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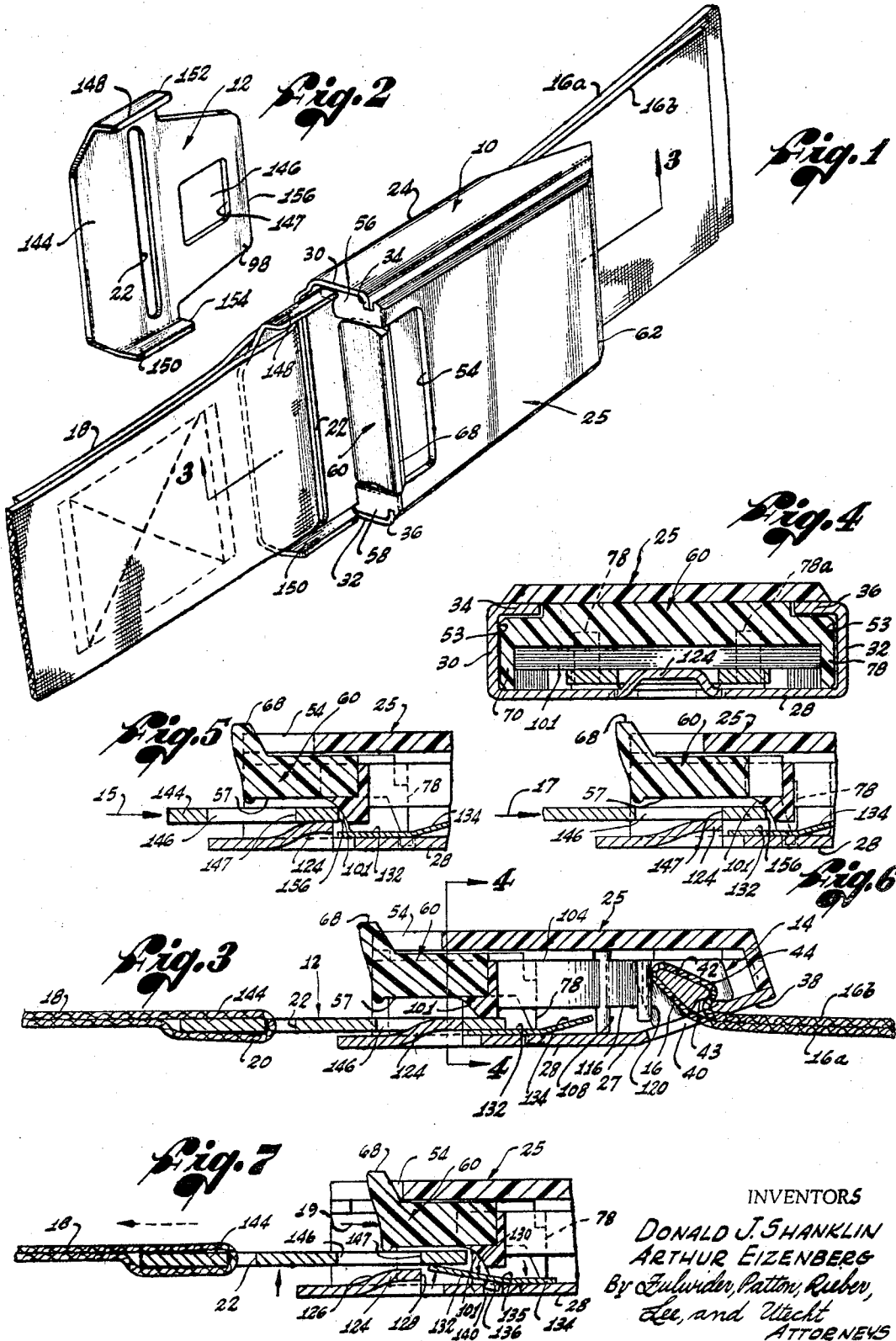
D. J. SHANKLIN ET AL

3,399,431

SAFETY SEAT BELT BUCKLE

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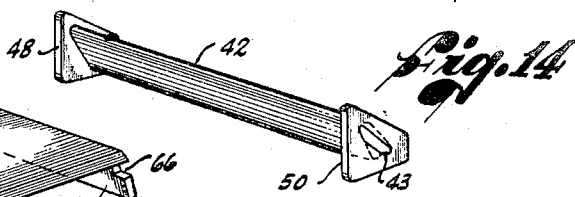
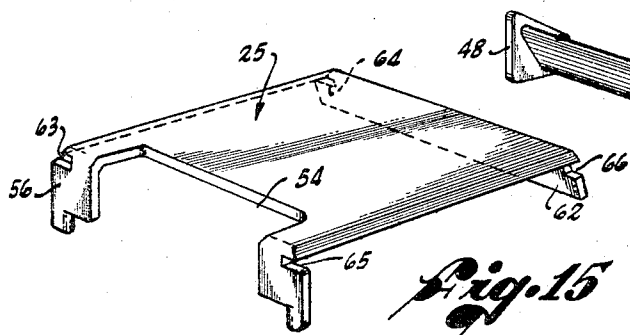
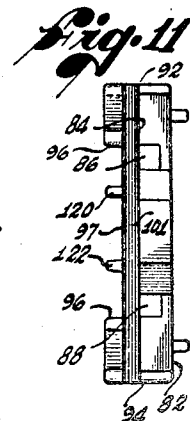
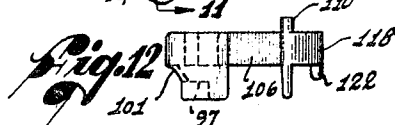
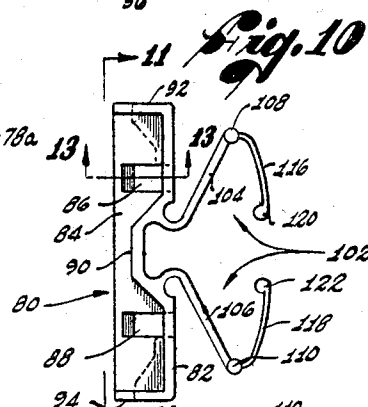
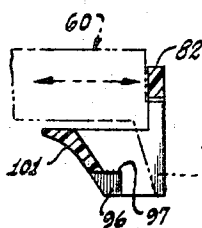
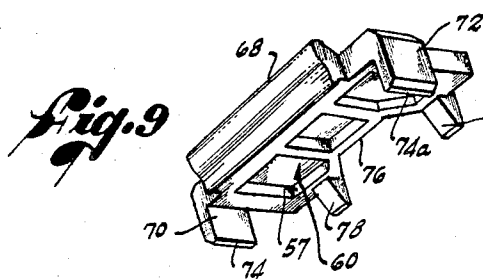
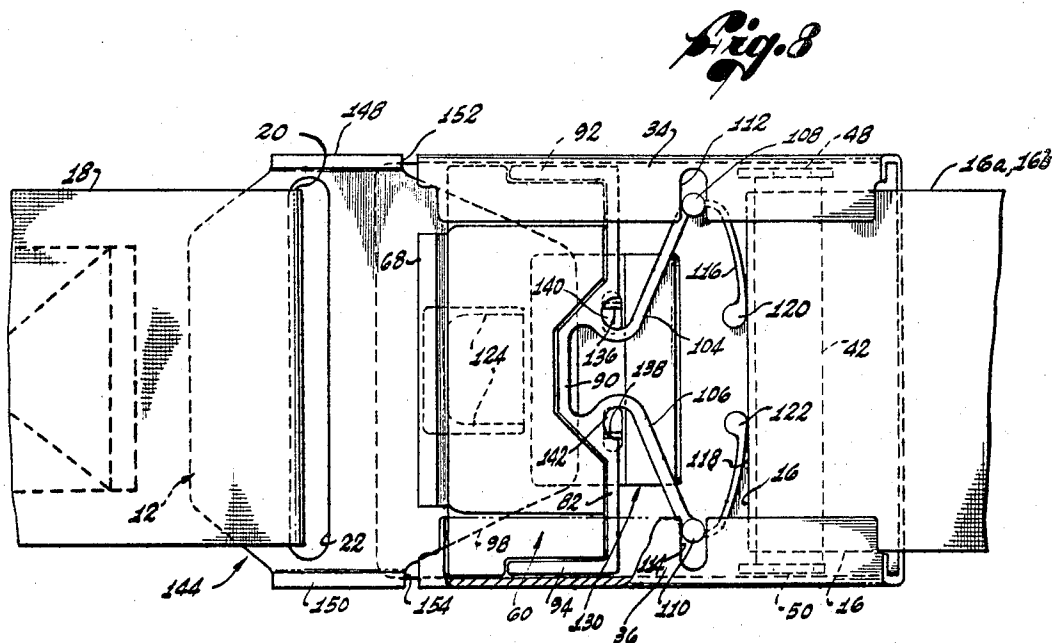
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SAFETY SEAT BELT BUCKLE

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2 Sheets-Sheet 2



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SAFETY SEAT BELT BUCKLE

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10 Claims. (Cl. 24-77)

ABSTRACT OF THE DISCLOSURE

A two-part quickly attachable and releasable safety seat belt apparatus for vehicles, such apparatus comprising a buckle body, and a buckle hasp insertable into the buckle body and automatically, lockingly coupled together and manually releasable by overlapping locking control components which slide principally within the buckle body transverse to the normal direction of impact acceleration and deceleration forces applicable thereto in use. The device includes a catch member in the buckle and a hasp which is inserted into the buckle and locked in coupling engagement with the catch member when the buckle and hasp are forcefully joined together, and manually operated means slidable longitudinally of the buckle is included for unlocking the hasp and moving the hasp from coupling engagement with the catch member.

Brief summary of the invention

Safety seat belt buckle mechanisms of the type heretofore employed in connection with automobiles, airplanes, and the like vehicles, have been constructed in such manner as to require manual manipulation and release by means of handle, lever or push button control elements which usually swing or move in directions generally parallel to the direction of the forces of acceleration or deceleration to which they are likely to be subjected, whereby under severe conditions, often causing inadvertent release of such seat belt buckle devices at the very instant of which they should be most securely locked.

Another weakness in the seat belt buckle device as heretofore employed resides in the construction usually employed, whereby in event of severe impact of the buckle with a part of the vehicle, such as for example with the steering wheel of an automobile, the parts may be sprung apart to such an extent as to cause failure of the buckle device at a time when its strength and integrity are most needed.

The seat belt buckle construction of the herein disclosed invention overcomes the before described disadvantages of the conventional seat belt apparatus by employing a construction in which substantially all of the movements of the coupling and disengaging control components are longitudinal with respect to the belt buckle and hasp axis and thus acceleration or deceleration forces cannot act upon the mechanism of the belt buckle in such a way as to cause inadvertent release.

Another feature of the invention resides in the crush-proof construction of the buckle body afforded by the superposed overlapping or stacked arrangement of the several parts thereof such that in event of severe impact of the buckle with a part of the vehicle, such as for example with the steering wheel, such parts will tend to be forced securely together instead of being sprung apart as can occur in many of the buckle devices heretofore known.

Another feature of this invention resides in the provision of means in the belt buckle whereby when the release mechanism is actuated, the two separable parts of

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the apparatus, namely the belt buckle and the belt hasp, are released and positively forced apart, thereby affording a quick, positive release of the seat belt attachment elements eliminating any need for subsequent manual tinkering with the parts to accomplish such disconnection.

Still another advantageous feature of the apparatus of the present invention resides in the employment of a latch mechanism in the belt buckle which permits the belt buckle and belt hasp to be manually coupled together without resultant movement of any of the control elements which extend to or are accessible from the exterior of the belt buckle. Thus the coupling engagement of the belt buckle and hasp can be conveniently accomplished while one hand of the operator completely grasps the belt buckle, and without interfering in any way with the latching action which otherwise occurs with belt buckle apparatus in which external levers or buttons must be caused to move in order to permit the latching action to take place.

Thus the operation of the apparatus of this invention is more safe, convenient, rapid and dependable than prevalent in most of the seat belt buckle apparatus heretofore known.

Other advantages and features of novelty of the invention will be evident hereinafter.

Brief description of the several views of the drawing

In the drawings which show by way of illustration the presently preferred embodiment of the invention and in which like reference characteristics designate the same or similar parts throughout the several views:

FIGURE 1 is a perspective view of the general assembly of the entire seat belt buckle apparatus of the invention, showing the two releasable parts thereof, namely the belt buckle and hasp, coupled and locked together, with respective opposite end portions of a seat belt attached thereto;

FIGURE 2 is a perspective view of the hasp portion of the apparatus separated from the buckle and with the seat belt omitted;

FIGURE 3 is a longitudinal, sectional view taken on line 3-3 of FIGURE 1, showing the seat belt buckle and hasp apparatus in a completely coupled and locked-together condition;

FIGURE 4 is a cross-sectional view taken on line 4-4 of FIGURE 3;

FIGURE 5 is a fragmentary view of a portion of the apparatus shown in FIGURE 3, but showing the positions of the parts of the belt buckle and hasp at an initial stage of interconnection of the hasp and belt buckle;

FIGURE 6 is a fragmentary view of the same portion of the apparatus shown in FIGURE 5, but showing the positions of the parts of the belt buckle and hasp just prior to reaching a fully connected and latched-together condition;

FIGURE 7 is a fragmentary view of the same portion of the apparatus shown in FIGURES 5 and 6, but showing the positions of the parts of the belt buckle and hasp at the initial stage of releasing the connection between the belt buckle and hasp;

FIGURE 8 is an enlarged, top elevational view of the apparatus assembly shown in FIGURE 1, but with the cover of the belt buckle body removed to expose the internal mechanism thereof to view;

FIGURE 9 is an under-side, perspective view of the belt buckle latch release control component of the belt buckle;

FIGURE 10 is a top, elevational view of the buckle

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latch lock control member and latch lock spring component of the apparatus;

FIGURE 11 is an end, elevational view of the apparatus component of FIGURE 10 taken from line 11—11 thereof;

FIGURE 12 is a side, elevational view of the apparatus element shown in FIGURES 10 and 11;

FIGURE 13 is an enlarged, fragmentary, detailed sectional view taken on line 13—13 of FIGURE 10;

FIGURE 14 is a perspective view of the safety belt webbing attachment bar contained within the buckle assembly and employed for adjustably attaching one looped end of the seat belt to the belt buckle; and

FIGURE 15 is a top-side, perspective view of the detachable cover for the belt buckle body.

Detailed description

Apparatus.—Referring first primarily to FIGURES 1, 2 and 3, the two principal attachable and releasable coupling components of the seat belt buckle apparatus comprise a buckle shown generally at 10 and a hasp shown generally at 12. The buckle 10 is adjustably attached at one end thereof, as shown at 14 in FIGURE 3, to an adjustable loop 16 formed at one end of one-half portion of the seat belt, such adjustable attachment being hereinafter more fully described, and the hasp 12 is preferably fixedly attached to one end of the other half portion of the seat belt by means of a conventionally stitched fold which forms a fixed loop 20 passing through a transverse slot 22 formed through an intermediate portion of the hasp 12.

Referring in more detail to the buckle 10, it consists basically of a two-pieced, hollow housing comprising a channel-shaped, open-ended and open-topped buckle body 24, and a cover, as indicated generally at 25, detachably attached to and covering the open-topped portion thereof.

The buckle body 24 is preferably formed in one piece of moderately thick sheet metal, with a generally flat bottom wall 28, and laterally opposite, parallel side walls 30 and 32 terminating at their outer edges in relatively narrow, intumed, top flanges 34 and 36 which extend substantially the entire length of the upper side of the buckle body 24. The channel-shaped buckle body 24 is of uniform cross-sectional size except, that beginning at an intermediate transverse bend line, as shown at 27 in FIGURE 3, the right-hand portion of the bottom wall 28 is formed with an upwardly sloping portion 38, thereby presenting a right-hand end portion tapering in height and terminating in a right-hand end opening of reduced height relative to the left-hand end opening.

The upwardly sloping bottom portion 38 of the buckle body 24 is provided through the thickness thereof with a relatively wide, transversely extending slot 40 for entrance therethrough the hereinbefore mentioned adjustable loop 16 of the seat belt webbing. Slidably retained within the tapered, right-hand end portion of the buckle body 24, adjacent the beforementioned slot 40, is a crosswise-extending frictional lock, belt attachment bar 42, around which the beforementioned loop 16 of the seat belt webbing passes, as shown at 44, the arrangement being such that, in operation, if tension is applied to the attached lower one, 16a, of the adjacent superposed return portions of the seat belt loop 16, the bar 42 is thereby urged slidably toward the right-hand edge of the slot 40 to the position shown in FIGURE 3, in which the portion of the belt disposed between the bar 42 and the right-hand edge of the slot 40 is firmly wedged such as to prevent slippage of the belt webbing around the bar 42 and through the slot 40. However, if tension is applied to the loose return end portion, 16b, of the belt loop 16, while the tension in the portion 16a thereof is released, the belt loop readily slips around the lock bar 42, thereby permitting the user to adjust the effective length and tension of the seat belt.

The lock bar 42 is approximately triangular in cross-section, as best shown in FIGURES 3 and 14, with the

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right-hand edge thereof, which normally makes wedging contact with the belt adjacent the right-hand edge of slot 40, as aforesaid, slightly concaved as shown at 43. The opposite ends of the lock bar 42 are provided with attached end guide plates 48 and 50, the outer surfaces of which make loose, sliding engagement with the adjacent inner surfaces of the side walls 30 and 33, thereby providing guidance to the movement of the lock bar 42, and by engagement of the upper and lower edges thereof with the inner surfaces of the top flanges 34 and 36 and the bottom wall 28, its escape of the lock bar from the tapered right-hand end of the buckle body 24 is prevented when not encircled by and attached to the seat belt loop 16. The end guide plates 48 and 50 also in the same manner serve to limit the clamping movement of the lock bar, under the tension of the encircling seat belt, to a position at which the seat belt is firmly clamped between the concave edge portion 43 of the lock bar and the adjacent parallel right-hand edge portion of slot 40, yet is restrained by the guide plates from further movement in a clamping direction which might otherwise result in damage or cutting of the seat belt at that point.

As beforementioned, the top of the buckle body 24 is provided with a generally rectangular-shaped, attachable cover 25 shown detached in FIGURE 15. The cover 25, when attached, rests upon and extends between the upper surfaces of the top flanges 34 and 36 of the buckle body 24, and forms therewith a generally rectangular sectioned guide channel 53, the cross-sectional shape of which is best shown in FIGURE 4, and which extends uniformly lengthwise with the buckle body 24 between the left-hand end and the bend line 27 at the beforementioned juncture of the flat bottom wall 28 with the upwardly sloping bottom wall portion 38. The cover 25 is formed at the left-hand end thereof, as best viewed in FIGURES 1 and 15, with a rectangular slot 54 having an opening at its left-hand end between a pair of integrally formed, oppositely positioned, downwardly-extending corner wing members as shown at 56 and 58. The wing members 56 and 58 serve partially to close the side portions of the left-hand end opening of the rectangular guide channel 53 which extends between the adjacent upper surface of the bottom wall 28 and the under surface of the top flanges 34 and 36, and also act as retainers for a release control member 60 which is longitudinally slidably contained in the left-hand end portion of the guide channel 53 within the body 24, as hereinafter more fully described. The right-hand end of the cover 25 is provided with an integrally formed, downwardly sloping, end closure wall 62 having notches at its transversely opposite ends, as shown at 64 and 66, which upon application of sufficient downward force to the top of cover 25 to spring the cover slightly, snap into retaining locking engagement with the left-hand end portions of the top flanges 34 and 36. The left-hand end of the cover 25 is provided with similar notches 63 and 65 which engage the top flanges 34 and 36.

As hereinbefore mentioned, contained and relatively closely fitting within the left-hand portion of the guide channel 53 and longitudinally slidable therein between limits determined by the right-hand edge of the rectangular slot 54 and the wing members 56 and 58, is a generally rectangular bodied, latch release control member 60. As best shown in FIGURE 9, the left-hand end of the release control member 60 has an integrally formed crosswise-extending, control flange 68 which extends upwardly through the slot 54 above the level of the upper surface of the cover 25, and which is adapted to slide longitudinally within the beforementioned slot 54, and by means of which longitudinal sliding movement may be manually imparted to the release control member 60. The release control member 60 also has integrally formed, transversely spaced-apart, parallel, downwardly projecting side runner members 70 and 72, the lower edges 74 and 74a of which make longitudinal sliding engagement

with the adjacent upper surface of the bottom wall 28 of the buckle body 24. The running members 70 and 72 thereby serve slidably to support the control member 60 within the guide channel 53 with the lower surface 57 thereof spaced from the upper surface of the bottom wall 28 of the buckle body 24 a fixed distance, to form an entrance opening for the tongue portion of the hasp 12. The right-hand end of the release control member 60 is formed with a trapezoidal-shaped indentation 76, and at the transverse extremities of such trapezoidal-shaped indentation 76 is a pair of transversely spaced-apart, downwardly extending, and downwardly tapered, coupling legs 76 and 78.

Also longitudinally slidably retained within the guide channel 53, intermediate the right-hand end of the release control member 60 and the bend line 27 of the bottom wall 28 of buckle body 24, is a latch control body shown generally at 80. The latch control body 80 as best shown in FIGURES 10 and 11 is formed with an upstanding rim 82 which encloses a depressed recess 84 into which the right-hand end portion of the release control member extends and makes longitudinally slidable, overlapping engagement. In the assembled condition as best shown in FIGURES 3, 5, 6 and 7, the beforementioned coupling legs 78a and 78 extend downwardly through coupling holes 86 and 88, respectively, formed through the bottom and end portions of the recess 84 of the latch control body 80. The dimensions of the coupling legs 78a and 78 relative to the coupling holes 86 and 88 are such as to couple the release control member 60 and the latch body 80 for longitudinal sliding motion together except for a predetermined amount of longitudinal lost motion therebetween which is determined by the limited longitudinal sliding movement possible between the coupling legs 78a and 78 and the relatively longitudinally longer coupling holes 86 and 88.

The beforementioned recess 84, including the rim 82, is formed with a trapezoidal-shaped projection 90 matching in shape that of the trapezoidal-shaped indentation 76 formed in the right-hand edge of the release control body 60, and which is adapted to move into and out of such indentation accompanying the beforementioned longitudinal overlapping sliding motion of the release control member 60 and the latch body 80 relative to one another, permitted by the beforementioned lost motion coupling. The transversely opposite end portions 92 and 94 of the latch control body 80, including the end portions of the beforementioned rim 82, are formed of sufficient vertical thickness to make guided sliding engagement between the adjacent upper surface of the bottom wall 28 and the lower surfaces of the top flanges 34 and 36, whereby the latch control body 80 is afforded limited, longitudinal sliding guidance within its adjacent portion of the guide channel 53. The bottom surface portion of the latch control body 80, intermediate the beforementioned ends 92 and 94 thereof, is formed with a crosswise extending, downwardly-facing clearance recess 96 for receiving the right-hand, tapered extremity of the tongue 98 of hasp 12, with the lower surface 97 of the recess 96 thereby adapted to make longitudinally sliding and latch-retaining engagement over the upper surface of the said inner tapered tongue portion 98 of the hasp 12, in the manner best shown in FIGURE 3.

The lower, right-hand edge of the latch control body 80 is also formed with a crosswise-extending, beveled or curved cam surface as shown at 101, leading into the right-hand side of the clearance recess 96, such surface being bounded along its upper side by the right-hand edge of the bottom surface of the beforementioned depressed recess 84 and along its lower surface by the right-hand edge of the downwardly-facing lower surface 97 of the clearance recess 96. The beveled or curved cam surface 101 serves as an abutment between the inner end of the tongue portion 98 of the hasp 12 and acts to guide the inner end portion of the tongue portion 98 into latch-

ing engagement with the catch dog 124 as hereinafter described in the description of the operation of the apparatus.

Formed integrally with the latch control body 80 and extending from spaced-apart portions of the rim 82 defining the beforementioned trapezoidal-shaped projection 90, is a latch control, bias spring assembly shown generally at 102, adapted to bias the latch control body 80 slidably toward a maximum left-hand position in the guide channel 53 within the latch body 24. The latch control bias spring assembly 102 consists of a pair of resilient, oppositely outwardly diverging, arm portions 104 and 106 carrying at the outer ends thereof a pair of vertically extending cylindrical attachment members 108 and 110 which normally, in the assembled condition of the apparatus, as best shown in FIGURES 3 and 8, are positioned with the lower ends thereof in abutment with the upper inner surface of the bottom wall 28 of the buckle body 24, and with the upper end portions thereof extending upwardly through and in detachable retaining engagement with a pair of oppositely located, inwardly facing U-shaped retainer notches 112 and 114, respectively, formed into the inner, confronting edges of the top flanges 34 and 36. Integrally formed with and extending from the cylindrical attachment members 108 and 110 are a pair of resilient, semi-elliptical spring members 116 and 118 terminating in cylindrical shaped end bearing pads 120 and 122, respectively, adapted to bear against the left-hand central surface portion of the attachment bar 42 or against the seat belt webbing loop extending therearound as best shown in FIGURES 3 and 8. The principal biasing force of the latch bias spring assembly 102 is afforded by the aforementioned resilient arm portions 104 and 106, and the semi-elliptical spring members 116 and 118 serve principally to exert a right-hand directed biasing force against the attachment bar 42 or against the seat belt webbing loop therearound, as beforementioned, in order to tend to maintain a belt locking bias thereagainst.

Referring again to the buckle body 24 and particularly to the bottom wall 28 thereof, there is formed therein an upwardly-projecting inwardly-facing, generally buttress-shaped catch dog 124 having an inwardly, upwardly sloping upper surface 126 terminating in a flat, crosswise-extending, inwardly facing catch shoulder 128 with which an opening in the inner end portion of tongue 98 of the hasp 12 is adapted to make releasable latching engagement.

Rackably supported upon the inner, upwardly facing surface of the bottom wall 28 of the buckle body 24, inwardly adjacent the catch shoulder 128 of the catch dog 124 is a latch-disengaging rocker lever 130. The rocker lever 130, although it is shown as made of thin, resilient sheet metal, may have a relatively thicker rigid construction, and is generally rectangular in plan view, as best shown in FIGURE 8. The rocker lever 130 is bent or curved across its mid-section to provide a pair of wide lever arms 132 and 134, extending at an obtuse angle with respect to one another from the resultant transverse apex 135, upon which it is rockably supported as aforesaid. The rocker lever 130 is retained in place by means of a pair of transversely spaced-apart, integrally formed lugs 136 and 138 which extend downwardly adjacent its apex 135 into relatively loose engagement with a pair of correspondingly positioned lug-retaining holes 140 and 142, formed through the bottom wall 28. The rocker lever 130 is thereby adapted to rock upon its apex 135 between two angular positions, namely between the angular position shown in FIGURES 3, 5 and 6 and the angular position shown in FIGURE 7. The bottom ends of the beforementioned coupling legs 78a and 78 of the latch control body 80 make slidable engagement with the upper surface of the rocker lever 130 and thereby serve both to retain the lugs 136 and 138 in engagement with the lug-retaining holes 140 and 142, and upon longi-

tudinal movement of the latch control member 80 between its position upon lever arm 132 shown in FIGURES 3, 5 and 6 and its position upon lever arm 134 shown in FIGURE 7, to force the rocker lever 130 to rock between the beforementioned two positions shown.

Referring next primarily to FIGURE 2, in which the beforementioned hasp 12 is best shown, the hasp comprises a flat, metal base 144 from which extends the beforementioned flat, tapered hasp tongue 98 which terminates in a forward end edge 156. The hasp tongue 98 is provided through the approximate central portion thereof with a rectangular latch opening 146 having an inner, transverse latch shoulder 147 adapted to make latching engagement with the hereinbefore-mentioned transverse catch shoulder 128 of the catch dog 124 within the buckle body 24, as shown in FIGURE 3, and as will be hereinafter more fully described in connection with the operation of the apparatus.

The base portion 144 of the hasp 12 is provided with a transverse slot 22 for receiving the loop 20 of the seat belt as hereinbefore-mentioned. The sides of the base portion 144 of the hasp 12 are preferably, although not necessarily, provided with a pair of parallel, oppositely positioned, upturned flanges 148 and 150 which serve as stiffening members and which also serve as stops, which by abutment of the forward ends 152 and 154 thereof, with the outer surface of the wing stop members 56 and 58, respectively, of the cover 25, determine the proper distance of insertion of the tongue 98 into the buckle body at which latching engagement between the opening 146 in hasp 12 and the catch dog 124 in the buckle 10 occurs.

Operation.—Assuming first for convenience of illustration that the belt buckle 10 and hasp 12 are disconnected from one another and it is desired to couple them together, the belt buckle 10 may be grasped by one hand and the hasp 12 by the other hand and the tongue 98 of the hasp 12 inserted in the direction indicated by arrow 15 in FIGURE 5, into the before-described entrance opening in the left-hand end of the buckle body 24 formed between the inner confronting surfaces of the side runner members 70 and 72 of the release control member 60 and between the upper surface of the bottom wall 28 of the buckle body 24 and the lower surface 57 of the release control member 60. The forward end edge 156 of the tongue 98 of the hasp 12 first encounters the upwardly sloping upper surface 126 of the catch tongue 124, by which the hasp tongue 98 is then lifted to an initial position corresponding to that best shown in FIGURE 5, with the forward end 156 thereof in abutment with the curved cam surface 101 of latch control body 80. Upon applying continued inward force to the hasp 12, as indicated by arrow 17 in FIGURE 6, the latch control body 80 is forced by the forward edge 156 of the hasp tongue 98 to slide in a right-hand direction within the guide channel 53 against the opposing biasing force of the resilient arm members 104 and 106, from the position shown in FIGURE 5 to the position shown in FIGURE 6, at which latter position, by reason of the action of the curved cam surface 101, the tongue 98 of the hasp 12 is forced downwardly into the position shown in FIGURE 3 at which the rectangular opening 146 in the hasp tongue 98 drops down over the catch dog 124 and the latch shoulder 147 brought into latching engagement with the catch shoulder 128.

Immediately following the downward movement of the hasp tongue 98 such as to bring the latch shoulder 147 thereof into latching engagement with the catch shoulder 128 of the catch dog 124, the latch control body 80 is freed to slidingly return from its position shown in FIGURE 6 to that shown in FIGURE 3 at which latter position the lower surface 97 of the latch control body 80 within the clearance space 96 therein, moves over the top surface of the forward end of tongue 98 to the position shown in FIGURE 3 thereby locking the tongue 98 down against the upper surface of the lever arm 132 of the latch-dis-

engaging rocker lever 130 in a position from which it cannot escape from its latching engagement with the catch dog 124. The hasp 12 is thereby securely locked in coupling engagement with the belt buckle 10. During the foregoing connection operations, the release control member 60 and the control flange 68 attached thereto may remain stationary by reason of the beforementioned lost motion provided in the coupling between the release control member 60 and the latch control body 80. Therefore the grasping of the buckle 10 by one hand, as before-mentioned, in such a way as to prevent movement of the release control member 60 and flange 68 will not in any way interfere with the buckling action.

When it is desired to release the hasp 12 from coupling engagement with the belt buckle 10, the finger control flange 68 is pushed in a right-hand direction, as indicated by arrow 19 in FIGURE 7, thereby correspondingly sliding the release control member 60 in a right-hand direction. The result of such motion of the release control member 60 is first to take up all of the lost motion provided between the coupling legs 78a and 78 thereof and the coupling holes 86 and 88 in the latch control body 80, after which continued movement of the release control member 60 in a right-hand direction results in movement of the latch control body 80 in a right-hand direction, in opposition to the bias of the resilient arms 104 and 106, from the position shown in FIGURE 3 to that shown in FIGURE 7, at which latter position the lower surface 97 of the latch control body 80 is removed from locking engagement with the upper surface of the hasp tongue 98. At the same time the lower ends of the coupling legs 78a and 78 of the release control member 60 are moved along the upper surface of the latch-disengaging rocker lever 130 from the position shown in FIGURE 3 at which they are in contact with the upper surface of the lever arm portion 132 thereof, to the position shown in FIGURE 7 at which they are in contact with the upper surface of the lever arm portion 134. The latch-disengaging rocker lever 130 is thereby forced to rock upon its apex 135 from the position shown in FIGURE 3 to that shown in FIGURE 7, at which latter position the lever arm portion 132 lifts the inner end of the hasp tongue 98 upwardly to a position in which the latch shoulder 147 of the latch opening 146 is moved out of engagement with the latch shoulder 128 of catch tongue 124, thereby releasing the hasp 12 from the catch dog 124 and permitting its withdrawal from the belt buckle 10.

Following such release of the hasp 12 from the belt buckle 10 and release of the manually applied force on the finger control flange 68, the release control member 60 may return to its initial position shown in FIGURE 5.

As hereinbefore-mentioned, the seat belt buckle body 24 and the hasp 12 are preferably constructed of relatively thick sheet metal, and such sheet metal may be composed of steel, or material of similar strength. While the other components of the belt buckle 10 may also be made of suitable metals, it has been found advantageous to form them, including the latch control bias spring assembly 102, of various suitable plastics, one such plastic material being Delrin which is an acetal resin manufactured by E. I. duPont de Nemours & Co., Inc. Such parts may be formed by any of the well known processes employable with plastics such as, for example, injection molding.

While a preferred embodiment of the invention has been herein illustrated and described, it is to be understood that such illustration and description are illustrative only, and that the invention is not to be limited thereby but includes all modifications and variations thereof which may be made by those skilled in the art within the scope of the invention as defined in the appended claims.

We claim:

1. In a belt buckle, apparatus comprising:
a housing having an opening in one end thereof;

catch means fixed to, and having a transverse catch shoulder located in said housing;

a hasp member having a forward transverse latch shoulder portion for insertion through said one end longitudinally into said housing, said latch shoulder portion being adapted to make latching engagement therein with said catch shoulder;

a latch lock control member longitudinally guidedly slidable in said housing between a first longitudinal position and a second longitudinal position, said lock control member, when in said first position, being located in a position to lock such latch shoulder portion in latching engagement with said catch shoulder, and when in said second position, being located in a position unlocking said latch shoulder portion from latching engagement with said catch shoulder;

resilient bias means normally maintaining said lock control member in said first position;

a latch release control member longitudinally guidedly slidable in said housing;

lost motion coupling means interconnecting said lock control member and said release control member through which said lock control member is slidable between said first longitudinal position and said second longitudinal position, in opposition to said biasing means, by imparting longitudinal movement to said latch release control member, but permitting said lock control member to be longitudinally slidable between said first longitudinal position and said second longitudinal position, as aforesaid, without necessitating such longitudinal sliding movement of said release control member;

means to guide said latch shoulder portion of said hasp member into abutment with said control member, upon insertion of said latch shoulder portion thereof through said one end into said housing, wherewith said lock control member is slidable in opposition to said bias means, from said first position to said second position;

means effective when said lock control member thus reaches said second position, to guide said latch shoulder portion out of such abutment with said lock control member and into latching engagement with said catch shoulder, and thereby free said lock control member for return by said bias means from said second position to said first position, in which second position said latch shoulder portion is lockable by said lock control member in such latching engagement with said catch shoulder, as aforesaid.

2. Apparatus according to claim 1 and means independent of said latch shoulder portion for manually imparting longitudinal movement to said latch release control member and thence through said lost motion coupling means to said lock control member to move said lock control member from said first position to said second position, in opposition to said biasing means, for unlocking said latch shoulder portion from latching engagement with said catch shoulder.

3. Apparatus according to claim 1 and:

disengaging means actuated by said release control member upon movement thereby of said latch control member from said first position to said second position, for disengaging a thus unlocked latch shoulder portion from latching engagement with said catch shoulder.

4. Apparatus according to claim 3 in which:

said disengaging means includes movable means actuated as aforesaid, for applying a force to such latch shoulder portion in a direction to move such latch shoulder relative to said catch shoulder to a position of disengagement therefrom.

5. Apparatus according to claim 4 in which:

said movable means comprises a lever means pivotally supported in said housing with one end portion of

said lever located adjacent said catch shoulder and in a position to be pivotally moved into contact with said latch shoulder portion when said latch shoulder portion is in latching engagement with said catch shoulder;

and actuating means fixed to said release control and in engagement with said lever means, operative in response to sliding motion of said actuating means relative to said lever means to pivot said lever means such as to move said one end portion thereof forcefully into such contact with said latch shoulder portion, as said latch control member, actuated by said release control means, approaches said second position thereof.

6. Apparatus in accordance with claim 4 in which said movable means comprises a lever device having two opposite lever members extending at an obtuse angle relative to one another from an intermediate pivot by means of which pivot said lever device is supported for limited angular rocking movement about a pivot axis upon an inner wall surface of said housing, said lever device being located adjacent said catch shoulder and in a position such that one end portion of one of said lever members is pivotally movable into contact with said latch shoulder portion when said latch shoulder portion is in latching engagement with said catch shoulder;

and actuating means fixed to said release control member and therewith slidable in forceful contact along said lever device in a direction normal to said pivot axis between positions of such sliding contact successively with opposite ones of said lever members on opposite sides of said pivot axis, whereby said lever device is imparted angular rocking motion about said axis between angular positions of engagement and disengagement of said one end portion of said one of said lever members with said portion of said latch shoulder portion.

7. Apparatus according to claim 1 in which said means to guide said latch shoulder portion out of abutment with said lock control member and into latching engagement with said catch shoulder includes:

a cam surface portion formed on said control member at the point of said abutment of said latch shoulder portion with said control member, said cam surface portion having an angle relative to the longitudinal axis of said housing such as to shift said latch shoulder portion laterally from such position of abutment into latching engagement with said catch shoulder upon said control member reaching said second longitudinal position.

8. Apparatus according to claim 1 in which:

said lock control member and said release control member are longitudinally slidably positioned in said housing in longitudinally overlapping superposed relation to one another.

9. In a belt buckle, apparatus comprising:

a housing having an opening in one end thereof;

catch means fixed to, and having a transverse catch shoulder located in said housing;

a hasp member having a forward transverse latch shoulder portion for insertion through said one end longitudinally into said housing, said latch shoulder portion being adapted to make latching engagement therein with said catch shoulder;

a latch lock control member longitudinally guidedly slidable in said housing between a first longitudinal position and a second longitudinal position, said control member, when in said first position, being located in a position to lock said latch shoulder portion in latching engagement with said catch shoulder and when in said second position, being located in a position unlocking said latch shoulder portion from latching engagement with said catch shoulder;

resilient bias means normally maintaining said lock control member in said first position;

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means to guide said latch shoulder portion of said hasp member initially into abutment with said lock control member, upon insertion of said latch shoulder portion thereof through said one end into said housing wherewith said lock control member is slidable in opposition to said bias means, from said first position to said second position;

means effective when said lock control member thus reaches said second position, to guide said latch shoulder portion out of such abutment with said lock control member and into latching engagement with said catch shoulder, and thereby free said lock control member to be returned by said bias means from said second position to said first position in which first position thereof said control member is in position to lock said latch shoulder portion in such latching engagement with said catch shoulder, as aforesaid;

lever means pivotally supported in said housing with one end portion of said lever located adjacent said catch shoulder and in a position to be pivotally moved into contact with said latch shoulder portion when said latch shoulder portion is in latching engagement with said catch shoulder; and

actuating means movable with said lock control member and engageable with said lever means, operative in response to sliding motion of said actuating means relative to said lever means to pivot said lever means such as to move said one end portion thereof forcefully into such contact with said latch shoulder portion, as said lock control member approaches said second position thereof to thereby disengage said latch shoulder portion from said latching engagement with said catch shoulder.

10. Apparatus in accordance with claim 9 wherein said

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lever means comprises a lever device having two opposite lever members extending at an obtuse angle relative to one another from an intermediate pivot by means of which pivot said lever device is supported for limited angular rocking movement about a pivot axis upon an inner wall surface of said housing, said lever device being located adjacent said catch shoulder and in a position such that one end portion of one of said lever members is pivotally movable into contact with said latch shoulder portion when said latch shoulder portion is in latching engagement with said catch shoulder;

and wherein said actuating means is coupled to said lock control member and therewith slidable, in forceful contact, along said lever device in a direction normal to said pivot axis between positions of such sliding contact successively with opposite ones of said lever members on opposite sides of said pivot axis, whereby said lever device is imparted angular rocking motion about said axis between angular positions of engagement and disengagement of said one end portion of said one of said lever members with said latch shoulder portion.

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