the strap end passing thereinto from lengthening, although allowing the same to be shortened, if desired, whereby the belt can be readily made snug around the body of the user without the possibility of any slackness developing in use and without releasing the buckle.

These and other features and advantages of the present invention will become more apparent from a perusal of the following specification taken in connection with the accompanying drawings wherein:

Fig. 1 is a perspective view of the novel buckle of the present invention, shown with the safety straps attached thereto, as in use;

Fig. 2 is an exploded view showing the buckle of Fig. 1 with the metal end fitting removed from the buckle

2

and with the buckle release lever turned outwardly into buckle release position;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 1 looking in the direction of the arrows, but showing the metal end fitting prior to insertion into the buckle;

Fig. 4 is a view, similar to Fig. 3, but showing the buckle with the metal end fitting inserted therein;

Fig. 5 is a view, similar to Fig. 4, but shows the buckle immediately after the release lever has been moved outwardly to release the safety belt.

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 1, but with the metal end fitting removed from the buckle.

Referring now to the drawings in detail, the safety belt buckle has a casing comprising a hollow body portion 1 which is approximately oval-shaped and which is adapted to bear against the body of the user in use. This body portion is dish-shaped or pan-shaped, having a peripheral stepped flange 2 which is cut away or notched at the forward end of the body 1 at 3 and at the rear end of the body 1 at 4 to receive projections 3' and 4' respectively provided on a flat stress plate 5 which is adapted to seat upon step 6 of the flange 2. Positioned above the stress plate 5 and in surrounding relation thereto, so as to retain the same within the buckle body portion 1, is a buckle cover or casing portion 7, which cover portion has a depending flange 9 which is adapted to be secured in abutting relation to the flange 2 of the body portion 1 by means of retaining screws 8 extending upwardly through apertures in the body portion 1 and threaded into apertures 8' provided in the cover portion 7.

Contained within the body portion 2 beneath the stress plate 5 is leaf spring member 10 which is apertured so as to engage over a boss 11 provided within the body portion. The rear end of spring 10 projects into a slot 12 provided in a projection 13 formed on the inner surface of body portion 1. Slot 12 coacting with boss 11 serves to position spring 10 within the hollow interior of the body portion such that its forward upturned end 10' engages the undersurface of a projection or lug 14 formed on a detent member 15 having a bevelled upper surface. Detent member 15 has a fulcrum lug or projection 16 that is confined between a supporting ledge 17 provided in body portion 1 and the undersurface of stress plate 5. The portion 10' of spring 10 urges projection 14 upwardly, tending to cause detent 15 to turn clockwise, as seen in Figs. 3, 4, and 5, with its fulcrum lug 16 turning within the space provided between ledge 17 and the undersurface of stress plate 5.

Positioned in overlying relation to the spring member 10 is an actuating link 18 having a curved dependent rear end 19 projecting into slot 12 and engaging the upper surface of member 10, the forward end of link 18 bearing upon the upper surface of detent lug 14. A coil spring 20 surrounding boss 11 urges link 18 upwardly and normally into engagement with the under-surface of stress plate 5. This stress plate has a detent receiving aperture 21 through which the bevelled upper portion of the detent normally projects due to the upward urging of spring member forward end portion 10'. This is especially shown in Fig. 3 wherein it will be noted that the upper bevelled end portion of detent 15 projects into the metal end fitting receiving slot 22 provided in the cover portion 7.

The upper bevelled portion of the detent 15 is adapted to be engaged by the free end or terminal 23 of a safety strap 24. This strap terminal is shown in the form of a tongue-like metal end fitting 23 forming a part of the strap. When the metal end fitting or terminal 23 is inserted into the slot 22 and pushed inwardly, it rides on the bevelled upper end of the detent 15 pressing this member downwardly, thereby compressing spring end

3

10' until such time that the metal end fitting opening 25 registers with the detent, whereupon the detent 15 snaps into aperture 25, thereby securing the metal end portion 23 and hence strap 24 to the buckle.

The other safety strap 26 is adapted to extend through rear notch 4 of body portion 1 and pass upwardly and around a cross-bar 27 which is slotted at its ends at 28 (see Fig. 2) for receiving and riding along the stress plate 5, this stress plate having an opening 42 for accommodating the cross-bar. The strap 26 wraps up and around the cross-bar 27 and passes down under the stress plate 5 and outwardly through notch 4 with its free end 26' positioned to be readily grasped by the passenger in use. The cross-bar is provided with a longitudinal recess 29 opposing the transverse barlike end portion or stop member 5' of stress plate 5, so that when this cross-bar is pulled to the left, as shown in Fig. 4, the safety strap 26 is wedged between the cross-bar 27 and the inner edge portion of stop member 5' which serves, in conjunction with the snubbing action of the inner rounded surface 27' of the cross-bar, to prevent the belt 26 from being pulled outwardly of the buckle, although by pulling upon the free end portion 26' of this belt the same may be slipped around the cross-bar 27 to make the safety belt tighter around the waist of the user in use.

Means are provided for physically moving the cross-bar 27 away from the member 5' of the stress plate when the buckle is released, as shown in Fig. 5, so that the strap 26 may thereupon be readily lengthened or shortened to suit the desires of the user. To accomplish this movement of the cross-bar, a release lever 30 is provided for the buckle, which lever is in the form of a tongue mounted upon a pivot pin 31 carried by the buckle cover portion 7. This release lever is normally held in closed position (see Fig. 1) upon the cover portion 7 due to the action of a torsion spring 43 (see Fig. 2) surrounding pin 31. Release lever 30 has a central cam 32 which engages a roller 33 that is retained in a rectangular slot 34 provided in the stress plate 5. With the lever 30 in its closed or locked position (as shown in Fig. 3) the low part of cam 32 engages the roller 33 which rests upon the upper surface of the actuating link 18 without depressing this link. However, when the release lever 30 is turned outwardly into unlocked position shown in Fig. 5, the high part of cam 32 serves to press the roller 33 downwardly, which in turn presses actuating link 18 downwardly, causing this link to depress detent 15 against the tension of spring end 10' into the position in Fig. 5, so that the metal end fitting 23 is released and may be removed from the buckle as shown in this figure.

A bifurcated link member 35 (see Figs. 2, 3, 4, 5, and 6) as of sheet metal rests upon the upper surface of stress plate 5 and has spaced legs 36 and 36' straddling the opening 42, which legs extend through the slotted ends 28 of the cross-bar 27 and have turned-up ends 37 which are adapted to pull the cross-bar inwardly of the buckle when the release lever 30 is turned outwardly, to thereby release the strap 26 and prevent the locking thereof. This action is accomplished by means of spaced depending hooks 38 and 38' (Figs. 2 and 6) provided on the release lever 30 for engaging the transverse portions 43 and 43' (see Fig. 2) of the bifurcated strap 35 adjacent and inwardly of the legs 36 and 36' thereof. Thus, as viewed in Fig. 3 and Fig. 6, as the release lever 30 is turned outwardly, the hooks 38 and 38' engage the transverse portions 43 and 43' of the bifurcated strap 35 and push this member towards the right as viewed in Fig. 6, thereby causing the turned-up ends 37 of this member to move the cross-bar 27 bodily towards the right as viewed in Fig. 6, so that the strap end 26' is released from gripping action between the member 5' and the recessed portion 29 of cross-bar 27. The bifurcated member 35 is formed with a forward depending projection 39 shown in the form of a rivet which is adapted to snap into an aperture 40 in the stress plate 5 when the release lever 30

4

is turned outwardly to release position, as shown in Fig. 5. With projection 39 engaged in aperture 40, the link member 35 and hence the cross-bar 27 is restrained from moving to the left (as viewed in Fig. 5) due to the holding action of turned-up ends 37, so that the strap or webbing 26 is free to slide in either direction around the cross-bar 27 and under the stress plate 5 without locking, so that the belt can either be tightened or loosened at will when the release lever is in its out-turned release position.

The bifurcated member 35 is provided with a turned-up end portion 41 which is adapted to be engaged by the metal end fitting 23 when this member is inserted into the buckle, as shown in Fig. 4. Thus, in inserting the metal end fitting, the end portion 41 is forced to ride up on the metal end fitting as shown in Fig. 4, causing projection 39 to move out of retaining aperture 40 and allowing the tension on belt or webbing 26 to pull the cross-bar 27 to the left as viewed in Fig. 4, thereby serving to lock the strap 26 against lengthening. The tension in this strap, of course, is due to the pressure of the user's body pushing against the same, thereby tending to pull this strap or webbing out of the buckle body, and moving cross-bar 27 towards the left as viewed in Fig. 4 and locking the strap against further lengthening by the gripping action of the cross-bar against the stress plate bar 5', this locking action being due to the friction between these members plus the snubbing action of the forward rounded end 27' of the cross-bar on the strap 26. However, with the strap or webbing in its locked position, shown in Fig. 4, it is possible to shorten the strap by merely pulling upon the free end 26' thereof, whereupon the tension in the strap end tends to push the cross-bar 27 slightly towards the right, as viewed in Fig. 4, away from bar 5', permitting the ready take-up of any slack in the belt 26, the tension in the strap end tending to straighten out that portion of the strap passing around the cross-bar 27 and into the recess 29 thereof. Thus, with the buckle in its closed and locked position as shown in Fig. 4, the passenger is free to tighten the belt readily around his waist but is not free to lengthen the same without lifting the release lever 30. Owing to the positive locking action of the cross-bar 27 co-acting with stress plate bar 5' and to the action of the locking detent 21 holding the metal end fitting 23, the passenger is retained firmly in his seat regardless of the amount of decelerating forces involved up to the breaking strength of the straps 26 and 24. The tension through the buckle is carried in a direct line through the stress plate 5 from one strap to the other, thereby providing an exceedingly strong construction.

When the passenger reaches to release the buckle, he merely turns the release lever 30 outwardly, which movement acts to rotate the depending hooks or fingers 38 and 38' serving to move the bifurcated member 35 towards the right as viewed in Fig. 5, which in turn moves cross-bar 27 away from member 5', releasing the locking action on strap 26. At the same time, the cam 32 on the release lever acts to release the detent 15 so that the metal end fitting 23 is free to move out of the buckle. Upon the completion of the outward movement of the release lever, the projection 39 snaps into opening 40 of the stress plate, preventing unintentional locking of strap 26, which strap is held in unlocked position until such time as the lever 30 is again closed and the metal end fitting 23 is again inserted into the buckle.

Thus, it will be apparent that the buckle is easily applied to the body of the user, with the straps disconnected. He merely draws the metal end fitting 23 and the buckle towards each other, the strap 26 sliding around cross-bar 27 to permit the movement of the buckle, and upon the insertion of the metal end fitting 23 into the buckle the bifurcated member 35 is moved to the left not only by the action of the metal end fitting but also by the tension of the belt, so that upon the closure of the lever 30 the belt 26 will not pay out any further, but

this belt may be tightened readily by merely pulling upon the free end 26' thereof, thereby fitting the belt snugly around the body of the user to retain him in his seat.

Since changes could be made in the above construction of the safety belt buckle and different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A safety belt buckle comprising a casing having receiving openings adapted for receiving the end portions of a pair of safety straps, a stop member within said casing, a movable cross-bar within said casing about which the end portion of one strap is adapted to pass, said cross-bar being movable to engage said stop member within said casing for locking said one strap against lengthening when said buckle is locked while still permitting the ready shortening of said strap, a detent within said casing for engaging and holding the other strap, and releasing means on said buckle operable for effecting movement of both said cross-bar and said detent to unlock said buckle and release said straps simultaneously.

2. A safety belt buckle as defined in claim 1 wherein said casing is provided with a transverse stress plate having said stop member as a part thereof therewithin for carrying the tension exerted by said straps upon the buckle, said stress plate having apertures for accommodating said cross-bar and said detent.

3. A safety belt buckle as defined in claim 1 wherein said releasing means comprises a lever pivoted upon said casing and mechanism within said casing for actuating said cross-bar and said detent from said lever.

4. A safety belt buckle as defined in claim 3 wherein said actuating mechanism comprises a link member for interconnecting said lever with said cross-bar, said lever having a projection for engaging said link member to actuate said cross-bar to unlocked position, and an actuating link engaging said detent, said lever having a cam surface for effecting movement of said actuating link to move said detent out of engagement with its cooperating strap end portion.

5. A safety belt buckle comprising a body portion adapted to have a pair of straps removably connected thereto, a cover portion for said body portion, a movable cross-bar within said body and cover portions for receiving the end portion of one strap passing therearound, a metal end fitting attached to the end portion of a complementary strap, a detent within said body and cover portions for locking said metal end fitting within the belt buckle when the same is inserted thereinto, and a release lever carried by said cover portion and operable to release said detent from said metal end fitting to release said complementary strap and to actuate said cross-bar to allow movement of the said one strap in either direction through the buckle.

6. A safety belt buckle as defined in claim 5 including a stress plate extending between said body and cover portions, said stress plate serving to carry said cross-bar, and a bifurcated member carried by said stress plate for

actuating said cross-bar and adapted to be engaged by said release lever to move said cross-bar to released position upon the operation of said release lever to released position, thereby permitting said one strap to be moved in either direction through the buckle, said stress plate cooperating with said cross-bar to prevent the lengthening of said one strap when the release lever is in locked position, while permitting the tightening thereof.

7. A safety belt buckle as defined in claim 6 wherein said detent is pivotally mounted in said body portion for projecting through an aperture in said stress plate, spring means for urging said detent outwardly through said stress plate aperture for cooperation with said metal end fitting, and cam means on said release lever operable upon movement of said release lever to released position to effect deflection of said spring and retract said detent from cooperative engagement with the metal end fitting.

8. A safety belt buckle as defined in claim 7 wherein said bifurcated member is provided with a locking projection and said stress plate is provided with an aperture for receiving said projection when said release lever is moved to released position, whereby said locking projection serves to lock said bifurcated member and hence said cross-bar in released position, preventing the locking of said one strap.

9. A safety belt buckle as defined in claim 8 wherein said bifurcated member is provided with an upturned end portion adapted to be engaged and lifted by the said metal end fitting when the latter is inserted into the buckle, thereby moving said bifurcated member locking projection out of cooperative engagement with said stress plate aperture and allowing the locking of said cross-bar against said stress plate, so that, upon the locking of the metal end fitting of the complementary strap to the belt buckle, said one strap is locked against lengthening.

10. A safety belt buckle comprising a buckle casing and mechanism within said casing for grasping and holding the ends of the two halves of a safety belt when the belt buckle is locked, said mechanism comprising a positive acting catch for holding one belt half end portion and comprising a cross-bar and co-operating stop member acting as snubbing means for holding the other belt half end portion wrapped therearound against lengthening of such belt half, said cross-bar being movable upon pulling on the free end portion of said other belt half to shorten the same automatically and to fit the safety belt tightly about the body of the user.

11. A safety belt buckle as defined in claim 10 having a release handle pivoted thereon for actuating the mechanism within said casing to released position, in which position said catch is removed from holding said one belt half end portion and said cross-bar is removed from its co-operating stop member to release the other belt half end portion, whereby the safety belt may be removed from the body of the user and said other belt half lengthened or shortened at will.

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