

[54] SAFETY BELT BUCKLE
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[51] Int. Cl. A44b 1/18
[58] Field of Search...24/230 A, 230 AK, 230 SC, 75

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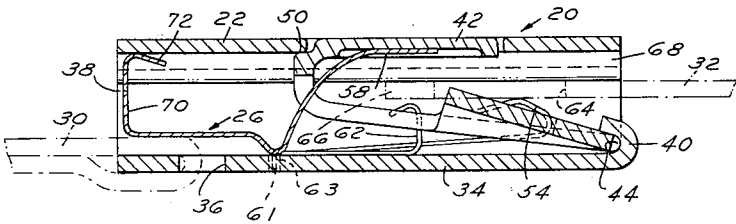
[57] ABSTRACT

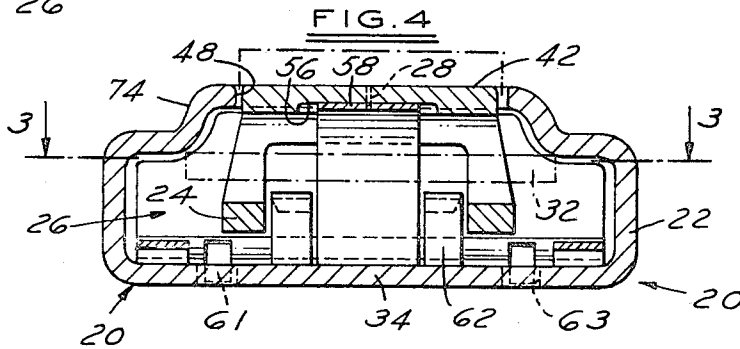
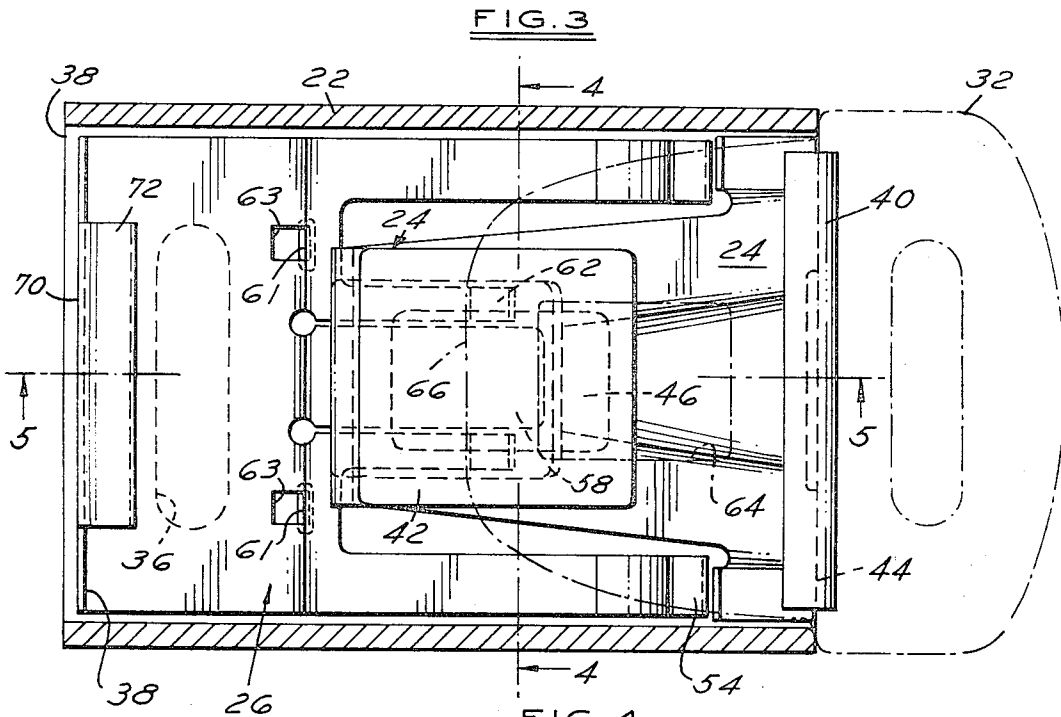
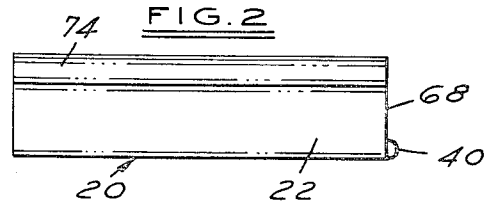
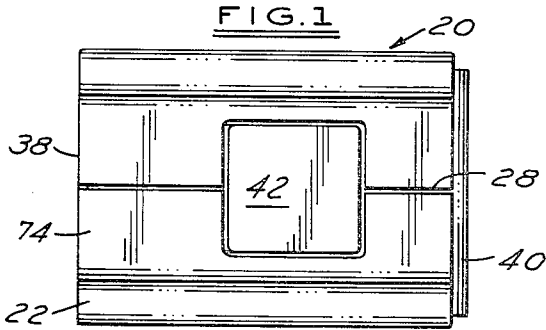
A safety belt buckle of the push button type, in which only three components are required, and which may be assembled without special tools, pins, bolts or the like. The assembly includes a single piece housing, a pivotally supported latch lever or plate, wherein the pivot axis is located at one end of the plate and the push button is at the other end, and a multipurpose spring member which secures the latch plate in the housing, spring biases the push button and guides the belt connector into coupling position.

10 Claims, 12 Drawing Figures

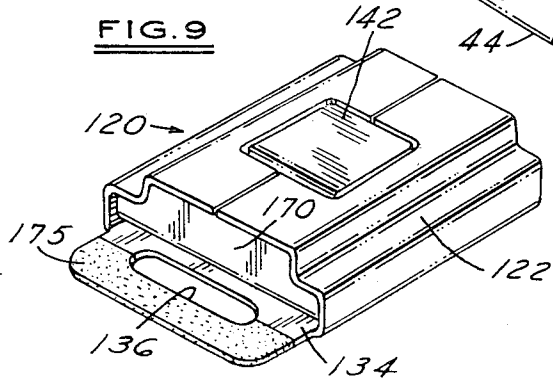
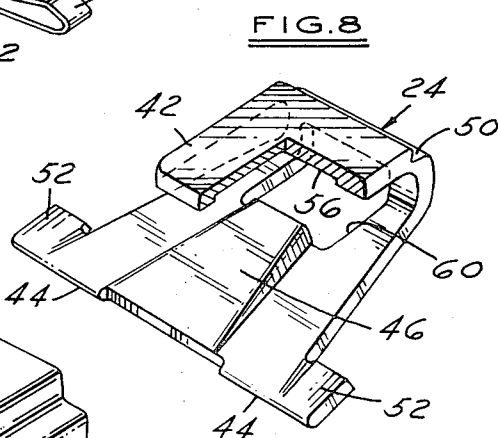
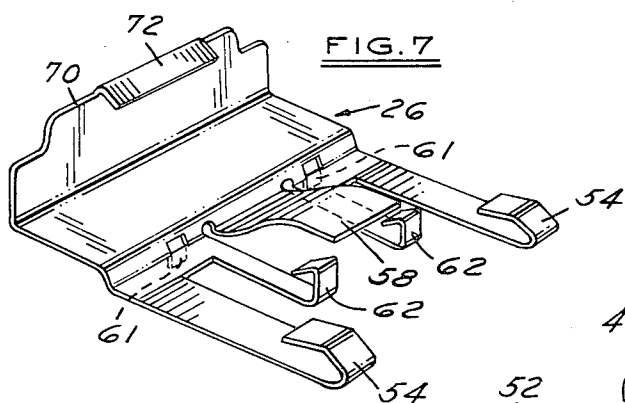
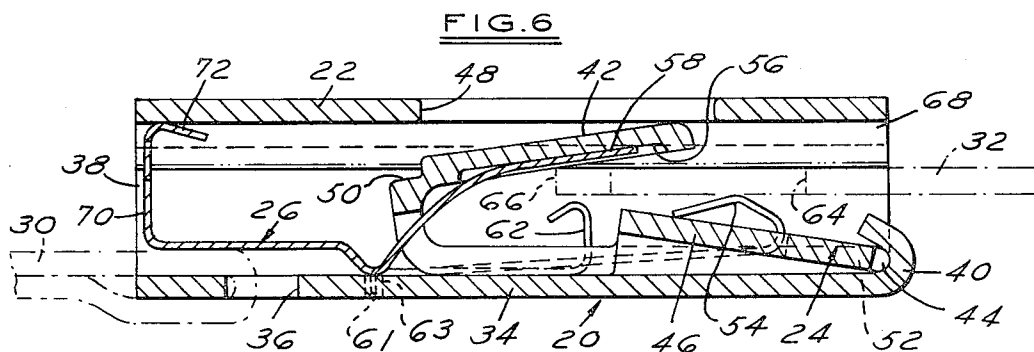
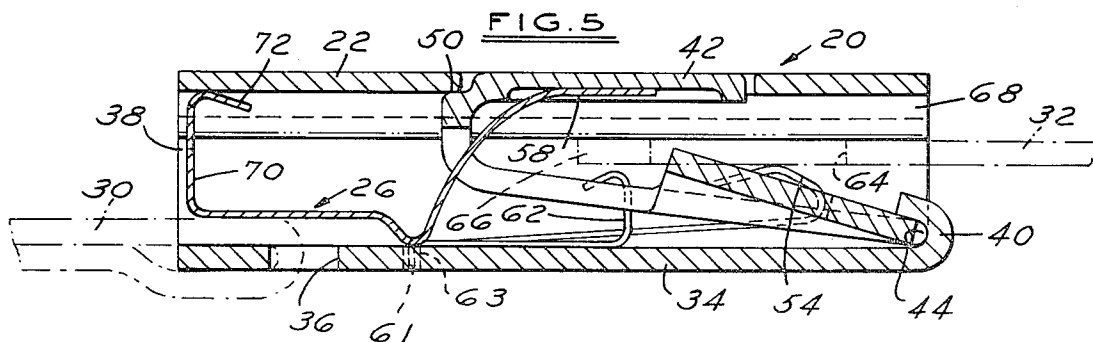
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FIG. 10

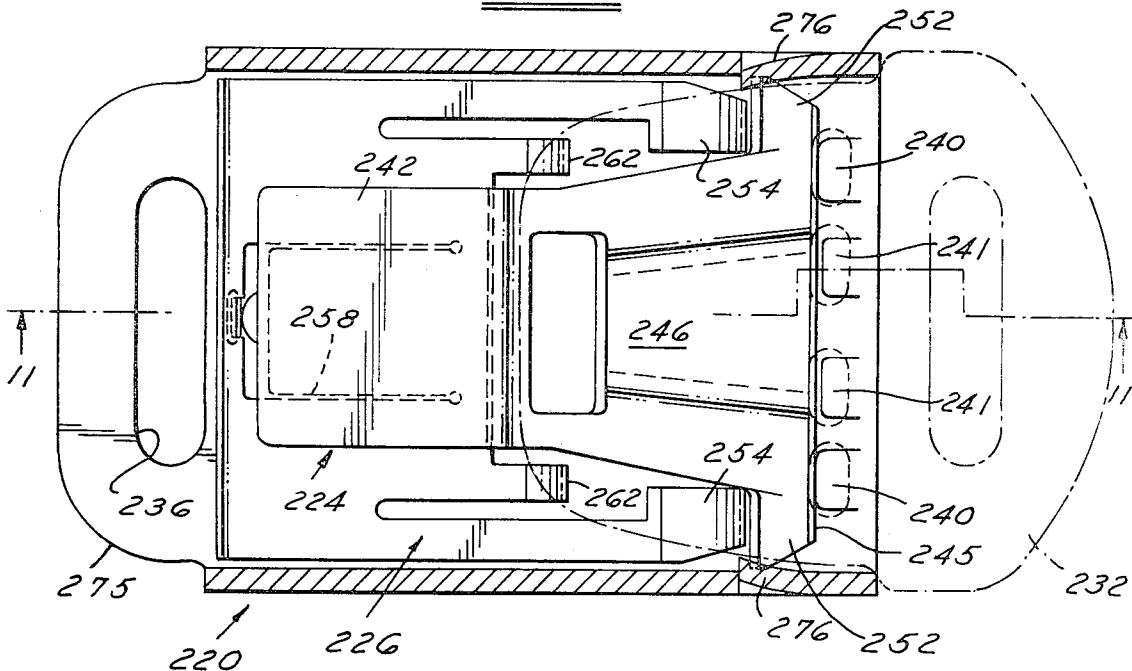


FIG. 11

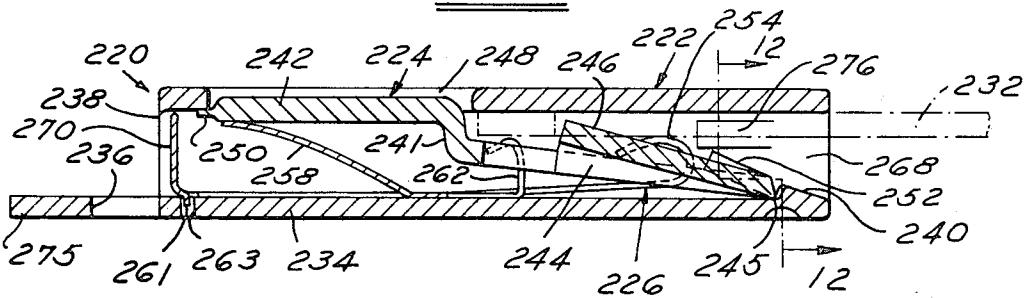
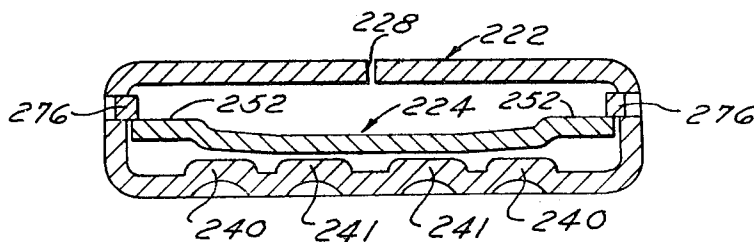


FIG.12



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SAFETY BELT BUCKLE

FIELD OF THE INVENTION

This invention relates to safety belt buckles of the push button type, such as utilized by the automotive and airline industries.

DESCRIPTION OF THE PRIOR ART

The prior art includes a relatively large number of safety belt buckle designs, which generally include a base plate, cover, latch plate and one or more spring members. In the push button types, the latch plate is generally pivoted on a pair of centrally located pins or lugs, which are received through the side walls of the base plate. The force of impact must therefore be borne entirely by these relatively small lugs. When it is understood that the fabric belt is designed to withstand forces greater than 8,000 pounds, it can be seen that this type of design may not be satisfactory.

The prior art also includes safety belt buckle designs having a pivotally mounted release handle, which engages the latch plate and releases the belt connector. In certain of these designs, the latch plate is pivoted directly on the base plate, or lugs struck from the base plate, which is considered an improvement in strength over the designs described hereinabove. These designs have come to be preferred in the automotive industry, for example, but are more expensive than the push button type buckles because of the greater number of component parts.

In both of these designs, a cover is required, which is riveted or otherwise secured to the base plate. If the cover is accidentally removed on impact or the like, the components in certain of these designs are released, which may result in release of the belt or serious injury to the passenger. The cost and weight of a safety belt buckle is also an important design factor, both to the manufacturer and the consumer. A large number of component parts in a safety belt buckle results in greater weight and cost, and the more complex designs may fail because of the lack of additional quality control required by such designs. It is also important to note that the components in each of the designs described hereinabove require a number of rivets and other assembly devices, which are eliminated by the safety belt buckle of my invention. Examples of the prior art include the following U.S. Pat. Nos.:

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SUMMARY OF THE INVENTION

The safety belt buckle of this invention requires only three component parts, including a housing or enclosure, a latch lever or plate and a spring member. In the preferred embodiment, the housing is a single piece enclosure having an open end for receipt of the latch lever and spring member. The buckle of this invention may be assembled without special tools and does not require pins, rivets, bolts or the like. The latch lever is preferably pivoted directly against the housing and the belt may also be secured directly thereto, providing a lightweight assembly which is able to withstand the relatively sever loading essential to the design.

In the preferred embodiment of the invention, the latch lever or plate is pivotally supported at one end against an upstanding bearing portion provided on an internal wall of the housing, normally referred to as the base plate. A push button is provided on the latch plate, opposite the pivotally supported end, and the detent latch is located therebetween. Access to the push button is provided through the housing wall, opposite the base plate, to permit manual manipulation of the push button. In one of the disclosed embodiments, the latch plate is generally U-shaped in cross section, with the push button and pivotally supported end defined on opposite legs of the "U," and the detent latch portion extending toward the center axis, on the leg including the pivot axis. In the other embodiment, the latch plate is generally straight.

The spring member is reactant against the latch plate to continually urge the push button portion away from the base plate and the detent latch portion into the normally locked position. The latch portion and the push button move in unison because the pivot axis is located at one end of the latch plate, eliminating the central pivot lugs provided on conventional push button type safety belt buckles. The spring member in the disclosed embodiment is secured within the housing to the base plate, and includes a latch plate retainer portion which secures the latch plate in the housing, and guide portions which guide the seat belt connector into coupling position with the detent latch. The spring member and the housing may be formed from a single piece stamping, providing a relatively simple mechanism. The spring member in the disclosed embodiment is also provided with an extension which overlies the open end of the housing, improving the appearance and reducing entry of foreign material.

Other advantages and meritorious features of the invention will be more fully disclosed in the following description of the preferred embodiments, claims and accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top elevation of one embodiment of the safety belt buckle of this invention;

FIG. 2 is a side elevation of the embodiment shown in FIG. 1;

FIG. 3 is a cross sectional top view of the embodiment shown in FIGS. 1 and 2, in the direction of view arrows 3—3 in FIG. 4;

FIG. 4 is a cross sectional end view of the embodiment shown in FIG. 3, in the direction of view arrows 4—4;

FIGS. 5 and 6 are cross sectional side views of the embodiment shown in FIG. 3, in the direction of view arrows 5—5;

FIG. 7 is a top perspective view of the spring member shown in FIGS. 3 to 6;

FIG. 8 is a top perspective view, partially cut away of the latch lever shown in FIGS. 3 to 6;

FIG. 9 is a top perspective view of another embodiment of the safety belt buckle of this invention;

FIG. 10 is a top cross sectional view of another embodiment of the safety belt buckle of this invention, in the direction of view arrows 10—10 shown in FIG. 11;

FIG. 11 is a cross sectional side view of the embodiment shown in FIG. 10, in the direction of view arrows 11—11; and

FIG. 12 is an end cross sectional view of the embodiment shown in FIG. 11, in the direction of view arrows 12-12.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiment of the safety belt buckle 20 of this invention shown in FIGS. 1 to 6 requires only three components, including a housing enclosure 22, a latch lever or latch plate 24 and a spring member 26. The housing is preferably formed from a single piece or blank of sheet metal, such as steel, to provide a structure capable of withstanding the severe shock loading to which seat belts may be subjected, and to reduce the number of required components. In this embodiment, the seam 28 of the sheet metal blank is located at the top portion of the housing, as shown in FIG. 1, and the seat belt 30 and seat belt connector 32 are secured to the base portion 34 as shown in phantom in FIGS. 5 and 6. An elongated slot 36 is provided in the base portion 34 to receive the fabric seat belt, which is normally looped through the slot and sewn or otherwise secured as shown.

The safety belt buckle of this invention is preferably assembled without rivets, pins or the like to avoid the possibility of breaking or losing such frangible assembly parts, which might affect the operation of the buckle, and to reduce the cost of the buckle. The housing in this embodiment is provided with an open end 38 which receives the latch lever 24 and spring member 26 therethrough, as described more fully hereinafter, and the opposite end of the housing is provided with a reversely folded flange 40 which pivotally receives the latch lever 24.

The latch lever 24, as best shown in FIG. 8, may also be formed from a single sheet metal blank, such as steel, and is designed to slide easily into the open end 38 of the housing. The member 24 has been characterized herein as a latch lever, rather than a latch plate, to differentiate over the conventional, single function latch plate shown by the prior art. In this embodiment, the latch lever is generally U-shaped in cross section, as shown in FIGS. 5 and 6, and includes a push button portion 42 opposite the pivotally supported end 44, and a detent latch portion 46 therebetween. The detent latch portion is integrally struck inwardly, toward the center axis of the "U," and is defined on the same leg of the "U" as the pivot end 44.

The push button portion 42 is manually depressed or manipulated through an aperture 48 in the housing wall opposite the base portion 34, and a stop 50 is provided on the push button to prevent the push button from extending through the aperture. The pivot axis of the latch lever is therefore located at one end 44, and the detent latch portion 46 and push button 42 pivot in unison thereabout. The end 44 of the latch lever is preferably biased directly against the upstanding portion 40 of the housing, rather than a pair of frangible ears, providing an exceptional strong structure in combination with the single piece housing. A pair of ears 52 are provided on the latch lever, adjacent the pivot end 44, which receives the latch lever retainer portions 54 of the spring member, and a slot 56 is provided on the underside of the push button which receives the latch spring portion 58 of the spring member.

The spring member 26 is best shown in FIG. 7, and may be formed from a sheet metal blank of spring steel, for example. The spring member includes a tapered latch spring portion 58 which is struck from the central portion of the spring blank, and is received through an aperture 60 in the latch lever to continually bias the push button portion toward the housing aperture 48. The end of the latch spring portion is received in the slot or groove 56 to limit the lateral movement of the latch lever.

In this embodiment of the buckle, the spring member is provided with a pair of lock detents 61 which are received in slots 63 provided in the base portions 34 of the housing. The detents retain the spring member in the housing, however it should be noted that the spring member is not subject to loading. The spring member thereby also prevents the latch lever from dropping out of the open end of the housing when the latch lever is not under load. The retainer portions 54 of the spring member are biased against the flanges 52 of the latch lever, as described hereinabove. A pair of spring guide portions 62 are struck from the spring blank adjacent the latch spring portion 58, which guide the seat belt connector 32 into coupling position with the detent latch portion 46, as described hereinbelow.

The seat belt connector 32 normally includes a rectangular slot 64 adjacent the work entering end 66. The end 66 of the connector is first received by the latch retainer portions 54 of the spring member, which also function as a guide for the connector, as shown in FIGS. 5 and 6. The end of the connector is then biased against the detent latch portion 46 of the latch lever, which is normally in the locked position shown in FIG. 5, as the connector is manually urged into the opening 68 in the housing. The latch spring is thereby compressed and the connector end is permitted to pass or override the detent latch. Finally the detent latch is received in the aperture 64 of the connector, and the latch snaps into the locked position shown in FIG. 5.

The connector is released by manually depressing the push button portion 42 of the latch lever, which pivotally swings the detent latch portion 46 to the unlocked position shown in FIG. 6, and the connector then may be easily removed. It can be seen from FIG. 6 that the spring guide portions 62, in this position, prevent the connector from tilting into locking engagement with the detent latch and guide the connector 32 into and out of coupling engagement with the detent latch. In this embodiment, the spring member includes an enclosure extension 70, which encloses the open end 38 of the housing, improving the appearance of the buckle and reducing entry of foreign matter. The tab 72 also functions as a reactor point for the spring member.

The safety belt buckle of this invention may be assembled merely by first locating the latch lever 24 on the spring member 26, such that the latch spring portion 58 is received through the aperture 60 and into the slot 56 in the underside of the push button portion 42. In the assembled position, the guide portions 62 are also received through the aperture 60 and the retainer portions 54 abut the ears 52 of the latch lever. The latch lever and spring member are then disposed in the housing, through the open end 38, until the lock tabs 61 on the spring member are received in the slots 63 in

the base portion of the housing; locking the spring member and latch lever in position. The housing in this embodiment includes a channel-shaped enlargement 74 to accommodate the U-shaped latch lever.

The embodiment of the safety belt buckle 120 shown in FIG. 9 is a modification of the buckle described hereinabove, wherein the upper portion of the housing 122 has been shortened, exposing the section of the base portion 134 including the elongated seat belt slot 136. In this embodiment, the exposed end 175 of the base portion has also been coated with a plastic material to prevent chafing of the fabric seat belt. The end of the base portion may be dipped in any suitable plastic material in the fluid state, such as polyethylene or polyurethane. The closure extension portion 170 of the spring member has also been shortened in this embodiment, however the other features of the buckle may be identical to the safety belt buckle described hereinabove and shown in FIGS. 1 to 8.

The embodiment of the safety belt buckle 220 shown in FIGS. 10 to 12 is a modification of the embodiments described hereinabove, wherein the latch lever 224 is generally linear, rather than U-shaped, and the pivot end portion 244 of the latch lever has a knife edge pivotal end. The advantages of this embodiment include a lower profile for the housing enclosure 222 and a greater tensile strength for the safety belt buckle.

Each of the three components may be formed from a single piece blank, as described above, and the buckle may be assembled without rivets, pins or the like through the open end 238 of the housing. Because of the similarity of this embodiment to the embodiments described hereinabove, FIGS. 10 to 12 have been numbered in the same sequence as FIGS. 1 to 8. The details which are not described herein may therefore be assumed to be identical to the description hereinabove.

The latch lever 224 in this embodiment includes a push button portion 242, a pivotal end portion 244, which is defined at an acute angle to the push button portion as shown in FIG. 11, and a detent latch portion integrally struck from the pivot end portion, toward the upper portion of the housing wall. The push button portion 242 and the pivot end portion 244 are joined in this embodiment by a generally right angle bend 241. The push button stop 250 in this embodiment is provided on the end of the push button portion 242.

The pivot end portion 244, in this embodiment of the latch lever, is provided with a relatively sharply tapered knife edge 245, which pivotally abuts a pair of upstanding bosses 240 on the base portion 234 of the housing. The inner bosses 241 are therefore redundant, and are set slightly back of the outer bosses 240 such that the inner bosses are normally not contacted by the knife edge 245. The pivotal support of an edge is preferably provided at two points adjacent the outer edges, as provided here by the bosses 240, however the inner bosses provide added support in the event the outer bosses are partially sheared under extreme loading conditions. It should therefore be noted that the load required to cause failure of this embodiment must be sufficient to shear the four bosses, which would be greater than the force required to deform the flange 40 of the embodiments described hereinabove.

The housing enclosure 222 is similar in design to the housing 122 shown in FIG. 9, wherein the base wall 234

extends beyond the enclosure at 275 and includes the seat belt slot 236. In this embodiment, a pair of detents or tabs 276 are integrally struck from the side walls of the housing, adjacent the housing end 268, which overlie the ears 252 of the latch lever and prevents the pivot end of the latch lever from shifting upwardly, as shown in FIG. 12.

The spring member 226 in this embodiment has been modified to accommodate the linear latch lever, however the function of the spring member is the same as described hereinabove. The latch spring portion 258 is therefore struck in the opposite direction to extend beneath the push button portion 248 of the latch lever, and the enclosure portion 270 of the spring has been shortened as described in regard to FIG. 9. The other features of the spring may be identical to the spring member 26 describe hereinabove, and has been numbered accordingly.

The function and assembly of the embodiment shown in FIGS. 10 to 12 will be substantially the same as described hereinabove. The buckle is assembled by first assembling the latch lever 224 and spring member 226; the assembly is then inserted into the housing and the detents 261 retain the assembly in the housing.

It will be understood that certain modifications may be made to the safety belt buckle of this invention without departing from the purview of the appended claims. For example, a decorative plastic cover or the like may be provided over the housing and/or the exposed portion of the push button, which may identify the automotive manufacturer. Similarly, the housing may be shaped to provide a distinctive appearance, which would not modify the function of the assembly.

What is claimed is:

1. A three piece safety belt buckle, comprising: an integral housing having an open ended hollow enclosure, a latch lever member disposed within the housing enclosure, through said open end, pivotally supported at one end against an upstanding bearing portion on one internal wall of said housing providing a pivot axis, said latch lever having a push button portion opposite said one end adapted to be manually actuated and a detent latch portion located between said one end and the push button portion, and a spring member disposed within said housing, through said open end and secured therein by an integral retaining means to a wall of the housing spaced from said pivot axis, said spring member having a latch spring portion biasing said push button portion of the latch lever member away from said one internal wall of the housing and at least two guide portions, generally U-shaped and extending from adjacent said one wall, adapted to guide a seat belt connector into coupling position with said detent latch portion of the latch lever member.

2. The safety belt buckle defined in claim 1, characterized in that said spring member includes a latch lever retainer portion biasing said one end of the latch lever member into pivotal engagement with said upstanding bearing portion and preventing unintentional removal of said latch lever member through said open end of the housing.

3. The safety belt buckle defined in claim 1, characterized in that said one end of the latch lever is a knife edge and said upstanding bearing portion is at least two spaced bosses integral with said wall of the housing providing pivotal support for said one end.

4. A safety belt buckle, functionally consisting only of: a single piece housing having an open end, said housing having integral side, top and bottom walls defining an enclosure, a single piece latch lever having a width permitting receipt of said latch lever within said enclosure through said open end, said latch lever having one end pivotally supported against said bottom wall of the enclosure about an axis, a manual actuator portion adjacent the opposite end and a latch portion located between said one end and said actuator portion, and a spring means located within said enclosure, retained therein by a retaining means and reactant against one of said enclosure walls to spring bias said manual actuator portion of the latch lever toward said top wall of the enclosure about said axis, and said manual actuator portion extending out of said enclosure to permit manual actuation of said latch portion.

5. The safety belt buckle defined in claim 4, characterized in that said latch lever is pivotally supported on sharp tapered edge which abuts an upstanding surface provided on said bottom wall of said enclosure.

6. The safety belt buckle defined in claim 5, characterized in that said spring means includes a central latch spring portion integrally struck from the body portion of the spring which extends beneath and biases the manual actuator portion of the latch lever toward said upper wall of said enclosure, and said spring means having opposite extending latch lever retainer portions which are biased against the latch lever adjacent the pivot axis, and guide portions which guide the belt connector into coupling position with the latch portion.

7. The safety belt buckle defined in claim 4, characterized in that said spring means is a single piece stamping, and includes a generally centrally located latch spring portion biased against said manual actuator portion, and at least two guide spring portions adapted to receive and guide a seat belt connector into coupling position with said latch portion of the latch lever.

8. The safety belt buckle defined in claim 4, characterized in that said spring member includes an extension overlying said open end of the enclosure member.

9. The safety belt buckle defined in claim 4, characterized in that said spring means overlies said bottom wall of said enclosure and is secured thereto, said spring means including an integral latch spring portion struck from the body portion of the spring and extending beneath said manual actuator portion to bias said actuator portion toward said top wall, a latch lever retainer portion biasing said one end of the latch lever into pivotal engagement with said bottom wall of the enclosure and preventing inadvertant removal of the latch lever, and at least two spring guide portions adapted to receive and guide a seat belt connector into coupling position with said latch portion.

10. The safety belt buckle defined in claim 4, characterized in that said spring means is located between said latch lever and said open end of the enclosure and is lockingly retained within said enclosure and biased against said latch lever to retain said latch lever within said housing enclosure.

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