

[54] SEAT BELT BUCKLE

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[52] U.S. Cl. .... **297/385**, 24/195, 24/196, 24/200, 24/201 HH, 24/201 B

[51] Int. Cl. .... **A44b 17/00**

[58] Field of Search ..... 24/201 HH, 230 SL, 194, 24/198, 75, 77, 236, 237; 297/386

[56] **References Cited**

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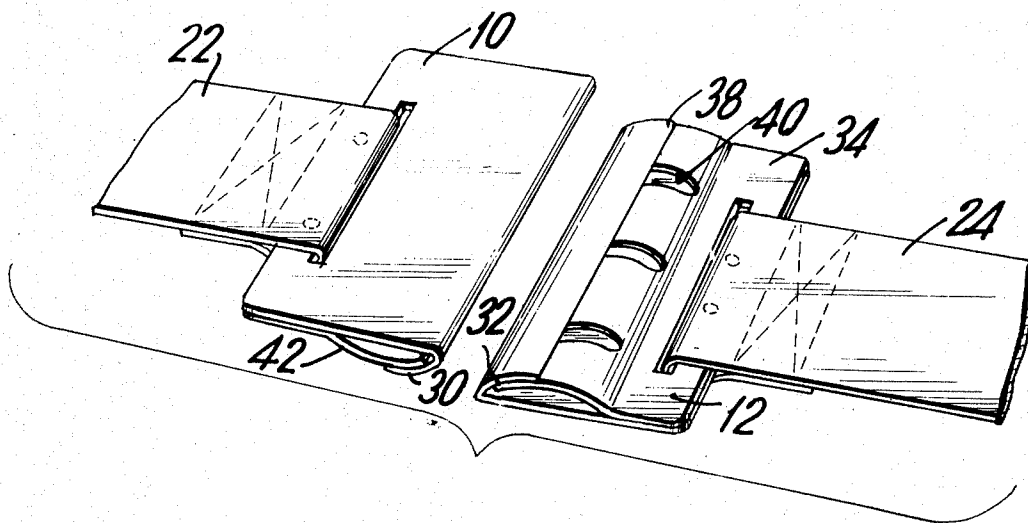
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*Primary Examiner*—Bobby R. Gay  
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[57] **ABSTRACT**

A seat belt buckle for use by occupants of vehicles including first and second metal members, and first and second belts respectively attached to said first and second members, said buckle being the fastening member of a seat belt assembly. The first member has a lip bent under the main portion of the first member and the second member has a lip bent over the main portion of the second member for mating with and engaging the lip of the first member. Magnetic or spring means are provided to hold the respective lips of said first and second members together when there is a lack of tension on the respective belts, and the mating engagement of the lips of the first and second members insures that the seat belt buckle will remain linked together when the respective belts are placed under tension.

**1 Claim, 13 Drawing Figures**



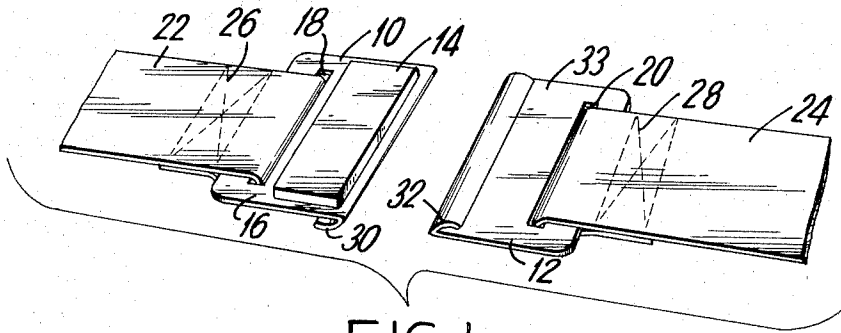


FIG. 1

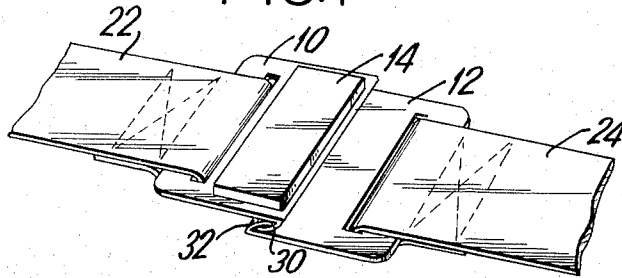


FIG. 2

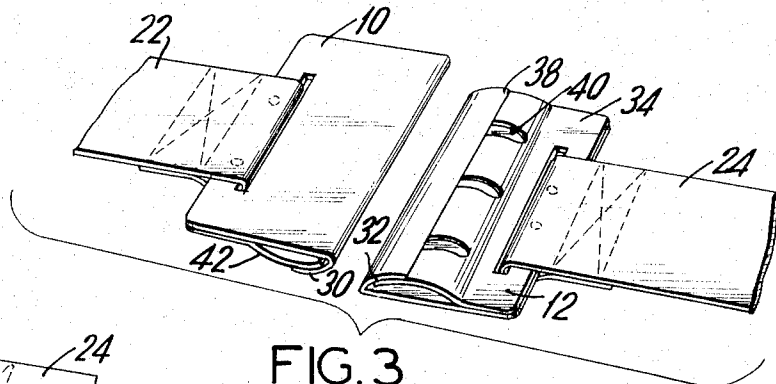


FIG. 3

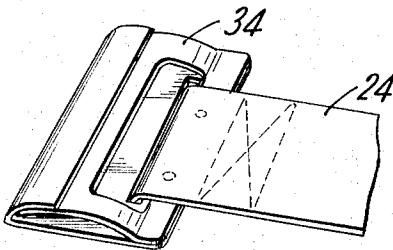


FIG. 4

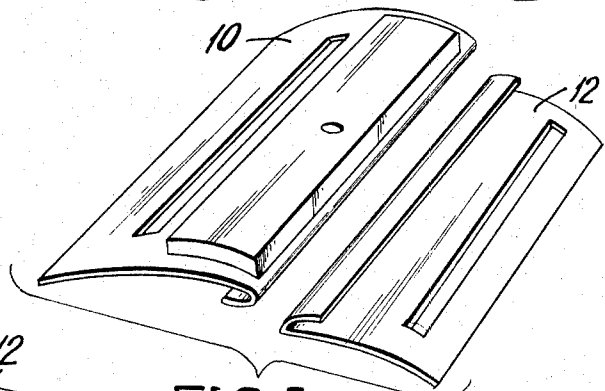


FIG. 5

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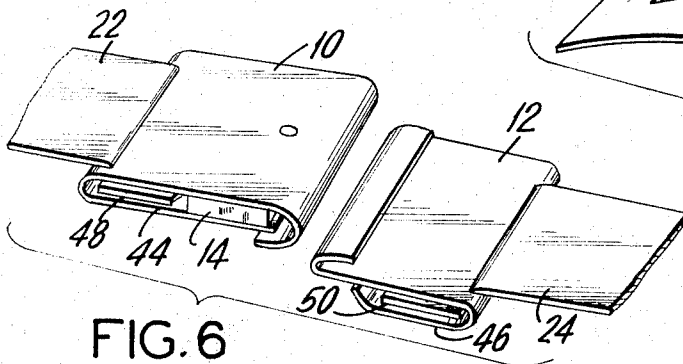


FIG. 6

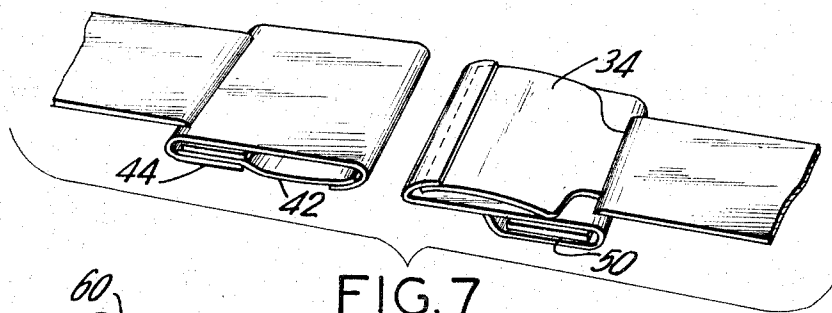


FIG. 7

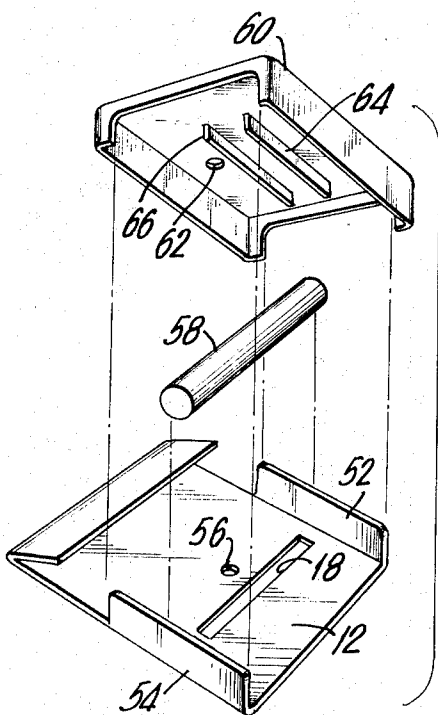


FIG. 8

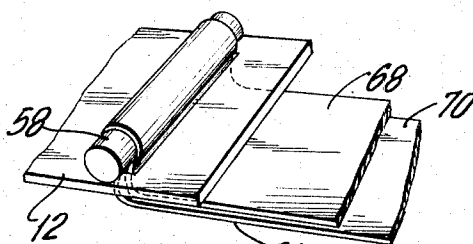


FIG. 9

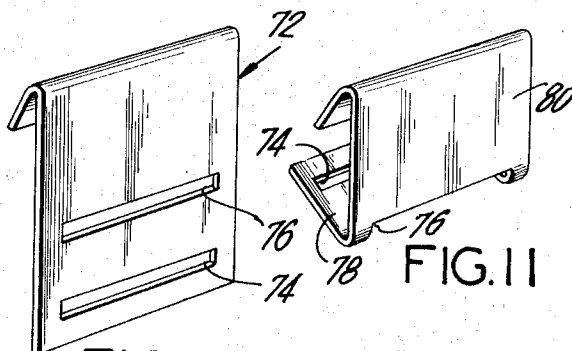


FIG. 10

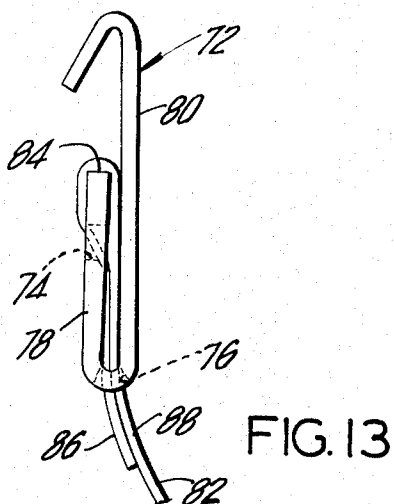


FIG. 11

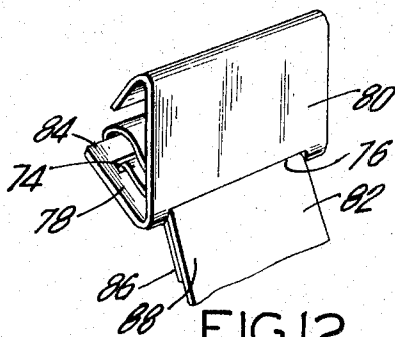


FIG. 12

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FIG. 13

## SEAT BELT BUCKLE

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to seat belt assemblies including a seat belt buckle for use by occupants of vehicles, and also to arrangements for adjusting the length of the belt used with the seat belt buckle.

## 2. Description of the Prior Art

Seat belt buckles presently used by the automobile and aircraft industry are bulky, clumsy and tend to require a sophisticated mechanism for fastening the belt buckle. The mechanism generally consists of a latching device which operates automatically when a tongue member having a slot at its front end is manually pushed into a buckle housing member, which housing member contains the latching device. The tongue must be forced sufficiently deep within the housing member in order that the spring loaded latching member will engage the slot in the tongue so as to hold the seat belt buckle assembly closed. The threading of the tongue into the housing member requires such precision that one must use two hands skillfully in order to close this device. Since it involves a certain amount of skill and effort, one may encounter some difficulty in mating and engaging the two buckle members and might very well be inclined not to fasten the seat belt at all. Furthermore, as often happens, the driver of a vehicle, after he starts driving, discovers that he has forgotten to fasten his seat belt. Once the car is in motion, due to the required skillful use of two hands when latching present seat belt buckles, it is unsafe for the driver to fasten the seat belt and thus the seat belt remains unfastened. If the driver does not fasten his seat belt, the other occupants of the vehicle usually do not.

Present seat belt buckles are generally disconnected by use of one of two types of unlatching mechanisms. One type of unlatching mechanism consists of lifting a lever to unlatch the buckle, and in the other type of seat belt buckle, a button on the face of the buckle member is depressed to unlatch the buckle.

The lever lifting release mechanism is activated when the lever is physically moved away from one's body, thus requiring an unobstructed area in which the arc, formed by the length and the movement of the lever, can be made. Therefore, if there is a serious accident, such that the space required for opening the seat belt buckle is obstructed, one would be unable to release himself, or be released, from the seat belt and thus from the car.

In the seat belt buckle containing the button release mechanism, the button is normally positioned below the face of the buckle so that one must place his finger on the button and press inward to disengage the buckle members. If one has a deformity such as arthritis in his fingers or is wearing gloves during cold weather, it can in fact become difficult to depress the button so as to disengage the buckle members.

In view of the number of parts necessary to fabricate the above type buckles and the accuracy of the components required, these buckles are expensive to manufacture.

## SUMMARY OF INVENTION

## 1. Purpose of the Invention.

It is therefore an object of this invention to provide for an improved seat belt buckle which is more easily fastened.

It is another object of this invention to provide a seat belt buckle which is more convenient to disengage.

It is still another object of this invention to provide a simply constructed and inexpensive seat belt buckle.

It is a further object of this invention to provide an arrangement for adjusting the length of a belt for use in a seat belt buckle.

Other objects of the invention will in part be obvious and in part be pointed out hereinafter.

## 2. Brief Description of the Invention

According to a broad aspect of the invention, there is provided a seat belt buckle for installation in a vehicle including first and second metal members, first and second belts respectively attached to said first and second members, said first member having a lip bent under the main portion of said first member, said second member having a lip bent over the main portion of said second member for mating with and engaging the lip of said first member, at least one of said members including means for holding the respective lips of said first and second members together when there is a lack of tension exerted on the first and second belts, whereby the mating engagement of the lips of said first and second members insure that said seat belt buckle will remain engaged until the respective belts are placed under tension.

A feature of the invention provides that the lips of the respective first and second members form a J-shaped groove with the main portion of the respective first and second members.

Another feature of the invention provides that the main portions of the first and second members may be curved to simulate the contours of an occupant's torso.

Still another feature of the invention provides that the holding means includes a formed spring having one end thereof fastened to at least one of said members, and the other end thereof positioned between the lip and main portion of said one member.

In still another feature of the invention, the holding means includes a permanent magnet attached to the main portion of at least one of said first and second members, and both of said first and second members being comprised of magnetically permeable material for matingly engaging and holding the lips of said first and second members together.

According to another aspect of the invention, there is provided an arrangement for adjusting the length of a belt for use with a seat belt buckle comprising a member having an aperture formed therein, a roller positioned over the aperture, said belt passes through the aperture fitting around said roller and exiting through the aperture, and a housing placed and fastened over said roller and the aperture, said housing being internally structured to allow sufficient lateral movement of said roller and belt.

A feature of the other aspect of said invention provides that the internal structure of said housing consists of a pair of ribs positioned parallel and spaced apart from said roller and belt.

According to a further aspect of the invention there is provided an arrangement for fastening a belt to a buckle member of a seat belt buckle, said buckle mem-

ber including first and second parallel slots, said buckle member being bent along said second slot and forming a lip extending from a remaining portion of said member, said belt having a portion extending through said second slot, around the outer edge of said lip, through said first slot and again through said second slot, said lip being sufficiently bent towards the remaining portion of said member to lock the portions of said belt therebetween.

According to a still further aspect of the invention, there is provided a method of fastening a belt to a buckle member of a seat belt, said buckle member having first and second parallel slots comprising the steps of bending said buckle member along said second slot to form a lip extending from the remaining portion of said member, passing said belt through said second slot, around the outer edge of said lip, through said first slot and again through said second slot, and pressing said lip sufficiently toward the remaining portion of said member to lock the portions of said belt therebetween.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings in which are shown various possible embodiments of my invention,

FIG. 1 is a perspective view of two unhooked buckle members containing magnetic holding means according to one embodiment of the invention;

FIG. 2 is a perspective view of the buckle members of FIG. 1 hooked together;

FIG. 3 is a perspective view of two unhooked buckle members containing spring holding means according to another embodiment of the invention;

FIG. 4 is a perspective view of a buckle member containing another type of spring holding means;

FIG. 5 is a perspective view of two unhooked buckle members which are curved to simulate the contour of an occupant's torso;

FIG. 6 is a perspective view of another embodiment of the buckle members shown in FIG. 1, which members include a reinforcement plate;

FIG. 7 is a perspective view of another embodiment of the buckle members shown in FIG. 3, which members include a reinforcement plate;

FIG. 8 is an exploded perspective view of a buckle member that will have a manually adjusted belt attached thereto;

FIG. 9 is a fragmentary perspective view of the belt assembled to the buckle member shown in FIG. 8;

FIG. 10 is a perspective view of a buckle member having two parallel slots formed therein;

FIG. 11 is a perspective view of the buckle member shown in FIG. 10, wherein the buckle member has been bent along the upper slot;

FIG. 12 is a perspective view of the buckle member shown in FIG. 11, wherein the belt is passed through the slots in the buckle; and

FIG. 13 is a side view of the buckle member shown in FIG. 12 wherein the belt is shown fastened to the buckle member.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, the seat belt buckle is shown to be comprised of buckle members 10 and 12. A magnet 14, such as a ceramic permanent magnet or an alnico permanent magnet, is fastened to the main portion 16 of buckle member 10. Although not shown, an addi-

tional or alternative magnet could be fastened to the main portion of member 12. Members 10 and 12 have respective slots 18 and 20 pierced therein for receiving respective belts 22 and 24. When one of the belts is automatically retractable, the belts can be simply attached to respective members 10 and 12 by stitching overlapping portions together as shown at 26 and 28, respectively, or in the other manners hereinafter described in this application. The automatically retractable feature can be provided by attaching one end of the belt to a spring loaded shaft, which shaft is mounted on the floor of the vehicle. Members 10 and 12 have respective lips 30 and 32 formed thereon. Lip 30 is bent under the main portion 16 of member 10 while lip 32 is bent over the main portion 33 of member 12. Lips 30 and 32 generally form an angle 30 degrees or less with the main portions of their respective members, wherein the optimum angle can be approximately 15° to 20° so as to place the respective lips in satisfactory mating engagement with one another. The shape of the lip bend in this example can be described as a J-shaped bend. Members 10 and 12 in this instance should be made of a satisfactory ferrous material such as steel having a thickness, for example, of approximately 3/32 inch.

To operate the seat belt buckle, member 12 is held or placed over the passenger's lap while member 10 is brought over buckle 12 until lips 30 and 32 are matingly engaged, as shown in FIG. 12. The means for holding members 10 and 12 together, when there is a lack of tension on belts 22 and 24, is provided by permanent magnet 14 and the magnetically permeable characteristics of the ferrous metal which comprises members 10 and 12. While magnet 14 provides sufficient magnetic force to hold lips 30 and 32 together when there is a lack of tension on belts 22 and/or 24, the matingly engaged position of lips 30 and 32 insure that the buckle assembly will not open when tension is applied to belts 22 and/or 24. To unfasten the buckle arrangement shown in FIG. 2, one need only to move member 10 toward member 12 until lips 30 and 32 are disengaged, or, alternatively, member 10 can be slid in the direction parallel to lips 30 and 32 until the respective lips are disengaged.

FIG. 3 shows an alternate means for holding lips 30 and 32 in mating engagement, when there is a lack of tension on belts 22 and/or 24. In this instance, the holding means is provided by a formed spring 34, which can have one end thereof affixed to the main portion 33 of member 12. Formed spring 34 has a section 36 which extends beyond the edge 38 of lip 32 and presses against lip 32 of member 12. The curved portion 36 of spring 34 may be provided with slots 40, which slots control the tension of the formed spring. Although not necessary, member 10 can have an identical formed spring 42 similarly attached to the underside thereof. Thus, when member 10 is positioned over member 12 so as to have lip 30 matingly engage lip 32, the curved portions of springs 34 and/or 42 will provide sufficient force to hold members 10 and 12 together when there is a lack of tension on belts 22 and/or 24. Referring to FIG. 4, formed spring 34, as shown, can be made without slots 40. Referring to FIG. 5 members 10 and 12 can be made to have a curve therein so as to simulate the contour of an occupant's torso.

FIG. 6 shows another embodiment of the seat belt buckle shown in FIG. 1. In this embodiment, members

10 and 12 have respective metal sections 44 and 46 extending therefrom and underneath the main portions of each of said respective members. Section 44 serves to lock belt 22 and plate 48 securely to buckle 10 and likewise section 46 serves to lock belt 24 and plate 50 securely to buckle 12 and, in this instant, section 44 in conjunction with the main portion 16 of member 10 serve to house permanent magnet 14 therebetween.

FIG. 6 also shows an alternate means for fastening belts 22 and 24 to respective members 10 and 12. In this example, belts 22 and 24 are slipped through the apertures in respective members 10 and 12, and are fastened to respective locking plates 48 and 50. The width of locking plates 48 and 50 is greater than the longitudinal dimension of respective apertures 18 and 20, so as to prevent respective belts 22 and 24 from becoming detached from respective members 10 and 12. FIG. 7 is another embodiment of FIG. 6 wherein permanent magnet 14 has been replaced by the formed springs 34 and 42 described above in reference to FIGS. 3 and 4.

If the automatic belt retracting member does not sufficiently take up the slack of the belt when the buckle is latched together, then it is necessary to manually adjust the belt length of one of the belts which are attached to one of the buckle members. FIG. 8 shows a plan view of the components used in the arrangement for manually adjusting the belt length. Member 12 is shown having slot 18 formed therein, and, member 12 has sidewalls 52 and 54 to control the location of the ends of the roller and to structurally reinforce the member. In this instance, member 12 will have a hole 56 formed and threaded within the main portion thereof. Roller 58, which is placed over slot 18, has a longer axial length and larger diameter than the respective length and width of slot 18. The sides of housing or cover 60 is designed to mate with the side walls of member 12 and is dimensioned to cover the belt adjusting arrangement when affixed to member 12. Housing 60 is internally structured so as to prevent roller 58 from moving excessively in the lateral direction. In this instance, housing 60 is provided with ribs 64 and 66 extending internally from the top wall thereof so as to be located parallel to the longitudinal axis of and spaced apart from the roller and belt. Ribs 64 and 66 are spaced sufficiently apart to allow the roller and belt assembly shown in FIG. 9 sufficient lateral movement so that belt adjustments operate satisfactorily. A screw passes through hole 62 and screws into threaded hole 56, which fastens housing 60 to member 12. If one would so desire, a permanent magnet or a formed spring could be placed on member 12 within housing 60 and could be conjointly fastened to member 12, using the same screw which passes through hole 62 and is screwed into hole 56.

FIG. 9 shows belt 24 passing through slot 18 in member 12 and around roller 58, and exiting again through slot 18. When both portion 68 and 70 of belt 24 are positioned parallel to member 12, the length of the seat belt can be shortened by pulling on the free end of the belt. Body pressure against the belt and the buckle will cause the belt to become tightly locked. When member 12 is positioned perpendicular to portions 68 and 70 of belt 24, the belt length can be adjusted by pulling on buckle member 12, thereby shortening the free end of the belt.

In the present art of fastening the belts to the buckle members, the belt is passed through a slot in the buckle member and the overlapping portions of the belt are stitched (sewn) together. FIGS. 10-13 show my invented method for fastening a belt to a buckle member, which method eliminates the stitching (sewing) together of overlapping portions of the belt. As shown in FIG. 10, buckle member 72 has first and second respective slots 74 and 76 formed therein. As shown in FIG. 11, buckle member 72 is bent along slot 76 so as to form a lip 78, which lip extends from a remaining portion 80 of buckle member 72. As shown in FIG. 12, belt 82 is passed through slot 76, around an outer edge 84 of lip 72, back through slot 74 and exiting through slot 76 so as to form overlapping portions 86 and 88 as shown. In FIG. 13, lip 78 is further pressed towards the remaining portion 80 of buckle member 72, until overlapping portions 86 and 88 of belt 82 are locked therebetween.

It should be noted that either the magnet or the formed spring, described above, provide a frictional force for holding lips 30 and 32 in mating engagement. That portion of lips 30 and 32 is engaged in a flat plane with the ends of the lips unobstructed so that either member 10 or 12 can be slid in opposite parallel direction parallel to lips 30 and 32 until members 10 and 12 are disengaged.

It thus is seen that there is provided a seat belt buckle which achieves the several objects of the invention and is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein described, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

Having now described the invention, there is claimed as new and is desired to be secured by Letters Patent:

1. A motor vehicle seat belt assembly comprising:
  - A. a first seat belt,
  - B. a second seat belt,
  - C. a first seat belt buckle member,
  - D. means for securing said first seat belt to said first seat belt buckle member,
  - E. a second seat belt buckle member,
  - F. means for securing said second seat belt to said second seat belt buckle member,
  - G. said first seat belt buckle member including
    - i. a first portion,
    - ii. a lip bent over said first portion of said first seat belt buckle member,
    - iii. a first two-ended formed spring of flat metal having one end fastened to said first portion of said first seat belt buckle member and the other end pressing against the under side of the lip of said first portion of said first seat belt buckle member.
  - H. said second seat belt buckle member including
    - i. a first portion,
    - ii. a lip bent under said first portion of said second seat belt buckle member,
    - iii. a second two-ended formed spring of flat metal having one end fastened to said first portion of said second seat belt buckle member and the other end pressing against the under side of the

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lip of said first portion of said second seat belt buckle member,

- I. all of said first portions, lips and springs being of uniform and the same widths,
- J. said buckle members being mutually interengage- 5  
able with the lip of each member entering between the lip and spring of the other member,
- K. said springs pressing the lips together in a direc-  
tion perpendicular to said first portions to prevent  
relative disengaging movement of said members in 10

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a direction parallel to the length of said seat belts when there is a lack of tension exerted on said belts,

- L. the interengagement of said lips maintaining said members in mating relationship when the belts are placed under tension but allowing said members to be disengaged by relative sliding movement of said members in a direction perpendicular to the lengths of said belts.

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