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T. B. WRIGHT
SAFETY BELT BUCKLE

3,375,558

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Fig. 1.

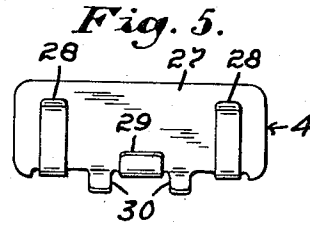
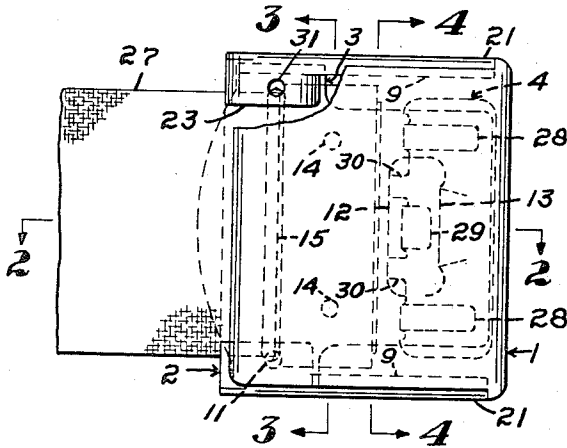


Fig. 2.

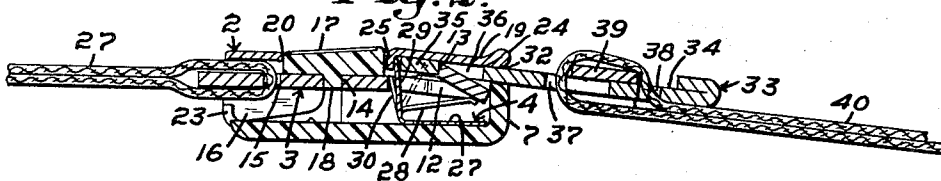


Fig. 3.

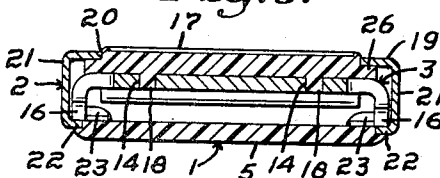


Fig. 4.

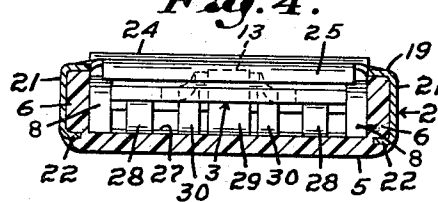


Fig. 6.

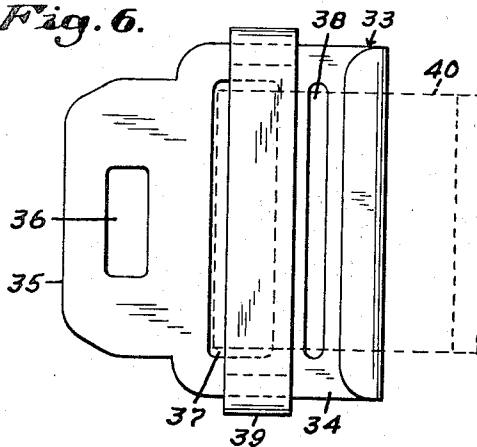
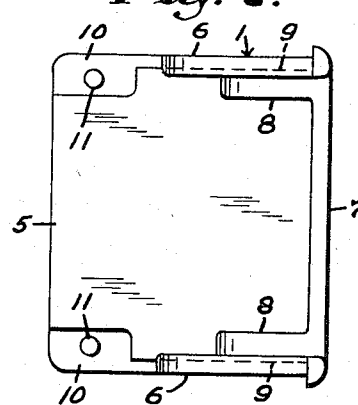


Fig. 7.



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1

3,375,558

SAFETY BELT BUCKLE

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9 Claims. (Cl. 24-230)

ABSTRACT OF THE DISCLOSURE

A safety belt combination of the type wherein a tongue plate attached to one belt section is releasably coupled to a buckle attached to a second belt section. The buckle includes a pivotal, spring biased locking plate for locking the tongue plate in the buckle and a mechanism for ejecting the tongue plate from the buckle when the tongue plate and locking plate are released. The second belt section is attached to the locking plate whereby stress on one belt section is transmitted directly to the other belt section through the locking plate and the tongue plate.

This invention relates to a novel safety belt buckle and the belt and buckle combination.

An object of the invention is to provide an inexpensive, highly efficient safety belt buckle having a minimum number of component parts.

Another object of the invention is to provide a belt buckle wherein the body of the buckle is formed of a synthetic resinous material which presents a smooth, imperforate surface adjacent the body of the wearer to minimize the danger of injury to the wearer or his apparel.

Another object of the invention is to provide a safety belt and buckle combination wherein a tongue plate attached to one belt section is released from the buckle by the depression of a push button as opposed to the lifting of a cover or latch plate.

Another object of the invention is to provide a safety belt buckle which is equipped with a mechanism for automatically ejecting a tongue plate from the buckle when the tongue is released.

A further object of the invention is to provide a safety belt combination wherein one belt section is attached directly to the locking plate which engages the tongue plate attached to the other belt section in order that pull or tension applied to either belt section will be transmitted directly through the locking plate and tongue plate to the other belt section with minimum strain being placed on the frame of the buckle.

A still further object of the invention is to provide a safety belt buckle having completely smooth side surfaces without pins, lugs or bolts etc. protruding therefrom.

Other objects and advantages of the novel buckle and belt-buckle combination will become evident from a reading of the following detailed description in conjunction with a viewing of the accompanying drawings in which:

FIG. 1 is a bottom plan view of the buckle having a portion of its base broken away and a belt section attached thereto;

FIG. 2 is a section taken on line 2-2 of FIG. 1;

FIG. 3 is a section taken on line 3-3 of FIG. 1;

FIG. 4 is a section taken on line 4-4 of FIG. 1;

FIG. 5 is a top plan view of a multi-leaf spring which is one of the components of the buckle;

FIG. 6 is a top plan view of the tongue plate having a second belt section attached thereto; and

FIG. 7 is a top plan view of the body portion of the buckle.

The buckle proper includes four major components, namely, a body portion 1, a cover 2, a locking plate 3, and a multi-leaf spring 4.

2

The body portion 1, is of one-piece construction and is formed of molded polymeric material for example, acrylonitrile-butadiene-styrene commonly referred to as ABS, which possesses a high impact strength, tensile strength, rigidity and hardness coupled with high chemical and heat resistance. Structurally the body portion includes a base 5 having a completely smooth outer surface, a pair of sides 6 which extend upwardly from the base and laterally over a little more than one-half its length, an end wall 7 extending upwardly from the base and transversely slightly beyond the side walls 6 and a pair of lugs 8 disposed inwardly of the sides 6 and having a height slightly less than the sides and a length slightly greater than one-half the length of the sides. A pair of grooves 9 are formed in the base along the length of the sides 6 and portions of the base beyond the sides are recessed at 10. Each of the recesses 10 has a small stud 11 located therein.

The locking plate 3 is a sheet metal stamping and includes an opening 12, a raised portion providing a tongue engaging shoulder 13 adjacent the opening 12, a pair of small, spaced circular openings 14, an elongated strap receiving slot 15, and a pair of rounded, beveled dogs 16 extending downwardly therefrom adjacent the ends of the slot 15. A press button 17 formed of a molded polymeric material, e.g. ABS, is attached to the upper surface of the locking plate 3 by a pair of studs 18 which are pressed into the spaced openings 14.

The cover 2 is likewise a unitary sheet metal stamping, the outer surface of which is chrome plated for decorative purposes. The cover comprises a top portion 19 having a transverse, rectangular slot 20 cut therein, a pair of spaced side flanges 21 extending downwardly from the top 19, a pair of narrow runners 22 extending inwardly from the side flanges 21, and a pair of generally canoe shaped tracks 23 extending inwardly from the side flanges 21 at one end thereof, in spaced relationship to the top 19 and immediately adjacent the runners 22. One end of the top 19 has a curled lip 24 extending angularly upwardly therefrom and a second transverse lip 25 extends downwardly from the top adjacent the slot 20.

As best depicted in FIGS. 2 and 3 the locking plate 3 with press button 17 attached thereto is assembled beneath the top 19 of the cover such that the beveled surfaces of the dogs 16 rest on the tracks 23 and the press button 17 extends upwardly into the slot 20. One will observe that the button 17 is notched at 26 to prohibit its passing through the slot 20 and that the curved ends of the tracks 23 prevent the locking plate from being withdrawn from the left end of the cover as viewed in FIG. 2. One safety belt section 27 is looped about the locking plate by passing its end through the slot 15 and thereafter securing the end in overlapped relationship to the remainder of the belt by stitching or any other suitable means.

As best seen in FIG. 5 the spring 4 includes a base 27, a pair of outboard leaves 28 which are bent to overlie the base 27 at approximately a 30° angle thereto, a central leaf 29 which is disposed at approximately a 60° angle to the base and acts as an ejector in a manner to be more fully described hereinafter, and a pair of leaves 30 between the outboard and central leaves which are disposed at approximately at 120° angle to the base and which act as spring and locking plate retainers as will be subsequently explained.

The assembly of the spring 4 and body portion 1 to the cover and locking plate sub-assembly is accomplished as follows:

The spring 4 is pressed against the undersurface of the locking plate 3 such that the leaves 28 are depressed towards the base 27. The leaves 30 engage the inner edge of the opening 12 in the locking plate (the left edge as viewed in FIGS. 1 and 2) and the leaf 29 extends into the opening 12 with its free end lying adjacent the shoulder

13. The body portion 1 is thereafter assembled with the cover 2 by inserting the runners 22 into the grooves 6 and sliding the body into the channel shaped cover until the end wall 7 comes to rest against the edges of the side flanges 21. As the body portion 1 is finally seated the tracks 23 seat in the recessed portions 10 of the base 5 and the studs 11 snap into a pair of openings 31 located in the tracks.

As best seen in FIG. 2 the base 27 of the spring 4 overlies the inner surface of the base 5 of the body portion and abuts the end wall 7. The spring leaves 28 bias the locking plate 3 upwardly toward the top 19 of the cover 2. The retaining leaves 30 engage the inner edge of the locking plate 3 defining the opening 12 to hold the spring in position against the end wall 7 and also to bias the locking plate to the rear or left so that the dogs 16 abut the curved ends of the tracks 23. The ejector spring leaf 30 (shown in phantom in its free condition in FIG. 2) extends into the opening 12 with its free end lying adjacent the shoulder 13. One will also observe from FIG. 2 that the end wall 7 of the body portion 1 and the lip 24 on the cover 2 co-operate to define a tongue plate receiving opening 32. As best viewed in FIG. 4 the locking plate 3 and spring 4 are laterally positioned by the lugs 8 which abut the outside edges of each of these components.

The tongue plate 33 shown in FIG. 6 includes a base plate 34 and a tongue 35 having a slot 36 cut therein extending from one end of the plate 34. The tongue 35 is tapered at its free end to provide a lead-in to the buckle. The plate 34 has a pair of parallel elongated slots 37 and 38 and its end remote from the tongue is curled over to provide a safe edge. A snubbing bar 39 is slideably attached to the plate 34 and a second belt section 40 passes through the slot 38, loops over the bar 39 and passes back through the slot 37. Thus the length of the belt section 40 can be readily adjusted and snubbed at the desired length when placed in tension by the wearer.

The operation of the buckle is as follows:

When the tongue 35 is inserted into the opening 32 in the buckle its leading edge engages the raised portion of the locking plate 3 and causes the latter to pivot downwardly against the bias of the spring leaves 28. As the leading edge of the tongue passes over the shoulder 13 it engages the spring leaf 29 and carries it back in tension until it engages the lip 25 on the cover which acts as a stop. At this point the shoulder 13 is in registration with the slot 36 in the tongue and the spring leaves 28 drive the locking plate upwardly to cause the shoulder to engage the leading edge of the opening 36 to positively lock the tongue in the buckle.

It is significant for one to observe that the belt sections are directly connected to each other through the tongue plate and locking plate. Thus tension or pull applied to one section is immediately transmitted to and resisted by the other belt section with only minimal resistance being furnished by the cover, spring and body portion of the buckle. Since tensile strength tests and post accident analyses have shown that the great majority of seat belt failures result from the shearing or buckling of pins or bolts which support rotatable latch plates or the buckle frame to which such pins and bolts are often attached, it becomes obvious that the present arrangement whereby most of the tensile stress is transmitted directly from one belt section to the other represents a definite improvement over known safety belt buckles.

To separate the belt sections in the present arrangement the wearer need only manually depress the button 17. This results in a corresponding downward pivoting of the locking plate 3 against the bias of spring leaves 28 and the disengagement of the shoulder 13 from the tongue 35. Upon release of the tongue the ejector spring 29 immediately recoils to the position shown in phantom in FIG. 2 and drives the tongue out of the buckle. Once the tongue clears the opening 32 the spring leaves 28 return

the locking plate to the locking position and the buckle is ready for subsequent receipt of the tongue. Thus in the aftermath of an accident or other emergency when the wearer of the belt may only have one hand free, the quick release feature of the present invention has definite advantages over the positive locking devices of the prior art.

Having considered the foregoing description it will be understood that the specific objects set forth above have been accomplished and while a single embodiment of the novel buckle and belt-buckle combination has been described for purposes of illustration, it should be further clearly understood that the disclosure is not to be interpreted in a limiting sense in that the scope of the invention is best defined by the following claims.

I claim:

1. In a safety belt combination of the type wherein a tongue plate attached to one belt section is releasably coupled to a buckle attached to a second belt section, a buckle comprising a body portion, a cover secured to and overlying said body portion and cooperating with said body portion to define a tongue receiving opening adjacent one end of said buckle, said cover having a top portion spaced from said body portion and having an opening formed therein, a locking plate pivotally mounted between said top portion and said body portion for lockingly engaging the tongue when the latter is inserted into said tongue receiving opening, a multi-leaf spring disposed between said locking plate and said body portion, at least one of said leaves biasing said locking plate toward the top portion of said cover and into locking engagement with the tongue and at least one other of said leaves being positioned to be engaged by the tongue and placed in tension when the tongue is inserted into said buckle and to eject the tongue from the buckle responsive to pivotal movement of the locking plate towards said body portion, and means for manually moving the locking plate toward said body portion against the bias of said first mentioned spring leaf.

2. A buckle according to claim 1 wherein said body portion is formed of a molded synthetic resinuous material.

3. A buckle according to claim 1 wherein said locking plate includes a raised portion extending upwardly towards the top portion of said cover and away from said tongue receiving opening to provide an abutment shoulder for lockingly engaging the tongue.

4. A buckle according to claim 1 wherein said means for manually moving the locking plate is a button formed of a molded synthetic resinuous material, said button having a base portion superimposed on said locking plate and extending into the opening in the top portion of said cover and a plurality of spaced lugs extending downwardly from said base portion and pressed into a plurality of spaced apertures in said locking plate.

5. A buckle according to claim 1 wherein said body portion is provided with longitudinal grooves extending along its sides and said cover has a pair of side flanges extending downwardly from the top portion and a pair of runners extending inwardly from said side flanges and spaced from the top portion, said runners being slideably seated in the grooves in said body portion.

6. A buckle according to claim 1 wherein said multi-leaf spring has a base overlying said body portion at the end thereof adjacent said tongue plate receiving opening and at least one other leaf engaging said locking plate to bias said spring towards said end of said body portion.

7. In a safety belt combination of the type wherein a tongue plate attached to one belt section is releasably coupled to a buckle attached to a second belt section, a buckle including a locking plate locking the tongue in said buckle and an ejector mechanism, said ejector mechanism being in the form of a multi-leaf, sheet metal spring having a base, at least one leaf biasing said locking plate into locked engagement with the tongue plate and at least

5

one leaf tensioned against the leading edge of the tongue plate in a partially unwound state, whereby upon release of said tongue plate from said locking plate, said last mentioned leaf will recoil to eject said tongue from said buckle, said second belt section being attached directly to said locking plate whereby stress on one belt section is transmitted directly to the other belt section through the locking plate and the tongue plate.

8. A safety belt combination according to claim 7 wherein said locking plate is apertured and said last mentioned leaf extends through said aperture to engage the leading edge of said tongue.

9. A safety belt combination according to claim 7 wherein said tongue plate has a slidable snubbing bar to allow for adjustment of the length of said first belt section.

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