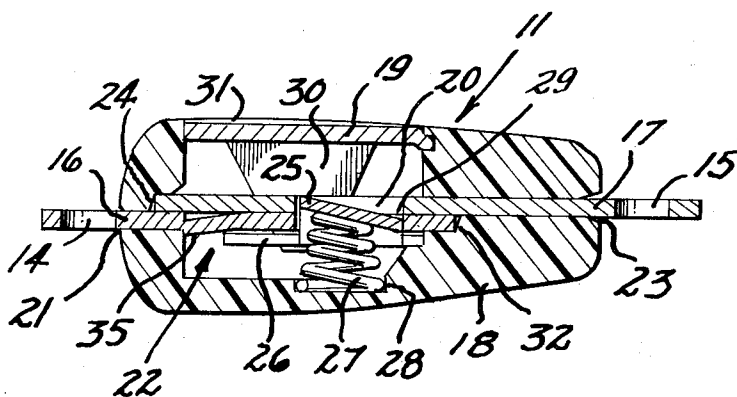


10 Claims, 11 Drawing Figures

safety belts into which housing are oppositely inserted two similar tongue pieces, one of which becomes fixed in its relation to the housing and the other of which is selectively removable therefrom. The fixed tongue plate retains a spring and a latch against which the spring presses and the latch includes a latch lug which extends through the fixed tongue plate. The spring and latch are in a cavity in the housing and the cavity opens outward transverse of the plane position of the tongue plates. The second of the tongue plates is insertable in the housing in slidable relation over the fixed tongue plate and is guided by buttressing in the housing so that on entry the latch is depressed until the latch opening in the second tongue plate registers with the latch opening in the fixed tongue plate. Upon registration, the latch lug pops through the latch opening in the second tongue plate and withdrawal is prevented. A push plate having legs astraddle the tongue plates is provided in the cavity of the housing and the legs impinge on the latch element. Manual depression of the push plate depresses the latch and releases the upper of the tongue plates for removal from its slot. Reinforcing means integral with the tongue plates provide added strengthening against torsional or twisting movement as between the two tongue plates under stress.



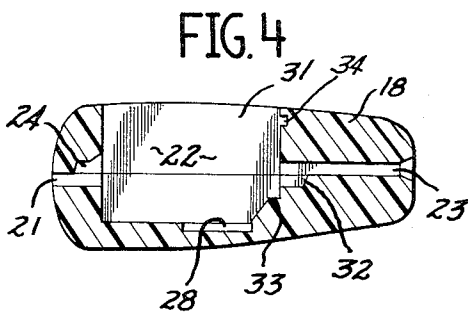
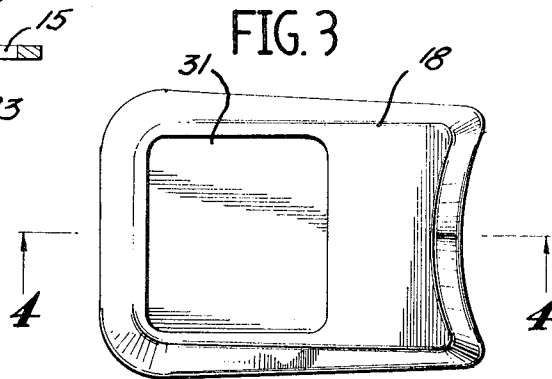
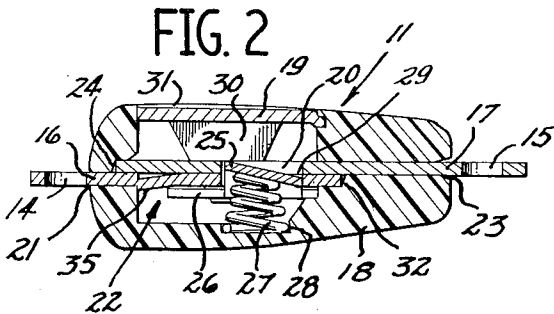
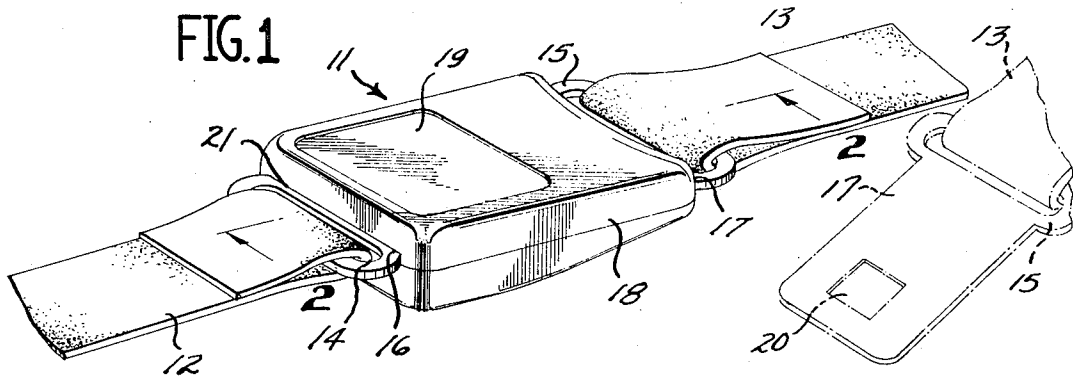
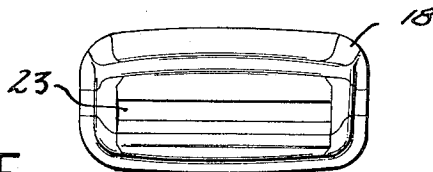
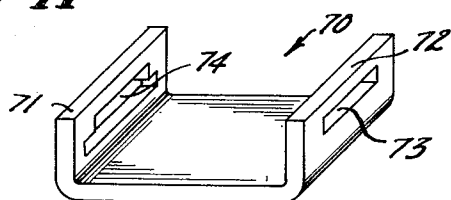
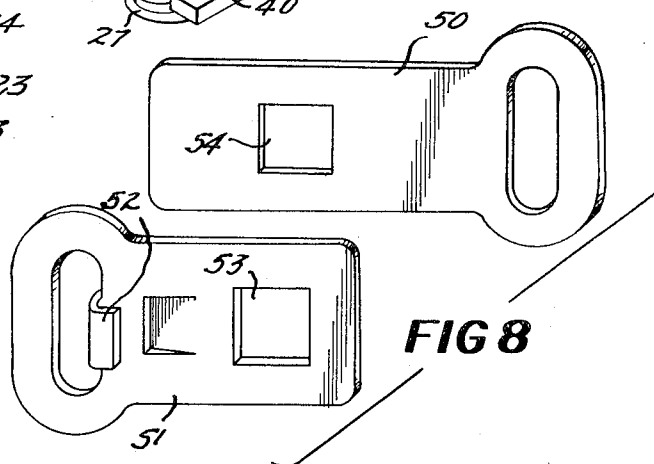
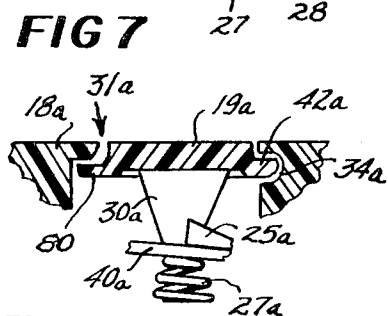
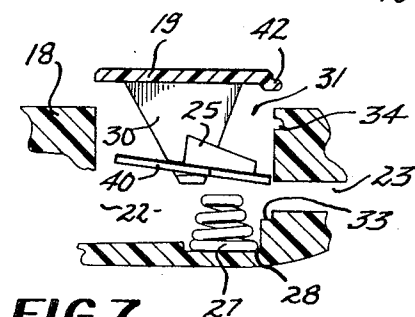
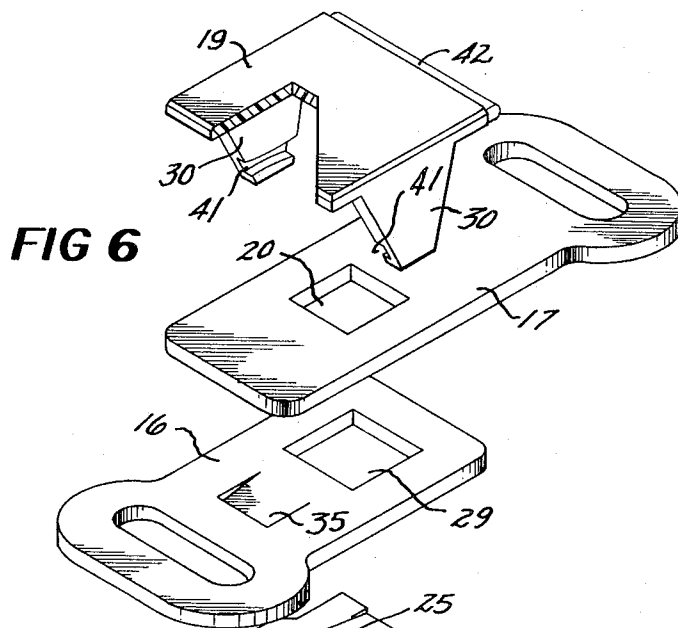


FIG. 5





BUCKLE

The present invention is a buckle and more particularly a seat belt or safety buckle with push button release for use in safety harness structures as known in automobiles, aircraft and watercraft. The construction of the present buckle is vastly simplified and the assembly of the buckle structure as described herein is accomplished in such a manner that insertion of a fixed tongue piece secures the single spring bias and latching means in operative relation for the removable of the tongue pieces and a single depression of the latching means by a force transverse to the plane of the tongue plates accomplishes release of the removable tongue plate. This is all accomplished using a simple wrap-around cast housing or enclosure and the housing, upon assembly is secured to the fixed of the tongue plates, and the relationship of the tongue plates in the housing to each other results in a high strength system of webbing support. The simplicity of the buckle and the ease of manufacture and the construction allowing a housing to be formed from resin or die cast metal without loss of strength are the principal objects of the present invention.

THE PRIOR ART

In a general sense buckles have comprised a housing or frame, means for securing webbing fixedly to the frame, and means for fixing webbing removably to the frame. A lock or latch is required to secure the removable element to the frame and the stresses applied to the connection are transmitted through the latch to the frame and thence to the connected webbing. In such systems, the ultimate stresses are applied to the housing and the housing as a consequence must be reinforced or made from high strength material or include shear resistant buttress provisions. This necessity has ruled out resins and low strength metals such as die cast zinc from forming the housing or framing, except as such materials may form non-stressed trim parts or ornamental escutcheons. As will be seen, the present invention opens the way for wrap-around housings and in other particulars avoids any heavy stressing of the housings while allowing the economies of die cast, metal or cast and injected resin to extend to safety belt structures at no sacrifice of strength. The closest known structure to the invention expressed herein is believed to be found in the U.S. Pat. No. 3,522,640 to T. E. Lohr. However, the cast frame is heavy, bulky, and requires cast in situ inserts or journalling for reinforcement against shock stressing and there is no suggestion of overlaying two similar tongue plates in a lock registering position in a wrap-around integral housing. Other structural distinctions and their functional consequences will be best appreciated as the description proceeds.

IN THE DRAWINGS

FIG. 1 is a perspective view of a buckle in accord with the present invention and securing two pieces of webbing together at the junction of the buckle, and one tongue plate selectively removable from the buckle.

FIG. 2 is a full cross section elevation view taken on the line 2—2 of the FIG. 1 and revealing the simplicity of the internal construction of the buckle of the present invention.

FIG. 3 is a top plan view of the housing of the buckle.

FIG. 4 is a cross section elevation view taken on the line 4—4 of FIG. 3 and showing the cavity slot relations in the buckle of the present invention.

FIG. 5 is an end elevation view of the buckle as seen in FIG. 3 and indicating the slots therethrough and their adjacent relationship.

FIG. 6 is an exploded perspective view of the latch-tongue plunger interrelationship and including the simple compression spring.

FIG. 7 is a detail elevation view of the plunger or push plate relationship showing the sliding grip of the legs of the push plate as they straddle the tongue plates and connect with the flanges of the latch plate.

FIG. 8 is a perspective exploded view showing the tongue plates of the present invention modified to grip each other on locking.

FIG. 9 shows a modified tongue plate in perspective view, upset to slidably receive the movable of the tongue plates.

FIG. 10 is a perspective view of a channel insert usable in defining the slot buttressing as necessary to strengthen the buckle against torsional or differential stressing.

FIG. 11 is a modified version of the push plate and in compression retained relationship between the housing and the spring biased latch plate.

GENERAL DESCRIPTION

In general the present invention is directed to a wholly unique buckle particularly adapted to safety belt and harness usage. The structure of the present buckle includes a wrap-around housing having a slot at both ends, the slots partially overlying each other as they pass through the cavity of the housing or frame. The cavity in the housing opens from one side and communicates with the slots at each end. A pair of tongue plates which are substantially similar in shape are inserted, one each in the slots and to the extent that their movement is limited by internal buttressing against the housing. These tongue pieces overlie each other in flat plane journal relation and when both are fully inserted, latch openings in each of the tongue plates are in register. One of the tongue pieces includes a detent element allowing the tongue to be fully inserted with minimum lateral deformation of the housing and upon deformation springs back to its original position at full insertion and locks against the detent of the tongue plate fixing it against withdrawal from the housing. This tongue plate is the "fixed" of the two plates. Upon insertion of the fixed plate, the fixed plate extends across the cavity and secures a latch plate and a compression spring in the cavity beneath the fixed plate. The latch lug of the latch plate extends upward through the lock opening in the fixed plate and is biased therethrough by the depressed spring which urges the latch upward. The edges of the latch plate are gripped by the legs of a straddle type push plate, so that depression of the push plate into the housing causes displacement of the latch with corresponding drop of the latch lug. Since the latch lug is ramped where it projects through the fixed tongue plate, the insertion of the removable tongue plate in its slot moving over the fixed plate depresses the latch lug and latch against the spring bias until the lock or latch opening in the movable tongue piece registers over the corresponding opening in the fixed latch plate. The lug is then projected upward to lock and the removable of the tongue plates cannot be removed until the push

plate is depressed releasing the removable plate from the blocking by the lug. The cavity will be understood to provide directional guidance to the tongue plates on entry and withdrawal and also limits their depth of entry to the housing by appropriate stops and shouldering. The cavity also includes a ledge or platform providing a simple open fulcrum for the latch plate. The edges of the latch lug extend beyond the width of the tongue plates so that the legs of the push button or plate straddle the tongue plates but allow the legs to terminally engage the latch plate in a tilt-in manner at assembly so that the push button or plate achieves a positive but laterally sliding grip on the edges of the latch plate.

In a modified version the push plate is hingedly secured to the push plate opening in the housing and is blocked by integral stops from popping out of the housing, then the legs of the push plate merely rest on the sides flanges of the latch plate and when the push plate is depressed the spring is depressed by the latch and the removable tongue plate is released. These devices easily achieve the strength of present safety requirements and additional strength against torsional and transverse stressing is easily applied as by bending over lugs from the fixed of the tongue plates to stabilize the overlying plate in its locked position. This wholly avoids shock stresses being transmitted directly to the housing, frame or case and the consequence is a very high degree of strength. Metal journalling or U-shaped inserts nested in the housing are also helpful and work well where no addition of weight or complexity is objected to.

It will be appreciated that the belting or webbing ends, functionally connected and disconnected at the buckle, are secured to the tongue pieces by means of the bars formed by the harness connecting slots as seen. These slots and indeed the outboard portion of the tongue plates can be modified as desired, for example, to accommodate a lock stud or connection for three and four strap connections as found in junctions combining lap and shoulder harness.

SPECIFIC DESCRIPTION

Referring to the drawings and with particular reference first to the FIG. 1, a buckle 11 embodying the invention is seen connecting two terminal ends of belting 12 and 13 as used for example, in safety belting for automobiles or aircraft. The belting 12 and 13, respectively, is connected to belt loops 14 and 15, respectively, integrally formed in the protruding ends of tongue plates 16 and 17, respectively. As will be seen, one of the tongue plates 16 is relatively fixed in its assembled relation in the case or housing 18 while the tongue plates 17 is selectively removable upon depression of the push button or push plate 19 visible in the face of the buckle 11. In phantom line the tongue selectively removable plate 17 is seen released from the buckle 11 and still connected to the belting 13. The latch opening 20 through the rectangular plate-like extension of the tongue plate 17 is visible. As will be seen, the fixed tongue plate 16 is similar in shape to the tongue plate 17, but upon insertion into the slot 21 in the end of the case or housing 18, the tongue plate 16 detent locks against withdrawal and the tongue plate 17, upon selected insertion into the case or housing 18, overlays the tongue plate 16. At full insertion, as seen in the full line portion of FIG. 1, the two tongue plates are interlocked as by a latch element and the latch ele-

ment, on depression of the push button plate 19, releases from the opening 20 allowing simple withdrawal of the tongue plate 17. The casing or housing 18 is a wrap-around enclosure and hence may be integrally cast or injection molded from metal or resin and aside from orienting the parts, the case 18 receives no major stressing when tension is applied to the belting 12 and 13 as through associated harness and is terminally closed against the tongue plates 16 and 17 through their interconnection inside the housing 18. Accordingly, the housing may be colored or ornamental and shaped as desired to satisfy external aesthetic requirements.

By reference to FIG. 2 the simplicity of the case 18 and the internal mechanism in the mechanical cavity 22 is best understood. The slot 23 for insertion of the tongue plate 17 is seen. The tongue plate 17 is shown fully inserted butting against the buttress 24 of the housing 18 and the tongue plate 17 is seen in sliding overlying contact with the tongue plate 16 and both are connected together against withdrawal by the latch lug 25 of the latch plate 26. The latch plate 26 and lug 25 are projected upwardly by the bias of the compression spring 27 thrusting against the casing 18 in the thrust pocket 28 and against latch plate 26 urging the lug 25 through the tongue plate 16 at the opening 29, there-through and through the adjacent registering opening 20 in the tongue plate 17. The push plate or button 19 is seen to have legs 30, which will be seen to straddle the tongue plates 16 and 17 and bear upon flanges of the latch plate 26 so that as the button 19 is hingedly depressed it tilts the latch plate 26 downwardly (as shown) and depresses the spring 27 while moving the lug 25 to unlock the tongue plate 17 so that it may be freely withdrawn. The push plate or button 19 rests in a transverse opening 31 through the top of the case 18 of the buckle 11 as shown and the push button is hinged at one side as shown in the FIG. 2.

The FIGS. 3, 4 and 5 best illuminate the integral cast or formed construction of the body or case 18. In the section view of FIG. 4 the slots 21 and 23 are best understood with their corresponding opposite buttresses 32 and 24, respectively, and providing stops limiting the insertion of the respective tongue plates 16 and 17. The step or ledge 33 which provides a fulcrum for the latch plate 26 is also best seen in the FIG. 4 and the female hinge groove 34 is also readily visible. The upper slot 23 for insertion of the tongue plate 17 is clearly visible in the FIG. 5. It is important to note with reference to FIG. 2 that the fixed tongue plate 16 includes a drop shoulder 35 which, upon insertion, detents against the case 18 adjacent the opening 21 and locks the tongue plate against chance withdrawal. Entry of the shoulder 35 is by local deformation of the case 18 and the same deformation stresses close on the tongue plate 16 is prevention of withdrawal. The insertion of the plate 17 also secures the latch plate 26 in position in relation to the simple compression spring 27 centered by the pocket 28 and the latch lug 25 extends upwardly through the latch opening 29.

In the exploded view of FIG. 6 the shapes and interrelation of the elements are revealed with the case 18 removed. The push button or push plate 19 with its depending legs 30 is seen in its astraddle relation above the tongue plates 16 and 17. The legs 30 depend to engagement or connection with the flanges 40. Connection where a positive grip on the flanges 40 is desired

is accomplished by use of the grooves 41 provided on the internal faces of the legs 30 and adjacent the lower extremities thereof. This provides a sliding grip on the flanges 40 and facilitates assembly and connection. The protrusion 42 is the male portion of the hinge resulting from tilting the push plate 19 into the cavity 22 and insertion in the groove 34. The feet 44 extending from the flanges 40 of the latch plate 26 rest on the fulcrum pedestal 33 in the cavity 22 of the case 18. The spring 27 seats in the recess 28 and rests in the pocket of the latch lug 25. The drop shoulder 35 is seen formed in the tongue plate 16 and the protrusion of the latch lug 25 through the registering openings 20 and 29 in the tongue plates 17 and 16 is readily understood, urged outwardly by the spring 27.

In the somewhat schematic FIG. 7 the assembly relation in the cavity 22 of the case 18 is best understood. The spring 27 is placed in the recess 28 in the cavity 22 of the case 18. The push button or push plate 19 is linked to the latch plate flanges 40 by the grooves 41 in the legs 30 and the whole assembly is pressed into the cavity 22 and seating the protrusion 42 in the groove 34 to provide a hinge action. Full depression grounds the latch plate 26 on the fulcrum ledge 33 and the tongue plate can thereupon be driven into the slot 21 and over the latch plate lug 25 until the lug 25 pops through the opening 29 (FIG. 6) and the drop shoulder 35 detents the fixed tongue plate 16 against removal. Then the selectively removable tongue plate 17 is insertable in the slot 23, overlying the tongue plate 16 and is locked thereto against withdrawal by the latch lug 25. Depression of the push button 19 depresses the latch plate 26 against the spring 27 and removal is facilitated.

The stress conducting elements, such as latch plate 26, tongue plates 16 and 17 are preferably formed from steel as by stamping and the forms as described are rather easily formed by stamping, the width of the overlying plate 17 being slightly less than the width of the tongue plate 16. The case 18, the push plate 19, and even the spring 27 may be made from suitable resin material. If desired, the case 18 and push plate 19 may be die cast or injection molded with all cavities, shoulders and internal buttresses provided without internal machining since the two elements of case and push button are only lightly stressed. The major stresses are supported by the steel or metal components of tongue plates 16 and 17 pinned together by the latch lug 25 and easily disconnected by transverse application of pressure on the latch plate flanges 40.

FIGS. 8 and 9 illustrate modified tongue plates 50, 51, and 60 substantially identical in most respects to the tongue plates 16 and 17 except that one of the plates 51 includes a lug 55 bent in a channel configuration to receive the tongue plate 50 in an abutting overlap relation so that torsional or twisting moments cause the resulting stresses to be transmitted into the tongue pieces instead of the case or housing 18. The latch receiving openings 53 and 54 are in register on full closure against the lug 52.

FIG. 9 illustrates the use of flank lugs 61 in the tongue plate 60. These function as guides for the insertion of a selectively removable tongue as 50. The plural lugs 61 provide supplemental strength in protection of the housing 28 against twisting moments or torsional stresses developing between the pair of tongue plates. Where the tongue plates of FIGS. 8 and 9 are used, the

entry openings in the housing 28 require modification to accommodate passage of the lugs 52 and 61 without interference and it is preferred that the lugs 52 and 61 be formed in the fixed tongue plates 51 and 60 as shown.

FIG. 10 is illustrative of a channel formed insert 70 and the upstanding legs 71 and 72 are provided with openings 73 and 74 through which the tongue plates travel in overlapped relationship. The insert 70 may be cast in the housing 28 and the object is to provide a high strength thrust buttress girdle preventing unusual forces from reaching the low strength housing 28. The function of the insert 70 is about the same as the structures shown in FIGS. 8 and 9.

FIG. 11 illustrates a modified push plate 19a having a hinge 42a at one side in the channel 34a and including an integral protruding offset flange 80 opposite the hinge piece 42a. The legs 30a are positioned to straddle the tongue plates and bear on the latch 25a at the latch plate flanges 40a. The spring 27a maintains the contact relation and the case 28a is modified at the opening 31a to include the undercut and stop 81a.

Having thus described our invention and several modifications thereof, others skilled in the art will readily perceive variations, improvements and modifications within the skill of the art and such variations, improvements and modifications are intended to be included herein limited only by the scope of our hereinafter appended claims.

We claim:

1. A buckle for seat belts and the like comprising: a cast wrap-around integral housing having two elongate slots, one slot entering one end of said housing and the other slot entering the other end of said housing and said slots passing through a transverse cavity which includes buttresses adjacent said slots, a spring recess and a ledge shoulder;
- a pair of similar tongue plates having webbing receiving openings at one end and having registering latch openings intermediate the ends thereof and in registry upon selected insertion of said plates in each of said slots in said housing and one of said plates upon insertion being fixedly secured against withdrawal;
- a spring in said spring recess of said housing;
- a latch against which said spring bears and resting against said ledge shoulder and the latch lug thereof extending through said latch opening in said fixed of said plates and through the registering opening of the other of said plates; and
- a straddle type push plate in the transverse cavity of said housing and operably engaging said latch whereby said latch is depressible against said spring and thereby releases one of said tongue plates for removal from said housing.
2. In the safety buckle as set forth in claim 1, the combination including projections in the face of one of said tongue plates and guidably supporting the other of said tongue plates in slidable registry.
3. A buckle for safety belts and the like comprising: a wrap-around housing;
- a pair of tongue plates in said housing in journaled overlap sliding relation and both having a registering opening therethrough, and at least one of said plates being selectively releasable;

a hinged push button accessible through said housing and including straddle legs spanning said tongue plates; and

a depressible latch element in said housing biased toward and through said tongue plates in said housing and connected to said hinged push button and upon depression freeing one of said tongue plates.

4. A buckle for safety belts and the like comprising: an integral housing having internal recessing including a central cavity and connecting longitudinal overlaying slots;

a pair of tongue plates, one insertable in one slot and the other insertable in the other of said slots so that both overlay each other in said housing and the one of said tongue plates being fixed against removal and the other of said tongue plates being selectively removable from said housing; and

a latch element depressible in said housing biased toward and through said tongue plates and depressible to release at least one of said tongue plates from said housing.

5. A buckle for safety belts and the like for securing webbing together at a connection comprising:

a housing having recesses and slots therein and including a cavity transverse to said slots;

a pair of oppositely oriented tongue plates, one fixed in said housing in one of said slots upon insertion against withdrawal and the other releasably secured in said housing in the other of said slots and both tongue plates having registering latch openings therethrough and one plate resting on the other in said housing.

a latch element pivotal in said housing and biased toward and through said tongue plate releasably securing said other of said tongue plates against withdrawal; and

means for selectively depressing said latch plate whereby said other of said tongue plates is released from said latch.

6. A buckle for safety belts and the like comprising:

a housing having longitudinal slots in each end thereof and internal recesses transverse of and connecting said slots and said housing having a spring receiver portion and latch pivot pedestal;

a first tongue plate insertable in one of said slots and secure against withdrawal;

a second removable tongue plate in the other of said slots and resting on said first tongue plate;

a latch plate, the lock lug thereof extending upwardly through both of said plates and resting at one end on said pivot pedestal;

a spring in said spring receiver portion of said housing and urging said latch plate upward against said first tongue plate; and

latch depressing means secured in said housing whereby said latch plate is movable against said spring and pivoting on said pedestal releasing said second tongue plate.

7. A buckle for safety belting and the like comprising: an integral housing defining a central mechanism cavity, there being a first longitudinal slot through one side of said housing and into said cavity, there being a second longitudinal slot through the other side of said housing and into said cavity over said first slot, a latch pivot pedestal, a plurality of support buttresses, and there being a top opening transverse to said longitudinal slots and

registrably over said mechanism cavity, one edge thereof being a hinge element;

a spring resting on said housing at the bottom of said mechanism cavity;

a latch, the upstanding lock lug thereof being ramped in one direction and resting on said spring and at one end on said pivot pedestal and having integral flanges extending outwardly therefrom;

a push button having legs astraddle said latch and positionally securing therebetween the latch flanges and said push button including a hinge portion operably engagable, upon assembly, with the hinge element of said housing;

a first tongue plate fixed in said housing and having a detent projection and inserted in said first slot over said latch lug and said detent projection impinging against said housing in prevention of withdrawal and said first tongue plate including an opening registrable with said latch lug and through which said latch lug projects and said first tongue plate secures against lateral movement against said buttresses in said housing; and

a second tongue plate insertable and removable in said second slot and having a lock opening there-through registering with said latch lug, said second tongue plate having a smaller width than said first tongue plate and resting on said first tongue plate and depressing said latch against said spring by way of said ramp and securable against said buttresses in said housing against lateral movement, and releasable by depression of said push button depressing said latch downwardly against said spring.

8. A push button release for latch elements for seat belt buckles comprising:

a channel shaped element, the web portion providing an upper surface for manual contact;

a housing having an opening therethrough and said web portion of said channel shaped element depressible through said opening;

a spring biased latch element in said housing and beneath said web portion of said channel shaped element; and

legs depending from said web portion and each having plate retention grooves in facing juxtaposed relation whereby said latch element is connected therebetween for raising or depressing movement of said latch in accord with motion of said web and the grip on said latch element is slidable.

9. A push button release in accord with claim 8 and including a hinge element on one edge of said web transverse between said legs whereby movement of said push button is a hinged movement.

10. A push button release for seat belt buckles and the like comprising:

a housing having an opening partially therethrough;

a channel shaped push button element, the legs of which extend into said opening and said legs including gripping grooves;

a pair of tongue plates in overlap relation in said housing, one of said tongue plates being releasable and each having a registering opening therethrough forming lock abutments and said legs flanking said tongue plates; and

a latch plate beneath said plates straddled by said legs and gripped by said grooves whereby said latch plate is movable in accord with movement of said push button element and upon depression releases one of said tongue plates.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,795,030 Dated 1974 March 5

Inventor(s) Gerald A. Yates and Arnold M. Stephens, Jr.

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

In the Heading: Change "MacLeod" to read -- McLeod --.

Column 3, line 18, change "sides" to read --- side ---

Column 4, line 42, change "sectnion" to read -- section --

Column 4, line 56, change "is" to read -- in --

Column 7, line 8, change "compressing" to read -- comprising --

Signed and sealed this 2nd day of July 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents