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SEAT BELT BUCKLE

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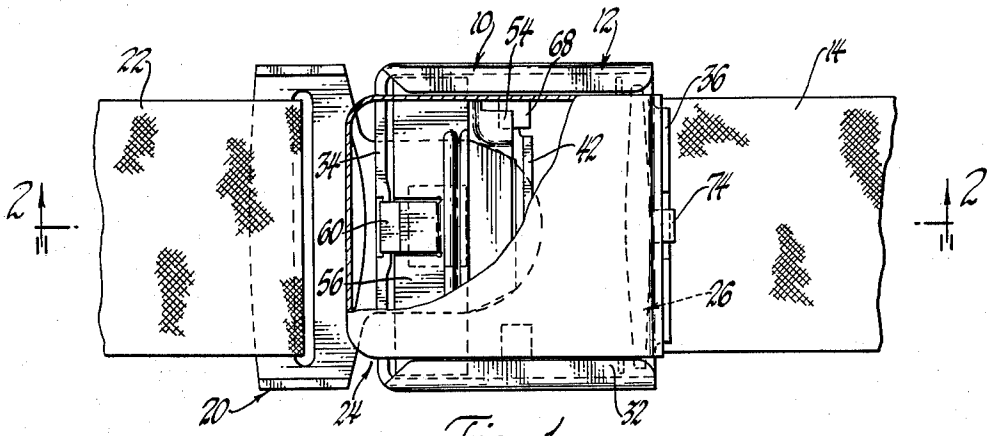

Fig. 1

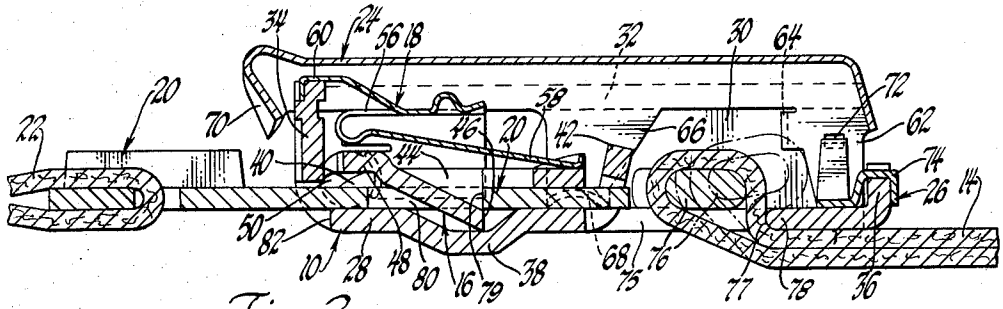

Fig. 2

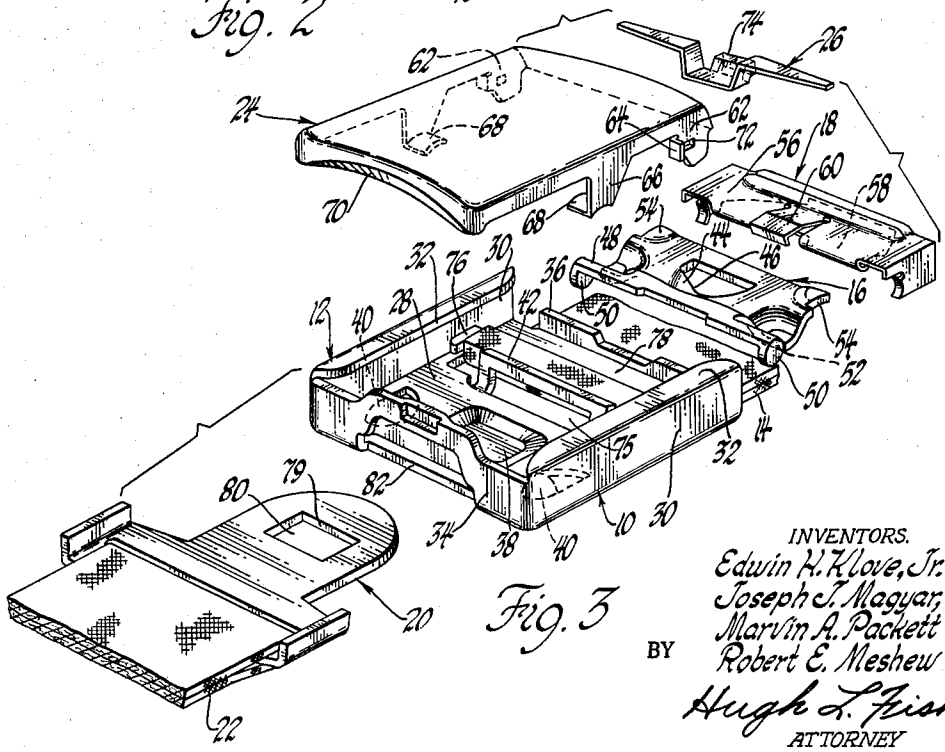

Fig. 3

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SEAT BELT BUCKLE

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This invention relates in general to fastening devices and more particularly to a seat belt buckle adapted to be used in connection with the retention of passengers in airplanes, motor vehicles, or the like.

Seat belt buckles of some of the prior art have not been entirely satisfactory because there is a tendency for many of the buckles to deform under excessive pressure conditions and allow the seat belts to slip. There is also a tendency for some of the buckles to open due to decelerating forces upon the sudden stopping of the vehicle, the weight of the hinged portion of the buckle tending to throw the same forwardly and release the strap rendering the safety belt useless. In addition some of the buckles are likely to open upon the application of a force at the rear of the pivot of the latch releasing member causing inadvertent releasing of the buckle.

It is a general object of the present invention to provide a novel buckle for use with safety belts which is free of the above difficulties and which is of simple rugged construction and reliable in use.

Other objects of the present invention are to provide a buckle which requires a minimum number of parts, is economical to manufacture, easy to assemble and relatively free of annoying rattle.

Another object of the present invention is to provide a buckle having a lock bar adapted to cooperate with a belt strap for maintaining the belt in an adjusted position so that the passenger is retained in his seat regardless of the intensity or magnitude of the decelerating force applied to the belt and to provide a reinforcement for the buckle structure under such conditions.

These and other objects and advantages of the present invention are obtained by a construction which includes a base member having a socket at one end thereof in which a latching pawl pivots. Resilient means normally bias the latching pawl toward a latching position where the pawl is adapted to be coupled to a locking plate. A cover member is provided with pawl releasing means and is attached to the base member by a cover spring which normally urges the cover member toward a closed position.

A more complete understanding of the present invention may be had from the following detailed description which should be read in conjunction with the drawings in which:

FIGURE 1 is a top plan view of the buckle with parts broken away;

FIGURE 2 is a sectional view taken along lines 2—2 of FIGURE 1;

FIGURE 3 is an exploded view of the buckle.

Referring now to the drawings, a preferred embodiment of the present invention is shown. The buckle is generally designated **10** and comprises a base member **12** which is adjustably secured to a seat belt strap **14**.

The base **12** supports the locking pawl **16** which is biased toward the base to a locking position by the spring **18**. A locking plate **20** is fixedly secured to the seat belt strap **22** and is adapted to be inserted into the base member **12** and be releasably coupled to the locking pawl **16** to join the straps **14** and **22**. A cover member **24** is attached to the base member **12** by a gull-winged shaped spring **26** which also biases the cover toward a closed position. The cover member **24** is adapted to uncouple the pawl **16** from the locking plate **20** and thereby separate the straps **14** and **22**.

The base member **12** includes a generally horizontal bottom wall **28** having upstanding side walls **30** with inwardly-extending flanges **32** and upstanding end walls **34** and **36**. The bottom wall **28** is provided with a generally rectangular indentation **38**, integrally formed stop tabs **40** and a guide bridge **42**.

The locking pawl **16** includes a tongue portion **44** having a transverse abutment edge **46**. The forward portion of the pawl **16** comprises laterally-extending fingers **48** having downardly-projecting rounded extensions **50** adapted to engage a socket defined by the juncture of the forward end wall **34** and the bottom wall **28**. The middle portion of the pawl **16** is provided with surfaces **52** adapted to engage the stop tabs **40** when the pawl is placed under load. The rearward section of the pawl **16** includes raised side portions **54** which are engaged by the cover **24** to release the buckle as will be explained hereinafter.

The pawl biasing spring **18** comprises an upper surface **56** abutting the underside of the flanges **32** of the base member **12** and a lower inclined surface **58** in engagement with the rearward portion of the locking pawl **16** so as to bias the pawl in a clockwise direction toward the bottom wall **28** of the base **12**. The mid section **60** of the upper portion **56** extends over the end wall **34** of the base **12** to prevent longitudinal movement of the spring **18**.

The cover member **24** is provided at its rearward portion with downwardly-extending side flanges **62** having integrally formed, outwardly-extending nibs **64**. A pair of legs **66** having inwardly-extending feet **68** projects downwardly from the mid portion of the cover. The handle portion **70** extends forwardly of the end wall **34** and provides a smooth gripping surface for the cover **24**. The spring **26** is provided with non-rotatable, laterally-extending arms which are recieved in the opening **72** in the side flanges **62** and is provided with a hook portion **74** which engages the end wall **36** to thereby attach the cover to the base **12**. With the cover **24** attached to the base **12**, the nibs **64** engage the underside of the flanges **32** and the inwardly-extending feet **68** extends between the pawl **16** and the bottom wall **28**. The nibs **64** in conjunction with the spring **26** pivotally mount the cover **24** to the base **12**. It should be noted that in the locked position there is a slight clearance between the pawl **16** and the feet **68** to insure that the feet do not interfere with the tongue **44** traveling to its fully locked position where it engages the bottom wall **28**.

As indicated previously, the belt strap **14** is adjustably coupled to the base **12**. For this purpose the base **12** is provided with a generally rectangular opening **75** over which is positioned a lock bar **76**. The strap **14** is inserted into the opening **75** around the lock bar **76** and back through the opening **75**. The lock bar **76** is generally

rectangular in cross section with rounded forwardly and rearwardly facing end portions and rests on the bottom wall **28** with no portion thereof extending into the opening **75**. Thus, when the straps **14** and **22** are subjected to extreme stress loads, the lock bar **76** moves rearwardly to the position shown in phantom lines wherein the belt strap **14** is wedged between the lower surface of the lock bar and the bottom wall **28**. It should be noted that the lock bar **76** does not force the strap **14** against the edge **77** formed by the opening **75** in the conventional manner but rather moves rearwardly of the edge **77** to serve as a reinforcement for the rear cross member **78** of the base **12**. Under extreme stress loads some conventional belt locking arrangements caused the base **12** to be deformed allowing slippage of the belt **14** thereby rendering the seat belt useless under these conditions. By merely rotating the base **12** approximately 90° the belt strap **14** may be lengthened while it is only necessary to pull on the free end of the strap to shorten the length.

In operation, the locking plate **20** which includes a transverse abutment edge **79** formed by a rectangular opening **80** is inserted through a transverse slot **82** in the end wall **34** and engages the tongue portion **44** of the pawl **16** thus raising the pawl in a counterclockwise direction against the spring **18** until the tongue portion **44** engages the opening **80** at which time the pawl returns to a locked position. When the locking plate **20** is fully inserted, it extends through the guide bridge **42** to maintain alignment of the locking plate and the base **12**. Any force on the seat belt straps **14** and **22** engages the edge **46** of the tongue **44** and the edge **79** of the locking plate **20** and tends to rotate the pawl **16** slightly in a clockwise direction while driving the surfaces **52** into engagement with the stop tabs **40**. When it is desired to release the buckle, the user grasps the handle portion **70** and rotates the cover **24** in a clockwise direction about the transverse axis passing through the nibs **64**. As the cover **24** raises, the feet **68** engage the surface **54** on the pawl **16** to rotate the pawl in a counterclockwise direction against the bias of the spring **18** at the same time the laterally-extending arms on the spring **26** are forced downwardly as a result of the engagement of the nibs **64** with the underside of the flanges **32** with a torsional force also being applied thereto. When the tongue member **44** clears the opening **80** in the locking plate **20**, the locking plate may be removed from the base **12**. Upon release of the cover **24**, the spring **18**, acting through the pawl **16**, and the spring cover **26** rotate the cover **24** in a counterclockwise direction to the position shown in FIGURE 2. As indicated previously, however, the spring **18** does not return the cover completely since the tongue portion **44** of the pawl **16** will engage the bottom wall **28** before the cover **24** is fully returned to the closed position. The spring **26**, however, will continue to exert a force on the cover **24** to return the cover to the fully closed position. It should be noted that while the cover **24** may be easily moved to a release position by pulling upon the handle portion **70**, the reverse is not so, i.e., pressure on the rear portion of the cover **24** does not cause the cover to be rotated to a release position. Rather, the spring **26** flexes downwardly where the flanges **62** engage the bottom wall **28** to prevent further movement of the handle portion **70** away from the bottom wall **28**. Thus it will be seen that the buckle is not subject to inadvertent release from the application of a force at or near the pivot axis of the cover.

The construction and arrangement of the parts of the buckle allow rapid assembly. After the lock bar **76** is placed in position, the pawl **16** is placed in position with the extensions **50** pivotally engaging the socket at the forward end of the buckle. Spring **18** is then inserted from the rear portion of the buckle beneath the flanges **32** and biases a pawl **16** toward the bottom wall **28**. The mid section **60** is snapped into engagement with the end wall **34** to maintain the spring **18** in position. Spring **26** is then connected with the cover **24** and snapped into position at the reaward end of the base **12** with the nibs **64** extending beneath the flanges **32** and the hooked portion **74** coupled to the end wall **36**.

The embodiment of the invention as disclosed herein is for illustrative purposes only and the scope of the invention is intended to be limited only by the following claims.

We claim:

1. A seat belt buckle comprising a base member, a latching pawl supported by said base member, said base member forming a socket at one end thereof in which said pawl pivots, a locking plate releasably coupled to said pawl, resilient means normally, yieldingly urging said pawl toward a latching position, a cover member including side flanges and pawl-releasing means extending between said pawl and said base member, a cover spring member supported by said base and extending through said side flanges to pivotally mount said cover member at the end opposite said one end of said base and to normally, yieldingly urge said cover toward a closed position.

2. A seat belt buckle comprising a base member, a latching pawl supported by said base member, said base member forming a socket at one end thereof in which said pawl pivots, a locking plate releasably coupled to said pawl, resilient means normally, yieldingly urging said pawl in a clockwise direction, a cover member including side flanges and pawl-releasing means extending between said pawl and said base member, a cover spring member supported by said base and extending through said side flanges to pivotally mount said cover at the end opposite said one end of said base and to normally, yieldingly urge said cover toward a closed position.

3. A seat belt buckle comprising a base member including a bottom wall and upstanding side walls forming a channel and having an opening therein, a lock bar supported by said bottom wall in sliding non-rotatable engagement in said bottom wall, a locking plate, a first belt strap coupled to said locking plate, latch means supported by said base member for releasably coupling said locking plate to said base member, a second belt strap extending through said opening and forming a loop around said lock bar, said lock bar being freely movable in a rearward direction, the rearward movement being limited only by the confines of said loop, whereby at least a portion of said lock bar moves rearwardly of said opening under load to prevent lengthening of said belt strap and to reinforce said bottom wall.

4. A seat belt buckle as defined in claim **1** wherein the base member includes an opening adapted to receive the end portion of a seat belt strap, a movable lock bar within said casing about which said strap is adapted to pass, said lock bar being movable rearwardly beyond the rear edge of said opening for locking said strap against lengthening and to reinforce said base member against deformation.

5. A seat belt buckle comprising a base member having side walls with inwardly-extending flanges, a latching pawl supported by said base member, said base member forming a socket at one end thereof in which said pawl pivots, a locking plate releasably coupled to said pawl, resilient means normally, yieldingly urging said pawl in a clockwise direction, a cover member including guide flanges and pawl releasing means extending between said pawl and said base and having laterally-projecting nibs, a cover spring member supported by said base member and extending through said side flanges to bias said nibs into engagement with the underside of the flanges of said base member to thereby pivotally mount said cover at the opposite end of said base member and to normally, yieldingly urge said cover in a counterclockwise direction.

6. A seat belt buckle as defined in claim **5** wherein the base member includes an opening adapted to receive the end portion of a seat belt strap, a movable lock bar with-

in said casing about which said strap is adapted to pass, said lock bar being movable rearwardly beyond the rear edge of said opening for locking said strap against lengthening and to reinforce said base member against deformation.

7. A seat belt buckle comprising a base member, a latching pawl supported by said base member, said base member forming a socket at one end thereof in which said pawl pivots, a locking plate releasably coupled to said pawl, resilient means normally, yieldingly urging said pawl toward a latching position, a cover member including side flanges and pawl-releasing means extending between said pawl and said base member and including laterally-projecting nibs, a cover spring member having a lower portion affixed to said base and laterally-projecting arms extending through the side flanges of said cover rearwardly of said nibs and cooperating with said nibs to pivotally mount said cover to said base while biasing said cover toward a closed position.

8. A seat belt buckle comprising a base member including a bottom wall having upstanding side walls and end walls with the side walls including inwardly-extending flanges, one of said end walls and said bottom wall forming a socket, a latching pawl supported by said base member and adapted to pivot in said socket, a locking plate releasably coupled to said pawl, resilient means normally, yieldingly urging said pawl in a clockwise direction toward said bottom wall, a cover member including side flanges and pawl-releasing means extending between said pawl and said bottom wall and including laterally-projecting nibs extending between said flanges of said side walls and said bottom wall, a cover spring member cooperating with said nibs to pivotally mount said cover to said base and including a lower portion abutting said bottom wall and having upwardly-extending side portions terminating in laterally-extending arms which protrude through the side flanges of the cover, rearwardly of the nibs to bias the nibs into engagement with the underside of the flanges of said side walls and to bias the cover in a counterclockwise direction, said lower portion also including a rearwardly-extending tab engaging the other end wall to maintain the position of said cover spring relative to the end wall.

9. A seat belt buckle for fastening the free ends of a seat belt comprising a base member adjustably secured to one of said free ends and having a bottom wall with upstanding side walls and an end wall, the side walls having inwardly-extending flanges, a slot extending through said end wall, said end wall and said bottom wall forming a socket, a locking plate secured to the other free end of said seat belt and including a transverse abutment edge, a locking pawl pivotally engaging said socket and including a tongue portion adapted to engage said transverse abutment edge, resilient means extending between said base and said pawl to normally, yieldingly urge said pawl toward a latching position, a cover member having pawl-releasing means extending between said pawl and said bottom wall and including downwardly-extending side flanges and laterally-extending nibs, a cover spring member cooperating with said nibs to pivotally mount said cover and having a lower portion affixed to said base and laterally-projecting fingers extending through the side flanges of said cover rearwardly of said nibs to bias said nibs into engagement with said flanges of said side walls while biasing said cover toward a closed position.

10. A seat belt buckle as defined in claim 9 wherein the base member includes an opening adapted to receive the end portion of a seat belt strap, a movable lock bar within said casing about which said strap is adapted to pass, said lock bar being movable rearwardly beyond the rear edge of said opening for locking said strap against lengthening and to reinforce said base member against deformation.

11. A seat belt buckle comprising a base member including a bottom wall having upstanding side walls and end walls with the side walls including inwardly-extending flanges, one of said end walls and said bottom wall forming a socket, a latching pawl supported by said base member and adapted to pivot in said socket, a locking plate releasably coupled to said pawl, resilient means normally, yieldingly urging said pawl in a clockwise direction toward said bottom wall, a cover member including side flanges and pawl-releasing means extending between said pawl and said bottom wall and including laterally-projecting nibs extending between said flanges of said side walls and said bottom wall, a cover spring member cooperating with said nibs to pivotally mount said cover adjacent the other end wall relative to said base and including a lower portion abutting said bottom wall and upwardly-extending side portions terminating in laterally-extending arms which protrude through the side flanges of the cover rearwardly of the nibs to bias the nibs into engagement with the underside of said flanges of said side wall and to bias the cover toward a closed position, said lower portion also including a rearwardly-extending tab engaging the other end wall to maintain the position of said cover spring relative to the end wall.

12. A buckle comprising a base member having a bottom wall, upstanding side walls and end walls, the side walls having inwardly-extending flanges with one of the end walls provided with an aperture, a locking plate including a transverse abutment edge and adapted to be inserted through said aperture, a locking pawl including a tongue portion adapted to engage said transverse abutment edge and laterally-extending fingers terminating in transverse rounded projections in engagement with a socket defined by the bottom wall and said one of said end walls to allow pivotal movement of said pawl, resilient means extending between said flanges of said side walls and said pawl and including a catch member in engagement with said one of said end walls to normally, yieldingly urge said pawl toward a latching position, a cover member overlying said base member and extending between the extremities of said flanges and having a handle portion extending beyond said one of said end walls, said cover member having a pair of downwardly-projecting legs with inwardly-projecting feet extending between said pawl and said bottom wall, said cover member also having a pair of transversely-extending side flanges and a pair of laterally-extending nibs engaging the underside of said flanges of said side walls, a flexible member extending through said side flanges and having a portion in engagement with said bottom wall and another portion in engagement with the other of said end walls and cooperating with said nibs to provide a pivotal mounting for said cover whereby pivoting of said cover causes said feet to lift said pawl to disengage said tongue portion from said abutment edge.

13. A buckle comprising a base member having a bottom wall with transversely-extending side walls and end walls, the side walls having inwardly-extending flanges, one of the end walls provided with a slot, said one of said end walls and said bottom wall forming a socket, a pair of stop tabs formed in said bottom wall and extending upwardly therefrom, a locking plate having a transverse abutment edge and adapted to be inserted in said slot, a latching pawl having a tongue portion extending toward said bottom wall and adapted to engage said transverse abutment edge, a rounded end portion in engagement with said socket and a portion in engagement with said stop tabs, a spring member between said pawl and said base member and normally, yieldingly urging said pawl toward said bottom wall, a cover member having pawl-engaging means extending between said pawl and said bottom wall and including laterally-extending nibs engaging the underside of said flanges, a cover spring member extending between said bottom wall and said cover and biasing said nibs into engagement with said flanges to provide a pivotal mounting for said cover mem-

ber while normally biasing said cover toward a closed position.

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