

[54] SAFETY BELT BUCKLE

[75] Inventors: **Louis Romanzi, Jr.**, Milford; **James A. Gavagan**, Centerline, both of Mich.

[73] Assignee: **Irwin Industries, Inc.**, Greenwich, Conn.

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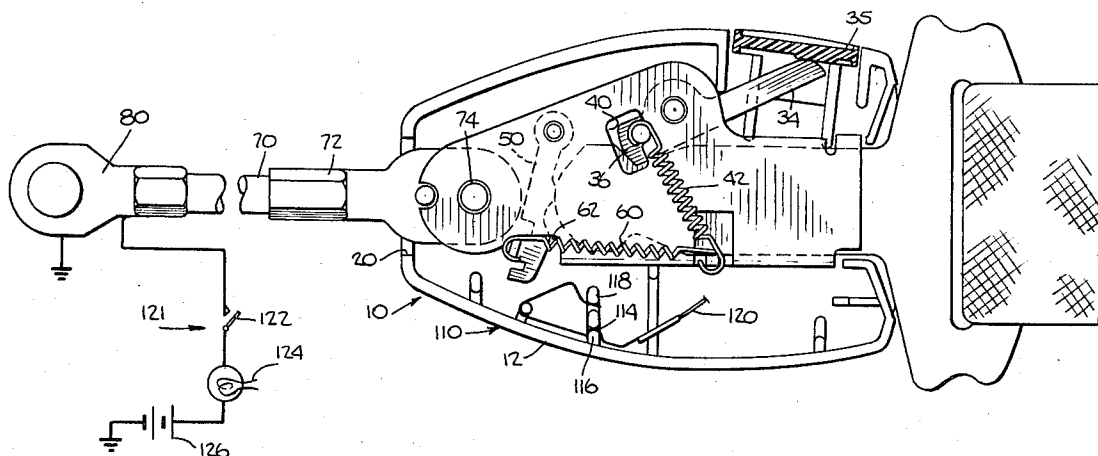
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Attorney, Agent, or Firm—Ryder, McAulay, Fields, Fisher & Goldstein

[57] **ABSTRACT**

A safety belt buckle is disclosed which has a receptacle with a tongue receiving passageway. A lock lever spring is loaded so that a lock end portion thereof is in the passageway to be contacted by the tongue when the tongue is inserted into the buckle. A spring loaded pivotally mounted ejection lever within the receptacle applies an ejection force on the tongue when the tongue is locked in the buckle. A switch is operated by the ejection lever to indicate the presence of a tongue in the passageway.

6 Claims, 4 Drawing Figures



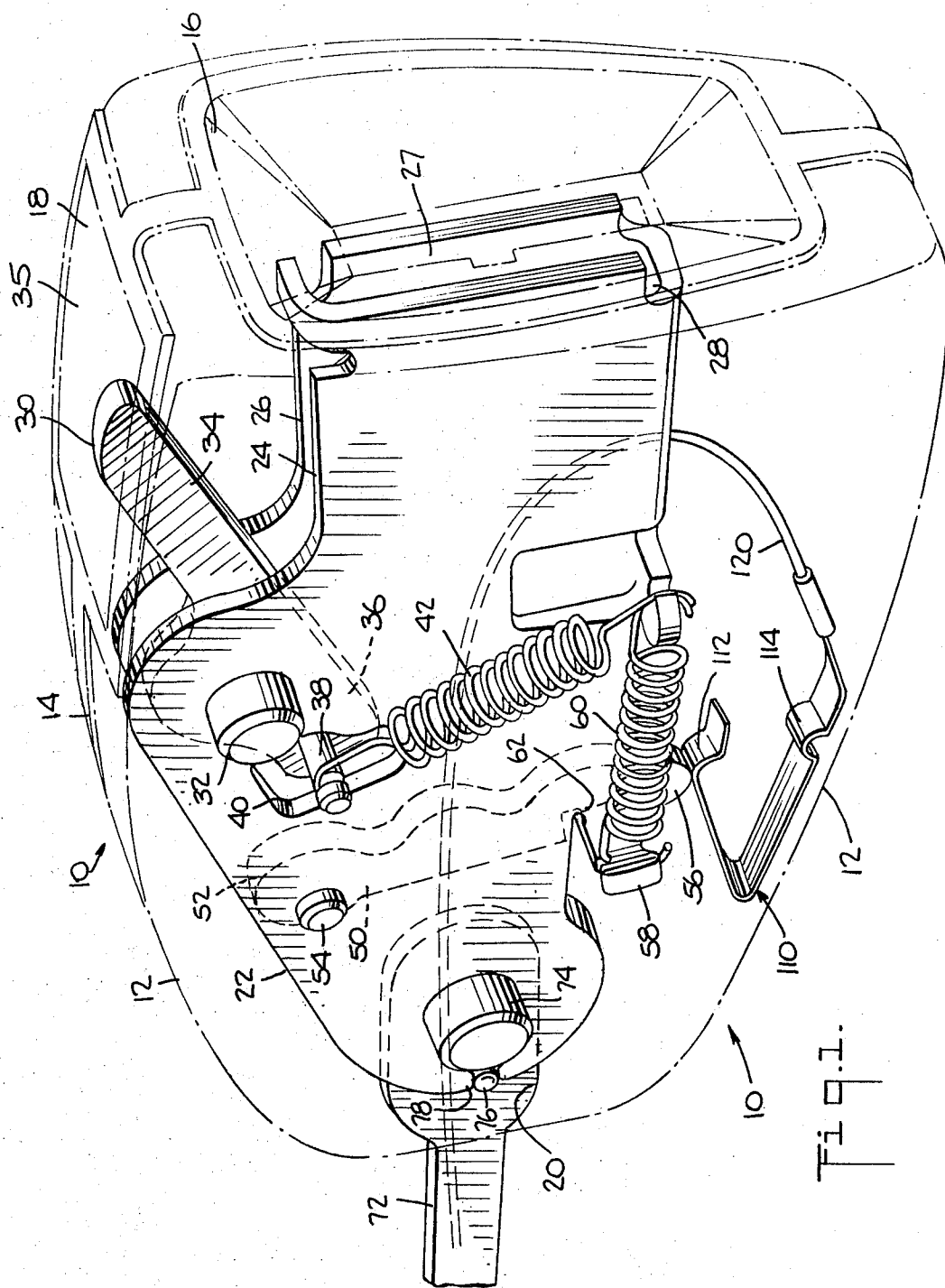
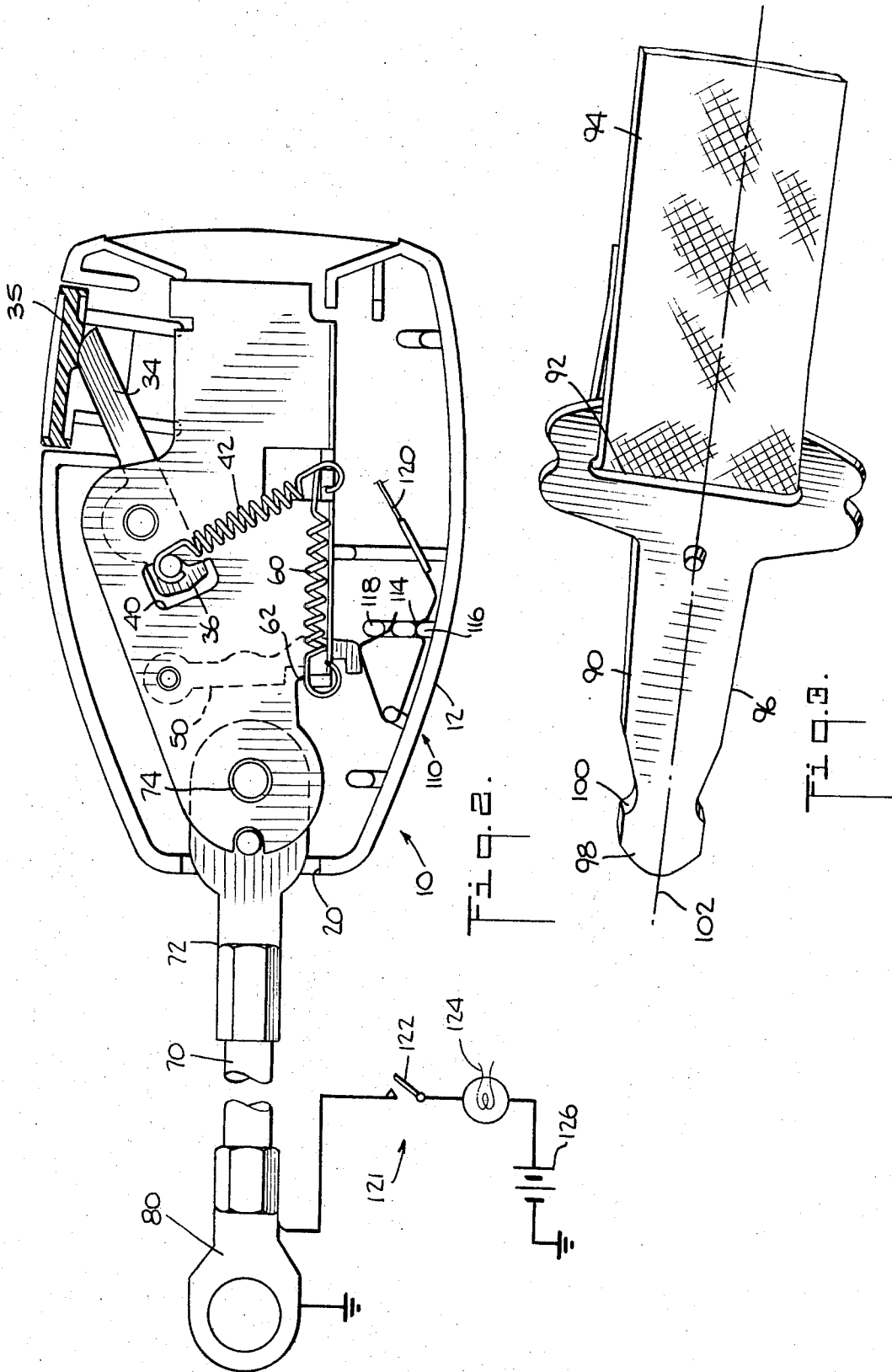
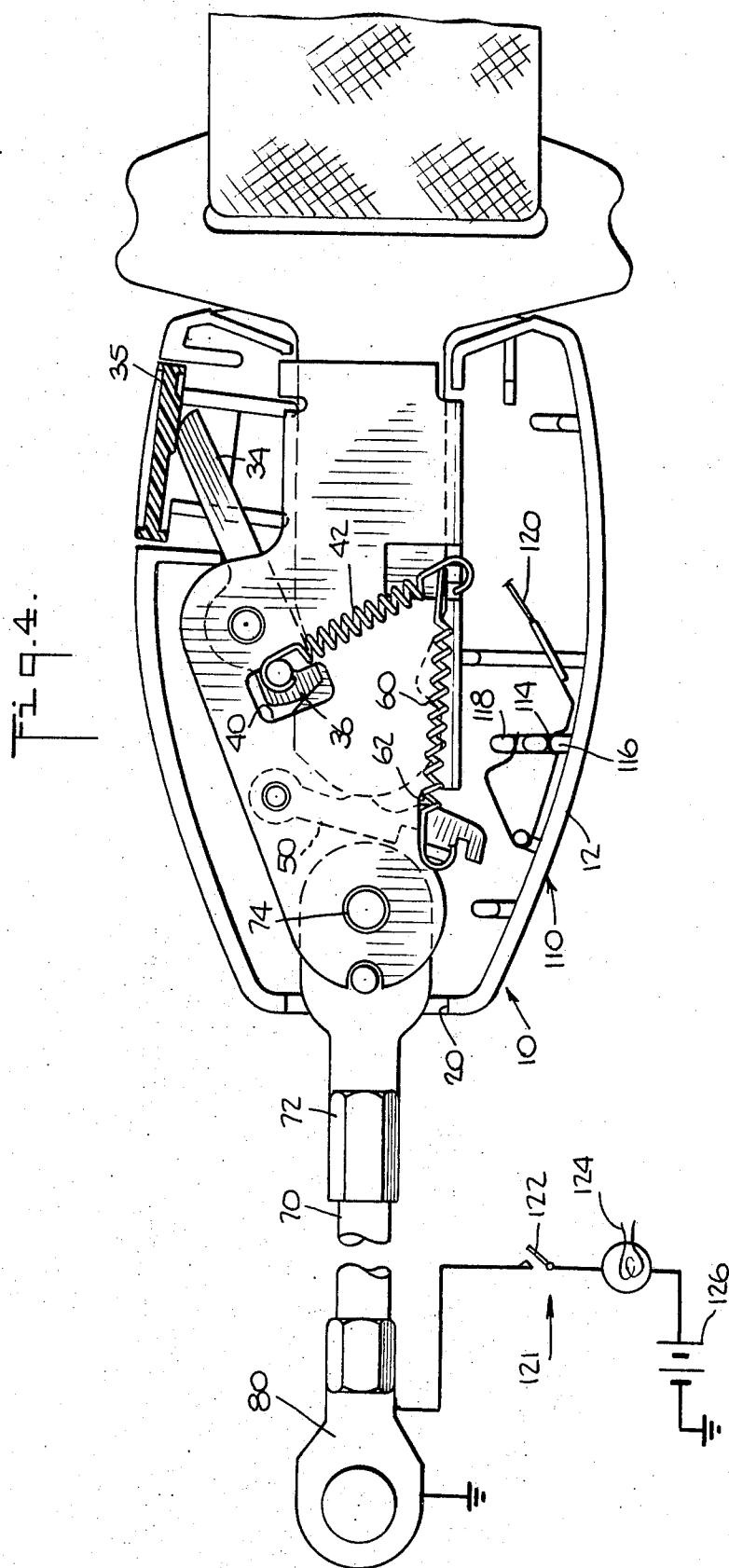


Fig. 1.





SAFETY BELT BUCKLE

BACKGROUND

This invention relates to seat belt or safety belt buckle assemblies, and, more particularly, to a buckle of the type mounted adjacent to the vehicle floor on the side of the passenger and adapted to lockingly receive a male member or tongue.

In order to encourage vehicle drivers and passengers to use seat belts it has been found necessary to simplify the method of fastening the belts about the passenger. One of the more commonly used seat belts is the type wherein a pair of straps or webbings are fixedly bolted to the floor of the vehicle on opposite sides of the passenger. One of the straps has a buckle adapted to receive a tongue which is mounted on the end of the other strap. The buckle and tongue are lockingly inter-engaged across the lap of the passenger by the passenger's inserting the tongue into the buckle.

Complaints have been raised about this type of buckle because it requires the use of two hands to lock the safety belt across the passenger and because some people object to having the buckle on their lap. The need to use two hands to engage this safety belt is particularly troublesome when a driver finds it necessary to loosen or unbuckle the safety belt while driving, such as to remove change from his pocket in order to pay a toll. He then finds it difficult to reconnect the tongue and buckle without removing both hands from the steering wheel.

A side mounted buckle of the type described herein includes a buckle mounted adjacent the floor of the vehicle on one side of the passenger and a tongue attached to a strap which in turn is fixedly mounted to the floor of the vehicle on the other side of the passenger. To lock the safety belt across the passenger's lap, the passenger need only take the tongue with one hand and insert it into the relatively rigid buckle mounted on the other side of him. This buckle is also usable with a shoulder and lap belt combination, wherein both straps are connected to a single tongue.

A preferred form of side mounted buckle permits easy insertion of the tongue into the buckle with the use of a single hand. Furthermore, the buckle should permit easy and quick release of the tongue at the command of the user. The buckle should also permit connection with the vehicle's electrical system so that appropriate signaling means can be used to indicate if the buckle is not in use. Such signaling means are required on automobiles in the United States. All of this must be accomplished with a buckle that is inexpensive to produce and install and which can withstand high forces without failure.

BRIEF DESCRIPTION OF THE INVENTION

Briefly described, this invention, in one form, includes a housing in which is mounted a metal receptacle adapted to receive a tongue connector having a recess therein. A lock lever is pivotally attached on the inside of the receptacle so that one end thereof is capable of projecting inwardly into the path of movement of the tongue when the tongue is inserted in the receptacle. The other end of the lock lever is accessible through an aperture in the housing so that it may be operated to release the lock lever when so desired. The

lock lever is spring biased into a position where it lockingly engages the tongue recess.

A second lever, namely an ejection lever, is pivotally mounted inside the receptacle in a position wherein it will be contacted by the tongue as it is inserted into the receptacle. The ejection lever is spring loaded in a direction which will effect ejection of the tongue upon release of the lever. The receptacle is connected to a cable which in turn is mounted on the vehicle.

When it is desired to equip the seat buckle with signaling capacity to facilitate use or disuse of the seat belt, a spring switch is mounted in the housing at a position wherein it is forcibly contacted by the ejection lever when a tongue is not inserted into the receptacle of the buckle. An electrical cable is attached to the switch for appropriate connection to suitable electrical circuitry which makes a signaling means, such as a light or buzzer, responsive to engagement of the ejection lever with the switch. When the tongue is inserted into the receptacle sufficiently far as to permit the lock lever to lockingly engage the tongue, the tongue forces the ejection lever against the biasing force of the spring, away from the switch, thereby opening the signal circuit indicating that the seat belt is being used.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention, its objectives and advantages, will be better understood from the detailed description below taken in conjunction with the drawings in which:

FIG. 1 is a perspective view of a seat belt buckle formed in accordance with this invention.

FIG. 2 is a sectional view of the buckle of FIG. 1.

FIG. 3 is a perspective view of a tongue connector used with the buckle of FIG. 1.

FIG. 4 is a sectional view of the buckle of FIG. 1 with the tongue connector inserted therein.

DETAILED DESCRIPTION

Throughout this specification and claims terms of relative position, such as front, back, side etc. are used with reference to the orientation shown in its drawings for simplicity of description and understanding but are not intended as limiting language.

The safety belt buckle 10 of this invention is formed with a housing 12 which may be fabricated out of plastic in two sections joined together along a longitudinal seam 14. The housing includes a tapered front opening 16, a side opening 18 and a rear opening 20. The shape and size of the housing 10 is such that a vehicle passenger can comfortably place his hand around it and place his thumb at the side opening 18 when the buckle is mounted in place as described below.

Fixedly mounted within the housing 12 is a receptacle 22 comprising a generally U-shaped member having spaced apart side walls 24, 26 forming a passageway 27 and a forwardly directed opening 28 at the front thereof in alignment with the opening 16 in the housing 12. A lock lever 30 is pivotally supported within the receptacle 22 by means of a pivot pin 32 extending between the receptacle's side walls 24, 26. The lock lever has a first portion 34 extending from one side of the pivot pin 32 and whose end is accessible through the side opening 18 in the housing 12. In a preferred form of this invention a button 35 is slideably mounted in the housing side opening 18 and contacts the end of the lock lever first portion 34. Depression of the button 35 causes the lock lever to pivot (clockwise in FIG. 2). In

another form of this invention the button 35 is eliminated and the lever 30 is exposed to the passenger. The other end of locking end 36 of the lock lever 30 extending from the opposite side of the pivot pin 32 resides within the receptacle 22 and is provided with an extension 38 which projects through an elongated aperture 40 in one of the side walls 24. A resilient means, such as a coil spring 42 is attached at one end to the lock lever extension 38 and at its other end to a projection 44 extending outwardly from the receptacle side wall 24. The coil spring biases the lock lever 30 toward a position wherein the first portion 34 of the lock lever extends outwardly toward the side opening 18 and the locking end 36 extends inwardly into the passageway 27 of the receptacle 22.

A second lever, referred to as an ejection lever 50, is pivotally mounted at one end 52 thereof within the receptacle 22 by means of a pivot pin 54 extending between the side walls 24, 26 of the receptacle 22. The ejection lever 50, adjacent the other end 56 thereof, has a sidewardly extending projection 58 extending therefrom to receive one end of a coil spring 60. The other end of the coil spring 60 is attached to the extension 44 projecting from the side wall 24 of the receptacle 22. The coil spring 60 biases the projection lever 50 in the direction toward the front opening 28 and into the passageway 27. A depending portion 62 of the side wall 24 prevents the spring 60 from pulling the ejection lever 50 forwardly beyond a desired point established by the depending portion 62.

The receptacle 22 is fixedly attached to a rigid mounting cable 70 by means of mounting plate 72 which is attached to the rear end of the receptacle 22 by any conventional fastening means such as a rivet 74. A pin 76 is provided on the mounting plate 72 to reside within a recess 78 formed in the rear end of the receptacle 22 in order to prevent relative rotation between the mounting plate 72 and the receptacle 22. The cable 70 terminates at its end remote from the seat belt buckle 10 with a conventional anchor strap 80 which is adapted to be bolted in a conventional manner to the vehicle. In this manner the seat belt buckle 10 is rigidly secured to the vehicle along the side of the vehicle seat and presents the forward opening 16 of the housing 12 facing upwardly making it easily accessible to the vehicle passenger.

A connector or tongue 90 designed to be used with the buckle 10 of this invention is illustrated in FIG. 3. The tongue 90 has an aperture 92 formed adjacent one end thereof to receive a safety belt strap or webbing 94 in a conventional manner. Extending forwardly from the aperture 92, the tongue is provided with an elongated flat shaft 96 ending in a head 98. Between the head 98 and shaft 96 is formed a recess 100 adapted to receive the locking end 36 of the lock lever 30. The tongue is generally symmetrical about a longitudinal axis 102 so that it may be inserted into the seat belt buckle 10 in either of two orientations.

Turning now to a comparison of FIGS. 2 and 4, operation of the seat belt buckle 10 and tongue 90 will be described. In FIG. 2 the buckle is shown without the tongue in place. It will be seen that the coil spring 60 forces the ejection lever 50 in to its forwardmost position in the passageway 27 while the coil spring 42 forces the lock lever 30 in position wherein the locking end 36 is at its downward most location in the passageway 27. To insert the tongue 90 into the buckle 10, the

passenger grasps the tongue 90, with one hand, pulls it across his lap and slides it into the housing opening 16. The tapered opening directs the tongue into the receptacle opening 18 and the tongue is then slid into the passageway 27. As the tongue 90 moves through the passageway 27 the tongue head 98 abuts against the locking end 36 of the lock lever 30 causing the lock lever 30 to pivot opposed to the coil spring force (in a clockwise direction as shown in FIG. 4) in order to permit the tongue 90 to be inserted further. As the tongue is pushed further into the buckle 10 the tongue head 98 abuts against the ejection lever 50 causing the ejection lever to pivot away from the front opening 16 of the buckle and in opposition to the force of the coil spring 60. The tongue 90 is continued to be forced in toward the rear of the buckle 10 until the locking end 36 of the lock lever 30 drops down into the recess 100 formed in the tongue 90. In this position the lock lever 30 locks the tongue in place preventing the tongue from being accidentally removed. In addition to the lock lever 30 being held in its locking position by the coil spring 42, the ejection lever 50 is forceably pulled against the head 98 of the tongue 90 causing the tongue to exert a force against the lock lever 30 in the direction tending to move the lock lever 30 toward its locking position (counter clockwise as shown in FIG. 4).

In order to release the tongue, the slideably mounted push-button 35 is depressed causing the lock lever 30 to pivot towards its release position (clockwise) removing the locking end 36 of the lock lever 30 from the recess 100 in the tongue 90. Upon removal of the lock lever from its locking position, the ejection lever 50 applies an ejection force on the tongue by virtue of the coil spring 60 forcing the tongue to move outwardly from the buckle 10 to a position at least wherein the recess 100 is displaced from the locking end 36 of the lock lever 30 to preclude relocking of the tongue within the buckle.

In a preferred form of this invention, the buckle is provided with signaling means to indicate when a passenger has not utilized the seat belt. Many signal systems are known to provide this indication, some of which involve logic circuitry to indicate when a particular sequence of events has or has not occurred such as a sequence including the seating of the passenger and then the buckling of the seat belt. Other known systems merely indicate when the tongue of the seat belt combination has been inserted into the buckle. The buckle 10 of this invention is provided with a switch enabling it to be used with many of the known signal circuits.

A switch 110, which is mounted within the buckle housing 12, is stamped from flat metal, such as copper, into a reverse bend in order to provide a spring contact 112. A depression 114 is formed in the base of the contact 112 to receive a nub 116 molded into the housing 12. The end of the contact 112 is snap fitted below another nub 118 formed adjacent to but spaced from the first hub 116 thereby locking the contact 112 in place. The contact 112 is located so that when the ejection lever 50 is in its normal forwardmost position (FIG. 2) it touches its contact 112. When the tongue 90 is inserted in the buckle 10 forcing the ejection lever 50 rearwardly, the ejection lever continues to touch the contact 112 until the tongue is far enough in to enable the lock lever 30 to lock the tongue in place.

An insulated electrical wire or cable 120 is attached to the end of the contact 112 and exits from the buckle housing 12 through the rear opening 20.

The receptacle 22 and ejection lever are stamped from an electrically conductive material as is the mounting plate 72 and cable 70 and anchor strap 80. Therefore, the ejection lever 50 is electrically connected to the vehicle chassis.

A typical circuit 121 with which the switch 110 can be used is shown in FIG. 2 where it can be seen that the electrical wire 120 is connected through an ignition switch 122 to a signal source 124 which, while shown as light, could be either a light, a buzzer or both. The circuit 121 further includes a battery 126 and is completed by the ejection lever 50 which is attached to the cable 70 which is electrically connected to the vehicle chassis which serves as ground.

With reference to FIG. 2, before the tongue 90 is inserted within the receptacle 92 the ejection lever 50 touches the contact 112 but the circuit 121 is not complete until the ignition switch 122 is closed. When a driver closes the ignition switch to start the vehicle the seat belt buckle circuit is completed and a light and/or buzzer are energized to indicate that the seat belt buckle is not in use. When the tongue 90 is inserted in the receptacle (FIG. 4) the head 98 of the tongue forces the ejection lever 50 away from the contact 112 thereby opening the seat belt buckle circuit 121. While only a simple warning circuit has been shown for illustrative purposes, it is clear that the buckle 10 with the switch 110 can be used for many different warning circuits.

What is claimed is:

1. A vehicle safety belt buckle comprising a receptacle having a first opening and a passageway to receive a tongue having a recess therein; mounting means for attaching said buckle to a vehicle; a lock lever pivotally supported between the ends thereof, said receptacle having a second opening through which a first portion of said lock lever is accessible, first resilient means biasing said lock lever toward a position wherein a second portion of said lock lever resides within said passageway, an ejection lever pivotally mounted and extending within said receptacle, said ejection lever being movable between a first position wherein said ejection lever is within said passageway and spaced from said first opening less than the length of said tongue and a second position which is further from said first opening than said first position; second resilient means biasing said ejection lever toward said first position, an electrical switch within said buckle, said ejection lever being in contact with said switch when in said first position, said switch being connected to a signal circuit to indicate when said ejection lever is in said first position.

2. A buckle as defined in claim 1 wherein said signal circuit comprises in series, the chassis of said vehicle, said mounting means, said receptacle, said ejection lever, said switch and a cable leading from said switch to an electrical power source and signal means.

3. In combination a vehicle safety belt buckle and tongue,

- a. said tongue being connected at one end to a safety belt and having a recess adjacent the opposite end thereof,
- b. said buckle including a receptacle having a first opening and elongated passageway to receive said tongue, mounting means for attaching said buckle

to a vehicle, a spring loaded lock lever pivotally supported between the ends thereof, said receptacle having a second opening through which a first portion of said lock lever is accessible, first resilient means biasing said lock lever toward a position wherein a second portion of said lock lever resides within said recess in the tongue when the tongue is in the passageway thereby locking said tongue in said receptacle, said first portion and said second portion of said lock lever being spaced from and on opposite sides of the pivot of said lock lever, a pivotally mounted ejection lever extending within said receptacle so that it is contacted by said tongue when said tongue is fully inserted in said passageway, said ejection lever being movable between a first position wherein said ejection lever is within said passageway and spaced from said first opening less than the length of said tongue and a second position which is further from said first opening than said first position, second resilient means biasing for clarity, said ejection lever toward said first position to eject said tongue when said lock lever is disengaged from said tongue recess, an electrical switch within said buckle, said switch being mounted at a location where (a) when said tongue is removed from said passageway said ejection lever is in contact therewith and (b) when said tongue is inserted into said passageway said ejection lever remains in contact with said switch until said second portion of said lock lever enters the tongue recess at which time the ejection lever no longer contacts said switch.

4. The combination of claim 3 wherein said buckle includes housing having a front opening aligned with said first opening and side opening and a slideable member mounted in said side opening and in contact with said first portion of said lock lever such that depression of said slideable member effects pivoting of said lock lever to a position wherein said second portion of said lock lever is removed from said tongue recess.

5. A vehicle safety belt apparatus comprising:

a belt buckle with a front opening and a passageway accessible through said front opening,

a tongue having a shaft and a first mating member on said shaft, said tongue normally being locked in said buckle when said shaft is inserted into said passageway a first predetermined distance,

a lock lever having a first portion and a second portion, said lever being pivotally mounted at a pivot point between said first and second portions,

said second portion having a second mating member, said lock lever being movable in a first rotational direction from a lock position to an unlatch position and in a second rotational direction from said unlatch position to said lock position,

a first spring biasing said lock lever in said second rotational direction about said pivot point,

said second mating member engaging said first mating member when said lock lever is in said lock position and when said shaft is inserted said first predetermined distance into said passageway to hold said tongue locked within said buckle,

the engagement between said mating members being such that when engaged, forces tending to move said shaft outward along said passageway further

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bias said lock lever in said second rotational direction,

a housing enveloping said buckle, said housing having a front opening aligned with said first opening and a side opening aligned with said first portion of said lock lever, said first portion of said lock lever ending within said housing,

a slideable member mounted in said side opening and in contact with said first portion of said lock lever, depression of said slideable member causing pivoting of said lock lever in said first rotational direction from said lock position to said unlatch position,

a pivotally mounted ejection lever, and

a second spring biasing said ejection lever in a rotational direction to bear against said shaft when said tongue is inserted into said passageway said first predetermined distance, the force exerted on said

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shaft by said ejection lever tending to move said shaft outward along said passageway,

said ejection lever moving, when said first portion of said lock lever is actuated, to a first position and forcing said shaft outward along said passageway to a position less than said first predetermined distance into said passageway.

6. The apparatus of claim 5 further comprising:

a switch within said buckle, said switch being mounted at a location where (a) when said shaft is removed from said passageway said ejection lever is in contact with said switch and (b) when said shaft is inserted into said passageway said ejection lever remains in contact with said switch until said shaft has entered said passageway said first predetermined distance.

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