Sept. 23, 1930. C. H. KUGLER 1,776,629

PARACHUTE

Filed Sept. 12, 1928

Fig. 1.

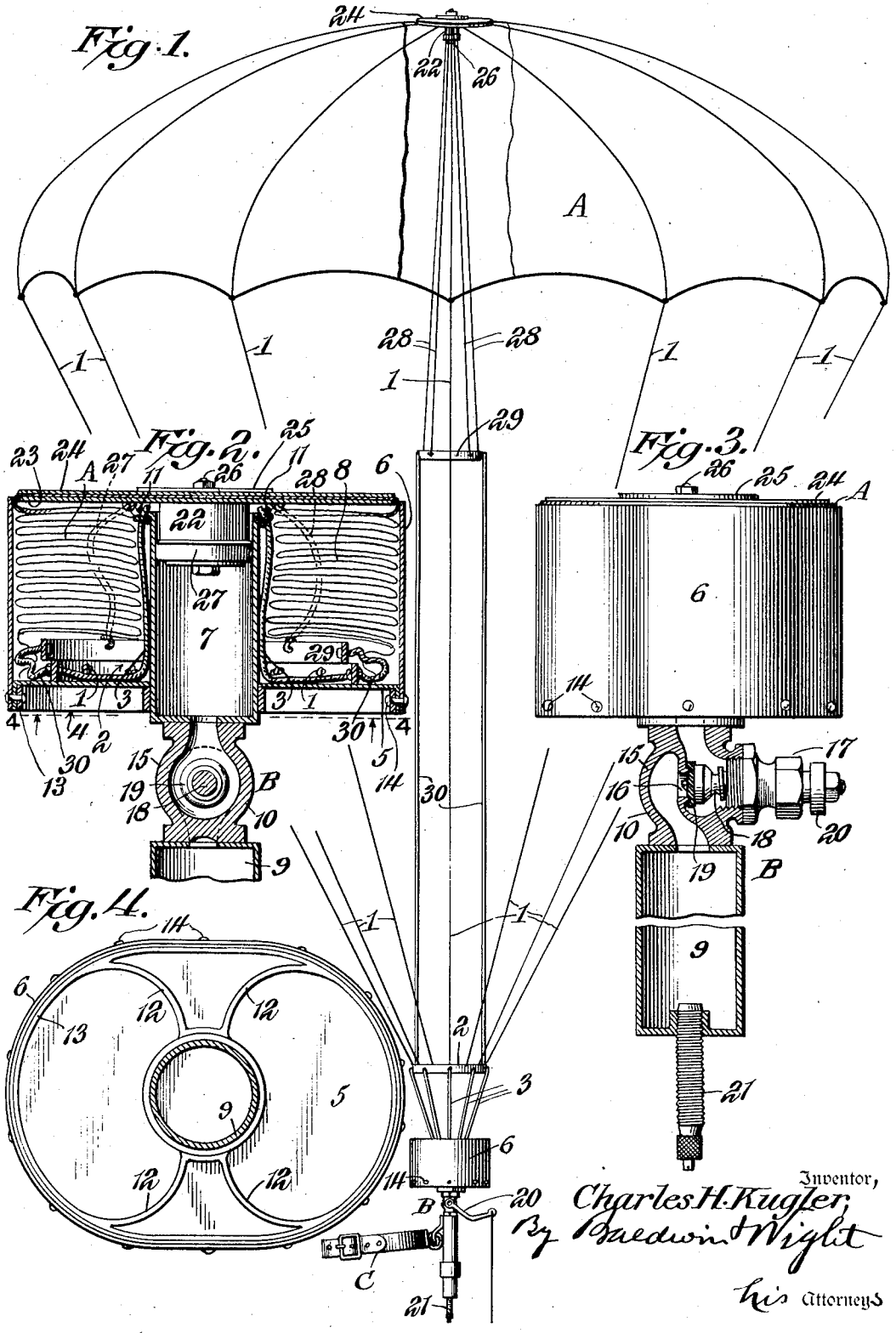


Fig. 2.

Fig. 3.

Fig. 4.

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PARACHUTE

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My invention relates to parachutes, and more particularly to improvements in a parachute in which means are provided for quickly launching the parachute sail.

In the type of parachute now most commonly used, the sail and sail ropes are folded into a packet and strapped to the back of the aviator or other person using the parachute, the sail being retained folded in the form of the packet by means of a tying cord known as a "rip cord." After an aviator using this type of parachute has jumped or fallen from an airship, he has pulled a free end of this "rip cord" to untie the sail and allow it to be unfolded and spread into its active position to retard the descent of the aviator. Such parachutes have worked well when the aviator has started to fall from a relatively great height, there being plenty of time for the sail to become unfolded. However, when it is necessary for an aviator to jump when relatively close to the ground, the sail does not unfold in time to appreciably check the aviator's descent, with the result that he strikes the ground with such force as to cause injury, and, in some cases, death.

The main object of my invention is to overcome this objectionable characteristic by the provision of means for quickly projecting the sail into the air in such a way as to cause it to unfold immediately and thus to begin to act to retard the descent of the aviator without delay.

For attaining this object I attach a piston to the under side of and at the center of a parachute sail. This piston is positioned within a cylinder concentrically located within a sail housing and is provided with a frictional packing which normally holds the piston within the cylinder, and the sail within the sail housing. The cylinder is adapted to communicate with a reservoir containing a supply of compressed air, the communication between the cylinder and the reservoir being controlled by means of a quick-opening valve. When the valve is opened to allow the reservoir to communicate with the cylinder, air pressure builds up in the cylinder to a value sufficient to project the piston from the cylinder with great speed, thus carrying the sail upwardly. Means which form an important part of my invention act to limit the throw of the piston and cause the edges of the sail to swing upwardly and outwardly relative to the center thereof, thus spreading the sail.

With the above main object, and briefly described means for attaining it, in mind, my invention will be better understood from the following detailed description, the appended claims, and the several views illustrated in the drawings, in which:

Figure 1 is a front elevation of a parachute embodying my invention,

Figure 2 is a central vertical sectional view showing parts of a launching device,

Figure 3 is a side elevation taken at right angles to Figure 2 of the launching device, some of the parts being shown in section, and

Figure 4 is a sectional view taken on the line 4—4 of Figure 2.

Like numerals designate corresponding parts in the several views illustrated.

In the drawings illustrating my invention, there is shown a parachute embodying a sail A, a launching device B, and a belt C connected to the launching device for attaching the latter to an aviator. For connecting the sail to the launching device, there is provided a plurality of flexible, inelastic sail cords 1 attached to the periphery of the sail at their upper ends and to a sail cord ring 2 at their lower ends, the sail cord ring being in turn connected to the launching device by means of rubber or other elastic cords 3.

The launching device B comprises a sail housing 4 having a bottom 5 and oval or cylindrical side wall 6, and a cylinder 7 located concentrically within the sail housing to provide an annular sail chamber 8 having an open upper end. An air reservoir 9 is rigidly connected to the bottom of the cylinder by a valve structure 10 which communicates with the cylinder 7 and the reservoir by means of the valve structure 10 interposed between the cylinder and the reservoir.

At the upper end of the cylinder 7 there is provided a number of eye-lugs 11 to which the elastic cords 3 are attached.

The sail housing may be constructed of any suitable light material such as leather or aluminum. In the drawings, I have shown a construction in which the side wall 6 and bottom 5 are of leather and are carried by a metal frame work comprising supporting ribs 12—12 attached to the cylinder 7, a ring 13 carried by the ribs 12, and rivets 14 for securing the bottom 5 and the side wall 6 to the ring 13.

The valve 10 may be of any type adapted to form an effective air-tight seal to prevent air from slowly leaking from the reservoir 9 and should be capable of being quickly opened. The valve comprises a valve casing 15 provided with a valve seat 16, a sleeve 17 threadably mounted in the casing, a threaded valve stem 18 having a valve 19 adapted to contact with the valve seat when the valve stem is moved inwardly, and a manually operated lever 20 fixed to the outer end of the stem. The threads on the valve stem are of sudden pitch in order that a small turning movement of the stem will quickly open or close the valve.

The reservoir 9 is provided with a valve 21 for allowing the reservoir to be filled with air under pressure from a pump or other source of air supply, this valve being shown as of the type used in automobile tires.

A piston 22 is attached to the center of the sail A by means of inside and outside leather reenforcing plates 23—24 respectively, a metal disc 25 on top of the outside plate 24, and a clamping bolt 26 which passes through the piston, the plates 23—24, the sail A, and the disc 25.

The piston 22 is provided with an annular packing 27 of such size as to cause the piston to be frictionally and releasably held within the cylinder 7. The plates 23—24 are preferably of substantially the same size as the top of the sail housing, so that, when the piston is positioned in the cylinder and so held by the friction of the packing 27, the plates 23—24 act as a closure for retaining the folded sail within the housing.

It is apparent that, when the sail is folded and the piston is positioned within the cylinder as shown in Figure 2, a sudden opening of the valve 19 will admit air under pressure into the cylinder until the pressure therein has reached a point sufficient to overcome the friction of the packing 27, at which time the piston will be suddenly projected with considerable speed from the cylinder, carrying the sail upwardly with it.

In order to limit the throw of the center of the sail and thereby to cause the edges thereof to swing outwardly and upwardly relative to the center, I provide connections between the piston and the cylinder, which connections comprise flexible, non-elastic, piston-retaining cords 28—28 attached at their respective ends to the piston and to a ring 29, and elastic cords 30—30 connected at their respective ends to the ring 29 and to the sail cord ring 2, the sail cord ring being connected to the cylinder by the elastic cords 3, as stated above.

The operation of the device may be briefly described as follows: It is assumed that the sail is folded and positioned within the sail housing, and the piston positioned within the cylinder. It is further assumed that the valve 19 is closed and that the air reservoir is filled with air under pressure. When it is desired to spread the parachute sail, the valve is opened to admit air under pressure into the cylinder 7 and to project the piston therefrom. As the piston ascends the sail will be unfolded and carried upwardly. When the piston has reached a predetermined point in its travel away from the cylinder, it will be halted by the piston retaining cords 28 and the elastic cords 30. By this time the edges of the sail will have been lifted clear of the sail housing, and, when the throw of the piston is checked, the momentum of the edges will continue to carry them upwardly, thus quickly unfolding the sail.

I have found by tests of my parachute that, as a result of the sudden projecting of the piston from the cylinder and the checking of its ascent to cause the edges of the sail to swing outwardly and upwardly, my parachute sail will completely unfold before the wearer has dropped more than ten feet.

It is to be understood that, while I have illustrated a preferred form of my invention, the arrangements of parts and details of structure may be variously changed without departing from the spirit and scope of my invention.

I claim:

1. The combination with a parachute sail, of a sail housing, a cylinder concentrically arranged within the housing to provide an annular chamber for normally containing the sail, a flexible connection between the sail and the cylinder, a piston attached to the sail and adapted to be frictionally and releasably held within the cylinder, and means for supplying air under pressure to the cylinder to project the piston therefrom.

2. The combination with a parachute sail, of a sail housing having an open upper end, a cylinder concentrically arranged within the housing to provide an annular chamber for normally containing the sail, a flexible connection between the sail and the cylinder, a piston adapted to be frictionally and releasably held within the cylinder, means for attaching the piston to the sail including a concentrically arranged plate forming a closure for the open end of the housing and for retaining the sail within the housing, and means for supplying air under

pressure to the cylinder to project the piston therefrom.

3. The combination with a parachute sail, of a cylinder, a flexible connection between the sail and the cylinder, a piston attached to the sail and adapted to be frictionally and releasably held within the cylinder, means for supplying air under pressure to the cylinder to project the piston therefrom, and means connecting the piston with the cylinder for limiting the throw of the piston including an inelastic flexible cord attached to the piston, and elastic means connected to said cord and to the cylinder.

4. The combination with a parachute sail, of a cylinder, a piston attached to the sail and adapted to be frictionally and releasably held within the cylinder, a ring intermediate the piston and the sail, a flexible connection between the ring and the sail, an elastic connection between the ring and the piston, and an elastic connection between the ring and the cylinder.

5. The combination with a parachute sail, of a cylinder, a flexible connection between the sail and the cylinder, a piston attached to the sail and adapted to be frictionally and releasably held within the cylinder, an elastic connection between the cylinder and the piston, and means for supplying air under pressure to the cylinder to project the piston therefrom.

In testimony whereof, I have hereunto subscribed my name.

CHARLES H. KUGLER.