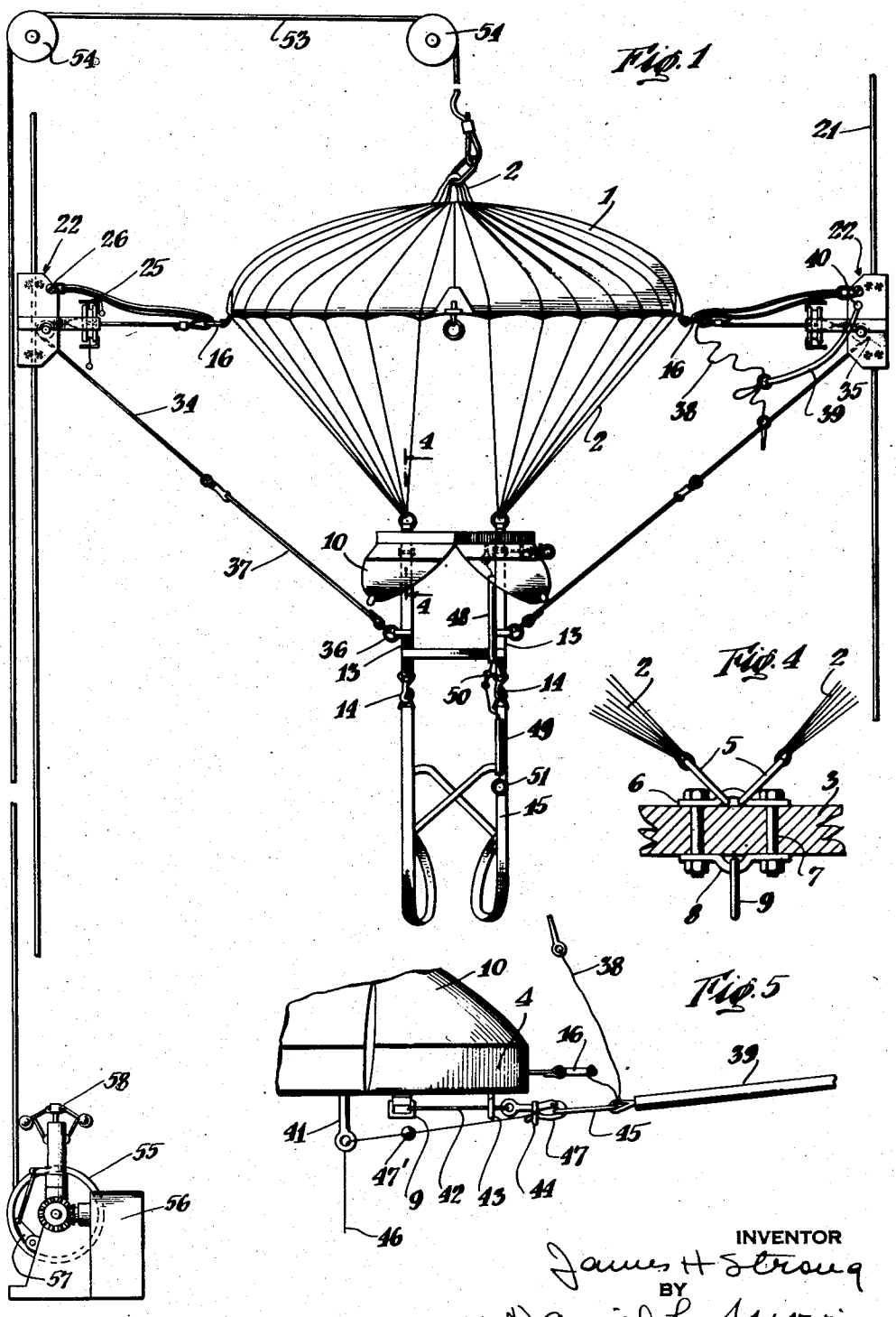
Oct. 11, 1938. J. H. STRONG 2,132,908

PARACHUTE TRAINING DEVICE

Filed Nov. 11, 1936 3 Sheets-Sheet 1



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Filed Nov. 11, 1936 3 Sheets-Sheet 2

Fig. 3

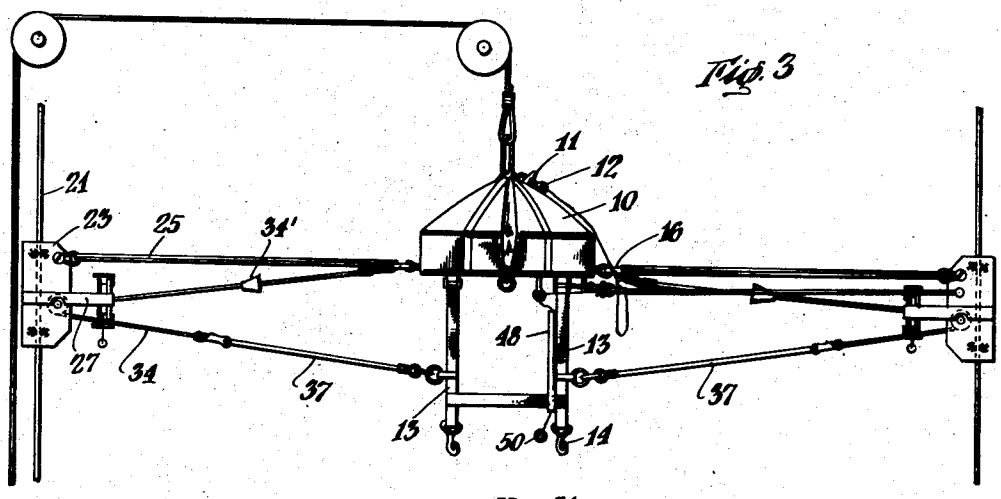
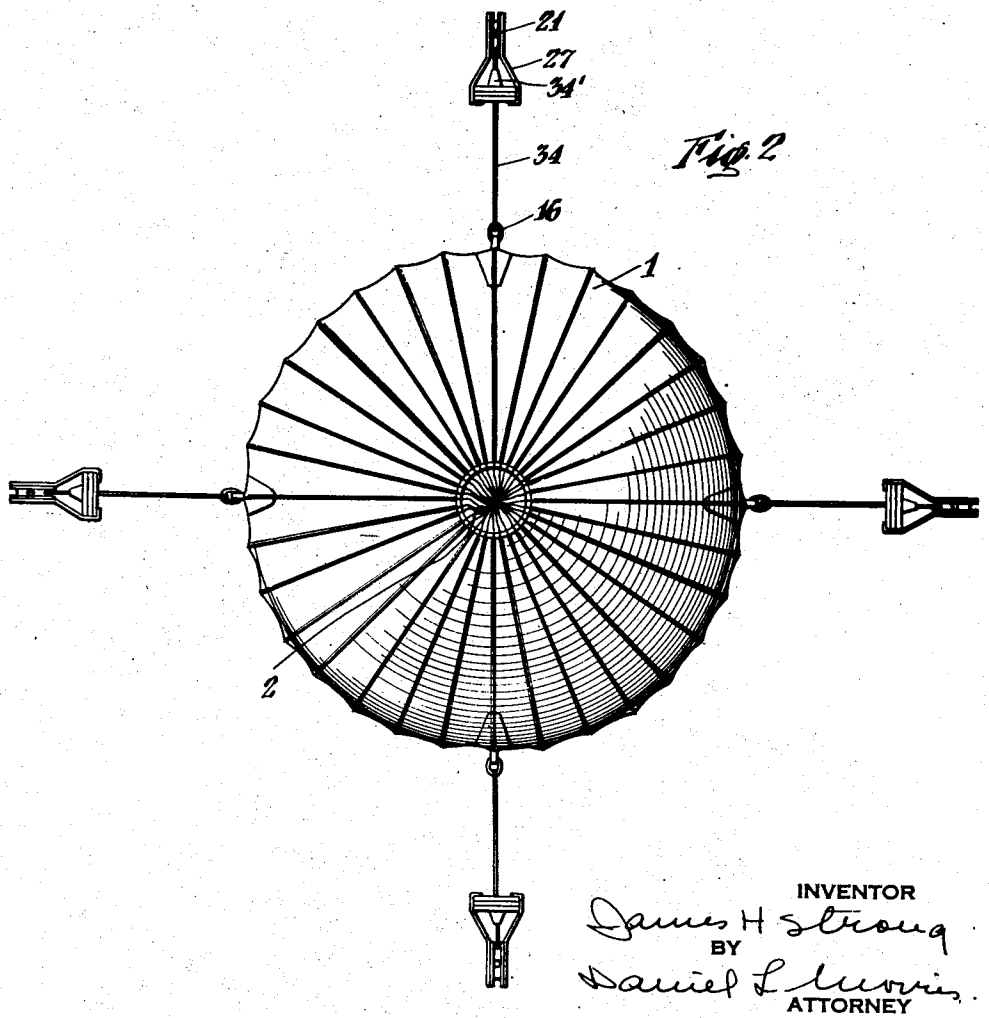


Fig. 2



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Filed Nov. 11, 1936 3 Sheets-Sheet 3

Fig. 6

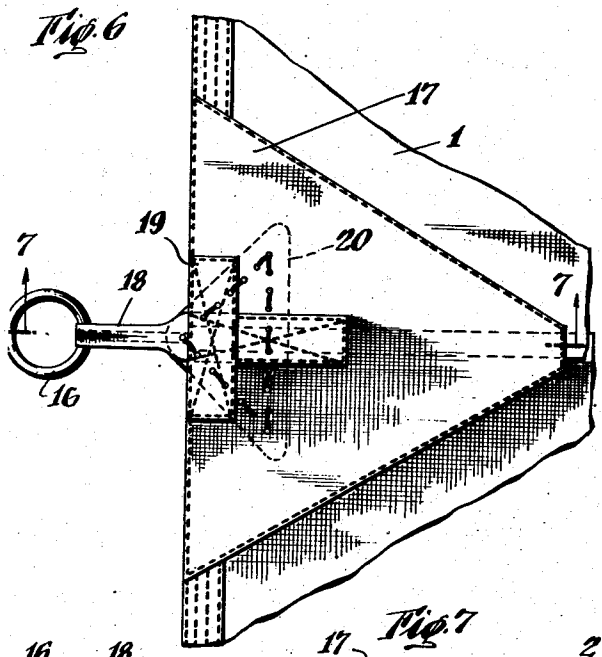


Fig. 8

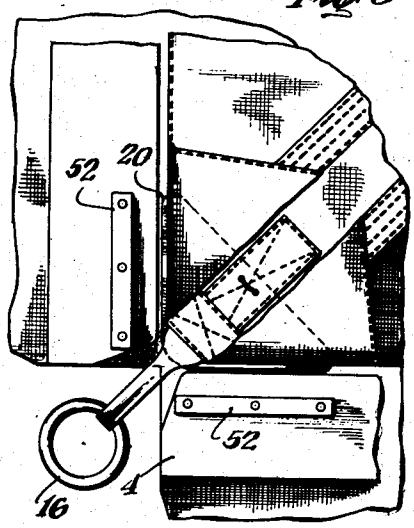


Fig. 7

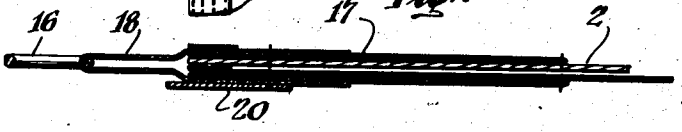


Fig. 9

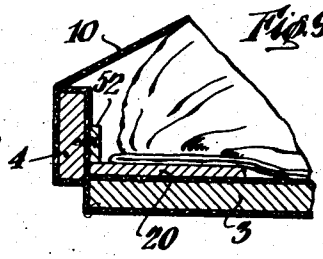


Fig. 10

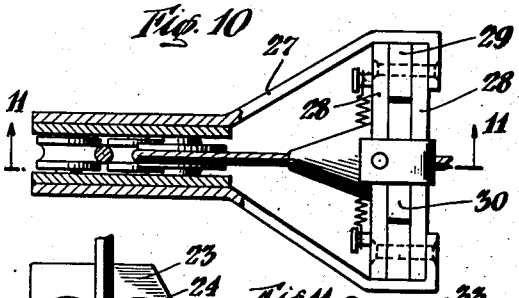


Fig. 11

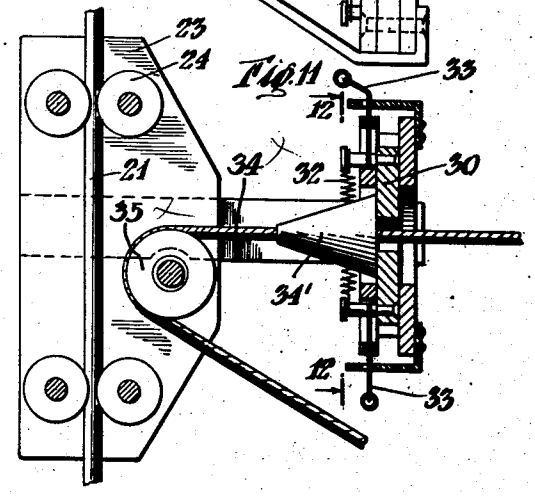
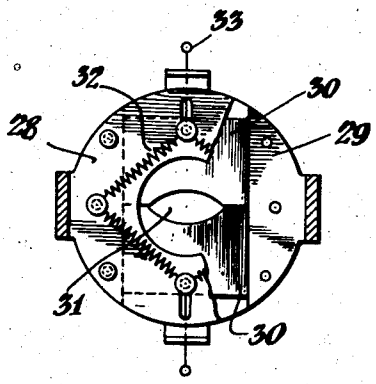


Fig. 12



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2,132,908

UNITED STATES PATENT OFFICE

2,132,908

PARACHUTE TRAINING DEVICE

James H. Strong, Trenton, N. J.

Application November 11, 1936, Serial No. 110,285

21 Claims. (Cl. 35—12)

This invention relates to a parachute training device utilizing a collapsible parachute of any suitable type having a canopy and shrouds attachable to a harness for supporting the jumper.

The principal object of the invention resides in the provision of a device that may be used in teaching aviation students the art of parachute jumping and wherein the opening and descent of the parachute simulates actual conditions.

In the drawings:

Figure 1 is an elevation with parts thereof broken away, showing the relation of the parts when the parachute is open and descending;

Figure 2 is a fragmentary plan view of the construction as shown in Figure 1;

Figure 3 is a side elevation with parts thereof broken away, showing the relative positions of the parts before the parachute has opened;

Figure 4 is a fragmentary sectional view showing the manner in which the shroud lines of the canopy and the harness are attached to the base of the cover of the pack;

Figure 5 is an enlarged detail of the pack showing particularly the arrangement of the rip cord and its controlling means;

Figure 6 is a detail of the portion of the canopy where the opening cables are attached;

Figure 7 is a sectional view on line 7—7 of Figure 6;

Figure 8 is a fragmentary view showing the manner in which the canopy is packed in the pack cover;

Figure 9 is a fragmentary section showing the manner in which the canopy is packed in the pack cover;

Figure 10 is a top plan view, partly in section, of the means for insuring the retaining of the canopy in its open position;

Figure 11 is a section of line 11—11 of Figure 10; and

Figure 12 is an end view, partly broken away, of the construction shown in Figure 10.

In the form of the invention illustrated in the drawings, I have illustrated a parachute canopy 1 having shroud lines 2 and a pack cover which consists of a rigid base 3 and rigid side walls 4, the base and side walls being covered with canvas and the side walls being hinged to the base as shown in Figure 9, by the canvas.

The shroud lines 2 are divided into four groups and are thus attached to the rigid base 3 of the pack cover. One group is attached to each ring 5 (see Figure 4). These rings 5 are pivoted on the rigid base 3 of the pack cover by means of cleats 6 that are secured to the base 3 by bolts 7 which bolts pass through the base 3 and secure cleats 8 to the base. The cleats 8 carry rings 9 for the purpose of attaching the harness to the rigid base 3, as will later appear. The pack cover also includes the flaps 10 which are preferably four in number, three of the flaps having eyelets and the fourth a cone 11 of the usual construction that passes through the eyelets and is adapted to receive a rip cord pin 12 for securing the flaps together as shown in Figure 3.

The canopy and shroud lines are adapted to be folded on the base 3 and the flaps 10 are adapted to be folded to cover the thus folded canopy and shroud lines in the usual manner as shown in Figure 3. A harness carrier which includes side straps 13 is attached to the base 3 of the pack cover, the straps being attached to the base by means of the rings 9 heretofore described. Detachably secured by suitable separable fasteners 14 to the harness carrier is a harness 15 of any desired form.

At four diametrically opposite points on the canopy 1 rings 16 are secured. These rings are secured in the following manner:

Substantially triangular reinforcing elements 17 that are preferably made of canvas are stitched to the canopy 1 on the inner and outer sides as shown in Figures 6 and 7. A tape 18 that overlies the shroud line 2 at this point is stitched to the inner and outer reinforcing elements 17 and extends beyond the edge of the canopy, being looped through the adjacent ring 16 as shown in Figure 16. A transverse reinforcing tape 19 which overlies the tape 18 is stitched to this tape and to the reinforcing elements 17 on the outer face of the canopy. Thus the rings 16 are attached to the canopy in such manner that the strain applied to the canopy through the rings will be distributed and the canopy will be reinforced at these diametrically opposite points to absorb the strain.

Stitched or otherwise secured to each outer reinforcing element 17 is a substantially triangular rigid plate 20, the purpose of which will later appear.

A plurality of vertical guides 21 which are taut and which in the illustration are four in number, are provided, being held in vertical positions by attachment to the ground at their lower ends and to a suitable support such as a tower (not shown) at their upper ends. Slides 22 are mounted on and are free to move vertically on these guides 21. These slides, as shown in Figure 11, include side plates 23 and rollers 24 between the latter of which the guides 21 are located.

A resilient element 25, which in the drawings is illustrated as an elastic rubber, is attached to each ring 16 and is attached to the adjacent slide 22 at 26. A locking element, shown in Figures 10, 11 and 12 is carried by each of the guides 22 and includes brackets 27 that are secured to the plates 23 of the guides. Spaced plates 28 are secured to these brackets and are spaced apart by fillers 29, leaving a space with-

in which locking elements 30 are adapted to slide. The abutting faces of these elements are cut away to form a recess 31 as shown in Figure 12 and these abutting faces are normally forced together by springs 32 and are adapted to be manually separated by operating cords 33. Cables 34 are attached to each of the rings 16, pass through the openings 31 in the locking elements, around pulleys 35 carried by the slides 22 and are attached at 36 to the straps 13 of the harness carrier. Interpolated in these cables 34 are resilient sections 37 which in the drawings are illustrated as elastic rubber. Each of these cables 34 carries an abutment 34', that is conical in shape as shown in Figures 10 and 11 and is adapted to pass through the opening 31.

The rip cord pin 12 that has heretofore been described is attached to a rip cord 38, which rip cord is in turn attached to one of the rings 16. To this rip cord 38 a resilient operating member 39 is attached at one of its ends, the other end being attached at 40 to the adjacent slide 22.

Referring now to Figure 5, it is to be noted that the rigid base 3 of the pack cover carries a pelican hook 41 which is attached to one of the rings 9 by a flexible connection 42 which passes through a retainer 43. The detent 44 of the pelican hook 41, with which latter a ring 45 on the end of the resilient element 39 is adapted to engage has an operating cord 46, connected thereto. This operating cord passes through a guide 47 on the base 3 and is limited in its movement by a stop 47'. This operating cord 46 extends downwardly through a housing 48 carried by one of the straps 13 of the harness carrier and through a housing 49 carried by the harness, the operating cord being made separable at 50 to permit detachment when the harness is detached from the harness carrier. An operating handle 51 is attached to the lower end of this cord 46 within convenient reach of the operator.

The side walls of the pack cover are provided with retaining strips 52 as shown in Figures 8 and 9 which are adapted to abut against the upper faces of the triangular elements 20 heretofore described in the manner and for a purpose that will later appear.

An operating cable 53 is attached to the shroud lines 2 at the point where they pass over the peak of the 'chute. This cable passes over pulleys 54 that are carried by the tower that has not been shown and to an operating windlass 55. This windlass is provided with a suitable actuating motor, illustrated conventionally at 56 and with a brake mechanism 57. This brake mechanism is under the control of an automatic governor 58 so that the paying out speed of the windlass may be automatically controlled for the purpose which will later appear.

In packing the canopy and shroud lines into the pack cover so that they will assume the condition shown in Figure 3, the shroud lines are first laid back and forth on the base 3 in a suitable arrangement and the canopy 1 is then laid back and forth over the shroud lines. In packing this canopy, the triangular plates 20 are arranged at the corners of the base 3 as shown in Figure 8 and the rings 16 protrude beyond the corner of the base. When the side walls 4 of the pack cover are in the position shown in Figure 9, the retaining strips 52 will bear against the upper surfaces of the triangular plates 20 and hold them firmly to the base 3. Thus said walls will be held in place by the flaps 10 that are themselves held in their positions by the engagement of the eyelets with the cone 11. This engagement is maintained by the rip cord pin 12 as shown in Figure 3. During the packing of the canopy and shroud lines as above described, the resilient elements 25 are put under great tension, as shown in Figure 3, as are also the resilient sections 37 and the cables 34, as also shown in this figure.

The rip cord and its operating mechanism is assembled, as shown in Figure 5, with the rip cord operating resilient member 39 engaged with the pelican hook 41. The parts are now in their assembled position and are ready to be raised by the cable 53. As the cable 53 is actuated and raises the pack and the operator who is carried by the harness, the connections between the pack and the slides 22 likewise cause these slides to be raised; but as shown in Figure 3, the pack is raised slightly more than the slides so that the cables 34 have a somewhat downward inclination.

When the brake of the windlass is released, the pack drops so that the cables 34 assume a horizontal position and the abutments 34' are in horizontal alignment with the openings 31 of the locking member.

When the operator pulls the operating handle 51, the operating cord 46 releases the detent 44 from the pelican hook 41 and the resilient member 39 disengages the rip cord pin 12 from the cone 11 allowing the flaps 10 to open. When these flaps open, the plates 20 carried by the canopy are released from the retaining strips 52 and the resilient operating members 25 cause the skirt of the canopy to open, as shown in Figure 1. During this operation the cable 53 is slack but remains in engagement with the shroud lines at the peak of the canopy.

As the canopy is opened by the elements 25, the cables are drawn around the pulleys 35, because of the weight of the operator and because of the presence of the resilient members 37, with commensurate rapidity so that they will always remain taut.

As these cables 34 are drawn around the pulleys 35 the abutments 34' are forced between the locking slides 30, as shown in Figure 11, and the shoulders of these abutments engage the inner faces of the locking slides so that the canopy is locked in its open position.

The relationship between the shroud lines 2 and the cables 34 is such that during the opening of the canopy the resilient elements 37 act as buffers between the canopy and the operator so that the shock that is normally felt by the operator in the opening of the canopy or of any parachute canopy is absorbed and the operator is relieved of the shock.

All of this opening of the canopy takes place during the descent of the canopy and while the cable 53 is slack.

Should the canopy fail to open or to properly function naturally the speed of descent will rapidly increase but when this speed of descent reaches a predetermined point, the governor 58 gradually applies the brake 57 of the windlass and retards the descent and if desired at the proper point completely arrests the descent so that the operator will not be subject to the liability of injury.

After the descent the canopy is again packed as has heretofore been described, the abutments 34 being released by the manual controls 33.

Thus I have provided a parachute apparatus which effectively simulates an actual parachute jump and wherein a packed parachute is raised, is released and the operator is permitted to pull

the rip cord in the usual manner so that he will get the experience and the sensation of a free fall, and I have provided in these apparatus means for insuring the safety of the operator during the descent should the canopy fail for any reason to properly function.

What I claim is:

1. A parachute training device including a parachute canopy having a harness suspended therefrom by shrouds and means external of the canopy for opening the same.

2. A parachute training device including a parachute canopy having a harness suspended therefrom by shrouds and means external of the canopy for extending the skirt and the peak of the same.

3. A parachute training device including a parachute canopy, releasable means for raising the same and permitting it to descend, means for guiding the canopy in its descent and means extending between the last mentioned means and the canopy for opening the latter.

4. A parachute training device including a parachute canopy, a pack cover for the canopy, automatic means for releasing the pack cover and means operated thereby for opening the skirt of the canopy upon the release of the pack cover.

5. A parachute training device including a parachute canopy, a pack cover for the canopy, means for elevating the packed canopy, means for releasing the pack cover and means external of the canopy for opening the skirt of the same operated by said pack cover releasing means.

6. A parachute training device including a parachute canopy, releasable means for elevating the same and permitting it to descend, braking means for said elevating means, means for opening the skirt of the canopy and means for automatically limiting the descent of the canopy independently of its opening.

7. A parachute training device including a parachute canopy contained within a pack cover, releasable means for elevating the packed canopy and permitting the canopy to descend, means for releasing the pack cover, automatic means operated by said pack cover releasing means for opening the skirt of the canopy, and means for retarding the speed of descent of the canopy when the speed reaches a pre-determined rate.

8. A parachute training device including a parachute canopy, means external of the canopy for opening the same ad means external of the canopy cooperating with the opening means for maintaining the canopy open.

9. A parachute training device including a parachute canopy, a pack cover for the same, releasable means for elevating the packed canopy and permitting it to descend, braking means for said elevating means, means for releasing the pack cover, means operating upon the release of the pack cover for opening the skirt of the canopy, means for maintaining the skirt open, and means for limiting the descent of the canopy independently of the opening of the same.

10. A parachute training device including a parachute canopy, a pack cover for the same including flaps, releasable means for securing the flaps together, means for releasing the flap securing means, manually controlled means for controlling the operation of said releasing means, means operating upon the release of the flaps for opening the skirt of the canopy and means for maintaining the skirt open.

11. A parachute training device including a parachute canopy, a pack cover for the same, releasable means for elevating the packed canopy and permitting the canopy to descend, braking means for said elevating means, means for extending the skirt of the canopy and means for limiting the descent of the canopy independently of the opening of the canopy.

12. A parachute device including a parachute canopy, means for operating the skirt of the canopy, a harness and means interposed between the canopy and harness to absorb the shock of opening of the canopy and prevent its transmission to the harness, said last mentioned means operating to maintain the skirt of the canopy open.

13. A parachute device including a parachute canopy, a harness connected with the canopy, means connected with the harness for opening the skirt of said canopy, and shock absorbing means interposed in said skirt opening means between the harness and canopy.

14. A parachute training device including a parachute canopy, releasable means for elevating the canopy and permitting it to descend, and means for opening the skirt of the canopy and guiding the canopy in its descent.

15. A parachute training device including a parachute canopy, releasable means for elevating the canopy and permitting it to descend, means for opening the skirt of the canopy, and maintaining the skirt open and means for guiding the canopy in its descent.

16. A parachute training device including a parachute canopy, releasable means for elevating the canopy and permitting it to descend, braking means for said elevating means, means for opening the skirt of the canopy, means for maintaining the skirt open, means for guiding the canopy in its descent and means for limiting the descent of the canopy independently of its opening.

17. A parachute training device including a parachute canopy, a pack cover for the same, releasable means for elevating the packed canopy and permitting it to descend, means for guiding the canopy in its descent, means cooperating with the guiding means for opening the skirt of the canopy and means cooperating with the guiding means for maintaining the skirt open.

18. A parachute training device including a parachute canopy, a pack cover for the same, releasable means for elevating the packed canopy and permitting it to descend, braking means for said elevating means, means for guiding the canopy in its descent, means cooperating with the guiding means for opening the skirt of the canopy, means cooperating with the guiding means for maintaining the skirt open, and means for limiting the descent of the canopy independently of its opening.

19. A parachute training device including a plurality of vertical guides, slides mounted on said guides, a parachute canopy, a pack cover therefor, a harness connected with the canopy, means for opening the pack cover, means connected with the slides for opening the canopy, and connections between the canopy and the harness for maintaining the canopy open.

20. A parachute training device including a packed parachute canopy, means external of the pack for opening the same, means external of the pack for opening the canopy and means external of the pack for maintaining the canopy open.

21. A parachute device including a packed parachute canopy, means for elevating the same and means external of the pack for opening the pack and extending the canopy.

JAMES H. STRONG.