Aug. 22, 1967 R. A. HUNTER 3,336,641

BUCKLE STRUCTURE

Filed Jan. 6, 1966

FIG-1

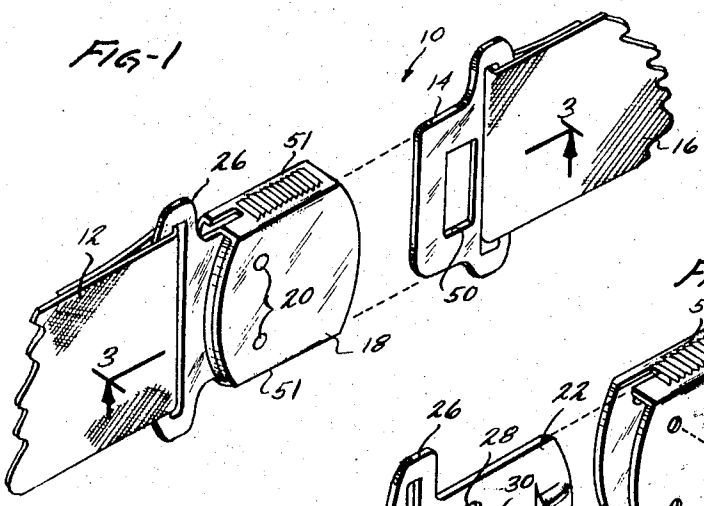


FIG-2

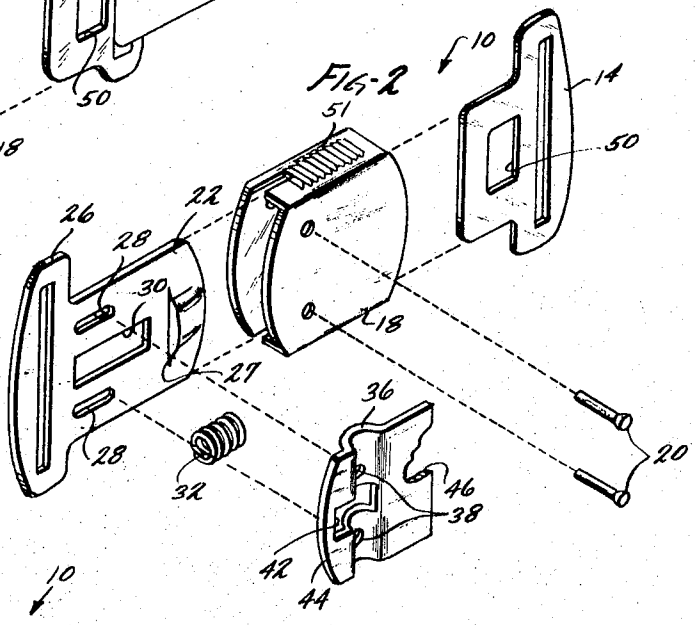


FIG-3

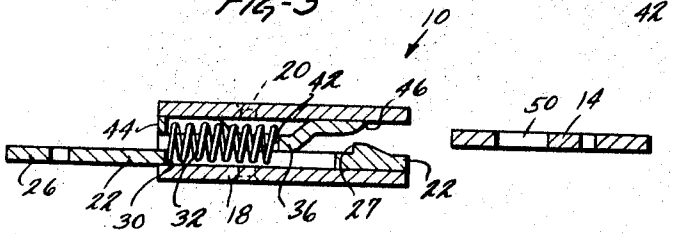


FIG-4

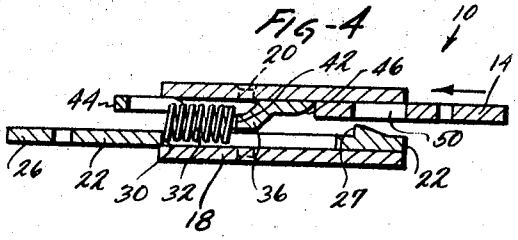


FIG-5

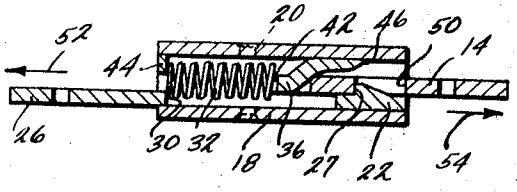
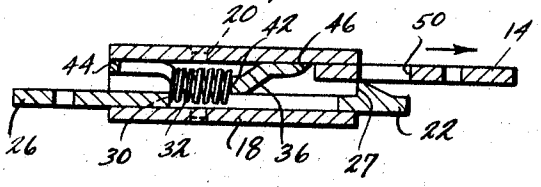


FIG-6



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BUCKLE STRUCTURE

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The present invention relates to buckles as for use on seat belts and more particularly to a buckle that is positive locking yet safe, economical and simple to use.

In recent years, public recognition of the protection provided by seat belts in automobiles, has accounted for very general use of such belts. Of course, such belts have also been in widespread use for many years in aircraft, speed boats and the like. As a result, a wide variety of different belt buckle structures have been proposed over the years. However, a need continues to remain for a buckle structure of universal acceptance.

A seat belt buckle should possess certain characteristic features. Specifically, it should be positive locking (not spring held), it should be simple to operate and of basically sturdy design. Furthermore, a snapping lock with an audible "click" on closure is desirable to signal the user. Still another desirable feature for a seat belt buckle is that it be releasable by using only one hand, as in an emergency. Of course, in addition to these features simplicity of design is always important both as related to reliability and to economy of production.

Accordingly, it is an object of the present invention to provide an improved buckle, as for seat belt use, which generally possesses the desirable characteristics for such buckles as considered above.

Another object of the present invention is to provide an improved buckle structure which is positive locking, rugged, simple to operate and yet capable of being embodied in a unit which can be very economically manufactured.

Still another object of the present invention is to provide an improved seat belt buckle which has relatively few parts, which can be manufactured without expensive tooling or the like.

One further object of the present invention is to provide an improved seat belt buckle which has a clean unobstructed appearance, and which is simple in use and manufacture, yet rugged and positive-locking.

Additional objects and advantages of the present invention will become apparent from a consideration of the following description taken in conjunction with the accompanying drawings which are presented by way of example only and are not intended as a limitation upon the scope of the present invention as defined in the appended claims, and in which:

FIGURE 1 is a perspective view of a buckle structure constructed in accordance with the present invention;

FIGURE 2 is an exploded view of the structure of FIGURE 1;

FIGURE 3 is a sectional view of the structure of FIGURE 1 taken along line 3—3;

FIGURE 4 is a sectional view similar to FIGURE 3 illustrating engagement of the buckle structure;

FIGURE 5 is a sectional view similar to FIGURE 3 illustrating the buckle structure engaged; and

FIGURE 6 is a sectional view similar to FIGURE 3 illustrating disengagement of the buckle structure.

Referring now to FIGURE 1, there is shown a female clasp **10** affixed to one belt end **12** and a male coupling **14** affixed to another belt end **16**. As shown, the clasp is simple and clean. To engage the coupling **14** to the clasp **10**, the former is simply inserted into the latter. Stress applied across the belt ends **12** and **16** will then be supported by the buckle structure remaining wedded. Disengaging

the coupling **14** from the clasp **10** is simply and easily accomplished by merely applying a separating force between the central body of the clasp **10** and the coupling **14**. Recapitulating, the mated buckle structure will support forces applied between the belt ends **12** and **16**; however, the structure easily disengages upon application of a force between the body of the clasp **10** and the coupling **14**.

Considering the structure in greater detail, the clasp **10** includes a flat housing **18** (FIGURE 2) defining a flat space with opposed open ends. A pair of slidable members are then affixed in the housing by rivet pins **20**. Specifically, a hook member **22** and a latch member **24** are held slidable relative the open ends of the housing by receiving the pins **20** transversely through elongate slots. These pins are riveted in the housing **18**.

The hook member **22** is of flat, generally-rectangular configuration with a belt-coupling integral loop **26**. At the end of the member remote from the loop **26**, there is formed a catch or hook **27** which is raised from the flat hook member **22**. A pair of slots **28**, through which the pins **20** extend are separated by a larger slot **30** in which a coil spring **31** dwells.

The hook member slides in flat surface engagement against one wall **32** (FIGURE 3) of the housing **18**. The opposed wall of the housing **34** is contiguous to a slidably mounted latch member **36** (FIGURES 2 and 3). The latch member defines parallel slots **38** which receive the pins **20** and a longer central slot **40** which mates with the slot **30** in the hook member to receivably contain the coil spring **31**. The latch member **36** is of a flat U shape in section, providing a central section **42** carrying the spring **31**, and extending flat end sections **44** and **46**, of which the section **46** is somewhat beveled.

In the operation of the structure, the coil spring **31** holds the hook member **22** and the latch member **36** in a central position, however, the spring is yieldable to permit the hook member **22** to be moved to the right as shown) and the latch member to be moved to the left. Thus, the coupling **14** is engaged to the clasp **10** by forcing the latch member **24** to the left relative the housing **18**, and is released from the clasp by forcing the hook member to the right relative the housing **18**.

The coupling **14** may take various forms; however, as shown it simply comprises a thickness of metal, for example, with the actual coupling section integrally formed with an elongate loop section **49** for attachment to a belt end as shown. The belt ends **12** and **16** can be attached to the loop section by stitching or otherwise as well known in the prior art.

In producing the structure illustratively described herein, the component parts may be relatively simply formed as by stamping from rather heavy sheet metal stock, for example. Specifically, the hook member **22** can be stamped or punched to simultaneously provide the slots and the hook **27** therein. The coupling **14** and the latch member **36** can be similarly formed, as may the housing **18** by the addition of a forming step to form the housing into a rectangular closure. Grip surfaces **51** (FIGURE 1) at the sides of the housing can be formed as by grooves or other knurling either during stamping or forming of the housing.

The components of the clasp **10** can be easily assembled, simply by mating the hook member **22** to the latch member **24**, with the spring **32** in the slots therein, then placing those units into the housing **18** and setting the rivet pins **20**. Of course various other forms of pin fasteners can be employed rather than the rivet pins **20** as generally well known in the prior art.

Considering the operation of the buckle structure in detail, the unwed clasp **10** and mating coupling **14** are shown in FIGURE 3. To couple these members, the coupling

14 is forced into the clasp **10**, slidably displacing the latch member **36** to the left (FIGURE 4) against the force of the spring **32**. When the latch member **36** is moved sufficiently to the left, the attachment coupling **14** drops downward with an audible snap receiving the hook **27** in a mating hook opening **50** in the coupling **14** (FIGURE 5). In this manner, the members are wedded and it is to be noted that forces applied as indicated by the arrows **52** and **54** in FIGURE 5, are unyieldingly supported by the buckle structure. This support results because of the positive engagement between the hook opening **50** in the coupling **14** and the hook **27** in the hook member **22**. Therefore, the buckle can be designed to support virtually any practical load.

To release the buckle, the coupling **14** is pulled or urged to the right, as shown in FIGURE 6, however, the force is applied not with respect to the hook **27**, but with respect to the housing **18**. As a result, the hook member **22** is slidably displaced to the right, overcoming the force of the spring **32**, so that the hook **27** is moved clear to the latch member **36** and the coupling **14** may easily slide out of engagement with the clasp **10**.

In the operation of the buckle structure, the engagement and disengagement occurs quite smoothly and is easily accomplished. In this regard, the beveled end section **46** and the somewhat rounded end of the coupling **14** assists in sliding the members together. In separating the members, it is to be noted that the hook **27** is slightly tapered to rearward, thus enabling the coupling **14** to raise therefrom.

Somewhat related to the ease with which the buckle can be mated and released, is the consideration that the releasing operation can be performed with one hand, as in the event of an emergency. This simply involves holding the housing **18** in the hand while urging the coupling **14** away from the housing, say with the thumb and one finger.

Another important feature of the invention resides in the simplicity with which structures embodying the invention can be produced. Specifically for example, the described clasp embodiment includes only four basic operating parts. With simplicity of this degree, the structure may be made very strong, durable and reliable.

Of course, as stated, various means can be employed with the basic structure hereof for attaching the buckle to belt ends and such devices can readily include adjustment means to vary the length of useful belt if desired.

These and other important features and advantages of the present invention will be apparent to those skilled in the art of buckles and the like, and furthermore various other structural embodiments hereof will also be apparent to such persons. Therefore, it is emphasized that the

present invention is not to be limited in accordance with the foregoing illustrative example but shall be determined in accordance with the claims set forth below.

What is claimed is:

1. A buckle structure as for releasably locking two belt ends together, comprising:

a housing defining a channel of rigid walls with opposed open ends;

a hook member slidably affixed contiguous one wall in said channel for movement between said open ends of said channel;

a latch member slidably affixed contiguous another wall in said channel opposed to said one wall for movement between said open ends of said channel;

a coil spring means fixed in a space defined by mating recesses in hook member and said latch member, for urging said first hook member and said latch member in closed relationship between said opposed walls of said channel; and

a hook engaging coupling member insertable into said channel by forced displacement of said latch member relative to said hook member and releasable therefrom by forced displacement of said hook member relative said latch member.

2. A structure according to claim **1** wherein said housing comprises a substantially flat rectangular closure defining external grip surfaces.

3. A structure according to claim **1** wherein said hook member comprises a substantially flat plate of somewhat rectangular configuration and said hook-engaging coupling member comprises a substantially flat plate defining an opening for engagement with said hook member.

4. A structure according to claim **3** wherein said hook member and said coupling member each include means for affixing a belt thereto.

5. A structure according to claim **1** wherein said hook member and said latch member are affixed to said housing by common pin means extending through elongate slots in said hook member and said latch member and fixed in said housing.

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