Feb. 8, 1966 W. H. MEEKER 3,233,300

SAFETY BELT BUCKLE

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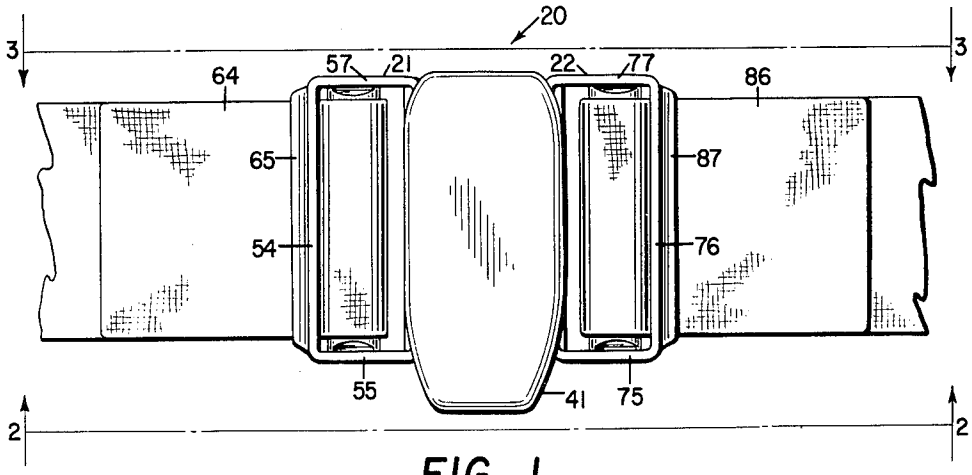


FIG. 1

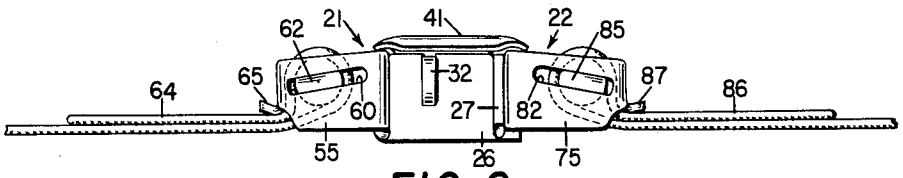


FIG. 2

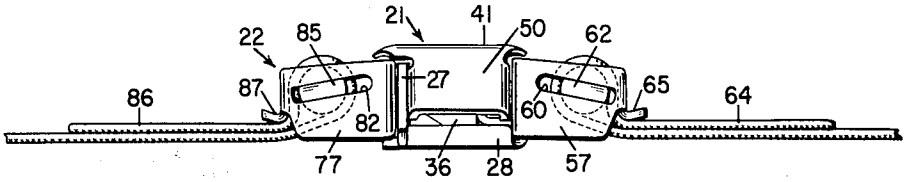


FIG. 3

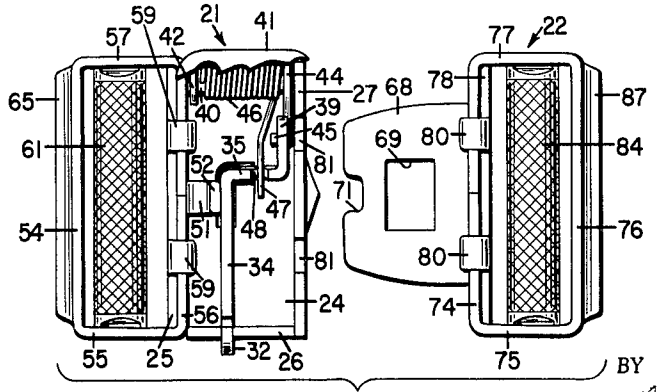


FIG. 4

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SAFETY BELT BUCKLE

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FIG. 5

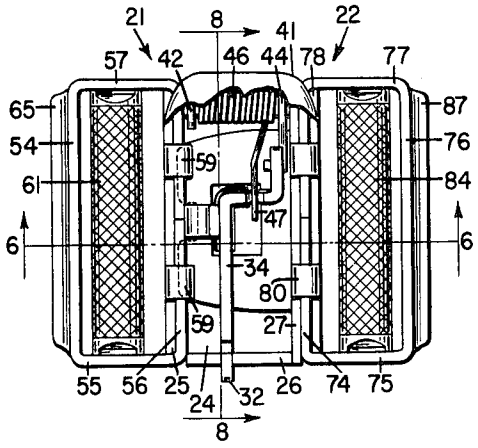
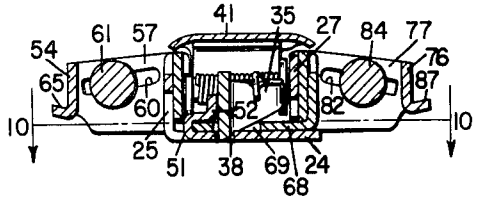


FIG. 6



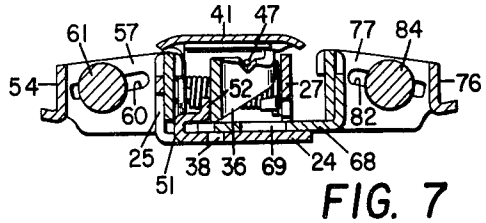
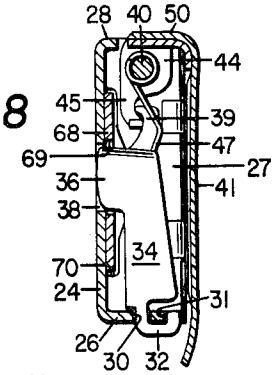


FIG. 7

FIG. 8



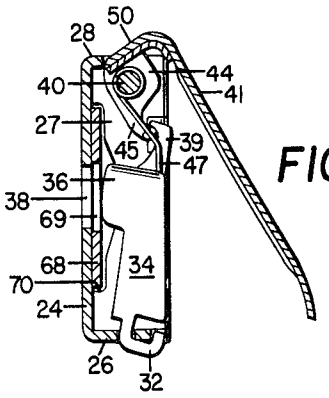
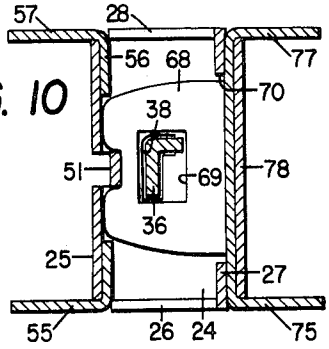


FIG. 9

FIG. 10



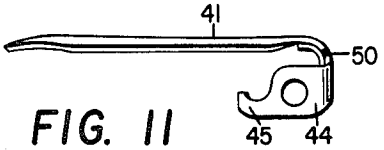


FIG. 11

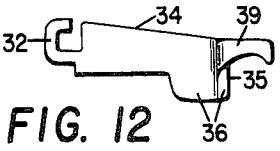


FIG. 12

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SAFETY BELT BUCKLE

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7 Claims. (Cl. 24—230)

This invention relates to buckles, and more particularly, to buckles for connecting the ends of safety belts such as are employed in airplanes and automobiles.

One type of safety belt buckle, that is now in common use, is formed with a base plate on which a cover plate is mounted for pivotal movement about a generally upright axis in the normal position of the buckle when it is in use. The operative parts of the buckle are arranged so that the cover plate can be pivoted about its axis, outwardly from the wearer, to open the buckle and release the belt; and so that the belt is in its closed position when the cover plate is pivoted toward the wearer.

Although this is a common arrangement, it is somewhat awkard to operate a buckle of this type, because of the need for manipulating the cover plate and the belt at the same time, which may be difficult.

Moreover, buckles of this common type ordinarily are made so that the connection of the belt end to the cover plate is not adjustable, and so that the connection of the belt end to the base plate portion of the buckle is adjustable. This limited adjustability is necessitated by the design of the ordinary buckle, in which the connector plate is little more than a flat piece of metal with a single slot in it, for receiving a loop at the end of the belt. This limited adjustability feature is often a handicap and inconvenience where a single safety belt must be used to accommodate people of all sizes, from small children to large, overweight adults.

Accordingly, one object of the present invention is to provide an improved, practical safety buckle.

Another object of the invention is to provide an improved, practical buckle for a safety belt, that has improved adjustability so that it can be used easily for people of all sizes.

A further object of the invention is to provide a safety belt buckle of a more convenient design, that can accommodate people of all sizes, and that is easily adjustable.

A more specific object of the invention is to provide an improved safety belt buckle that permits adjustment of both ends of the belt where these ends are secured to the respective parts of the buckle.

Still another object of the invention is to provide a safety belt buckle that is practical, that provides a double adjustment of the safety belt webbing, at each side of the buckle respectively, but that is compact in structure.

Yet another object of the invention is to provide an attractive safety buckle that has an improved structural design and greater convenience in use.

A further object of the invention is to provide a practical safety belt buckle having a reliable mechanism, that is convenient and easy to operate, in a buckle that is compact yet rugged.

A further specific object of the invention is to provide an improved and practical safety belt buckle that is operated by a cover plate that can be moved, to open or to close the buckle, in a direction transverse to the length of the safety belt.

Still another object of the invention is to provide a buckle of the character described that requires a minimum number of parts and that is economical to manufacture and assemble.

A more specific object of the invention is to provide an improved, practical safety belt buckle of the character

described, that meets the statutory requirements that are now imposed by most states as to strength, security, and ease of operation, and that can be made with a highly attractive appearance, and at a competitive cost.

Generally, the improved safety belt buckle according to the invention is a metal-to-metal buckle the separable portions of which are each adjustably connected to a length of belt so that the buckle is adjustable to rest in a convenient central forward portion of the torso of any wearer regardless of the wearer's girth. Also, the inventive buckle can be conveniently latched by sliding the separable portions together, and can be opened by moving a cover plate that is pivotally mounted on an axis that is transverse to the buckle and belt and generally parallel with the path of relative motion of the separable portions of the buckle.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims. To these and other ends, the invention resides in certain improvements and combinations of parts, all as will hereinafter be more fully described, the novel features being pointed out at the end of this specification.

In the drawings:

FIG. 1 is a fragmentary front plan view of a safety belt having a buckle that is constructed in accordance with one preferred embodiment of the present invention, showing the buckle in its closed position, with the belt ends connected;

FIG. 2 is a fragmentary bottom elevation thereof, taken on the line **2—2** of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a fragmentary top elevation thereof, taken on the line **3—3** of FIG. 1, looking in the direction of the arrows;

FIG. 4 is a top plan view of a buckle alone, with the belt ends removed, and with the connector plate shown in its detached position, the cover plate being partly broken away;

FIG. 5 is a top plan view of a buckle alone, with the connector plate inserted, and secured in place, and with the cover plate partly broken away;

FIG. 6 is a section taken on the line **6—6** of FIG. 5, looking in the direction of the arrows;

FIG. 7 is a view similar to FIG. 6, but showing the connector plate inserted only part way;

FIG. 8 is a section taken on the line **8—8** of FIG. 5, looking in the direction of the arrows;

FIG. 9 is a view similar to FIG. 8, but showing the cover plate in its fully opened position;

FIG. 10 is a fragmentary view taken on the line **10—10** of FIG. 6 looking in the direction of the arrows;

FIG. 11 is a side elevation of the cover plate alone, looking from the right to the left relative to FIG. 1, and

FIG. 12 is a side elevation of the latch lever alone, looking from the right to the left relative to FIGS. 1 and 5.

Referring now in detail to the drawings by numerals of reference, the numeral **20** denotes generally the buckle that is constructed in accordance with one preferred embodiment of this invention, that is shown in the drawings and described in detail therein by way of illustration only. This buckle has two major, separable parts, a latching assembly **21** and a connector assembly **22**.

The latching assembly **21** comprises a base plate **24** that is formed with four upstanding walls **25, 26, 27** and **28** respectively. These four walls enclose a working chamber within which the latching components are disposed.

As can be seen best in FIG. 8, the lower wall **26** is formed with a generally rectangular opening **30**, and directly above the opening **30**, with a recess **31**. The curved

end 32 of a latching lever 34 extends through the opening 30 and is curved back upon itself to project into the recess 31. The latching lever 34 is formed toward its upper end with a right angle extension 35. A portion of the shank of the latching lever 34 and of the extension 35 project toward the rear face of the buckle to provide a generally L-shaped latching finger 36 for engagement in an L-shaped opening 38 that is formed in the base plate 24. At the extremity of the extension 35, the latching lever is formed with an upwardly extending arm 39, that is disposed to be substantially in parallelism with the right wall 27.

A pin 40 is secured between the walls 25 and 27, adjacent the upper end of the buckle. The cover plate 41 of the buckle is formed at its opposite sides with a pair of ears 42 and 44 respectively. These ears are formed with aligned circular openings, through which the pin 40 passes, and are sufficiently large to provide clearance about the pin, to permit rotary movement of the ears on the pin. The right ear 44 is formed with a downward extension 45 that provides a lever arm, the lower end of which engages under the arm 39 of the latching lever.

A coil spring 46 is wound about the pin 40. One end of the coil spring is secured to the pin, and the other end 47 is extended downwardly within the buckle and engages in a notch 48 (FIG. 4) in the upper surface of the extension 35 of the latching member 34, constantly to urge the latching lever to its closed buckle position.

As is best shown in FIG. 3, the cover plate 41 is formed at its upper end with a downwardly depending skirt 50, and the upper wall 28 is reduced in height as compared to the other walls on the base plate, to accommodate the skirt 50 and permit it to swing upon opening and closing of the cover. The cover plate is just wide enough to extend over all of the walls of the base plate, and is long enough to provide a downwardly hanging lip at the lower end of the cover plate, for convenient grasping. If desired, a decorative emblem may be disposed on the front, exposed face of the cover plate, although none is shown in the drawing.

As is best shown in FIGS. 6 and 7, the left wall 25 preferably is integral with the base plate 24, and a tongue 51 is struck from a part of the wall and a part of the base plate. This tongue is formed with an outwardly turned lip portion 52 that is disposed in close proximity to the shank of the latching lever 34, to serve as a guide for the latching lever during its movement.

The latching assembly 21 also includes an extension that consists of a bracket having four unitary walls 54, 55, 56 and 57, respectively. These walls are arranged to enclose a generally rectangular space, and are arranged to be in parallelism with the walls that stand up from the base plate. The right wall 56 of the extension of the latching assembly is inserted between the left wall 25 of the latching assembly frame and the confronting ends of the lower and upper walls 26 and 28 respectively of this frame, and the wall 25 is formed with a pair of ears 59 that are bent over a wall 56, to secure it in place.

The upper and lower bracket walls 55 and 57 respectively are formed with aligned, inclined slots 60. A knurled cylindrical bar 61 is mounted to extend between these walls 55 and 57, and is formed with reduced and flattened end portions 62 that engage in the inclined slots 60 for slideable movement therein. This construction permits limited movement of the bar 61 in a direction longitudinally of the slots 60. The belt end 64 is threaded around the bar 61 and between the bar 61 and the left bracket wall 54. The bracket wall 54 is formed along its rear edge with a lip 65, against which the belt reach engages. With this construction, the belt may be readily adjusted in the latching assembly 21, while at the same time, whenever any load is placed upon the belt, the bar 61 is urged toward the left end of the latching assembly, to wedge and clamp the end portion of the belt against the bracket wall 54.

The connector assembly 22 comprises a connector plate 68 that is formed with a central, rectangular opening 69. The opening 69 is disposed so that, in the closed position of the buckle, the opening 69 registers with the L-shaped opening 38 in the base plate 24, and also with the latching finger 36. Moreover, the opening 69 is sufficiently large to permit the latching finger 36 to project therethrough, for engagement in the L-shaped opening in the base plate. The wall 27 of the latching assembly is formed with a slot 70 (FIG. 10) to permit insertion of the connector plate 68 into the latching assembly, to overlie the base plate 24. The latching finger 36 is formed with a rear surface, as can be seen in FIG. 3, that is inclined or cammed, so that upon insertion of the connector plate 68 into the latching assembly, the latching lever can ride up on the connector plate, to permit its insertion without requiring movement of the cover plate. The connector plate is formed at its left end, relative to FIG. 4, with a recess 71, to provide a pair of inclined, guide shoulders to engage at either side of the tongue 51, to guide the connector plate to its proper position for closing of the buckle.

The connector plate 68 is secured rigidly to a unitary extension or bracket that has four walls 74, 75, 76 and 77 respectively. In the buckle embodiment that is illustrated in the drawings, the left wall 74 is reinforced by a stiffening plate 78, that is secured to the left wall 74 by a pair of bent over ears 80. The wall 27 of the latching assembly is formed with a pair of recesses 81, to accommodate these ears 80 in the closed position of the buckle.

The lower and upper walls 75 and 77 respectively of the connector assembly are formed with aligned, inclined slots 82. A knurled bar 84 is disposed to extend between these walls. This bar is formed with reduced and flattened end portions 85 (FIGS. 2 and 3) that engage in the inclined slots 82 for slideable movement therein. This construction permits limited movement of the bar in a direction longitudinally of the inclined slots 82. The other end 86 of the belt is threaded around the bar 84 and between the bar 84 and the right wall 76. The wall 76 is formed at its rear edge with an outwardly extending lip 87, and the free end of the belt end 86 is passed under this lip. With this construction, this belt end 86 may be readily adjusted in the connector assembly while at the same time, whenever any load is placed upon the belt, the bar 84 is urged over to the right, toward the wall 76, to wedge and clamp a portion of the belt end against the wall 76.

To use a buckle that is made in accordance with the present invention, the latching assembly and the connector assembly are secured to the two ends of a safety belt, in the manner previously described. If the safety belt is one that is installed in an automobile, in which the other two ends of the belt will be anchored to the frame or other structural part of the automobile, then both the latching assembly and the connector assembly can be easily adjusted in position, for optimum comfort of the wearer.

To secure the two ends of the belt together, the connector plate 68 is inserted in the latching assembly 21. After the connector plate 68 has been inserted through the slot 70 in the wall 27 of the latching assembly, it engages against the inclined lower surface of the latching finger 36, and causes the latch lever 34 to pivot in a clockwise direction relative to FIG. 8, about its curved end portion 32. As the latch lever 34 is pivoted, it acts against the free end 47 of the coil spring 46. When the connector plate has been fully inserted, the action of the spring forces the latch lever to the rear of the buckle, and causes the latching finger 36 to project through the opening 69 in the connector plate, to engage in the L-shaped opening 38 in the base plate.

With the buckle in its latched position, any load that is applied, that tends to cause the connector plate to move away from the latching assembly, is transmitted

from the connector plate to the latching finger **36**, and from the latching finger **36** to that portion of the base plate about the L-shaped opening **38**, against which the latching finger **36** engages.

To open the buckle and to separate the two ends of the safety belt, the lower end of the cover plate **41** is grasped and pulled upwardly and outwardly relative to the wearer, or counterclockwise relative to FIGS. 8 and 9. As the cover plate **41** is pivoted in the counterclockwise direction, the lever arm **45** on the right ear **44** of the cover plate pivots also and engages against the arm **39** on the latching lever, to cause the latching lever to be pivoted in a clockwise direction relative to FIGS. 8 and 9. When the cover plate is in its fully opened position, as shown in FIG. 9, the latching finger **36** is withdrawn from the L-shaped opening **38** in the base plate and also from the rectangular opening **69** in the connector plate, permitting withdrawal of the connector plate from the latching assembly.

Since the opening action utilizes a double lever arrangement, very little force is required to open the buckle even when the buckle is under a load. Moreover, because the latching lever has its movement in a direction that is transverse to the direction of opening movement of the buckle, the action of opening the buckle is not in opposition to the direction of the applied load, as is the case with some of the buckles that are now available.

One important advantage, of a buckle that is constructed in accordance with the present invention, is the double adjustment of the safety belt webbing that can be effected at the buckle. This permits a single safety belt to be used to accommodate people of much different sizes. Moreover, the adjustment that is required in the size of the belt can be accomplished rapidly and easily.

Another important advantage of a buckle that is constructed in accordance with the present invention is that the latching mechanism is simple and easy to operate, can be accommodated in a compact buckle design, but can be constructed to be rugged, practical, and reliable in its performance.

While the invention has been disclosed herein by reference to the details of a preferred embodiment thereof, it is to be understood that such disclosure is intended in an illustrative, rather than in a limiting sense, and it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

I claim:

1. A buckle comprising:

(a) a base plate for attachment to one end of a belt;

(b) a latch member that is mounted on said base plate;

(c) a connector plate for attachment to the other end of the belt and for insertion between said base plate and said latch member, to overlie said base plate, said connector plate being formed with a latching opening therein;

(d) said latch member being formed with at least one latching finger for engagement in said latching opening for securing said connector plate to said base plate;

(e) said base plate being formed with an extension at one side thereof, and at one side of said latch member;

(f) means mounted on said extension for adjustably securing said base plate to its end of said belt;

(g) said connector plate being formed with an extension that is disposed to be at the other side of said latch member from said base plate extension when said connector plate is inserted between said base plate and said latch member;

(h) means mounted on said connector plate extension for adjustably securing said connector plate to its end of said belt;

(i) a cover plate mounted at one end of said base plate for pivotal movement about an axis that extends substantially in the direction of movement of said connector plate relative to said base plate, said cover plate being coupled to said latch member for operating said latch member to open and to close said buckle; and

(j) said latch member being pivotally mounted at an end of said base plate opposite said one end and about an axis that extends substantially in the direction of movement of said connector plate relative to said base plate.

2. A buckle for a belt that is to be worn about the torso, comprising:

(a) a base plate for attachment to one end of said belt;

(b) a latch member that is mounted on said base plate;

(c) a connector plate for attachment to the other end of said belt and for insertion between said base plate and said latch member to overlie said base plate, said connector plate being formed with a latching opening therein;

(d) said latch member being formed with at least one latching finger for engagement in said latching opening for securing said connector plate to said base plate;

(e) said base plate being formed with an extension at one side thereof and on one side of said latch member;

(f) means mounted on said extension for adjustably securing said base plate to its end of said belt;

(g) said connector plate being formed with an extension that is disposed to be at the other side of said latch member from said base plate extension when said connector plate is inserted between said base plate and said latch member;

(h) means mounted on said connector plate extension for adjustably securing said connector plate to its end of said belt;

(i) a cover plate that is mounted on said base plate for pivotal movement about an axis that extends substantially in the direction of movement of said connector plate relative to said base plate, and that is located at the upper end of said base plate, said cover plate being coupled to said latch member for operating said latch member to open and to close said buckle; and

(j) said latch member being mounted for pivotal movement relative to said base plate about an axis that extends substantially in the direction of movement of said connector plate relative to said base plate, and that is located at the lower end of said base plate.

3. A buckle for a belt that is to be worn about the torso, and that is substantially symmetrical in appearance in its closed position, comprising:

(a) a base plate for attachment to one end of said belt and that is formed with four upstanding walls that extend substantially about its perimeter, to enclose a working chamber therebetween;

(b) a latch member that is pivotally mounted on said base plate within said working chamber;

(c) a connector plate for attachment to the other end of said belt and for insertion between said base plate and said latch member, to overlie said base plate, said connector plate being formed with a latching opening therein;

(d) said latch member being formed with at least one latching finger for engagement in said latching opening for securing said connector plate to said base plate in the closed position of said buckle;

(e) spring means mounted constantly to urge said latch member to its closed buckle position;

(f) said base plate being formed with an extension at one side thereof, that extends beyond the wall at that side of said base plate and that is disposed at one side of said working chamber;

(g) means mounted on said extension for adjustably securing said base plate to its end of said belt;

(h) said connector plate also being formed with an extension that is disposed to be at the other side of said latch member from said base plate extension when said connector plate is inserted between said base plate and said latch member;

(i) means mounted on said connector plate extension for adjustably securing said connector plate to its end of said belt;

(j) each of said extensions and each of said belt securing means respectively comprising upper and lower confronting wall members that are formed with opposed, aligned slots, a knurled bar that is mounted to extend between said wall members and to be slidable in said slots along their lengths, and a pressure bar against which the reach of each belt end can be pressed when wound round the knurled bar;

(k) a cover plate mounted on said base plate for pivotal movement about an axis that extends substantially in the direction of movement of said connector plate relative to said base plate, and said cover plate being coupled to said latch member for operating said latch member to open and to close said buckle; and

(l) said pivotal axis of said cover plate being located at the upper end of said base plate, and said latch member being mounted for pivotal movement relative to said base plate, about an axis that extends substantially in the direction of movement of said connector plate relative to said base plate and that is located at the lower end of said base plate.

4. A safety belt buckle comprising:

(a) a base plate;

(b) means arranged on said base plate for adjustably securing said base plate to a first length of belt;

(c) a latch member pivotally mounted transversely of said base plate and belt and at one side of said base plate;

(d) spring means for biasing said latch member toward said base plate;

(e) a connector plate adapted for insertion between said base plate and said latch member and having shoulders engageable by said latch member for retaining said connector plate in a latched position overlying said base plate, said latch member and said connector plate being arranged so that said latch member is moved away from said base plate against the bias of said spring means upon said insertion of said connector plate, and said latch member is movable toward said base plate under the bias of said spring means to engage said shoulders;

(f) means arranged on said connector plate for adjustably securing said connector plate to a second length of belt;

(g) a cover overlying said base plate and pivotally mounted transversely of said base plate and said belt and at the opposite side of said base plate for raising said latch member to release said connector plate from said latched position; and

(h) means for intercoupling said latch member and said cover plate so that said spring means also biases said cover plate toward said base plate and toward a closed position of said cover plate and said latch member is movable away from said base plate by said connector plate independently of said cover plate.

5. The safety belt buckle of claim 4 wherein each of said belt securing means comprises a knurled bar and an abutment surface, said knurled bar being slidable toward and away from said abutment surface and adapted for receiving a loop of said belt for frictional engagement between said bar and said abutment surface.

6. The safety belt buckle of claim 4 wherein said latch member is pivotally mounted on the lower side of said base plate, and said cover plate is pivotally mounted on the upper side of said base plate.

7. A safety belt buckle comprising:

(a) a base plate having a pair of opposite side edges and opposite ends;

(b) means arranged at one side edge of said base plate for connecting said base plate to a length of belt;

(c) a latch member pivotally mounted on an axis transversely of said base plate at one end of said base plate, and having a cam surface;

(d) spring means for biasing said latch member toward said base plate;

(e) a connector plate secured to another length of belt and adapted for insertion between said base plate and said latch member at the other edge of said base plate, said connector plate being adapted for engaging said cam surface of said latch member for raising said latch member against the bias of said spring means, and said connector plate having shoulders engageable by said latch member for retaining said connector plate in a latched position overlying said base plate;

(f) a cover plate pivotally mounted on an axis transversely of said base plate at the opposite end of said base plate and arranged for overlying said base plate; and

(g) means intercoupling said cover plate and said latch member so that said spring means also biases said cover plate toward said base plate and toward a closed position, said intercoupling means allowing said latch member to be raised from said base plate by said cover plate for unlatching said buckle and allowing said latch member to be raised from said base plate by insertion of said cover plate without movement of said cover plate.

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