Dec. 2, 1941. J. H. STRONG 2,264,920

PARACHUTE DROP SAFETY DEVICE

Filed Aug. 6, 1940 4 Sheets-Sheet 1

Fig-1-

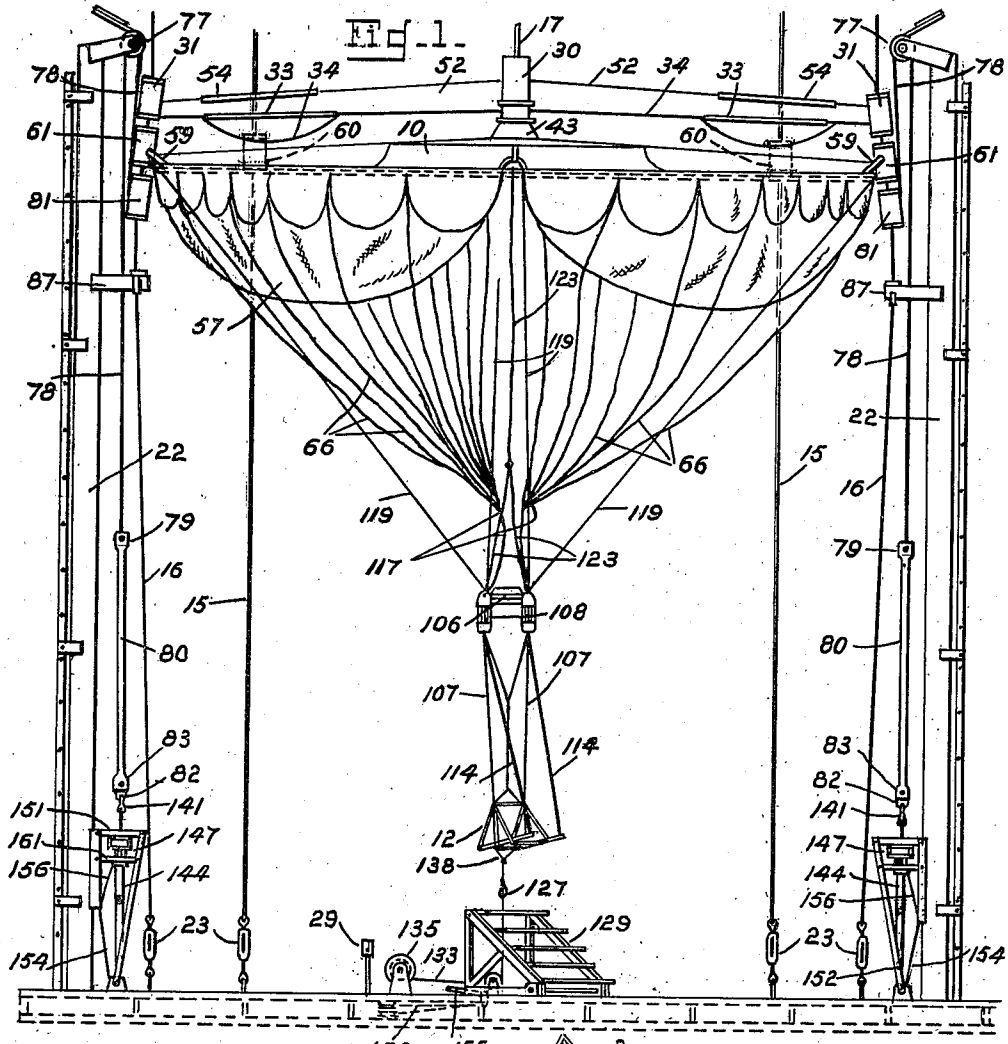
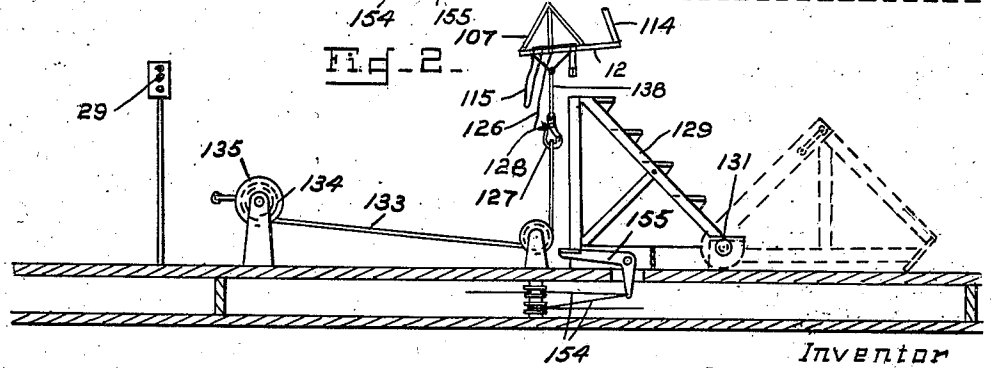


Fig-2-



Inventor
James H. Strong
By Emery Holcombe Miller
his Attorneys

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PARACHUTE DROP SAFETY DEVICE

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Fig. 3.

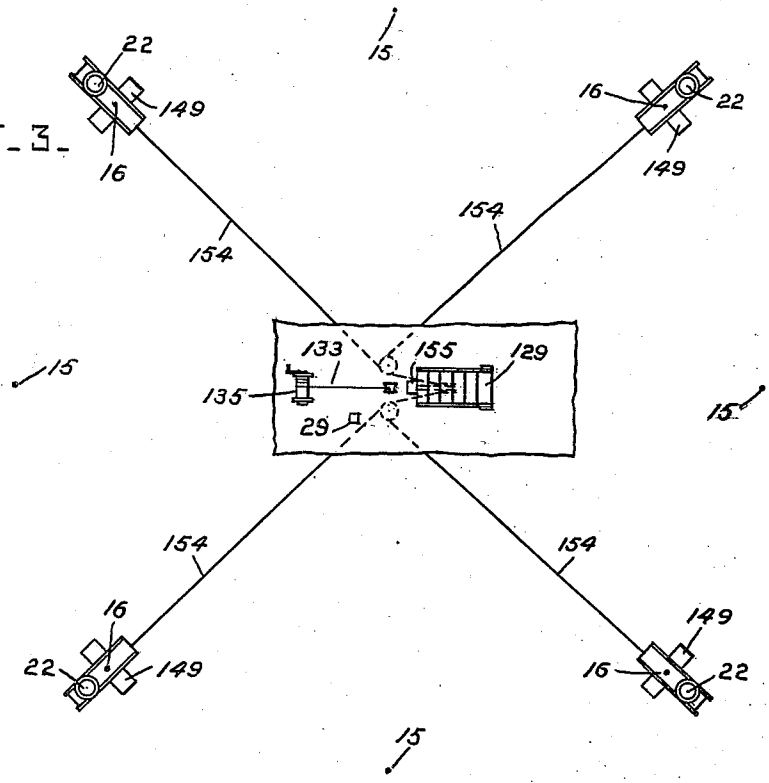
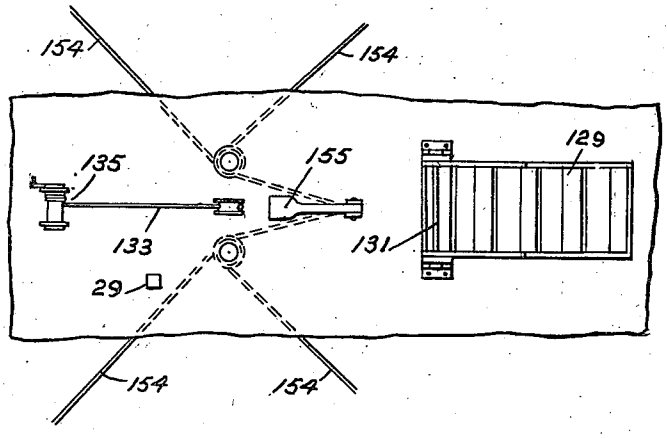


Fig. 4.



Inventor
James H. Strong

By Emery, Holcombe & Miller
his Attorneys

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PARACHUTE DROP SAFETY DEVICE

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Fig. 5.

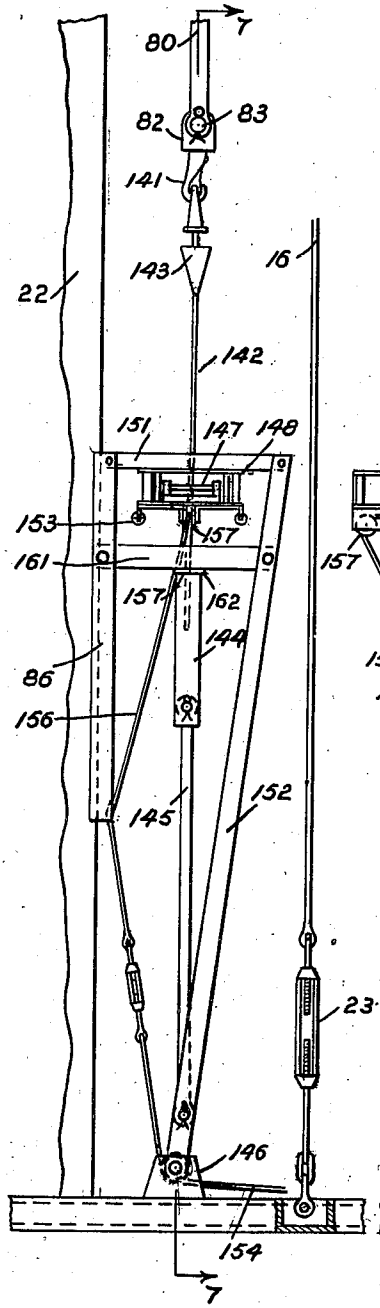


Fig. 6.

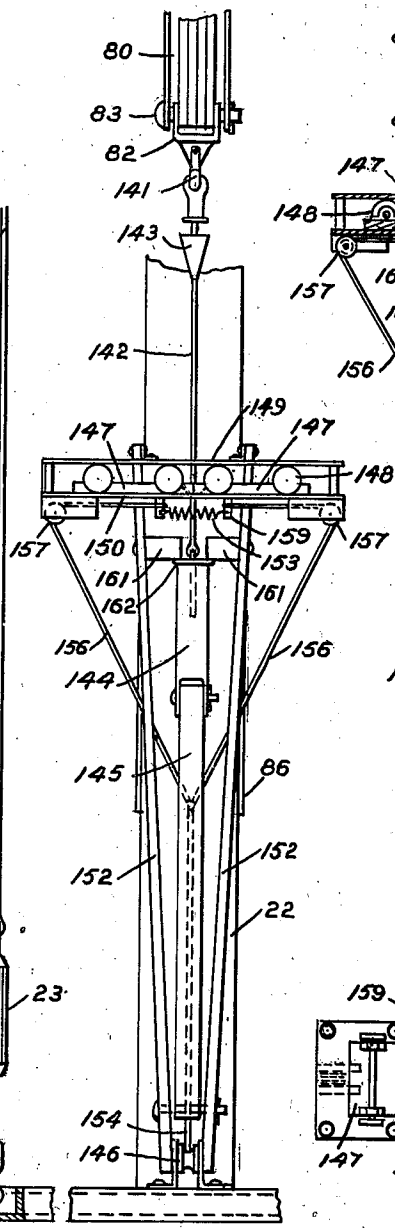


Fig. 7.

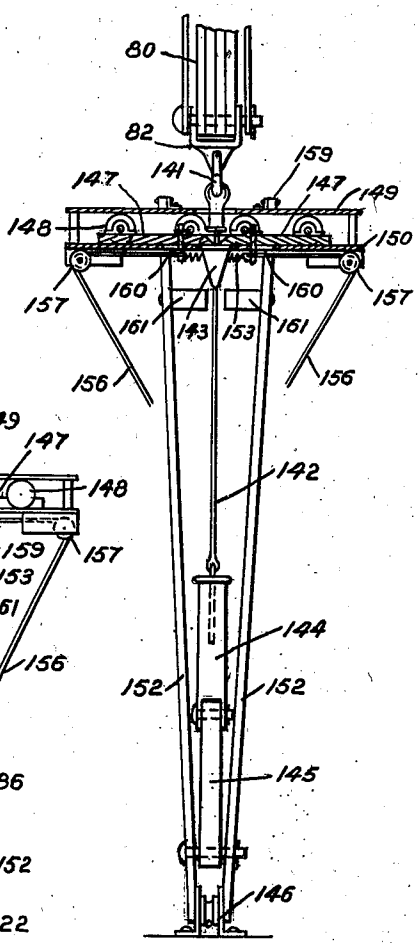
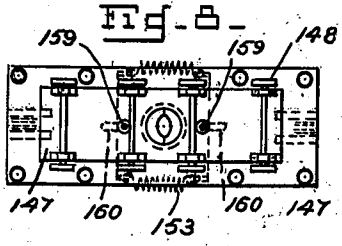


Fig. 8.



Inventor
James H. Strong

By Emery Holcombe Miller
his Attorneys

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PARACHUTE DROP SAFETY DEVICE

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Fig. 9.

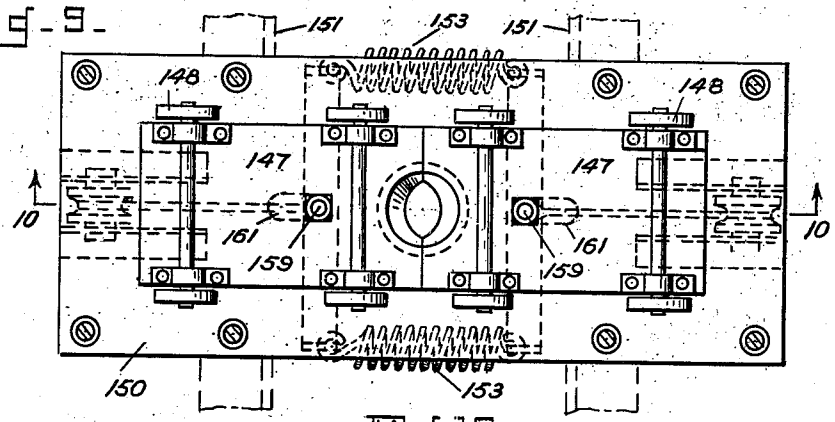


Fig. 10.

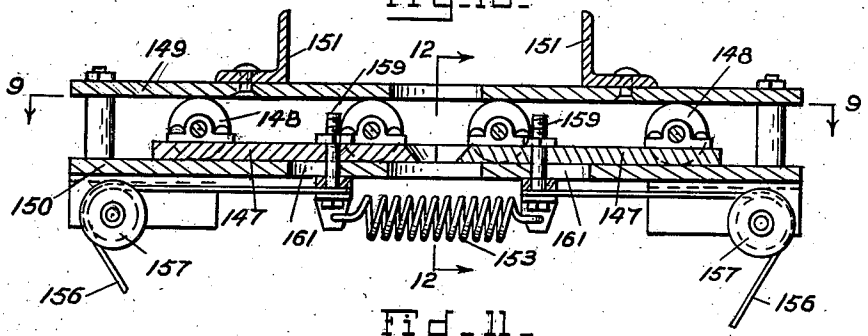


Fig. 11.

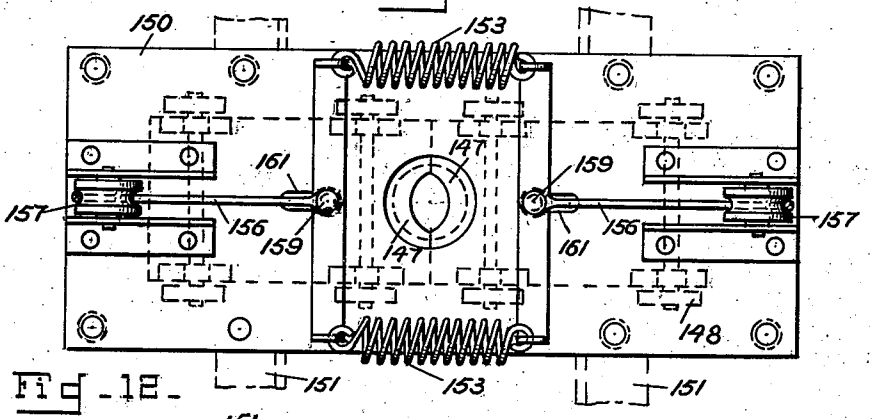
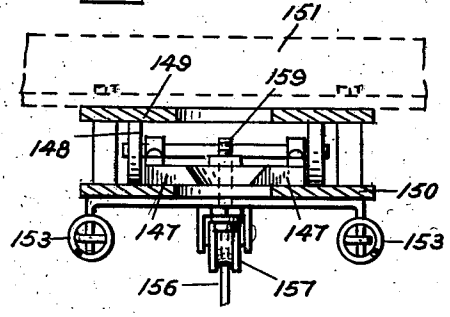


Fig. 12.



Inventor
James H. Strong
By Emery Holcombe Miller
His Attorneys

Patented Dec. 2, 1941 2,264,920

UNITED STATES PATENT OFFICE

2,264,920

PARACHUTE DROP SAFETY DEVICE

James H. Strong, Windsor, N. J.

Application August 6, 1940, Serial No. 351,585

13 Claims. (Cl. 272—6)

This invention relates to amusement and training devices of the type shown in my application Ser. No. 287,153, and comprises certain improvements in the shock absorbing means for cushioning the landing of the parachute at the end of the drop and particularly for readily resetting and holding the swing in a convenient unloading and loading position after it has come to rest.

In the apparatus as built for the 1939 New York World's Fair, there are eleven parachutes provided with passenger carrying swings suspended from a steel tower, each with its own motor and hoisting cable, individually controlled and operated from separate landing stations on the ground spaced around the base of the tower. The parachutes are guided throughout their entire movement up and down by guide cables, of which there are eight for each parachute in the improved apparatus, the upper ends of which are shackled to fittings mounted on the tower, and the lower ends of which are fastened to the ground by means of turnbuckles so as to be readily maintained at sufficient tension to prevent undue swaying and bellying of the parachute canopy.

In order to cushion the parachute and swing at the end of the drop upright posts are set alongside of four of the guide cables to catch the parachute, each post being of sufficient height to suspend the swing clear of the ground when the parachute is checked at the bottom of its descent. The cushioning is accomplished by rubber shock cords, which stretch under the weight and momentum of the parachute, swing and passengers, and recoil somewhat after the fall is checked, thus lifting the swing so high above the landing platform that some means must be provided for the assistance of the passengers in getting on and off. These means comprise a winch and line adapted to be hooked on to the swing to hold it steady and steps arranged to be tipped out of the way when they are not needed for assisting the passengers on and off. Two attendants have heretofore been required for manipulating the winch and steps because of the height of the rebound due to the stretch of the shock absorbing rubbers at the bottom of the drop and the force needed to pull the swing down to the normal loading position within reach of the attendants. Obviously the shock absorbing means must be considerably elevated above the ground to prevent passengers from striking the ground at the bottom of the drop, and in order to avoid the need for too high steps and to permit the attendants to operate the device from the ground level, in my prior apparatus the hand winch was arranged to pull down the swing and parachute several feet to bring the latter into the unloading and loading position against the resistance of the shock absorbing means.

One of the objects of this invention is to reduce the distance through which the swing must be pulled down after coming to rest in order to permit passengers to get on and off easily without the use of more than three or four steps.

Further objects of the invention are to improve the operation of the cushioning means and to permit of ready adjustment thereof to suit different loads and air conditions, making the apparatus safe for operation in all usual weather with a minimum amount of supervision and a single attendant at each loading position.

Other advantages and objects of the invention appear in connection with the following description of the illustrative embodiment thereof shown in the accompanying drawings, being the apparatus in use at the New York World's Fair 1940.

In the drawings,

Fig. 1 is a side elevation of the loading platform, parachute, swing and shock arresting apparatus showing the swing in the position in which it comes to rest after a descent, and the steps in normal loading and unloading position;

Fig. 2 is a vertical cross-section through the platform; showing the steps, swing and operating mechanism in side elevation in normal loading position, the dotted lines indicating the position of the steps when tipped out of the way;

Fig. 3 is a plan view of the loading platform, showing the steps in normal loading position;

Fig. 4 is an enlarged plan view of the working parts at the center of the platform, showing the steps tipped out of the way for an ascent;

Fig. 5 is a side view, and

Fig. 6 is a face view of one of the posts and cushioning apparatus for absorbing the shock on landing, the parts being shown in normal loading position of the swing;

Fig. 7 is a cross-section on the line 7—7 in Fig. 5, looking in the direction of the arrows, showing the snubbing device locked in position as during an ascent;

Fig. 8 is a plan view of the locking device with the top plate removed to disclose the jaw members and operating means; and

Figs. 9, 10, 11 and 12 are details of the locking device drawn to a larger scale, Fig. 9 being a top view similar to Fig. 8, the cross-section being on the line 9—9 in Fig. 10; Fig. 10 is a vertical longitudinal section on the line 10—10 in Fig. 9;

Fig. 11 is a bottom plan view; and Fig. 12 is a vertical transverse section on the line 12—12 in Fig. 10, respectvely.

Referring to Figs. 1 and 3 of the drawings, the parachute 10 is guided between the cables 15, 16 by suitable fittings 60, 61, secured to the skirt of the canopy 57, and freely sliding on the cables. The parachute and its suspended swing 12 are adapted to be raised by the hoisting cable 17, through the medium of the automatic hoisting head 30 which may be like that described in my Patent No. 2,121,413. Turnbuckles 23 are provided for tightening the guide cables, of which there are eight disposed at equal angles from the axis of the parachute. Four posts 22, adjacent to the lower ends of the guide cables 16, support the shock absorbing mechanism and serve to hold the parachute canopy at a sufficient distance above the platform to avoid interference with the swing at the bottom of the descent.

The construction of the parachute is similar to that described in my patent application Ser. No. 287,153 excepting that a flexible cable is sewed into the hem around the skirt of the canopy, replacing the rigid ring heretofore used. Snap hooks 59 secure the fittings 60, 61 to the skirt of the canopy. This is advantageous in relieving the guide cables and fittings from stresses due to the rigidity of the ring formerly used, and also permits of operating the parachutes in higher winds, as there is no tendency to raise one side of the parachute when the opposite side is depressed by a gust when no rigid ring is used for spreading the skirt of the parachute, and the four additional guide cables 15 provide ample protection against side drafts and air currents tending to collapse the parachute during the ascent and descent.

The hoisting head is guided centrally of the axis of the parachute by means of fittings 31 which slide on the guide cables 16, to which it is connected by tie wires 34 provided with extensible sections 33, and the fittings 31 are supplied with brakes under the control of the wires 52 for locking the heads to the guide cables should the hoisting cable 17 break or cease functioning properly as in my application Ser. No. 287,153.

The swing 12 is preferably made of a light metal frame, supported from a spreader bar 106 by means of reinforced webbing straps 107 and rubber shock members 108 as in my application Ser. No. 287,153. In order to prevent overturning, the swing side frame bars are extended forwardly and are connected at their ends to the rubber shock members by cables enclosed in metal tubes 114. A wide webbing strap 115 is provided for securing the passengers to the seat.

For suspending the swing from the hoisting head and elevating the swing and passengers when the parachute canopy is deflated, a bridle 123 is provided, the upper end of which is connected to the apex fitting of the parachute near where it is grasped by the hoisting head and the lower ends of which are attached to the spreader bar 106, as shown in Fig. 1. This bridle takes the weight of the swing and passengers during the ascent and relieves the shrouds 66, which support the swing during the normal free descent of the parachute.

At the end of each descent, the parachute swing 12 is suspended at the loading and unloading position from the guide fittings 61, which are secured to the parachute canopy 57 and run on the guide cables 16, and which bear against the buffer fittings 81 also mounted to slide freely on the lower ends of the guide cables 16 near the tops of the posts, these buffer fittings being held up by short cables 78 passing over pulleys 77 at the tops of the posts, and secured at their lower ends to the rubber shock cords or snubbers 80 by means of fittings 79, as in the apparatus described in my prior application Ser. No. 287,153.

The lower ends of the shock cords 80 at each post are pinned to a yoke 82, which is connected by a snap hook 141 to a short line 142 provided with a locking cone 143 and at the lower end of the line there is attached a weight 144 to which is secured a rubber strap 145 connected at its lower end to a member 146 secured to the ground at the foot of the post, as shown in Figs. 1, 5, 6 and 7. When the parachute is elevated, the weights 144 pull the cables 78 down until the locking cones 143 are caught by the sliding jaws 147 as shown in Fig. 7, thereby holding the buffer fittings 81 at the tops of the posts ready to catch the parachute guide fittings 61 when the parachute drops.

The sliding jaws 147 are mounted on rollers 148 between top and bottom plates 149, 150, which are secured to the posts by angles 151 supported at their outer ends by struts 152. Springs 153 normally hold the jaws together to embrace the locking cones. For unlocking the locking jaws, lines 154 are provided leading from a treadle 155 near the control mechanism at each loading station to each post, and each line is provided at its end with a bridle 156, the ends of which pass around pulleys 157 at the ends of the bottom plate 150 and are connected by pins 159 on the under side of each sliding jaw. These pins pass through slots 160 in the bottom plate and serve to guide the jaws as well as move them. The springs 153 are also connected at their ends to these pins.

In the operation of the apparatus, assuming that the parachute has landed with the locks in locking position as shown in Fig. 7 and come to rest at a considerable height above the ground, the attendant tilts the steps 129 into place beneath the swing 12 and hooks on the down haul line 133 to the bridle 138 by means of the pelican hook 127, and immediately steps on the treadle 155 to unlock the locks, whereupon the parachute and swing drop until the weights 144 abut against the stop bars 161 on the posts 22, rubber buffers 162 being provided to soften the impact as shown in Fig. 5. Thereupon the attendant turns the hand winch 135 until the swing is drawn down into position above the steps and securely held for the passengers to disembark as soon as he frees the safety belt.

After the next load of passengers has climbed on to the swing and the safety belt 115 has been secured by the attendant, the hoisting button on the control switch 29 is pressed and the hoisting cable starts to raise the parachute and swing. This trips the line 126 which unhooks the pelican hook guard 128 and permits the swing to ascend. The lifting of the weight of the parachute and swing frees the shock absorbing blocks and relieves the tension on the shock cords 80, whereupon the weights 144 pull the locking cones 143 down into engagement with the locking members 147.

Meanwhile the attendant tilts the steps out of the way of the legs of the passengers when the parachute descends, and presses the control button which lowers the hoisting head 30, which follows the parachute down and hooks on automatically after the parachute has come to rest.

The invention is not restricted to the details of construction illustrated, as obviously many

modifications may be made by selecting equivalent constructions so combined as to accomplish the same purpose.

I claim the following as my invention:

1. Parachute apparatus comprising a canopy, vertically extending guide members spaced around said canopy, means attached to said canopy engaging said guide members for directing the descent of said canopy, shock absorbing means slidable alongside of the lower ends of said guide members for arresting the descent of said canopy, said shock absorbing means comprising flexible extensible members and end fastenings having two operating positions, means for locking said end fastenings in one of said operating positions, and means for releasing said locking means.

2. Parachute apparatus comprising a canopy, vertically extending guide members spaced around said canopy, means attached to said canopy engaging said guide members for directing the descent of said canopy, shock absorbing means slidable alongside of the lower ends of said guide members for arresting the descent of said canopy, said shock absorbing means comprising flexible extensible members and end fastenings having two operating positions, means for locking said end fastenings in one of said operating positions, and means for releasing said locking means, said releasing means being simultaneously operable from a central point.

3. Parachute apparatus comprising a canopy, vertically extending guide cables spaced around said canopy, sliders attached to said canopy engaging said cables for directing the descent of said canopy, buffer sliders engaging the lower ends of said cables for arresting the descent of said canopy, supports alongside the lower ends of said cables, said supports carrying pulleys near their upper ends over which lines are carried to support said buffer sliders, the lower ends of said lines being connected to extensible shock cords, locking means for releasably securing the free ends of said shock cords to said supports, and quick releasing means for said locking means.

4. Parachute apparatus comprising a canopy, vertically extending guide cables spaced around said canopy, sliders attached to said canopy engaging said cables for directing the descent of said canopy, buffer sliders engaging the lower ends of said cables for arresting the descent of said canopy, supports alongside the lower ends of said cables, said supports carrying pulleys near their upper ends over which lines are carried to support said buffer sliders, the lower ends of said lines being connected to extensible shock cords, automatic locking means for releasably securing the free ends of said shock cords to said supports, and quick releasing means for manually disengaging said locking means.

5. Parachute apparatus comprising a canopy, vertically extending guide members spaced around said canopy, means attached to said canopy engaging said guide members for directing the descent of said canopy, a passenger carrier suspended from said canopy, suspension means from said canopy directing means to said passenger carrier, shock absorbing means slidable alongside of the lower ends of said guide members for engaging said canopy directing means to arrest the descent of said canopy and passenger carrier, said shock absorbing means having two operating positions in one of which it engages said canopy directing means at a higher elevation for bringing it to rest with the passenger carrier before the latter strikes the ground and in the other of which it supports the canopy directing means, canopy and passenger carrier at a lower elevation to aid in ready access to the passenger carrier from the ground.

6. Parachute apparatus comprising a canopy, vertically extending guide members spaced around said canopy, means attached to said canopy engaging said guide members for directing the descent of said canopy, a passenger carrier suspended from said canopy, suspension means from said canopy directing means to said passenger carrier, shock absorbing means slidable alongside of the lower ends of said guide members for engaging said canopy directing means to arrest the descent of said canopy and passenger carrier, said shock absorbing means having two operating positions in one of which it engages said canopy directing means at a higher elevation for bringing it to rest with the passenger carrier before the latter strikes the ground and in the other of which it supports the canopy directing means, canopy and passenger carrier at a lower elevation to aid in ready access to the passenger carrier from the ground, in combination with automatic means for locking said shock absorbing means in its higher engaging position when the canopy and passenger carrier guide means are raised from engagement with said shock absorbing means.

7. Automatic locking means for the shock cushioning members of a parachute drop comprising two oppositely movable jaws, spring means tending to hold said jaws together, a tapered circumferentially grooved member mounted on a line connected to a shock cushioning member and guided between said jaws by means adjacent thereto, and means for spreading said jaws against the pressure of said spring, said last named means being actuated from a position remote from said locking means convenient to the control means for said parachute drop.

8. Parachute apparatus comprising vertically extending guide cables, means connected to the skirt of the parachute freely running on said cables, fixed posts adjacent to the lower ends of said cables, parachute shock absorbing means supported by said posts, locking devices carried by said posts for securing said shock absorbing means in operative position to check the downward movement of the parachute, and means for engaging said locking devices with said shock absorbing means upon the ascent of the parachute.

9. Parachute apparatus comprising vertically extending guide cables, means connected to the skirt of the parachute freely running on said cables, fixed posts adjacent to the lower ends of said cables, parachute shock absorbing means supported by said posts, locking devices carried by said posts for securing said shock absorbing means in operative position to check the downward movement of the parachute, and means for engaging said locking devices with said shock absorbing means upon the ascent of the parachute, said engaging means including a line attached at its upper end to said shock absorbing means and provided with a weight at its lower end.

10. Parachute apparatus comprising vertically extending guide cables, means connected to the skirt of the parachute freely running on said cables, fixed posts adjacent to the lower ends of said cables, parachute shock absorbing means

supported by said posts, locking devices carried by said posts for securing said shock absorbing means in operative position to check the downward movement of the parachute, and means for engaging said locking devices with said shock absorbing means upon the ascent of the parachute, said engaging means including a line attached at its upper end to said shock absorbing means and provided with a weight at its lower end, said weight serving as a stop to limit and maintain said shock absorbing means in position to hold the parachute at the desired level for convenient access.

11. A parachute loading station comprising circumferentially spaced vertical guide cables, vertical posts adjacent thereto, shock absorbing snubbers supported by said posts, said snubbers having a snubbing position and a parachute loading position, locks adjacent to said posts for holding said snubbers in snubbing position, and means extending from said locks to a point adjacent the central control means for said loading station for unlocking said locks simultaneously.

12. A parachute loading station comprising circumferentially spaced vertical guide cables, vertical posts adjacent thereto, shock absorbing snubbers supported by said posts, said snubbers having a snubbing position and a parachute loading position, locks adjacent to said posts for holding said snubbers in snubbing position, and flexible means extending from said locks to a point adjacent the central control means for said loading station for unlocking said locks simultaneously, said unlocking means including a treadle operated lever to the inner end of which said flexible means converge and are secured.

13. In apparatus of the character described, a post provided with means for positioning a parachute guide cable, a sheave on said post above said positioning means, a block sliding on said cable above said positioning means, a line connected to said block and running over said sheave, flexible shock absorbing members connected at their upper ends to said line below said sheave, the lower ends of said shock absorbing members being secured to a locking member, automatic locking devices secured to said post in alinement with said locking member, and means to draw said locking member into said locking devices when the pull on said shock absorbing members is diminished by the ascent of the parachute.

JAMES H. STRONG.