Dec. 18, 1945. B. H. TURNER ET.AL 2,391,204

QUICK RELEASE BOX FOR PARACHUTE HARNESSES

Filed Nov. 12, 1943 3 Sheets-Sheet 1

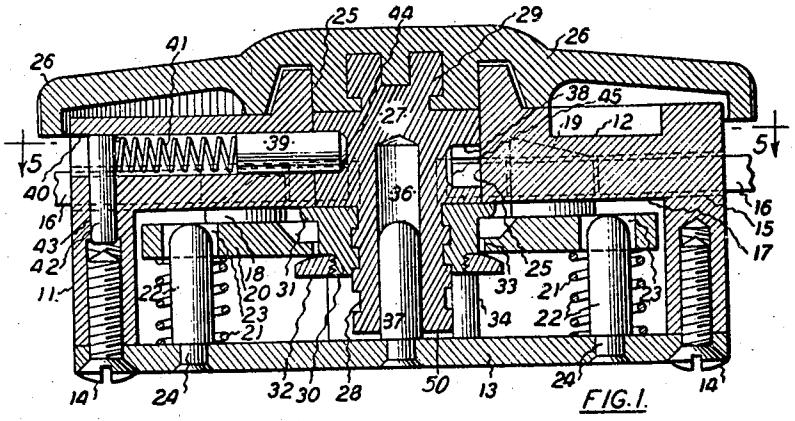

FIG. 1.

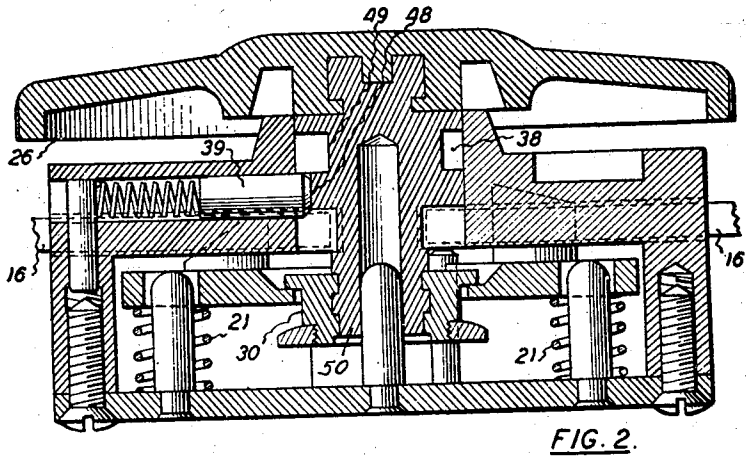

FIG. 2.

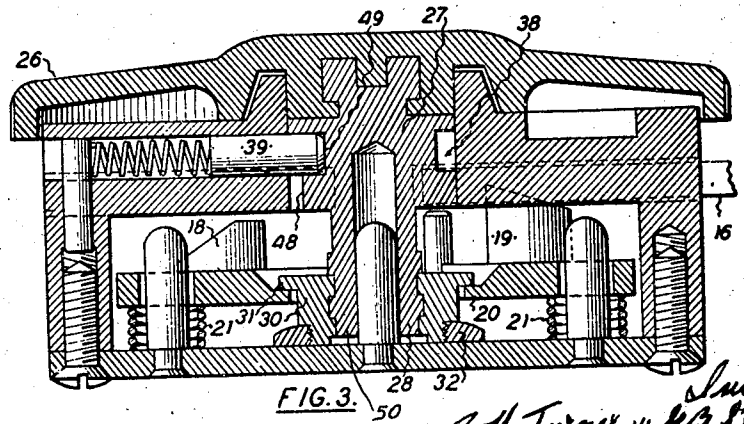

FIG. 3.

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QUICK RELEASE BOX FOR PARACHUTE HARNESSES

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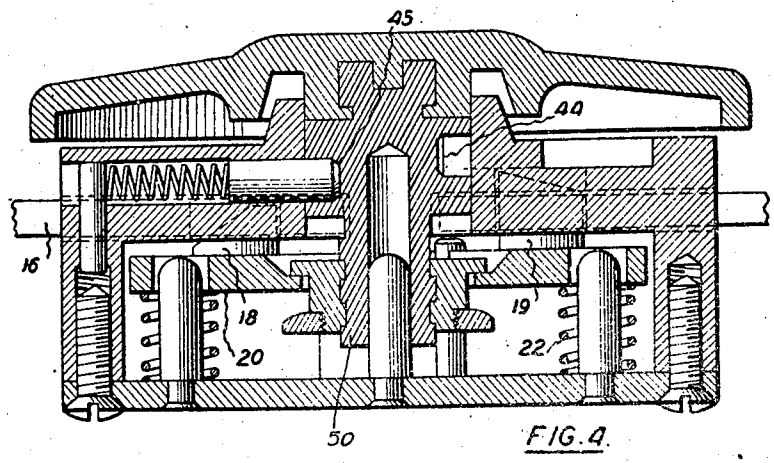

FIG. 4.

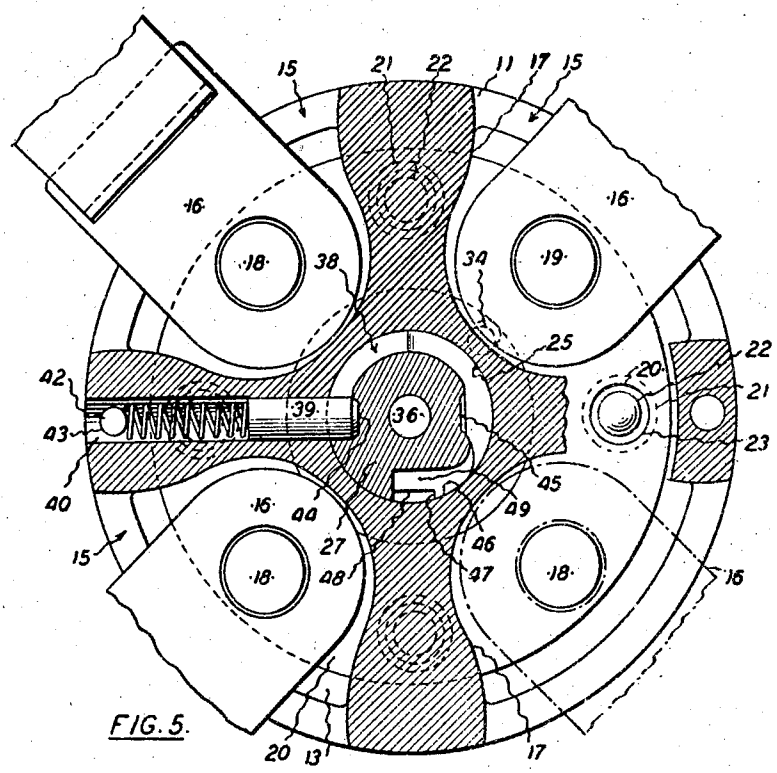

FIG. 5.

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QUICK RELEASE BOX FOR PARACHUTE HARNESSES

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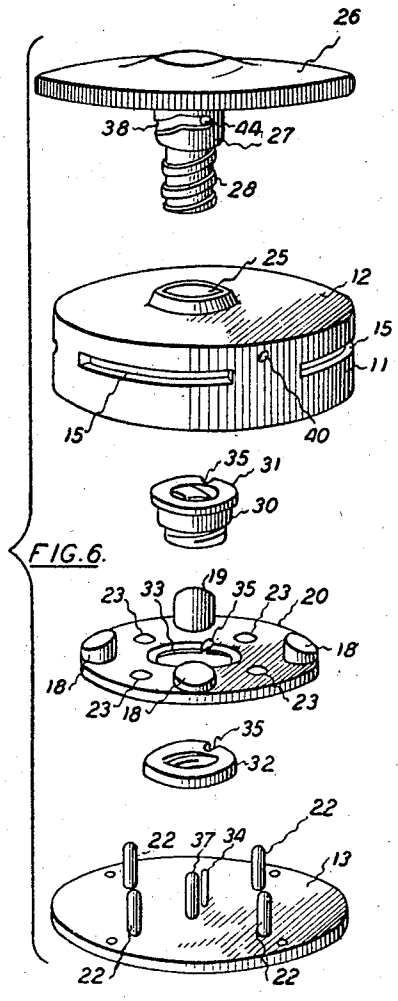

FIG. 6.

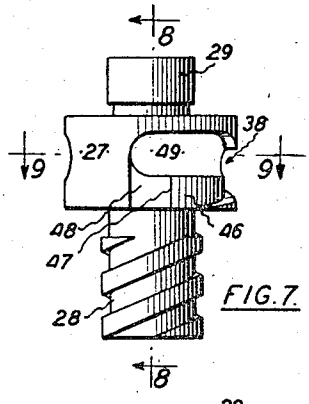

FIG. 7.

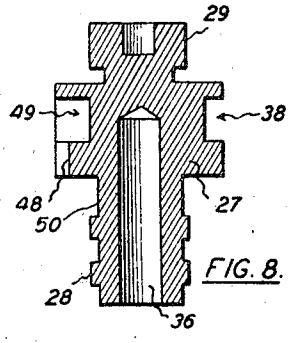

FIG. 8.

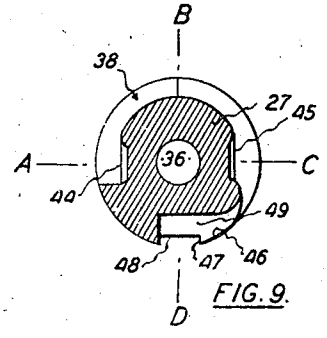

FIG. 9.

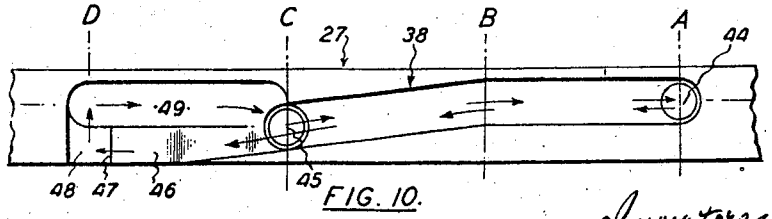

FIG. 10.

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Patented Dec. 18, 1945

2,391,204

UNITED STATES PATENT OFFICE

2,391,204

QUICK RELEASE BOX FOR PARACHUTE HARNESS

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Application November 12, 1943, Serial No. 510,018
In Australia December 4, 1942

4 Claims. (Cl. 24—205)

Quick release boxes for parachute harnesses constitute a junction and anchorage for the main thongs of the harness; and when in use, they are located in front of the harness wearer, so that by a simple manipulation, he may release the thong ends from the box, thus enabling him easily to step out of the harness, or causing the harness readily to fall away from him when he has made a landing.

The main essentials of a quick-release box are, that it positively retain the thong ends in the absence of an unlocking manipulation, and that the manipulation may be easily and speedily effected when required. This necessity for positive retention of the thong ends is important, as in some existing quick-release boxes the thongs have occasionally become disconnected from the box while the parachute has been dummy dropped (that is, under test). It is believed that this unintentional disconnection is due to the box striking the hard wooden dummy when the parachute opens and so causing inertia relaxation of the springs which support the lugs holding the thongs. In this way the lugs are depressed thereby allowing release of the thongs. This inertia disconnection may arise under service conditions and consequently it is essential for the box parts to be proof against dangerous unintentional release.

The object of the present invention is the provision of a quick-release box which possesses the mentioned requisites in more pronounced degree than do existing quick-release boxes, and which, in the event of a user being dragged along the ground by his open parachute, is capable of being unlocked by contact with the ground. This last mentioned ability is important, as it frequently happens that the initial shock of landing may cause the user to fall over and perhaps become dazed or even unconscious, and in such case he may be considerably hurt, especially in a strong wind, if he remains attached to the parachute.

A quick-release box according to this invention is so designed that when the thongs are connected thereto and the wearer has the box in the "lock position" the thongs are not locked as with other types only by means of springs, but are positively locked mechanically thereby eliminating likelihood of thong disconnection as a result of inertia effect.

The box subject hereof comprises a casing having radial apertures therein each of which is adapted to receive and accommodate a harness attachment eye. Within the casing is a spring loaded annular locking plate which is axially movable in the casing and has latch teeth thereon which at all times are influenced to enter or remain in alignment with the mentioned casing apertures and thus be able to engage and retain harness attachment eyes homed in said apertures. A longitudinally movable actuating bolt is borne centrally within the casing. This bolt has a screwed shank carrying a non-rotatable nut which lies within the open centre of the annular locking plate and has end flanges lying on opposite sides of the plate. The spacing of these flanges is such that the nut is capable of some endwise movement while the plate remains stationary. The head of the bolt is disposed outside the casing and is formed as a disc or turn handle. The bolt has a cam groove formed therein for controlling endwise movements of said bolt. This groove constitutes a runway for the end of a spring loaded follower pin which is restrained against all movement other than movement radially of the cam groove. The cam groove and the follower pin constitute guide and control means whereby the several operations of the movable parts of the box assembly are governed and determined.

An example of the invention is illustrated (to some extent schematically) in the accompanying drawings in which—

Fig. 1 is a medial sectional side elevation of a quick-release box with its parts in locked positions.

Figs. 2 to 4 are similar views to Fig. 1 showing the same box with its parts in different stages of operation. Fig. 2 shows unlocked position, Fig. 3 shows harness release position, and Fig. 4 shows reloading position.

Fig. 5 is a sectional plan taken on line 5—5 in Fig. 1.

Fig. 6 shows the main parts of the box (perspectively, and on a reduced scale) unassembled.

Fig. 7 is a side elevation of the bolt previously referred to herein.

Figs. 8 and 9 are sections taken respectively on lines 8—8 and 9—9 in Fig. 7.

Fig. 10 is a flat projection of the cam groove which almost entirely encircles the bolt as shown in Fig. 9.

The casing consists of a body 11 having integral roof-plate 12, and a floor-plate 13 which is secured to the body by set-screws 14. The body has radial apertures 15 through which the harness attachment eyes 16 may be readily passed to lie just under the roof-plate 12 and to be

separated by curved abutments or ribs 17 on the underside of said roof-plate. The eyes 16 are engaged and retained by latch teeth 18 and 19 which are fixed to or are part of an annular locking plate 20. The plate 20 is axially movable within the casing against the pressure of loading springs 21 sleeved on guide-posts 22 which freely enter holes 23 in said plate. The posts 22 are fixed to the floor-plate 13 as shown at 24. The floor-plate or the casing body may be furnished with usual lug or plate extension (not shown) having a slot therein to enable the box unit to be permanently secured by a thong or band to a suitable part of the harness. If required, however, such a lug or plate extension may be dispensed within the present invention, and may then be replaced by making one of the latch teeth (19 for example) appreciably taller than the other teeth (18). This provision of a tall tooth such as 19 prevents the particular harness eye associated therewith, from leaving the box when the other teeth (18) are released, or at other times, so that said particular harness eye constitutes the permanent connection of the box to the harness. This connection is made when the quick-release box is assembled. It will be appreciated that the four eyes 16 may be effectively separated from each other notwithstanding the fact that one of them remains secured to the quick-release box.

The roof-plate 12 has a central smoothly bored orifice 25 which forms a bearing for the actuating bolt 50. This bolt is provided with a head 26, a shoulder 27 and a threaded shank 28. The head 26 may be integral with the remainder of the bolt, or it may be moulded on to an anchorage lug 29 as shown. The shank 28 carries a nut 30 which is freely disposed within the open centre of the locking plate 20. The said nut has end flanges 31 and 32 which are adapted to bear upon the thinned edge margin 33 of the locking plate centre hole. The nut 30 is restrained against rotation by a key-post 34 fixed to the floor-plate 13. Key-post 34 has a sliding fit in keyways 35 formed in the nut flanges 31 and 32 and the margin 33. The bolt may be bored, as at 36, as a sliding fit for a steadying post 37 fixed on the floor-plate 13. The shoulder 27 has the cam groove 38 formed therein. A follower pin 39 which works in said groove, has a sliding fit in a bore 40 in the roof-plate 12. The said pin is radially thrust into the cam groove 38 by a spring 41 which bears against an abutment pin 42 held in position within a bore 43 by one of the set screws 14.

Figs. 1 and 5 show the box with its parts in locked or harness retention position. In this position the follower pin 39 is seated in cam groove depression 44, the bolt is in its lower-most position relative to the casing, and the nut 30 is in its highest position, with its flange 32 bearing under the margin 33 and thereby positively preventing descent of the locking plate 20 from its locked position.

When a harness release is to be effected, the bolt is turned (by means of head 26) through the full range of its rotatory movements, namely, three-quarters of one revolution. The first third of this range (a quarter revolution) brings the point B of the cam-groove 38 (see Figs. 9 and 10) in line with the centre of the follower pin 39. The cam-groove portion from A to B is horizontal, and hence the said follower pin prevents the bolt from rising or falling during this quarter revolution. Because of this, and because of the non-rotatability of the nut 30, the latter is caused to descend from its position shown in Fig. 1. The bolt thread is such that the quarter revolution is just sufficient to lower the top flange 31 on to (or substantially on to) the top face of the locking plate margin 33.

The second quarter revolution of the head 26 brings the point C of the cam-groove in line with the follower pin 39, said pin homing in shallow depression 45. The cam-groove portion from B to C, is inclined at the same angle as the helix angle of the bolt thread, and consequently the nut 30 is not moved during the second quarter revolution of the bolt, the motion being manifested as a rise or partial emergence of the bolt in or from the casing.

The third and final quarter revolution of head 26 brings the point D of the cam-groove 38 in line with the follower pin 39, said pin having swept over high portion 46 and down the step 47 to rest on the flat 48. During this third quarter-turn, the springs 21 effectively oppose downward movement of the nut 30 and hence the final quarter turn is externally manifested as a further partial emergence of the bolt from the casing. The positions of the several parts at the end of this final quarter revolution, that is, unlocked positions, are shown in Fig. 3.

Release of the harness eyes from the unlocked box is effected by a hand slap or ground pressure on the head 26, or other pressure or blow thereon, sufficient to compress the springs 21 and thereby descend the locking plate 20 as shown in Fig. 3. When the releasing blow is administered, the bolt 50, the nut 30 and the locking plate 20 all descend as one piece, thereby clearing the latch teeth 18 from their respective eyes, while tooth 19 (if included as a tall tooth) retains its particular eye (16) as shown in Fig. 3. The releasing blow causes the flat 48 to slide under the follower pin 39 which consequently seats itself (as shown in Fig. 3) at the "D" end of a return groove 49. This return groove extends from D to C (Fig. 10) and ends in the depression 45.

When relocking the quick-release box, that is, re-inserting and relocking the harness eyes therein, the head is back rotated a quarter revolution from D to C, the follower pin 39 sweeping the cam groove portion 49 and reseating itself in depression 45. This brings the box parts to the load positions shown in Fig. 4. When the nut 30 has moved down the shaft 28 so that the top flange 31 rests on the top of the thinned margin 33 of the locking plate 20 a space exists between the underneath side of the said locking plate and the lower flange 32 of nut 30. This space allows the locking plate 20 to tilt downwards so that the harness eyes 16 may be readily thrust on the latch teeth 18 against resilient opposition due to the springs 21. The box is relocked by further back turning of the head 26 until the parts are again as shown in Fig. 1, that is, with the nut 30 raised up the screw shank 28 to the top position, this time with the space between the flanges 31 and 32 above the thinned edge 33, allowing the lower flange now screwed up tightly to the lower side of the part 20 to lock this locking plate mechanically to the roof 12 of the box 11 with the follower pin 39 seated in depression 44. The complete movement cycle of the said follower pin relative to the cam groove is indicated by the arrows in Fig. 10.

What is claimed is:

1. A parachute harness quick-release box, com-

prising, a casing having apertures each able to accommodate a harness attachment eye, a spring loaded annular locking plate which is axially movable within said casing, latch teeth on said locking plate which are able to engage harness attachment eyes homed in said apertures, a rotatable and longitudinally movable actuating bolt in said casing, a non-rotatable nut on said bolt having end flanges lying on opposite sides of said locking plate, said bolt having a cam groove, and a spring loaded follower pin associated with said cam groove; the arrangement of said parts being such that a part rotation of said bolt and a subsequent endwise movement thereof enable release of harness attachment eyes from said casing.

2. A quick-release box according to claim 1 in which the cam groove is of the form herein described and diagrammatically illustrated by Fig. 10 of the accompanying drawings.

3. A quick-release box according to claim 1, which includes one latch tooth of sufficient height to constitute a permanent connection between said box and a harness eye.

4. A quick-release box according to claim 1 in which the cam groove is of the form herein described and diagrammatically illustrated by Fig. 10 of the accompanying drawings and includes a first horizontal portion, a second angularly inclined portion, a third flat portion, and a final return portion terminating at the lower end of said inclined portion, said box including one latch tooth of sufficient height to constitute a permanent connection between said box and a harness eye.

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