Oct. 26, 1965 A. G. CARTER ETAL 3,213,503

BELT-ADJUSTMENT DEVICE

Filed May 31, 1962 2 Sheets-Sheet 1

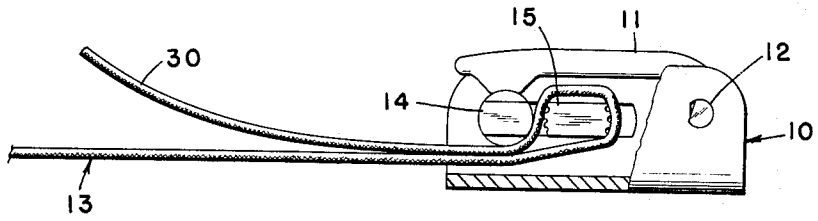

FIG. 1

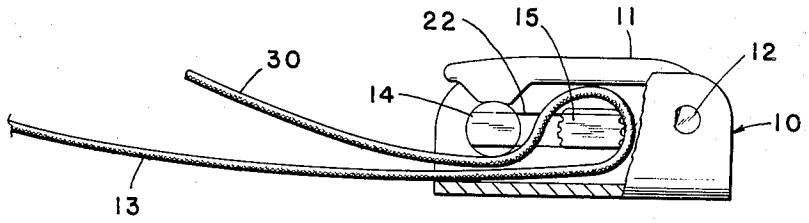

FIG. 2

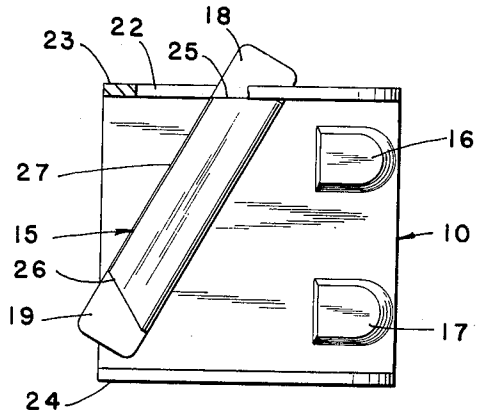

FIG. 3

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BELT-ADJUSTMENT DEVICE

Filed May 31, 1962 2 Sheets-Sheet 2

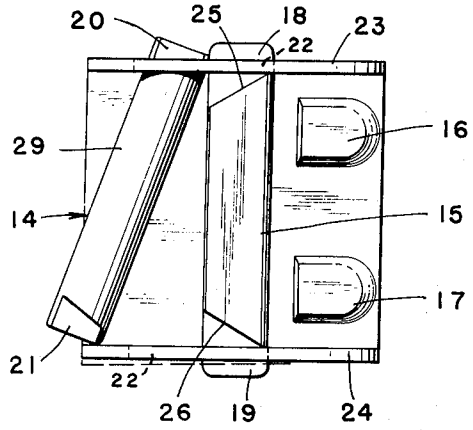

FIG. 4

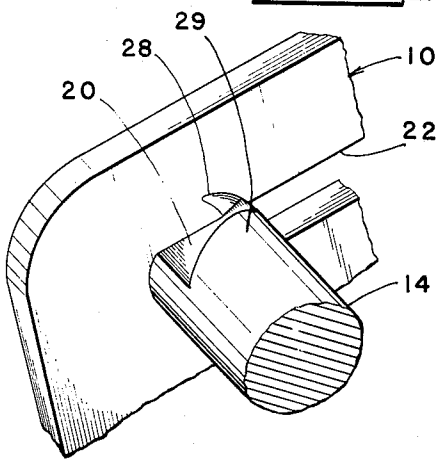

FIG. 5

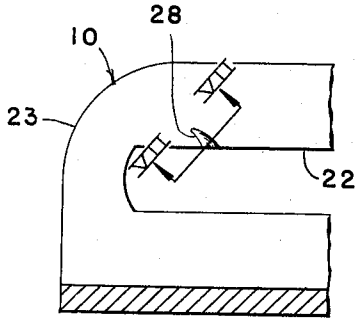

FIG. 6

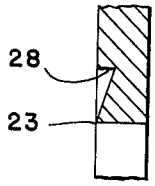

FIG. 7

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BELT-ADJUSTMENT DEVICE

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Filed May 31, 1962, Ser. No. 198,965
3 Claims. (Cl. 24—196)

This invention relates to the construction of belt buckles, and particularly of the portion of these devces which forms an adjustable connection for the belt. Thus invention has been developed primarily in conjunction with safety belt equipment, and the need for adjustment of belt length to suit the needs of the individual user requires a device capable of simple manipulation and secure engagement. The cost is also a very important factor, since the increasing use of safety belt equipment is producing highly competitive manufacturing and marketing conditions.

The use of spaced parallel bars to provide an adjustable belt terminal is well-known. Normally, these bars are mounted so that one of them is capable of sliding toward the other, and the belt material is inserted in such a manner that tension will urge the movable bar toward the fixed bar to produce a jamming action capable of increasing the frictional engagement with the belt material to a point sufficient to resist belt tension without slippage. The present invention provides a device functioning within these general principles, the central significance of the invention being in the formation of the components for simplicity of assembly. The invention is intended for use in conjunction with a buckle frame having at least a portion which is channel-shaped in cross section to provide opposite sides supporting the bars engaged by the belt. A structural resilience of the frame material is utilized, in that some degree of deflection of the sides of the frame is required in order to admit the bars during the assembly procedure. This resilience is also utilized in providing a latch-type function in maintaining the fixed bar in its fully-assembled position. The several features of the invention will be analyzed in further detail through a discussion of the particular embodiment illustrated in the accompanying drawings. In the drawings:

FIGURE 1 presents a fragmentary sectional elevation of a buckle embodying this invention, with the belt-adjustment device in the normal load-carrying position.

FIGURE 2 presents a fragmentary sectional elevation on a plane similar to that of FIGURE 1, showing the relaxed position of the buckle used to increase the length adjustment.

FIGURE 3 shows a plan view, partially in section, of the first stage of the insertion of the floating bar of the device.

FIGURE 4 illustrates the procedure for inserting the fixed bar of the device.

FIGURE 5 is a fragmentary section on an enlarged scale showing the arrangement for locking the fixed bar in position.

FIGURE 6 is a section on an enlarged scale illustrating the discontinuity of the frame used for locking the fixed bar in position.

FIGURE 7 is a section on the plane VII—VII of FIGURE 6.

Referring to the drawings, the buckle illustrated in FIGURES 1 and 2 has a frame generally indicated at **10** in which an actuating handle **11** is pivotally mounted on the shaft **12** to control a latch mechanism (not shown). A belt **13** is interengaged with the fixed bar **14** and the floating bar **15** to produce a jamming action sufficient to

resist the tension in the belt **13** without slippage. The forces of belt tension are transmitted through the frame **10** to the opposite side of the buckle assembly (not shown) at the abutments **16** and **17**.

The end extension **18** and **19** of the floating bar **15**, and the end extensions **20** and **21** of the fixed bar **14**, are received in opposite aligned slots **22** in the sides **23** and **24**, respectively, of the frame **10**. The end-extensions **18–19** and **20–21** are both formed as sections of reduced thickness of the respective bars, with the thickness dimension being selected to be slidably received within the slots **22**. The extensions **18** and **19** terminate on surfaces **25** and **26**, respectively, which are in planes inclined to the axis of the bar **15**, and intersect the periphery of the central portion indicated at **27** to form junction surfaces slanted to provide for the insertion of the bar **15** as shown in FIGURE 3. The bar **14** is similarly formed at the ends. In the case of the bar **15**, the distance parallel to the axis of that bar representing the maximum length between opposite end junction surfaces is selected to be slightly less than the distance between the sides **23** and **24** of the frame so that the floating bar **15** is freely movable in a direction parallel to the sides **23** and **24**. The total length of the bar **15**, including the projections **18** and **19**, is also selected so that it may be freely inserted between the sides **23** and **24**, and the projections **18** and **19** engaged with the slots **22**, as long as the fixed bar **14** is not present.

The length of the slots **22** with respect to the width of the extensions **18–21** is selected so that the bar **15** cannot be moved to a sufficiently inclined position (such as that shown in FIGURE 3) to become disengaged from the slots **22** as long as the fixed bar **14** is present. The length of the fixed bar **14** from one junction surface to the end of the opposite extension is carefully selected so that both extensions **18** and **19** will not be receivable in the slots **22** at the same time without a small degree of initial deflection of the sides to the dotted line position shown in FIGURE 4. The bar **14** must be crowded into position to the point where the extension **21** will engage the slot **22** in the side **24** of the frame. A point is eventually reached where the extension will snap into engagement with the slot.

It now becomes desirable to fix the position of the bar **14** with respect to the slots **22**, and this is done through the use of discontinuities indicated at **28** formed in the material of the frame **10** and preferably disposed to intersect the slots **22**. The maximum length of the central portion **29** of the fixed bar **14**, at the ends of the junction surfaces, is selected to be slightly greater than the distance between the sides **23** and **24**, so that a solid pull is required to bring the fixed bar **14** to the left extreme of the slots **22** in perpendicular relationship to the frame sides, as shown in the several views. At this point, the ends of the central portion **29** snap into engagement with the discontinuities **28** to maintain this position of the fixed bar.

Referring to FIGURES 1 and 2, tension in the belt **13** will cause the floating bar **15** to move to the left, in trapping the free end **30** of the belt between the bar **15** and the fixed bar **14**. The belt can be shortened by simply grasping the free end **30** and pulling it, since the jamming action is uni-directional. To increase the length of the belt, however, it is necessary to grasp the outer extremities of the extension **18** and **19** (usually with the thumb and forefinger), and move the bar **15** to the position shown in FIGURE 2. Clearance is thereby established between the floating bar **15** and the fixed bar **14**, and the free end **30** is free to move between these bars to the new adjusted length. A renewed application of belt tension will automatically shift the components into the gripping position shown in FIGURE 1.

The particular embodiment of the present invention

which has been illustrated and discussed herein is for illustrative purposes only, and is not to be considered as a limitation upon the scope of the appended claims.

We claim:

1. In combination with a buckle member having a channel-shaped frame position provided with relatively yieldable opposite sides and a back, each of said sides having an elongated slot, said slots being in alignment, an adjustable belt-securing device comprising:

a first bar, said first bar having end-extensions of reduced thickness normally slidably engaging said slots, respectively,

said first bar end extensions joining the central portion of said first bar at surfaces disposed in planes oppositely inclined to the axis of said first bar,

said first bar being initially receivable between said frame portion sides, for engagement of said end extensions with said slots, only in diagonal relationship therewith, and movable after said engagement into perpendicular relationship with said sides;

a second bar, said second bar having end-extensions of reduced thickness normally engaging said slots, respectively,

said second bar end-extensions joining the central portion of said second bar at junction surfaces disposed in planes oppositely inclined to the axis of said second bar,

said second bar being initially receivable between said frame portion sides in the presence of said first bar, for engagement of said end extensions with said slots, only in diagonal relationship with said sides and accompanied by resilient outward deflection of said sides, said second bar being movable after said engagement into perpendicular relationship with said sides for receiving belt means looped around said first bar, and

means on said frame sides forming discontinuities adjacent said slots engageable with portions of said second bar at the intersections of said second bar junction surfaces with the periphery of the central portion of said second bar, the engagement thereof requiring resilient outward deflection of said frame portion sides.

2. In combination with a buckle member having a channel-shaped frame portion provided with relatively yieldable opposite sides and a back, each of said sides having an elongated slot, said slots being in alignment, an adjustable belt-securing device comprising:

a first bar, said first bar having end-extensions of reduced thickness normally slidably engaging said slots, respectively,

said first bar being initially receivable between said frame portion sides, for engagement of said end extensions with said slots, only in diagonal relationship therewith, and movable after said engagement into perpendicular relationship with said sides;

a second bar, said second bar having end-extensions of reduced thickness normally engaging said slots, respectively,

said second bar being initially receivable between said frame portion sides in the presence of said first bar, for engagement of said second bar end extensions with said slots, only in diagonal relationship with said sides and accompanied by resilient outward deflection of said sides, said second bar being movable after said engagement into perpendicular relationship with said sides for receiving belt means looped around said first bar; and

means on said frame sides forming discontinuities adjacent said slots engageable with portions of said second bar, the engagement thereof requiring resilient outward deflection of said frame portion sides.

3. In combination with a buckle member having a channel-shaped frame portion provided with a pair of relatively yieldable opposite sides and a back, each of said sides having an elongated slot, said slots being in alignment respectively, an adjustable belt-securing device comprising:

a first bar, said first bar having end-extensions of reduced thickness normally slidably engaging said slots, respectively,

said first bar being initially receivable between said frame portion sides, for engagement of said end extensions with said slots, only in diagonal relationship therewith, and movable after said engagement into perpendicular relationship with said sides; and

a second bar, said second bar having end-extensions of reduced thickness normally engaging said slots, respectively,

said second bar being initially receivable between said frame portion sides in the presence of said first bar, for engagement of said second bar end extensions with said slots, only in diagonal relationship with said sides and accompanied by resilient outward relative angular deflection of said sides with respect to each other and to said back, said second bar being movable after said engagement into perpendicular relationship with said sides for receiving belt means looped around said first bar.

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