Aug. 18, 1959 C. E. CUSHMAN 2,899,732

QUICK RELEASE BUCKLE

Filed Aug. 6, 1956 2 Sheets-Sheet 1

Fig. 1

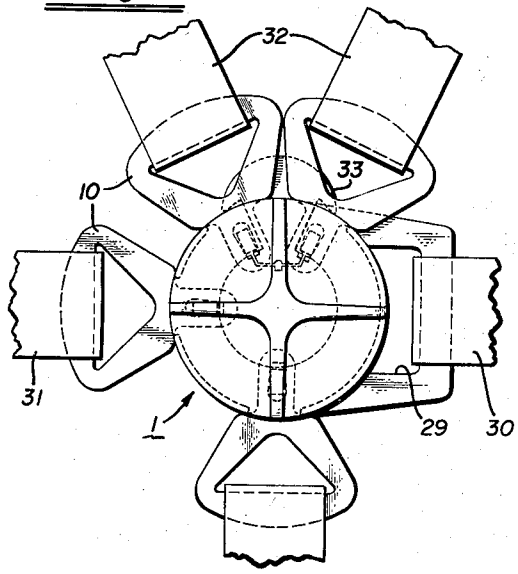
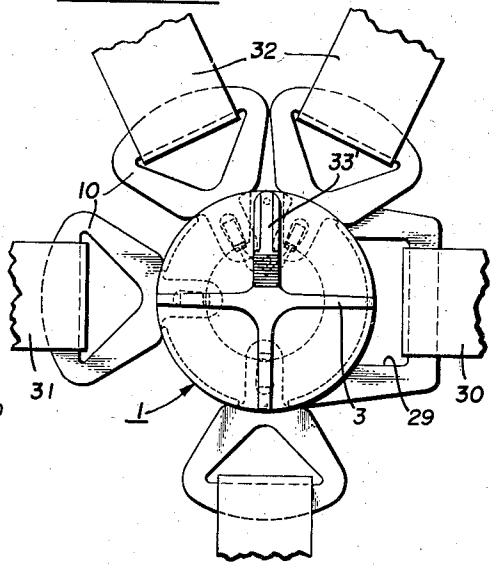


Fig. 6



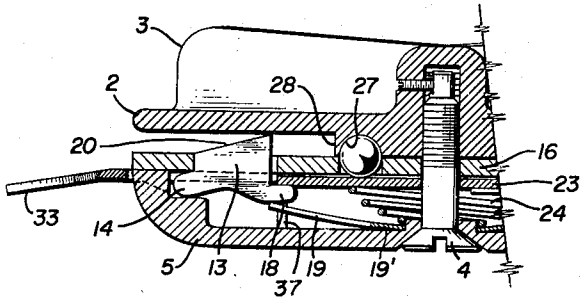


Fig. 2

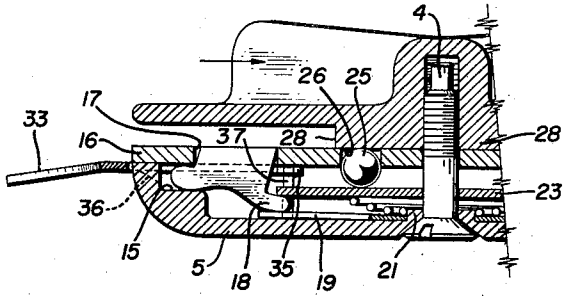


Fig. 3

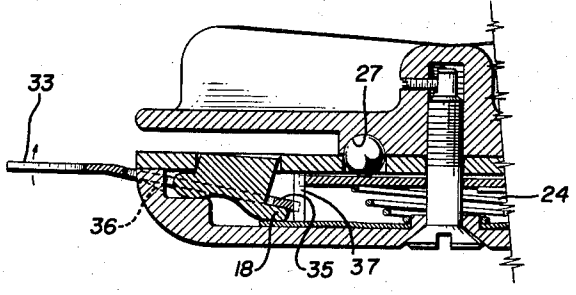


Fig. 4

INVENTOR.
Clifford E. Cushman
BY
Paul B. Hunter
Attorney

Aug. 18, 1959 C. E. CUSHMAN 2,899,732

QUICK RELEASE BUCKLE

Filed Aug. 6, 1956 2 Sheets-Sheet 2

Fig. 5

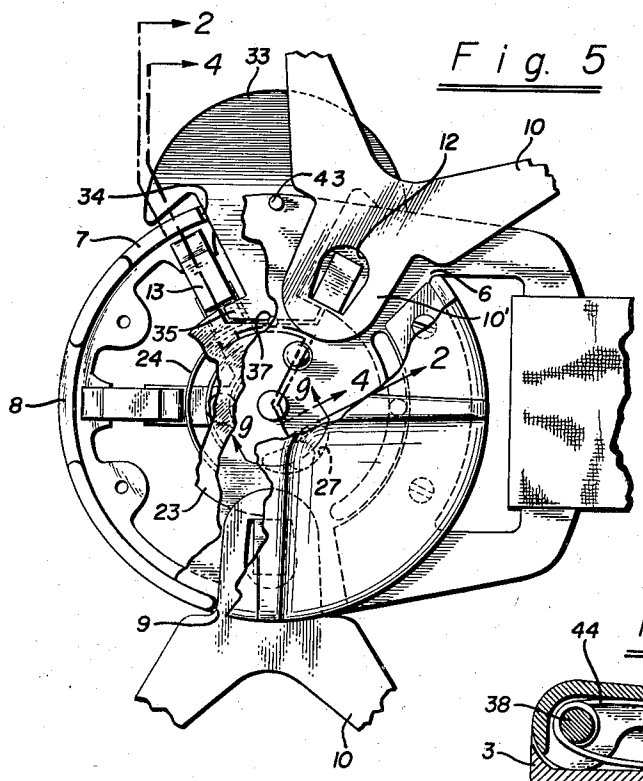


Fig. 9

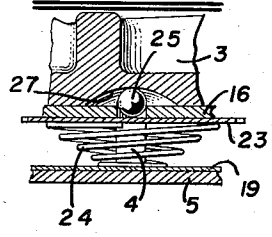
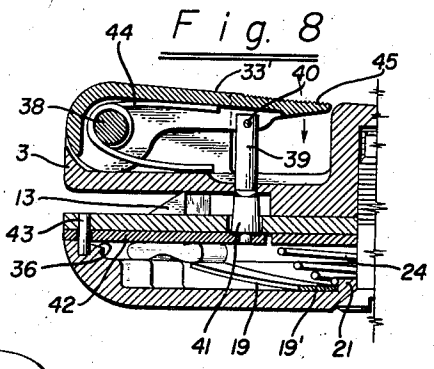


Fig. 8



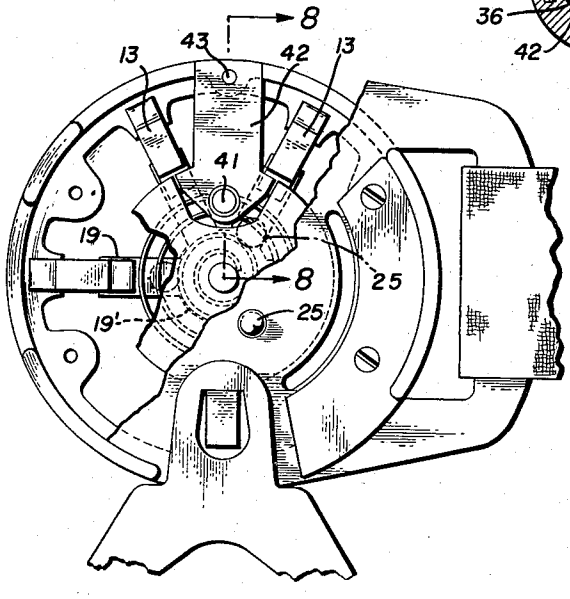


Fig. 7

INVENTOR.
Clifford E. Cushman

BY Paul B. Hunter,

Attorney

United States Patent Office 2,899,732 Patented Aug. 18, 1959

2,899,732

QUICK RELEASE BUCKLE

Clifford E. Cushman, Burbank, Calif., assignor to Pacific Scientific Aeroproducts, Glendale, Calif., a corporation of California

Application August 6, 1956, Serial No. 602,295

8 Claims. (Cl. 24—205.17)

This invention relates, generally, to quick release buckles, and the invention has reference, more particularly, to a novel buckle of the type disclosed in my copending application, Serial No. 576,116, filed April 4, 1956, which is especially suited for use with shoulder harnesses, parachute harnesses, safety belts, and the like, and which is adapted to be employed for readily receiving the strap terminals in locking relation to thereby secure the user, for example in his seat, and yet be able to release quickly the strap terminals upon a simple manipulation of the buckle.

In my prior application, there is disclosed a novel buckle of this character, wherein all of the strap terminals, i.e., the shoulder strap terminals and the safety belt terminals as well as the seat or crotch strap, if used, are simultaneously and instantly released by a simple rotary or turning movement of the buckle face in either direction by the user.

The principal object of the present invention is to provide a novel quick release buckle of the above type wherein the shoulder harness strap terminals or metal end fittings may be instantly released independently of the other strap terminals attached to the buckle, thus allowing the user to be locked in his seat for example while freeing him from the shoulder harness.

A feature of the present invention is to provide a novel buckle of the above character that is of simple, rugged, and reliable construction, for attaching and detaching the shoulder straps, seat belt, and similar articles, the said buckle being compact and of light-weight construction, and yet possessing great strength owing to the inherent design thereof, the said buckle being adapted for instant release of the strap terminals attached thereto, if desired, by a simple turning movement of the buckle face in either direction.

Another feature of the present invention is to provide a novel buckle of the above character to which the strap metal end fittings can be readily attached by merely inserting the same into notches provided therefor in the buckle, said buckle being capable of withstanding high stresses without injury thereto and without interfering with the relative quick release of the metal end fittings inserted thereinto, when desired.

Another feature of the present invention is to provide a novel buckle of the above character employing spring means for urging pivoted detents into locking engagement with the harness strap metal end fittings upon the insertion of the fittings into apertures provided therefor in the buckle, finger operated lever means being provided on the buckle for overcoming such spring means and actuating shoulder strap end fitting detents to release the shoulder straps instantly when desired.

These and other features and advantages of the present invention will be apparent from a perusal of the following specification taken in connection with the accompanying drawings wherein:

Fig. 1 is a view in front elevation of the novel buckle

of the present invention shown with the strap metal end fittings attached thereto;

Figure 2 is an enlarged fragmentary sectional view, taken along the line 2—2 of Fig. 5 and showing a buckle detent in locking position;

Fig. 3 is a view similar to Fig. 2, but shows the face plate of the buckle turned to unlock the buckle detents;

Fig. 4 is a view similar to Fig. 2, but showing the finger operated lever actuated to release the shoulder harness strap terminals only;

Fig. 5 is an enlarged view of the structure of Fig. 1, with parts broken away or omitted;

Fig. 6 is a view similar to Fig. 1 of a somewhat modified structure;

Fig. 7 is an enlarged view of the structure shown in Fig. 6, but with parts broken away or omitted; and

Fig. 8 is an enlarged sectional view taken along the lines 8—8 of Fig. 7.

Referring now to the drawings in detail, the reference numeral 1 designates the novel buckle of this invention as a whole, the said buckle having a casing comprising a face plate 2 provided with a cruciform projection 3 for enabling the ready turning of the face plate about a screw 4 by the user's fingers, the screw 4 being carried by a dished back plate 5 completing the buckle casing. The face plate 2 serves to close the open front of back plate 5. These members are shown of circular shape with the screw 4 positioned so as to extend along the central axes of these members, the buckle operating mechanism being enclosed by these back and face plates.

The forward peripheral edge of the dished back plate 5 is provided with notches or strap terminal receiving recesses 6, 7, 8, and 9 (see Fig. 5), which in cooperating with face plate 2 form receiving openings in the buckle for receiving the strap terminals or metal end plates 10 attached to the various buckle straps. The strap terminals 10 have reduced tongue-like end portions 10' for individual insertion in the openings 6 to 9 within which openings the tongues 10' are adapted to slide over bevelled spring pressed detents or latches 13 until these detents snap into eyes or openings 12 to lock the strap terminals in the buckle. As especially shown in Figs. 2 to 4, the detents or latches 13 are formed with projecting lugs 14 which engage between shoulders 15 formed on the inner surface of the back plate 5 and the rear face of a stress plate 16 to provide for pivotal movement of these detents. The stress plate 16 is provided with rectangular apertures 17 for accommodating the detents 13. These detents are also formed with lugs 18 at their ends remote from the lugs 14 which are engaged by leaf spring fingers 19 extending radially from the central portion of the back plate and pressing against the lugs 18 to urge the detents outwardly through openings 17 in the stress plate 16 for cooperative engagement with the terminals 10, the outer faces of the detents 13 for cooperating with the terminals 10 being bevelled at 20 so as to allow the ready insertion of the terminals 10 by the riding of the end portions of these terminals over the bevelled surfaces 20, thus depressing the detents against the tension of spring fingers 19 and causing the detents to turn about their pivotal lugs 14, as especially illustrated in Figs. 2 to 4.

The spring fingers 19 are formed on a central substantially annular member 19' surrounding a boss 21 provided at the center of the back plate 5. Screw 4 extends through an aperture in the boss 21. The forward faces of detent lubs 18 engage the rear peripheral surface of a tripping disc 23 which is normally pressed into abutting relation with the stress plate 16 by means of a spiral compression spring 24 with its rounded inner end surrounding the boss 21 and its outer enlarged end abutting the tripping disc 23. The forward face of the disc 23 is also en-

gaged by three metal balls 25 spaced angularly about the central screw 24 at 120° intervals and normally positioned in circular apertures 26 provided in stress plate 16. These balls also rest in tapered cam grooves or bevelled notches 27 provided in a central boss 28 formed on the rear surface of the face plate 2. The balls 25 and cam grooves 27 constitute camming means at the underside of face plate 2 for releasing the straps.

Thus, with the buckle in its normal position shown in Figs. 1 or 2, the strap terminals 10 may be readily attached to the buckle by merely inserting tongues 10' into the openings 6, 7, 8, and 9, with the tongue ends riding over the bevelled surfaces 20 of the detents 13, pressing these detents rearwardly against the tension of springs 19, until the forward ends of the detents snap into the eye openings 12 of the tongues 10', thereby retaining the harness straps attached to the buckle. When it is desired to remove the strap terminals from the buckle, it is merely necessary for the user to grasp the cruciform projection 3 of the face plate and give the same a turn in either direction, whereupon the balls 25 are forced to ride up out of grooves or notches 27 from their position shown in Fig. 2 to the top surface of boss 28 as shown in Fig. 3, which rearward motion of the balls forces the tripping disc 23 rearwardly against the tension of spiral spring 24 and also causes the peripheral edge of tripping disc 23 to push lugs 18 of detents 13 rearwardly, compressing spring fingers 19 and turning latches or detents 13 about their pivotal lugs 14 so that the detents are moved rearwardly away from engagement with the tongues 10', thereby allowing the strap terminals 10 to fly out of openings 6, 7, 8, and 9, thereby releasing all the strap terminals simultaneously from the buckle.

It will be noted that, with the strap terminals attached to the buckle, the stress of the various straps is transmitted through the detents 13 directly in shear to the stress plate 16, so that this plate, generally made of steel and of great strength, carries the full load of the several straps and forms a simple, direct way of carrying the strap loads from one strap to another without creating high eccentric loads in the buckle. The stress plate is formed with an eye or bight 29 carrying one safety belt 30, this belt being adapted to be permanently though adjustably attached to the buckle. This belt 30, together with an opposing belt 31 having a terminal for entering the opening 8, could serve as a safety belt without the use of additional belts. Merely releasing the face plate 2 after turning the same causes this face plate to turn back to its original position, owing to the action of springs 24 and 19, so that the buckle is again ready to receive the strap terminals as before in locking relation.

Means are provided according to the present invention for releasing the shoulder straps 32 independently of the other straps attached to the buckle. This is accomplished in Figs. 1 through 5 by means of a finger piece or lever 33 projecting downwardly through a notch 34 (see Fig. 5) provided in the back plate 5. The portion of the lever projecting into the interior of the back plate is of sector shape and has an enlarged end portion 35 projecting into a conforming recess or aperture provided in the tripping disc 23. This enlarged end portion 35 is adapted to overlie partially the lugs 18 of the detents 13 positioned to secure the shoulder strap terminal end plates. The back plate is bevelled at 36 in the region of notch 34 to provide a bearing or fulcrum surface for the finger piece 33 when this finger piece is pressed forwardly to actuate the detents holding the shoulder strap terminals. Thus, as shown in Fig. 2, the finger piece 33 is in its normal rear position with the locking detents for the shoulder straps in locked position. However, when the finger piece 33 is pressed forwardly as shown in Fig. 4, this finger piece rocks on the bevelled surface 36 causing the enlarged end portion 35 to press detent lugs 18 inwardly or downwardly as shown in Fig. 4 to release the shoulder strap terminals independently of the other straps attached to the buckle. Thus, when it is merely desired to release the shoulder straps without releasing the other straps attached to the buckle, the finger piece 33 is actuated to effect this. A pin 37 is carried by the back plate 5 and by passing through notches in the finger piece end portion 35 and in the tripping disc 23 serves to retain these members in proper alignment in use.

In the form of the invention shown in Figs. 6 to 8, the finger piece 33' is carried by one arm of the cruciform projection 3 and is pivoted upon a pin 38 mounted in such arm (see Fig. 8). This finger piece carries an inwardly projecting plunger 39 pivoted at 40 on the finger piece and adapted to engage a boss 41 formed on a tripping lever 42 pivoted so as to rock on the bevelled surface 36 and shown retained by a pin 43. A light torsion spring 44 normally holds finger piece 33' in its uppermost position shown in Fig. 8, but by pressing upon the serrated portion 45 of this finger piece the same may be pressed inwardly, thereby causing pin 39 to actuate boss 41 and turn tripping lever 42 downwardly against the tension of springs 24 and 19, thereby actuating the shoulder strap metal end terminal detents 13 inwardly to released position to thereby release the shoulder straps instantly.

Thus, it will be seen that the novel buckle of the present invention is capable of selectively releasing certain straps while not disconnecting other straps, and, at the same time, all of the straps may be released instantly if desired. As shown in Fig. 8, the cruciform projection 3 can be actuated without operating the finger piece 33', the turning of the cruciform member causing the release of all strap terminals simultaneously in the same manner as that described in connection with Figs. 1 through 5. The structure of Figs. 6 through 8 is similar to that of Figs. 1 through 5 except for the substitution of finger piece 33' and associated parts for finger piece 33 and its associated parts.

Thus, there is provided a mechanically simple buckle of great strength and dependability for readily receiving and locking the strap terminals, while at the same time allowing the quick, positive, and instant release of all or certain of these terminals merely by turning face plate 2 or by operating the finger piece 33 or 33'.

Since many changes could be made in the above construction of the quick release buckle and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A buckle of the character described, comprising a casing having strap terminal receiving openings therein, spring pressed detents within said casing for retaining strap terminals inserted into said openings to thereby secure straps to said buckle, means on said casing connected with said detents for releasing all of said strap terminals simultaneously, and additional means on said casing connected with certain of said detents for selectively releasing certain of said strap terminals only.

2. A buckle as defined in claim 1 wherein said casing comprises a dished back plate and a face plate turnably mounted upon said back plate, said releasing means comprising finger grasping projections provided on said face plate for turning the latter, a tripping member within the casing for engaging all of said detents, camming means provided on the back of said face plate and turnable for effecting actuation of said tripping member and the movement of said detents to release position, and said additional releasing means comprising a finger piece means projecting into said casing for engaging said certain detents, said finger piece means being operable to actuate said certain detents to released position.

3. In a quick release buckle, a hollow back plate having strap terminal receiving openings and a face plate for

closing said back plate and turnable thereon, a stress plate extending within said back plate and having detent receiving apertures therein, detents pivoted within said back plate, spring means within said back plate and engaging said detents for urging movement of said detents outwardly through said stress plate apertures for engaging and locking strap terminals inserted through said back plate openings, camming means operable by the turning of said face plate for retracting said detents and releasing all of said strap terminals simultaneously, and a finger piece means pivoted with respect to said face and back plates for selectively retracting certain of said detents to release selected strap terminals.

4. A quick release buckle as defined in claim 3, wherein said spring means comprises a leaf spring member carried by said back plate and having spring fingers pressing against said detents.

5. A quick release buckle as defined in claim 3, wherein said camming means comprises ball and socket means mounted at the back of said face plate, said stress plate having apertures for receiving the balls of said ball and socket means, a tripping member engaging said detents and actuated by said ball and socket means upon the turning of said face plate to retract said detents, said finger piece means comprising a lever member adapted to be actuated by the user's fingers, and mechanism projecting into the interior of said back plate and having means for retracting certain of said detents to release selected strap terminals only.

6. A quick release buckle as defined in claim 5, wherein said tripping member comprises a spring pressed disc for urging the balls of said ball and socket means into

the deep portions of their sockets, thereby tending to turn said face plate to its normal position with said detents positioned for locking strap terminals inserted into said buckle, said disc having a portion thereof cut away to accommodate said finger piece means.

7. A quick release buckle as defined in claim 6, wherein said detents have pivotal lugs pivoted between said back plate and said stress plate, said detents having bevelled active surfaces for enabling the strap terminals to depress temporarily said detents while inserting the strap terminals into the buckle, said pivotal lugs pivoting to allow such movement of said detents.

8. In a quick release buckle, a hollow back plate having strap terminal receiving openings and a face plate for closing said back plate and turnable thereon, a stress plate extending within said back plate and having detent receiving apertures therein, detents pivoted within said back plate, spring means within said back plate and engaging said detents for urging movement of said detents outwardly through said stress plate apertures for engaging and locking strap terminals inserted through said back plate openings, translating means operable by the turning of said face plate for retracting said detents and releasing all of said strap terminals, and a finger piece positioned exteriorly of said buckle and having translating means extending into said buckle for selectively retracting certain of said detents to release certain strap terminals only.

References Cited in the file of this patent

FOREIGN PATENTS

144,059 Australia ---------- Nov. 1, 1951