United States Patent

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[15] **3,649,999**

[45] **Mar. 21, 1972**

[54] REFLEX SEAT BELT BUCKLE

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[22] Filed: **May 22, 1969**

[21] Appl. No.: **826,965**

[52] **U.S. Cl.** **24/230**

[51] **Int. Cl.** **A44b 11/26**

[58] **Field of Search** ..... 24/230.1 T

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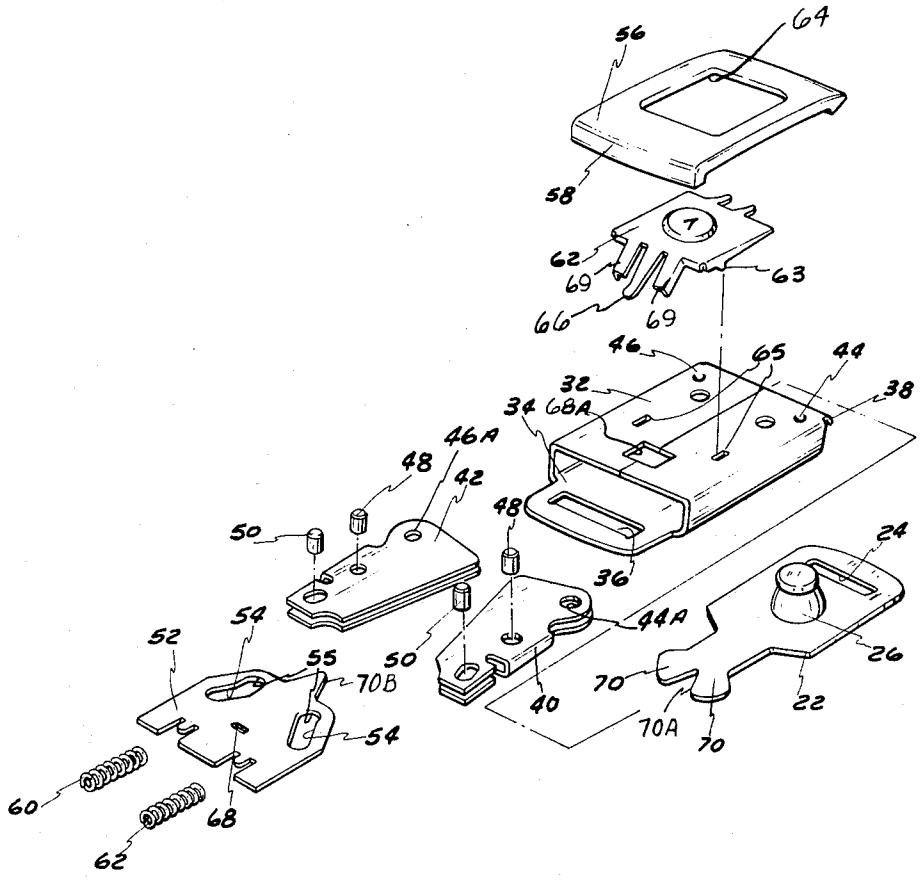
[57] **ABSTRACT**

A push button seat belt buckle having a tongue which is received in a buckle housing to connect a pair of belts together. As the tongue is being received, it moves a release plate toward a position in which a push button prevents the release plates return motion. The release plate, in turn, pivots a pair of latch members toward the tongue to prevent its removal from the housing. The tongue is released by operating the push button to free the release plate for its return motion which allows the latch members to be disengaged from the tongue by its removal from the housing.

3 Claims, 7 Drawing Figures



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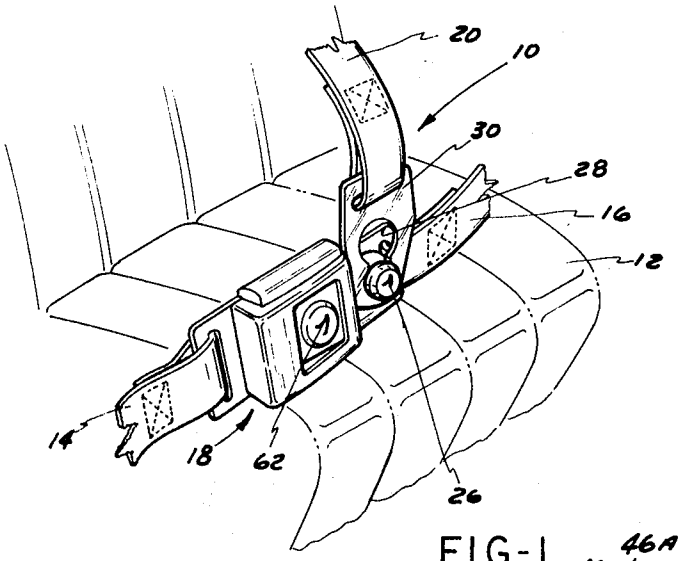

FIG-1

FIG-2

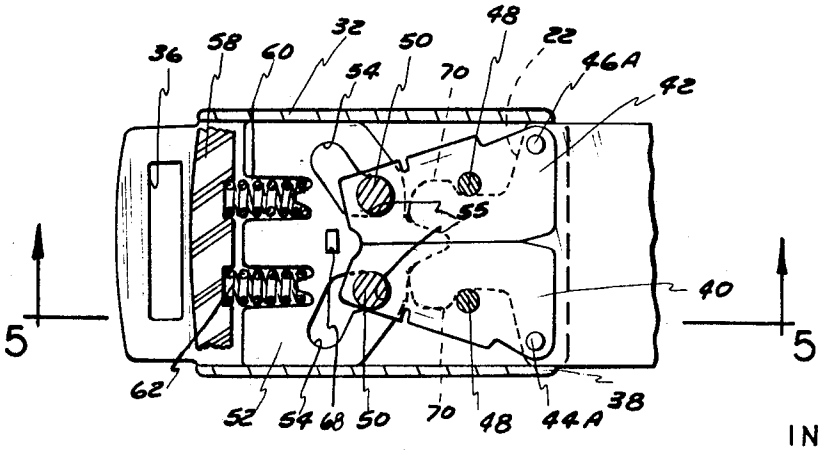

FIG-3

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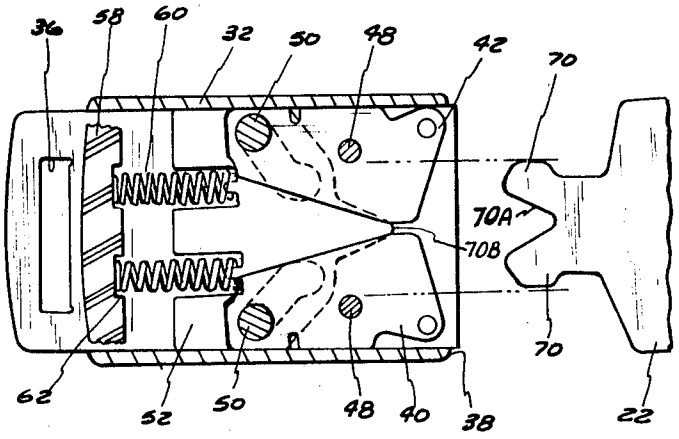

FIG-4

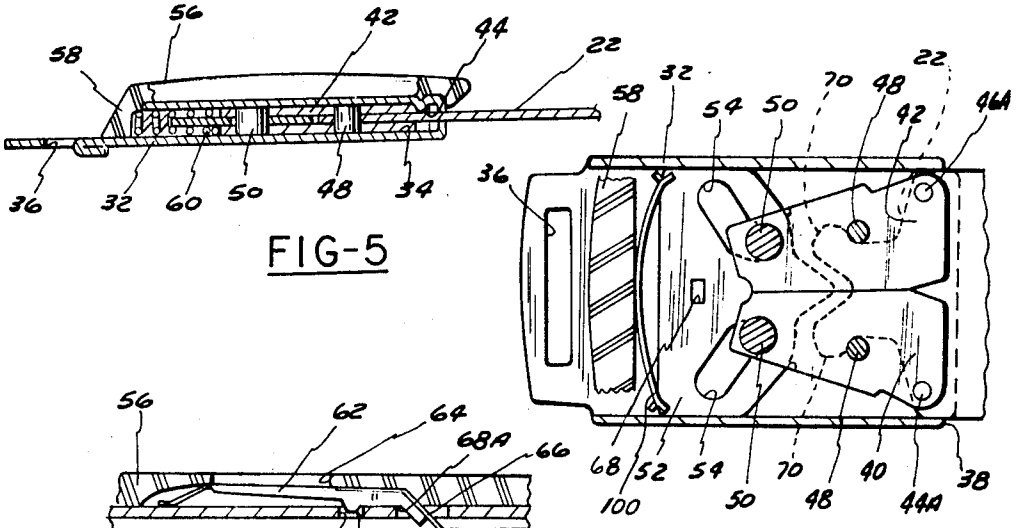

FIG-5

FIG-7

FIG-6

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REFLEX SEAT BELT BUCKLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is related to safety seat belt buckles, and more particularly to an assembly including a platelike tongue which is locked to a buckle housing by latch members that engage the tongue's side edges, and a push button for releasing the tongue from the housing.

2. Description of the Prior Art

Seat belt buckle manufacturers have endeavored to reduce the overall size of seat belt buckles while still retaining a reliable latching mechanism that can be released only in response to a deliberate release motion by the buckle user. One problem in developing a compact buckle housing is related to the space that is necessary to accommodate the motion of the latching mechanism. In addition, it is desirable to mount the release actuator such that it is not exposed in a manner which would permit accidental release. A push button actuator that is recessed within the housing and which is mounted for a release motion toward the housing base reduces the risk of an accidental release as compared to those release members that are pivoted away from a protected position within the housing, however, the housing must have a sufficient thickness to accommodate all of the push button motion.

Conventional buckle assemblies employ an actuator that is connected to the latch such that as the user operates the actuator, the latch is disengaged from the tongue by the motion of the actuator. Usually the latch is removed from an opening in the tongue, however, the prior art shows latches that engage the tongue's side edges, as in U.S. Pat. No. 3,311,188 to J. G. Gutshall.

A problem with such latch mechanisms is that the tongue's contact with the latch provides a load on the latch that must be overcome by an appropriate release effort on the actuator. In some cases, an effort of several pounds must be applied on the actuator in order to release the tongue.

SUMMARY OF THE INVENTION

The broad purpose of the present invention is to provide a seat belt buckle assembly in which the latch is disengaged from the tongue by the tongue's removal from the buckle housing, not by the motion of the actuator. One advantage of such a configuration is that the release effort necessary to operate the actuator is independent of the load that is being applied on the latch by the tongue.

In the preferred embodiment, the tongue is formed of a plate that is received through an opening in the buckle housing to form a connection between a pair of belts. As the tongue is being received by the housing, it moves a release plate toward a position in which it is retained against its return, release motion by the actuator. A pair of latch members are pivoted by the release plate toward the tongue's side edges to prevent its removal from the housing. When the release plate is connected to the actuator, the latch members are retained from being disengaged from the tongue.

To release the tongue, the actuator, preferably a push button, is depressed to free the release plate. The tongue is then removed from the housing in a motion in which its side edges move the latch members toward their release position. Thus, substantially all the motion of the latch members is in accordance with the motion of the tongue, either as it is being received into or removed from the housing.

Because the release effort that must be applied to the actuator is substantially independent of the load acting on the latch, the release effort can be predetermined to accommodate the user. In addition, the actuator of the preferred assembly is not subjected to inertial forces that may be developed under certain circumstances on the latch members because of their mass. This is because the latch members and the actuator move independently of one another, and because the actuator can be formed of a lightweight material having a low mass. Therefore, any tendency of the actuator to be accidentally released when the buckle is exposed to a shock is obviated.

Furthermore, the small distance that is necessary to depress the actuator allows the buckle to be formed with a thin configuration.

Other advantages of the invention will become readily apparent to those skilled in the art to which the invention pertains upon reference to the following detailed description.

DESCRIPTION OF THE DRAWINGS

The description refers to the accompanying drawings, in which like reference characters refer to like parts throughout the several views, and in which:

FIG. 1 is a perspective view showing a seat belt assembly having a buckle embodying the present invention;

FIG. 2 is a perspective view showing the components of the preferred buckle in exploded relationship;

FIG. 3 is a fragmentary plan view showing the tongue in its latched position;

FIG. 4 is a view similar to FIG. 3, but showing the latch means in its release position ready to receive the tongue;

FIG. 5 is a sectional view of the preferred buckle assembly taken along lines 5—5 of FIG. 3;

FIG. 6 is an enlarged view showing the push button and the manner in which it engages the release plate; and

FIG. 7 is a view similar to FIG. 4 but showing the buckle with an alternative spring bias member.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Now referring to the drawings, a seat belt assembly **10** is illustrated in FIG. 1 for use by the occupant of a vehicle seat assembly **12**. The seat belt assembly **10** comprises a pair of lap belts **14** and **16** which are releasably connected together by a buckle assembly **18**. Buckle assembly **18** also provides means for releasably connecting a shoulder belt **20** to the lap belts **14** and **16**.

As best shown in FIG. **2**, the buckle assembly **18** comprises a tongue **22** formed of a metal plate with an opening **24** for receiving the looped end of belt **16**. A stud **26**, carried on the tongue **22**, is receivable in a keyhole-shaped opening **28** formed in a plate **30**. Plate **30** is carried on the end of shoulder belt **20** and cooperates with stud **26** to form a connection between the shoulder belt and the lap belts.

A preferred buckle housing includes a metal base member **32** having a tubular configuration and a planar base surface **34**. One end of the base member **32** has an opening **36** for receiving the looped end of the belt **14**, and its other end has an opening **38** for receiving the tongue **22**.

A pair of links **40** and **42** are connected to the base member **32** on opposite sides of opening **38** by pivots **44** and **46** received in openings **44A** and **46A** formed in the links **40** and **42**. Pivots **44** and **46** are formed by depressions stamped in the top wall of the base member **32**. Each of the links **40** and **42** comprises a metal plate which is doubled to form a channel for receiving a lateral half of the tongue **22**.

Each of the links **40** and **42** carries a latch pin **48** and a release pin **50**. Since the two links are pivotal about axes which are perpendicular to the planar base surface **34**, the latch pines **48** and the release pins **50** are supported for motion parallel to the base surface **34**. The latch pins **48** are movable toward one another to a position in which the links **40** and **42** abut one another, as illustrated in FIG. **3**, and away from one another toward a position in which the links **40** and **42** abut the side walls of the base members, as illustrated in FIG. **4**.

A plate member **52** is slidably mounted in the base member and has a pair of slots **54** which receive the pins **50**. Each of the slots **54** is at an angle of about **45** degrees with respect to side walls of the base member **32** and has a short inner end **55** which is parallel to the side walls of the base member. The slots **54** are formed such that as the plate member **52** is moved away from the links **40** and **42**, the latch pins are moved toward one another until the two links **40** and **42** abut one another, as illustrated in FIG. **3**. The release pins **50** are then received into the parallel slot ends **55** by a further motion of

the plate member **52**. When the pins **50** are in slot ends **55**, a force tending to pivot the links **40** and **42** away from one another is transmitted through pins **50** to the release plate **52** and the side walls of the base member **32**. The release plate **52** must then be moved a small distance toward the links **40** and **42** in order to position the pins **50** in the slots **54**. The links **40** and **42** can then be separated to pivot the latch pine **48** away from one another.

A cover **56**, mounted on the base member **32**, has a tab **58** which extends across the open end of the base member **32**. A pair of springs **60** and **62** are disposed between the tab **58** and the plate member **52** to bias it toward the links **40** and **42**.

A resilient metal push button **62**, which acts as a release actuator, is mounted on the base member **32** and can be actuated through an opening **64** in the cover **56**. Side tabs **63** near one end of the button **62** are received in apertures **65** formed in the base member **32** to prevent the push button from being displaced parallel to the base member. A finger **66**, carried at one end of the push button **62** extends through a slot **68A** in the base member and abuts the plate member **52**. The finger **66** is received in an aperture **68** in plate member **52** to retain it from movement toward the links **40** and **42** when the latch members **48** are engaged with the tongue. Depressing the push button **62** rocks the button on the pivot points formed by the tabs **63** and pivots the finger **66** out of the aperture **68** to free the plate member for movement by the springs **60** and **62** toward the links **40** and **42**. A pair of resilient legs **69** on the push button are received in the slot **68A** to position the finger in the path of motion of the aperture **68**.

Now referring to FIGS. **3** and **6**, the tongue **22** has a side edge formed with a pair of laterally extending ears **70** which pass between the two latch pins **48** as the tongue is inserted through the opening **38**. As the tongue **22** is received by the base member, the forked end **70A** of the tongue mates with the pointed end **70B** of the plate member **52** and moves the aperture **68** toward the finger **66** of the push button. This motion of the plate member moves the links **40** and **42** toward one another, and the latch pins **48** toward the side edges of the tongue behind the ears **70**. A continuation of the tongue's motion after the latch pins **48** are behind the ears **70** moves the release pin **50** into slot ends **55** until the finger **66** of the push button is received in aperture **68** to prevent the plate member **52** from being moved a sufficient distance to separate the links **40** and **42** from one another. The latch pins **48** then prevent the tongue from being removed from the base member **32**.

To release the tongue **22**, the user depresses the push button **62** to pivot finger **66** out of the aperture **68** of the plate member **52**. The springs **60** and **62** then move the plate member toward the links **40** and **42** until the release pins **50** are disposed in slots **54**. The tongue **22** can then be removed from the base member **32** as the tongue's side edges move the latch pins away from one another.

Although the springs **60** and **62** bias the plate member **52** such that it tends to eject the tongue from the base member, they function primarily to move the plate member a sufficient distance to release the links **40** and **42** after the push button **62** is operated. This small travel can also be performed by a flat spring **100**, which is mounted, as shown in FIG. **7**, to replace springs **60** and **62**. Spring **100** allows a further reduction in the overall length of base member **32**.

Having described my invention, I claim:

1. In a vehicle seat belt assembly, a buckle assembly comprising:

a tongue having a forked end and formed of a plate having a side edge;

a base member having a planar surface and an opening for receiving the tongue in a position parallel to said planar surface;

a plate member having a pointed end for engagement with said forked end and slidably mounted on said base member for motion from a first position in which there is engagement with the side edge of the tongue to prevent its removal toward a second position allowing removal of the tongue from said opening, said member provided with an aperture;

bias means urging said plate member toward said second position;

a push button mounted on said base member for motion toward and away from said planar surface, said button provided with a finger for engagement in said aperture in said plate member locking said plate member against movement urged by said bias means, in said first position and whereby motion of said button toward said planar surface disengages said finger permitting said plate member to said second position allowing removal of the tongue from said opening.

2. The assembly as defined in claim **1**, in which said latch member is movable toward said first position by said tongue as said tongue is received by said base member.

3. The assembly as defined in claim **1** including a pair of side tabs provided on said push button for reception in a pair of apertures formed in said base member whereby said push button is prevented from being displaced parallel to said base member.

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