

DEVICE FOR CLOSING PARACHUTE PACKS**Field of the invention**

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The present invention relates to a device that aids the closing of a parachute pack, particularly in compressing the pack flaps of a packing tray of a parachute and aiding in securing the same during closure.

10 **Background of the invention**

The process of packing parachutes involves folding a canopy, packing the folded canopy into a packing tray and finally closing the packing tray. Currently, the closing of the packing tray is the most strenuous part of the packing process, as
15 it involves physically demanding activities on the riggers who pack the canopy, such as pulling the closing string of the packing tray, jumping on the packing tray and pounding it to compact the packing tray and contents. Since the packing is done manually and repetitively by riggers, riggers often unconsciously adopt undesirable postures that put themselves under severe musculoskeletal strain
20 and at the risk of injury. Over prolonged periods, they tend to complain of chronic neck, shoulder and backache that are caused directly by the physical demands of packing the parachutes.

It may take as many as three riggers, and as long as fifteen minutes to close and
25 pack one parachute. Furthermore, due to the strenuous and repetitive nature of the packing task, long periods of rest have to be assigned to the riggers. This disrupts their work-cycle and reduces their productivity. It may also necessitate their having to take medical leave from their work for physical injuries obtained. Thus, it would be desirable to have a tool or device to reduce the time taken to
30 pack a parachute and to help riggers avoid physiological strains in the course of their work.

Summary of the invention

5 An object of the present invention is thus to seek to provide a mechanical device to reduce the labour intensiveness of packing a parachute.

10 According to the invention, there is provided a device for closing parachute packs, each of which has a plurality of flaps and a closing cord (36), the device (10) being characterised by a base (12) for bearing on a flap in one direction during the packing operation, and by a mechanism (18, 22) adapted to draw a pull cord (34) connectable to the closing cord (36) in substantially an opposite direction to allow the flaps to be secured relative to the closing cord (36) by a pin.

15 It will be convenient to hereinafter describe an embodiment of the present invention with reference to the accompanying drawings which illustrate one form of device incorporating the invention. It is to be understood that the particularity of the drawings and the related description is not to be understood as superseding the generality of the broad description of the invention as defined in the claims.

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Brief description of the drawings

Figure 1 is an isometric view of the parachute packing device according to the preferred embodiment of the invention.

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Figure 2 shows the position of the closing loop of the closing cord just above the grommet for securing by a temp pin.

30 Figures 3(a) and 3(b) are cross-sectional views of the parachute packing device of Figure 1 along section A-A illustrating a closing cord being hooked onto the peg of the device.

Figure 4 shows the handle in a substantially upright position and about to be rotated.

- 5 Figure 5 is a side view of the device wherein the roller lock is released, thereby allowing the roller to unwind.

Figures 6(a) and 6(b) show the handle being detached from the right side of the device and a new handle inserted into the left side of the device.

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Detailed description of the preferred embodiment of the invention

Figure 1 is an isometric view of the parachute packing device 10 according to the preferred embodiment of the invention. The device 10 comprises a base 12 including brackets 14 in the form of protrusions, and a grip 16 for holding the device 10 in position during the packing operation. There is one part in the form of a handle 18 and a handle stop 20 integrated with the handle 18 which fits into a groove in the device 10 to prevent the handle 18 from moving past a substantially vertical position contrary to the operation direction.

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There is a second part in the form of a roller 22 that includes a pair of pegs 24 that is affixed to the roller 22 such that the pegs 24 move with the rotation of the roller 22. The parts (18, 22) form a mechanism which on a turning motion of the handle 18 gives rise to counter-rotating motion of the roller 22 in an opposite direction in what may be described as a cranking action. Rotation of the roller 22 is essentially restricted to one direction only by a roller lock 26 that cooperates with opposite ends of the roller 22 in a ratchet-and-teeth arrangement. A release block 28 may be used to release the roller lock 26 from engagement with the ends of the roller 22.

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A switch 30 is further located adjacent the handle 18. The switch 30 has two positions wherein a first position engages the handle 18 to the roller 22 to allow the aforesaid cranking action, and a second position releases the engagement such that the roller 22 is allowed to rotate freely in both directions. A cross-bar
5 32 is included to aid in positioning and tensioning a pull-cord 34.

During the packing of a canopy, a series of closing flaps (usually seven) must be securely closed. Each flap must be closed tightly one at a time by compressing the flap relative to a closing loop so that the tip of the closing loop is exposed
10 over a grommet of the flap. The closing loop is then secured by a temp pin for each loop that is closed. The compression of the flap relative to the closing loop is achieved by applying forces to the closing loop and the flap in opposite directions. Traditionally, a pull cord 34 is used to pull the closing loop while the flap is being stepped on or otherwise constrained.

Figure 2 shows the position of the closing loop 36 of the closing cord 38 just above the grommet 40 for securing by a temp pin (not shown). When the closing loop 36 is in the position shown in Figure 4, the user should stop cranking the handle 18. In that position, the closing loop 36 is sufficiently exposed so that a
15 20 temp pin can be inserted into the closing loop 36 to secure the flap.

Figure 3(a) is a cross-sectional view of the parachute packing device 10 of Figure 1 along section A-A. The device 10 is placed on a flap (not shown) that is being compressed, such that its base 12 is resting on the flap and the brackets 14 are
25 arranged so that the grommet of the flap is substantially centred at the opening formed by the brackets 14. The pegs 24 on the roller 22 are oriented such that they are at a small angle past the vertical.

Figure 3(b) shows a similar view to that of Figure 3(a) but illustrates a pull cord 34 wherein a loop at its top end is hooked onto the top of the peg 24. The
30 parachute is first prepared by threading the closing loop 36 and pull cord 34

through the grommet 40 of the flap to be secured before hooking the pull cord 34 to the peg 24. Pulling on the pull cord 34 in the direction shown in Figure 3(b) will result in the pulling of the closing loop relative to the flap until the top of the closing loop is exposed above the grommet. Once the top of the closing loop is exposed, a temp pin is inserted into the closing loop to secure the flap. This action is repeated seven times if there are seven flaps to be secured. After the seventh flap is secured, a retaining pin is inserted into the closing loop and the packed parachute will be ready for use.

Figure 4 shows the handle 18 in a substantially upright position and about to be rotated. The switch 30 should first be turned in the direction "E" indicated on the switch to engage the handle 18 to the roller 22 for cranking action. The pull cord 34 is threaded to the closing loop 36 and the top end of the pull cord 34 is hooked onto the peg 24 as shown in Figure 3(b). The handle 18 is pulled to crank the roller 22. As the roller 22 turns, the peg 24 draws the pull cord 34 which loops around the roller 22 as the roller 22 is rotated. In summary, the handle 18 is first cranked to place the pull cord under tension. Further cranking will pull the device closer to the flap and more of the pull cord 34 is exposed above the grommet 40.

Figure 5 is a side view of the device 10 wherein the roller lock 26 is released, thereby allowing the roller 22 to unwind. To achieve this, the switch 30 is first turned to the release ("R") position. The handle 18 is then pushed onto the release block 28 until a "click" is heard. The release block 28 will rotate the roller locks 26 away from the roller 22, freeing the roller 22 for the unravelling of the pull cord 34. The handle 18 is maintained in a depressed position by gently holding the handle 18 down with the user's thumb and the user lifting the device 10 with both hands smoothly from the parachute whereby the roller 22 is free to turn and unwind the pull cord 34.

Figures 6(a) and 6(b) show the handle 18 being detached from the right side of the device 10 and a new handle inserted into the left side of the device 10. This is to cater for left-handed users and is achieved by having a spring-loaded plunger button 42 engaging a corresponding plunger hole 44 in a socket 46 of the device 10. To remove the handle 18 from the socket 46, the plunger button 42 is pushed inwards so that it ceases to engage with the plunger hole 44. The handle 18 is pulled away from the socket 46 while pressing the plunger button 42. The second handle 18' is then oriented such that the plunger button 42' of the second handle 18' faces the left side of the device 10. While the plunger button 42' is pressed, the second handle 18' is inserted into the socket 46' as shown in Figure 6(b). The spring-loaded plunger button 42' of the second handle 18' will engage the plunger hole 44' and lock the handle 18' in place.

It will be appreciated that the invention provides a device that may be compact and portable, and easy to use. It enables quick engagement and disengagement of a pull cord used to pull the closing loop of a closing cord. It can also be made from standard off-the-shelf components to reduce the cost of manufacture.

The invention is usable with the packing trays of parachutes of various manufacture, but they should preferably have a single closing loop and wide flaps, such as the Mech III Alpha, Techo, Eagle 220 & 260, Maverick, Vega, Tandem, Swift Plus 200 & 225 and Ruby.

While a particular embodiment of the invention has been shown and described, it will be appreciated by those skilled in the art that changes and modifications of the present invention may be made without departing from the invention in broadest aspects. As such, the scope of the invention should not be limited by the particular embodiment and specific construction described herein but should be defined by the appended claims and equivalents thereof. Accordingly, the aim in the appended claims is to cover all such changes and modifications as fall within the spirit and scope of the invention.



CLAIMS:

1. A device for closing parachute packs, each of which has a plurality of flaps
5 and a closing cord (36), the device (10) being characterised by a base (12) for
bearing on a flap in one direction during the packing operation, and by a
mechanism (18, 22) adapted to draw a pull cord (34) connectable to the closing
cord (36) in substantially an opposite direction to allow the flaps to be secured
relative to the closing cord (36) by a pin.
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2. A device according to claim 1, characterised by the mechanism (18,22)
comprising a cranking mechanism whereby rotation of one part (18) rotates the
other part (22) to draw the pull cord (34).
- 15 3. A device according to claim 2, characterised by the one part (18)
comprising a handle and by the other part (22) comprising a roller about which
the pull cord is trained.
4. A device according to claim 3, characterised by a releasable lock (26)
20 adapted to ensure rotation of the roller (22) in one direction to draw the closing
cord for connection to the flap.
5. A device according to claim 4, characterised by means (28) to release the
lock (26) from the roller (22) to allow for rotation of the roller in a direction
25 opposite to the drawing direction.
6. A device according to claim 5, characterised by a switch (30) operable in
one position to connect the handle (18) and roller (22) for the cranking operation
and in a second position to release the handle (18) and roller (22) whereby on
30 release of the lock (26) by the means (28) the roller can rotate in the direction
opposite to the drawing direction.



7. A device according to any of claims 4 to 6, characterised by an element (32) for aiding positioning and tensioning of the pull cord (34).

5 8. A device according to claim 7, characterised by the element (32) comprising a cross-bar.

9. A device according to any preceding claim, characterised by the base (12) comprising a guide (14) for the pull cord (34).

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10. A device according to claim 9, characterised by the guide (14) comprising oppositely directed spaced apart protrusions defining a gap through which the pull cord is guided.

15 11. A device according to any of claims 3 to 10, characterised by the roller (22) comprising an anchor (24) for the pull cord (34).

12. A device according to claim 11, characterised by the anchor (24) comprising a pair of pegs (24) projecting radially of the roller (22) and to one of
20 which the pull-cord is anchored for pulling in the drawing direction.

13. A device according to any of claims 3 to 12, characterised by the handle (18) being releasable from the device (10).

25 14. A device according to claim 13, characterised by a manually releasable device (42) for releasing the handle.

15. A device according to claim 14, characterised by the device (42) comprising a plunger button.

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16. A device according to any of claims 13 to 15, characterised by a limit means to prevent over-cranking of the mechanism.

5 17. A device according to claim 16, characterised by the limit means comprising a stop (20) engaged and operable to run in a groove of a body of the device (10).

18. A device according to any preceding claim, characterised by means adapted to allow operation by both a right-handed and a left-handed person.

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19. A device according to claim 14, characterised by the means comprising a socket (44') opposite the handle (18) adapted to receive releasably a handle (18').

15 20. A device according to claim 19, characterised by the handle (18') being releasable by a spigot and socket arrangement (42', 44') and a release button (46').

20 21. A device according to any preceding claim, characterised by a means (16) whereby the device (10) may be pressured to bear on a flap in one direction.

22. A device according to claim 21, characterised by the means (16) comprising an integral transverse grip by which a user may grip the device (10) and bear downwardly on it in the one direction during a packing operation.

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23. A device according to any preceding claim, characterised by the device (10) being portable.