

Feb. 10, 1970

J. E. DAHMS
SAFETY BELT BUCKLE

3,494,007

Filed June 21, 1968

3 Sheets-Sheet 1

FIG. 1.

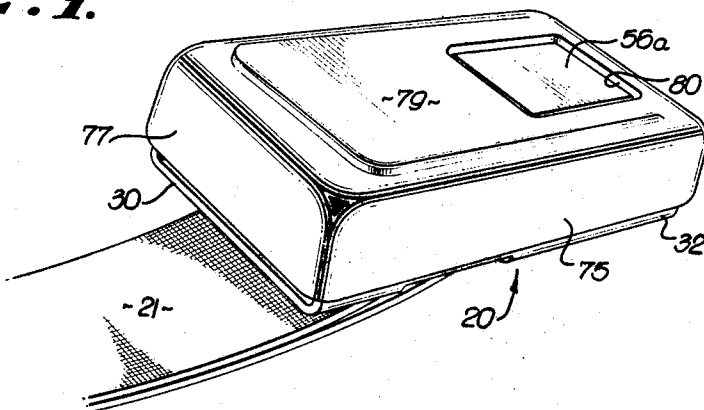
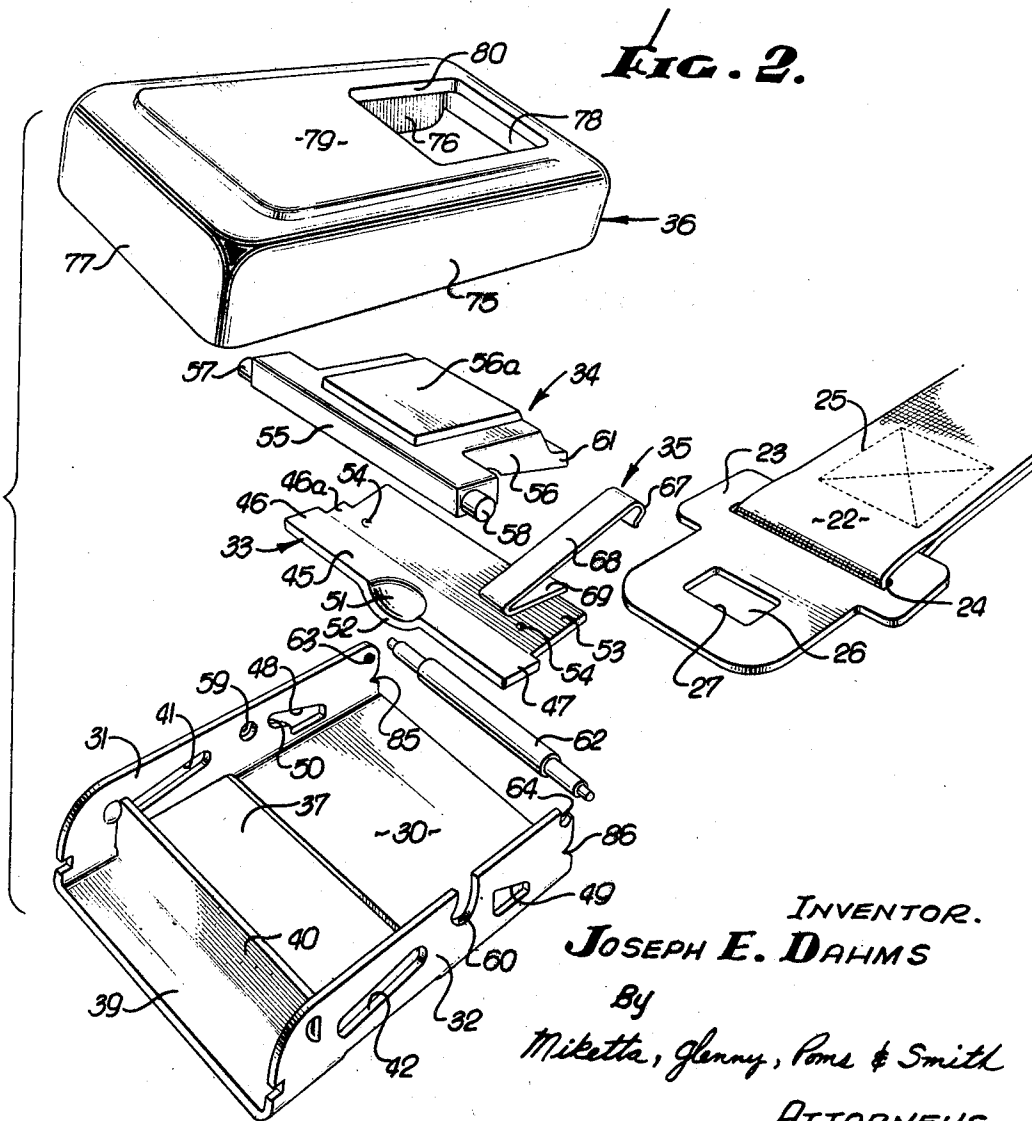


FIG. 2.



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FIG. 3.

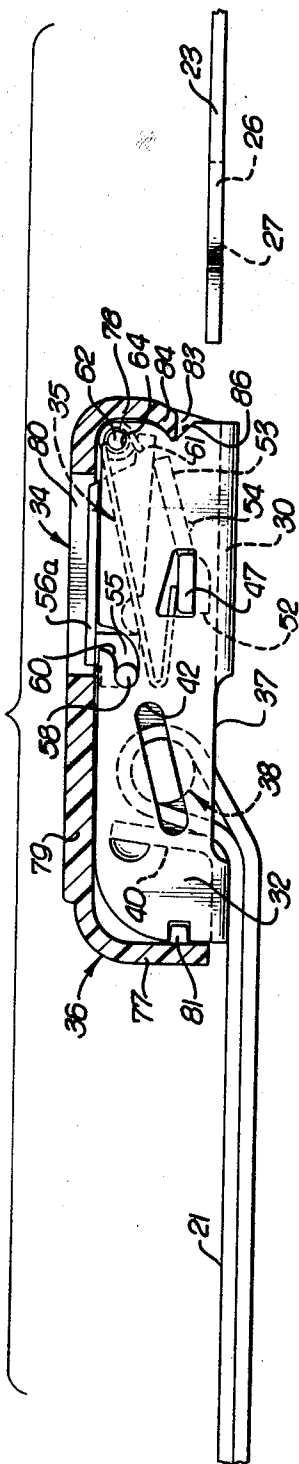
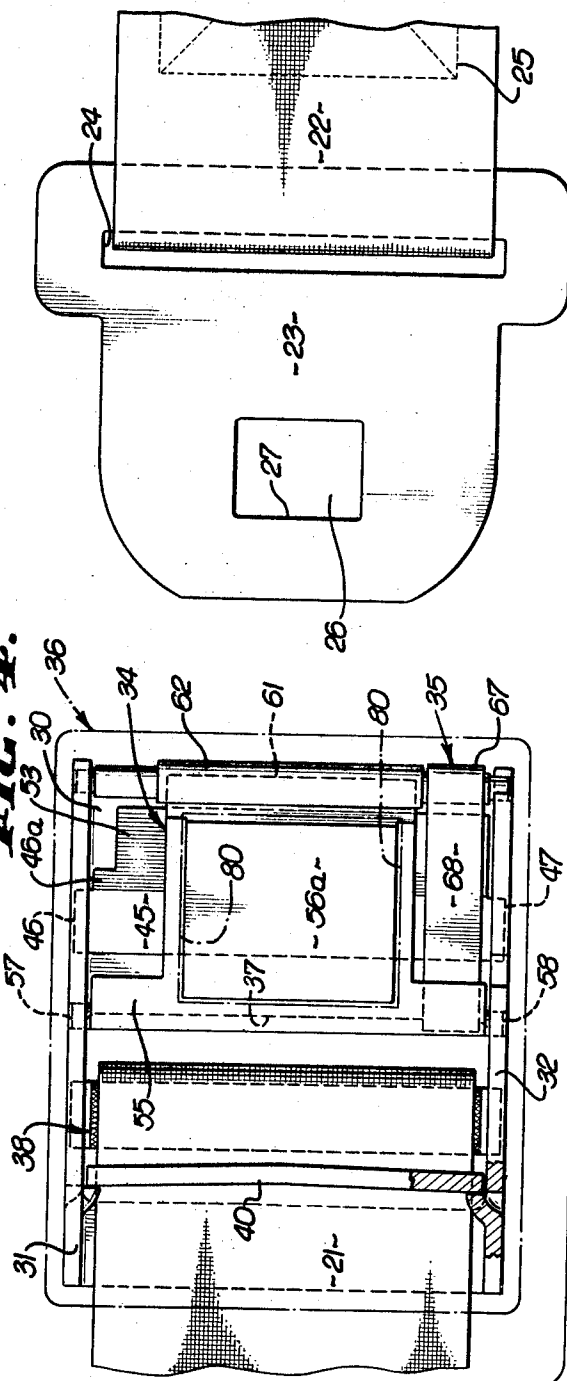


FIG. 4.



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FIG. 5.

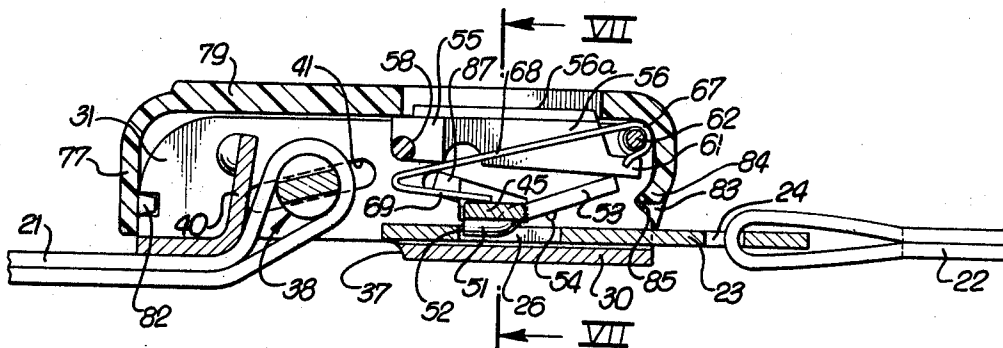


FIG. 6.

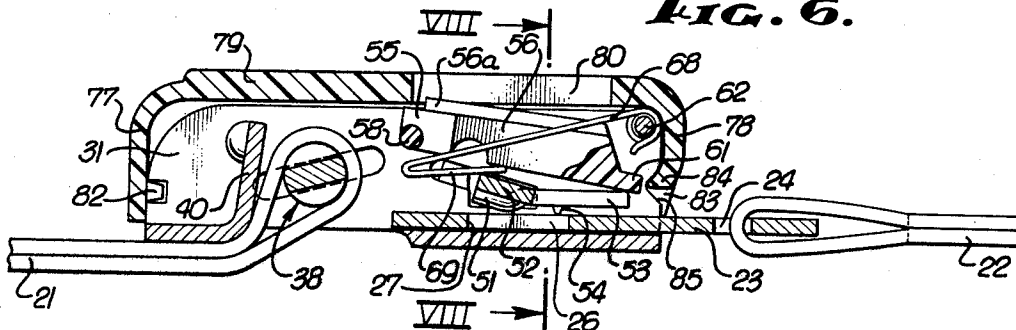


FIG. 7.

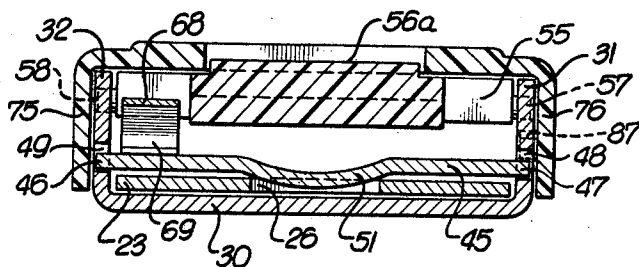
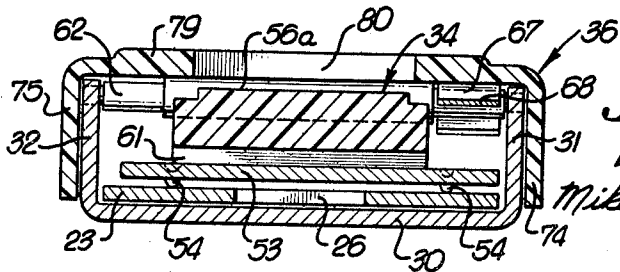


FIG. 8.



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SAFETY BELT BUCKLE

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Filed June 21, 1968, Ser. No. 738,980

Int. Cl. A44b 15/00

U.S. Cl. 24—230

12 Claims

ABSTRACT OF THE DISCLOSURE

A safety belt buckle having a pivoted latch that includes a locking element for engaging an apertured tongue plate. The latch has projecting bearing detents also engageable with the tongue plate while being disengaged. A pivoted push button actuates the latch.

Recent public and governmental concern for safety measures in automobiles has resulted in the widespread adoption of safety belt restraint systems for use in such vehicles. The most predominant type of available buckles at the time automobile use became popular was of the lever or lid type wherein a tongue plate was engaged with the buckle and released by pulling the pivotally mounted lid away from the buckle. However, it was found that this type of release mechanism was not entirely desirable because the buckle could be inadvertently actuated during use. Consequently, the recent trend in buckle design has utilized a push-button type of actuating member.

While the push-button type of buckle has solved the above-described problem, it was recognized that the pivoted lid or lever type of buckle did have one advantageous characteristic, namely, the lid provided considerable leverage for effecting the release of the tongue plate from the buckle even when the seat belts were under load. Load on the seat belt occurs when subsequent to an accident the weight of the occupant restrained by the seat belt is directed entirely against the seat belt such as when the vehicle is in other than an upright position. Safety regulations, applicable to push-button type of buckles, require that the release can be effectuated with a certain minimum force applied to the push button by the occupant. This safety requirement imposed a design problem in that the provision of good leverage characteristics had to be accommodated with limited size of the overall buckle and acceptable aesthetic appearance.

Prior art efforts to solve the above-described problem has resulted in increasingly more complex safety belt buckles of the push-button type which have therefore sacrificed cost, durability, and the simplicity required for preventing malfunction.

It is therefore a principal object of the present invention to disclose and provide an inexpensive but strong and durable safety belt buckle which is assembled from a relatively few stamped and formed sheet metal parts so as to minimize potential malfunctioning.

It is another object of the present invention to disclose and provide a safety belt buckle of the above character in which high loads placed upon the seat belt and transmitted to the buckle and tongue plate will not result in a buckle which requires excessive force on the push button to effect release.

It is also an object of the present invention to disclose and provide a safety belt buckle of the above character in which the desirable leverage characteristics of the buckles are attained without sacrifice of the product appearance or simplicity.

One more object of the present invention is to provide a safety belt buckle which has numerous features to facilitate the mounting of the components to the buckle base

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and side wall and thereby reduce assembly time and expense.

Still one more object of the present invention is to provide a safety belt buckle having an inexpensive and simple spring member for maintaining positive locking of the buckle and tongue plate and which can be easily mounted during assembly.

Generally stated, the present invention comprises a safety belt buckle for releasably engaging a tongue plate insertable therein, the tongue plate having a retaining shoulder, the buckle including a base and side walls, a latch member including a first planar portion pivotally supported by the side walls and having a downwardly projecting locking element and a second integral planar portion disposed at an obtuse angle to the first planar portion and having downwardly projecting means for bearing engagement with the tongue plate, a push-button actuating means pivotally supported in the side walls and overlying the latch member, and spring means biasing the latch member locking element downwardly so that the buckle may receive the tongue plate such that the locking element engages the tongue plate retaining shoulder to prevent withdrawal of the tongue plate from the buckle and allowing the tongue plate to be withdrawn by depression of the push-button actuating means which pivots the latch member so that the locking element disengages from the tongue plate retaining shoulder and the latch member bearing engagement means allows smooth withdrawal of the tongue plate from the buckle.

Advantages and other objects of this invention will be more readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view of an exemplary embodiment of a safety belt buckle constructed in accordance with the present invention;

FIG. 2 is a perspective exploded view of the safety belt buckle of FIG. 1 shown with an exemplary tongue plate;

FIG. 3 is a side sectional view of the safety belt buckle of FIG. 1 shown with the tongue plate removed;

FIG. 4 is a top plan view of the exemplary safety belt buckle and tongue plate and with the buckle cover shown in phantom lines;

FIG. 5 is a side sectional view of the safety belt buckle of FIG. 1 showing the relationship of the buckle parts when the tongue plate is inserted into the buckle;

FIG. 6 is a side sectional view of the safety belt buckle of FIG. 1 showing the relationship of the buckle parts upon depression of the push button actuating member for withdrawal of the tongue plate;

FIG. 7 is a sectional view of the safety belt buckle shown in FIG. 5 taken along the plane VII—VII; and

FIG. 8 is a sectional view of the safety belt buckle shown in FIG. 6 taken along the plane VIII—VIII.

Referring now to the drawings, an exemplary embodiment of a safety belt buckle according to the present invention, shown generally at 20, and its mode of operation, will be explained in detail. The buckle is to be employed with a safety belt of conventional form including a first strap 21 and a second strap 22. The safety belt straps 21 and 22 may be attached to a vehicle frame or floor in any well known manner so as to be positioned one on each side of a passenger or occupant riding in a vehicle. The first strap 21 is secured to the buckle in a manner to be explained more fully hereinafter. Strap 22 may be secured to a tongue plate 23 by being passed through a relatively narrow strap receiving slot 24 and being sewn at 25 to be permanently secured to the tongue plate which has an aperture 26 forming a tongue plate retaining shoulder 27. While the retaining shoulder in the exemplary tongue

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plate is defined by an aperture, it will be understood that the tongue plate could have other configurations without an aperture but with a retaining shoulder. The safety belt straps 21, 22 are preferably adjusted to bring the buckle 20 and tongue plate 23 into position to be interlocked or engaged with one another directly in front of the passenger using the belt so that the buckle is easily reached to be either connected or released. The safety belt buckle of the present invention may also be associated with other conventional hardware and retraction devices as is apparent to those skilled in the art.

The exemplary form of a buckle, indicated generally at 20, essentially consists of a base 30, provided with a pair of integrally formed upstanding spaced opposed side walls 31, 32; a latch member, indicated at 33; push button actuating means, indicated at 34; spring means indicated at 35; and a buckle cover indicated generally at 36.

The buckle base 30 and opposed side walls 31, 32 may be stamped and formed from a single sheet of metal by well known progressive punch and die operation. Base 30 is interrupted by a strap receiving aperture, indicated at 37, through which the strap 21 passes to engage a knurled bar 38, as seen best in FIGS. 3 and 4. A rear portion 39 of base 30 is provided with an upstanding snubber wall 40, preferably integral with rear portion 39 of base 30. Opposed side walls 31, 32 are provided with opposed inclined slots 41, 42, respectively, for slidably receiving the knurled bar 38. It will therefore be seen that the strap 21 will be snubbed between the knurled bar 38 and the snubber wall 40 upon application of a pull or load between the buckle and strap 21, thereby holding the buckle in the adjusted position relative to strap 21.

The present invention includes latch means for selectively locking or securing the tongue plate within the buckle. In the exemplary embodiment, such latch means comprises latch member 33 which includes a first planar portion 45, having rectangular cross-section axle extensions 46, 47 received in a pair of opposed slots 48, 49 in side walls 31, 32, respectively. Slots 48 and 49, as seen best in FIG. 3, are generally triangular in shape having one edge substantially parallel to base 30 and having a length which is slightly larger than the length of axle extension 46, 47. The lateral edge of latch member 33 adjacent axle extension 46 includes a cut-out to form a shoulder 46a which is received within slot 48, together with axle extension 46, during assembly. After assembly, shoulder 46a prevents lateral movement of latch member 33. Slot 48 is elongated at 50 so that in assembling the buckle the axle extension 46 and the shoulder 46a may be positioned in slot 49 and axle extension 47 may be moved into slot 48 through the elongated portion 50 without in any manner deforming latch member 33 and after the opposed side walls 31, 32 have been formed to their final position. The forward edge of axle extensions 46, 47 defines a pivotal axis for latch member 33.

First planar portion 45 of latch member 33 includes a locking element 51 which in the exemplary embodiment projects downwardly and has an abutting surface 52. Latch member 33 also includes a second integral portion 53 which may be planar and disposed at an obtuse angle to the first planar portion 45. Second planar portion 53 is provided with means for bearing engagement with the tongue plate during withdrawal of the tongue plate from the buckle, which in the exemplary embodiment comprises a pair of dimples 54 projecting downwardly from the lower surface of the second planar portion 53, as seen in FIGS. 6 and 8.

Push button actuating means is provided in accordance with the present invention to effect movement of the latch member from a locking to a withdrawal position. Such push button actuating means in the exemplary embodiment comprises the push button 34 including a pivot bar 55 and a lever 56. Pivot bar 55 has stub axles 57, 58 on opposite ends thereof. Stub axles 57, 58 are receivable in openings 59, 60 in opposed side walls 31, 32, respec-

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tively. Opening 59 in side wall 31 is circular and opening 60 is preferably an arcuate or dog-leg notch, as seen best in FIG. 3, formed in the upper edge portion of side wall 32. It will be seen that the push button 34 may be assembled to the base and side walls by positioning stub axle 57 in opening 59 and sliding stub axle 58 into the arcuate notch 60 whereby the pivot bar 55 is constrained against vertical movement. An upwardly projecting button 61 is formed on the upper surface of push button lever 56 so as to project into an opening in the buckle cover when the buckle is assembled.

Push button lever 56 is provided with a stop element 61 at the forward end thereof so as to bear against a stop pin 62, mounted in openings 63, 64 in side walls 31, 32, respectively, to limit upward pivotal movement of the push button 34 when the buckle is assembled. Stop pin 62 is also positioned forwardly of lever 56 so as to constrain forward movement of stub axle 58 in slot 60. Opening 64 in side wall 32 is a U-shaped slot with a constricted mouth and receives the stop pin 62 with a snap fit.

Planar portion 45 of latch member 33, including locking element 51, is normally biased downwardly by spring means which in the exemplary embodiment comprises a strip of spring metal 35 having a resilient hook shaped portion 67 for snap fit connection to stop pin 62, an elongated arm 68, extending downwardly and rearwardly, and a short folded back arm 69 extending downwardly and forwardly and bearing upon first planar portion 45 of latch member 33. As may be seen in FIG. 5, the lower edge of pivot bar 55 of push button 34 bears downwardly upon elongated arm 68 so as to constrain the arm 68 against upward movement, and the free end of short arm 69 bears upon the upper surface of planar portion 45 of latch member 33. Thus, spring 35 provides a bias force tending to rotate latch member 33 in a counterclockwise direction, as viewed in FIG. 5, so as to force locking element 51 into aperture 26 of tongue plate 23 so as to retain or lock the tongue plate within the buckle.

A buckle cover is provided in accordance with the present invention to provide the buckle with a suitable aesthetic appearance. Such buckle cover in the exemplary embodiment comprises the cover 36, preferably formed of slightly resiliently plastic material, having side walls 75, 76, a rear wall 77, a front wall 78, and a top wall 79 having an opening 80 for receiving button 61 of push button 34. As seen in FIG. 1, button 61 projects into opening 80 of the cover when push button 34 is in the non-depressed position and the upper surface of button 61 is preferably flush or nearly flush with the upper surface of top wall 79. Cover 36 is received on buckle base 30 and side walls 31, 32 with a snap fit. To provide this snap fit, rear wall 77 of buckle 36 includes a pair of inwardly projecting tabs 81, 82, as seen in FIGS. 3 and 5. Front wall 78 of buckle cover 36 depends downwardly from top wall 79 to form a forward tongue plate receiving aperture 83. The lower edge of front wall 78 terminates in an inwardly projecting portion 84 received in slots 85, 86 in the forward edge of side walls 31, 32, respectively. Side wall 76 of buckle cover 36 is provided with an inwardly projecting tab 87, as seen best in FIG. 5, receivable by snap fit in elongated portion 50 of slot 48 in side wall 31. Tab 87 assists in retaining the cover to the buckle and side walls and also prevents the movement of axle extension 46 of latch member 33 out of slot 48 after the buckle and cover is assembled.

Buckle 20 is assembled by insertion of knurled bar 38 in slots 41, 42 of side walls 31, 32, respectively and passing safety belt strap 21 through strap receiving aperture 37 of base 30 around the knurled bar 38 and back out of the buckle through aperture 37. Latch member 33 is then positioned in the buckle by positioning the axle extensions 46, 47 in slots 48, 49 of side walls 31, 32, respectively. Push button 34 may then be mounted on the base and side walls by positioning stub axle 57 in circular opening 59 of side walls 31 and stub axle 58 into arcuate

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slot 60 in side wall 32. Stop pin 62 is then secured to side walls 31, 32 by insertion of one end in opening 63 and by forcing the other end in U-shaped slot 64. Spring 35 is then mounted in the buckle by positioning lever arms 68, 69 beneath pivot bar 55 of push button 34 and above planar portion 45 of latch member 33 and snap fitting hook shaped portion 67 of stop pin 62. Cover 36 is then snap fitted onto the base and side walls by positioning tabs 81, 82 on rear wall 77 of cover 36 into slots formed in the rear edge of side walls 31, 32 and forcing the forward wall downwardly so that inwardly projecting portion 84 of front wall 78 snaps into slots 85, 86 in the forward edge of side walls 31, 32. The buckle is then assembled and ready for use.

In operation, the relationship of the various components within buckle 20 may be seen in FIGS. 3, 5 and 6. In FIG. 3, the tongue plate 23 is entirely removed from the buckle. To secure the tongue plate 23 to the buckle, the forward edge of the tongue plate is inserted through the tongue plate receiving aperture 83 between the lower edge of front wall 78 of cover 36 and above the upper surface of base 30 so that the forward edge of the tongue plate 23 bears upon the forward inclined outer surface of locking element 51 causing the latch member 33 to rotate clockwise, as viewed in FIG. 5, until the aperture 26 of tongue plate 23 is positioned beneath locking element 51. The tongue plate is then positively retained within the buckle through the abutting engagement of the abutting surface 52 of locking element 51 and the retaining shoulder 27 of tongue plate 23.

Quick release of tongue plate 23 from buckle 20 is provided through the push button actuating means, or more particularly, by depression of push button 34, as seen in FIG. 6, which causes latch member 33 to rotate clockwise through the pivotal movement about the edge of axle extensions 46, 47 on planar portion 45 of latch member 33 within slots 48, 49 of the side walls. This pivotal clockwise movement of latch member 33 withdraws locking element 51 out of aperture 26 of tongue plate 23 so that the tongue plate is free to be withdrawn longitudinally out of buckle 20.

An important feature of this invention, relating to the withdrawal of the tongue plate from the buckle, can be appreciated by reference to FIGS. 6 and 8. In the event that safety belt strap 21, 22 are under load, such as when the weight of the occupant or passenger restrained by the safety belt is entirely or partially supported by the safety belt straps, tongue plate 23 will be forced away from base 30. Under such conditions, the upper surface of tongue plate 23 is forced against the lower surface of second planar portion 53 of latch member 33 so as to cause considerable frictional resistance to withdrawal of the tongue plate. However, in the present invention, the frictional contact between the tongue plate and the lower surface of the latch member is minimized through the provision of the dimples 54 projecting downwardly from the lower surface of second planar portion 53 so as to reduce the bearing area between the tongue plate and the latch member. Thus, even with considerable load on the seat belt straps, the tongue plate can be easily withdrawn from the buckle after the buckle is unlatched from the tongue plate.

It will also be seen that the above-described buckle 20 provides good leverage characteristics. Specifically, when the safety belt straps are under load, tongue plate 23 is forced out of buckle 20 in a longitudinal direction creating substantial frictional force between the abutting surface 52 of locking element 51 on latch member 33 and the retaining shoulder 27 in aperture 26 of tongue plate 23. This frictional force resists the upward movement of locking element 51 out of aperture 26 and must be overcome by the depression force applied to push button 34 which must be less than a minimum force as required by certain safety regulations. The required leverage is provided in the present invention by the increased length of

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planar portion 53 relative to planar portion 45 of latch member 33. It has been found that this difference in the length of the lever arm is more than adequate to meet present safety regulations, and to provide a buckle having an easily operable actuating mechanism.

The foregoing detailed description has been made with reference to an exemplary embodiment of a safety belt buckle in accordance with the present invention. It should be noted that other embodiments of the buckle and various modifications, alterations and changes thereof may be made while still within the scope of the present invention which is defined and limited only by the following claims.

I claim:

1. A safety belt buckle for receiving and engaging a tongue plate having a retainer shoulder, comprising:

a base and opposed side walls;

a latch member in the forward end of said buckle including a first planar portion pivotally supported by said side walls and having a downwardly projecting locking element with an abutting surface, and a second integral portion disposed forwardly of said first planar portion and having downwardly projecting means for bearing engagement with the tongue plate; push button actuating means supported for motion toward and away from the base, overlying said latch member and engaging said latch member second portion; and

spring means biasing said latch member locking element downwardly;

whereby said buckle may receive the tongue plate so that said locking element abutting surface engages the tongue plate retaining shoulder to prevent withdrawal of the tongue plate from the buckle and the tongue plate may be withdrawn by depression of said push button actuating means so as to pivot said latch member, disengaging the locking element abutting surface from the tongue plate retaining shoulder and engaging said means for bearing engagement on said latch member second portion with the tongue plate.

2. The safety belt buckle of claim 1 wherein said second integral portion is planar and disposed at an obtuse angle to said first planar portion and said means for bearing engagement with the tongue plate on said latch member second integral planar portion comprises at least one dimple.

3. The safety belt buckle of claim 1 wherein said latch member first planar portion includes rectangular cross section axle extensions received in triangularly shaped slots in said opposed side walls for pivotal movement about the forward edge of said angle extensions, the free end of said second integral portion engaging said push button actuating means, the distance between the pivot edge of said axle extensions and the point of engagement between said second integral portion free end and said push button actuating means being greater than the distance between said pivot edge and said locking element abutting surface on said first planar portion of said latch member.

4. The safety belt buckle of claim 3 wherein said triangularly shaped slot in one of said opposed side walls has an elongated portion and said second integral portion of the latch member has a cut-out in one lateral edge thereof defining a lateral shoulder preventing lateral movement of said latch member when said buckle is assembled, said first planar portion axle extension and said lateral shoulder being receivable within said slot with elongated portion during assembly whereby the other axle tension may be aligned with and inserted in said other triangularly shaped slot so as to facilitate assembly of said buckle.

5. The safety belt buckle of claim 4 including a cover having a top wall with an opening above said push button actuating means, side walls, one of said side walls having an inwardly projecting tab on the inner surface thereof

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received within said elongated portion of said triangularly shaped slot so as to prevent movement of the axle extension within said triangularly shaped slot into said elongated portion, a rear wall including means for securing said cover to said base, and a front wall defining a tongue plate receiving aperture and including means for securing said cover to said base.

6. The safety belt buckle of claim 2 wherein said push button actuating means includes a lever having an upwardly projecting button mounted on a pivot bar having stub axles on opposite ends thereof, one of said opposed side walls having a substantially circular opening for receiving one of said stub axles, the other of said opposed side walls having a slot extending downwardly from the upper edge of said side wall and then extending rearwardly for receiving the other of said stub axles so as to facilitate mounting of the push button actuating means in the buckle.

7. The safety belt buckle of claim 6 additionally including a stop pin fixedly mounted between the upper forward ends of said opposed side walls, said stop pin overlying a portion of said push button lever to limit upward pivotal movement of said lever and lying immediately forward of another portion of said lever so as to limit forward movement of said stub axle within said rearwardly extending portion of said side wall slot.

8. The safety belt buckle of claim 7 wherein said spring means comprises a strip of spring metal with a resilient hook-shaped portion snap fitted on said stop pin, an integral elongated arm extending rearwardly and downwardly below said pivot bar and restrained against vertical movement thereby, and a short folded back arm extending forwardly and downwardly and bearing upon said latch member first planar portion.

9. In a safety belt buckle means having a base with upstanding side walls, cover means enclosing said base with a tongue plate receiving aperture in a forward portion of said buckle and actuating means supported in said buckle for depression towards said base, the improvement comprising the provision of:

a latch member pivotally mounted within said buckle between said side walls with its pivotal axis extending between said side walls and spaced upwardly of said

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buckle base for receiving a tongue plate inserted into said buckle thereunder;

locking means associated on an underside of said latch member facing said buckle base and being positioned thereon rearwardly of the latch member pivotal axis for locking engagement with a tongue plate inserted thereunder, said latch member also including an extension portion forwardly of said latch member pivotal axis within said buckle and associated with said actuating means for imparting a pivotal release movement of said latch member locking element in a direction away from said buckle base on depression of said actuating means toward said buckle base; and means associated with said latch member extension portion adjacent said latch member pivotal axis for bearing upon said inserted tongue plate during release of said tongue plate from said latch member locking element.

10. The improvement in safety belt knuckle means of claim 9 wherein said actuating means includes a push button mounted within said buckle.

11. The improvement in safety belt buckle means of claim 9 wherein said latch member locking means is formed in a first planar portion of said latch member and said means for bearing upon said inserted tongue plate is formed integrally of said extension portion of said latch member.

12. The improvement in safety belt knuckle means of claim 11 wherein said first planar portion and said extension portion of said latch member lie in intersecting planes making an upwardly opening obtuse included angle therebetween and said means for bearing includes at least one convex ended projection depending from said extension portion.

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626,294 5/1927 France.

BERNARD A. GELAK, Primary Examiner

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,494,007

Dated February 10, 1970

Inventor Joseph E. Dahms

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 5, line 48, "bet" should read --belt--.

Column 6, line 12, "follownig" should read --following--.

Column 8, line 19, "knuckle" should read --buckle--.

Column 8, line 28, "knuckle" should read --buckle--.

SIGNED AND
SEALED
JUN 30 1970

(SEAL)

Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents