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
1 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 buckle housing 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 makes 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 over 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 belt.

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 pins 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
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 pin 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 moved 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.