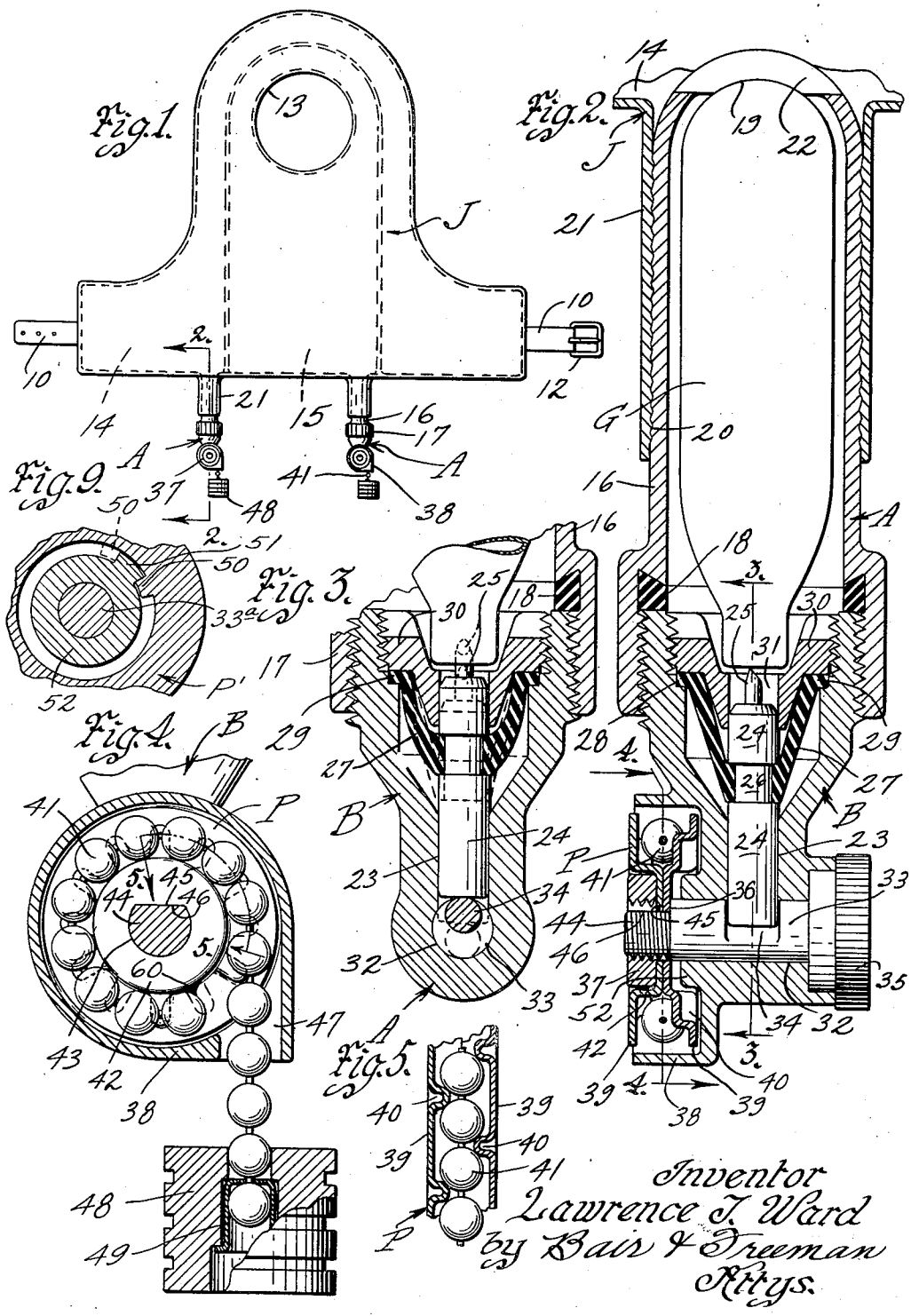
April 18, 1944. L. T. WARD 2,347,010

LIFE JACKET INFLATOR

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LIFE JACKET INFLATOR

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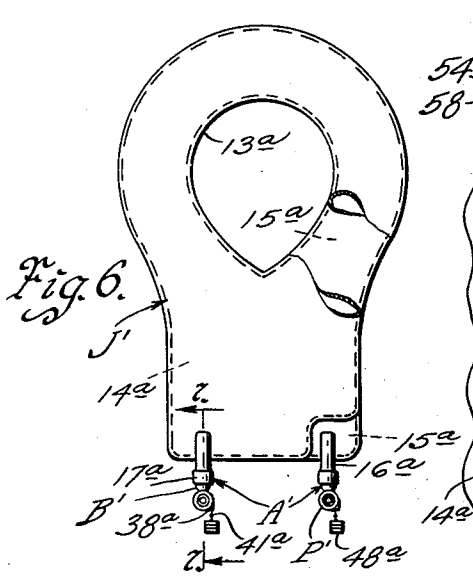


Fig. 6.

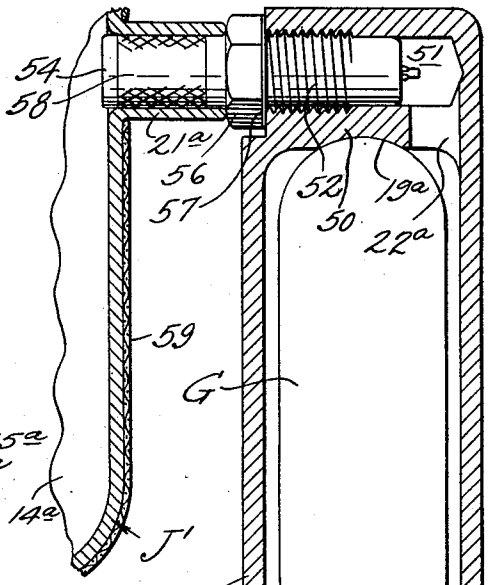


Fig. 7.

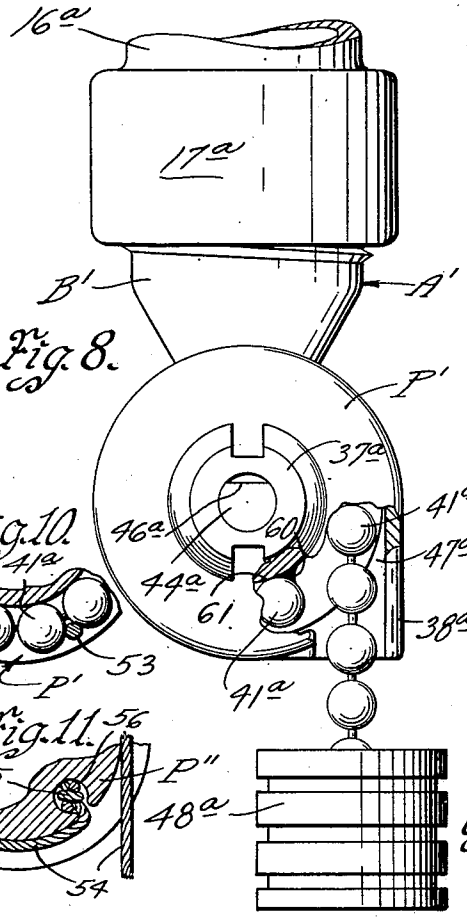


Fig. 8.

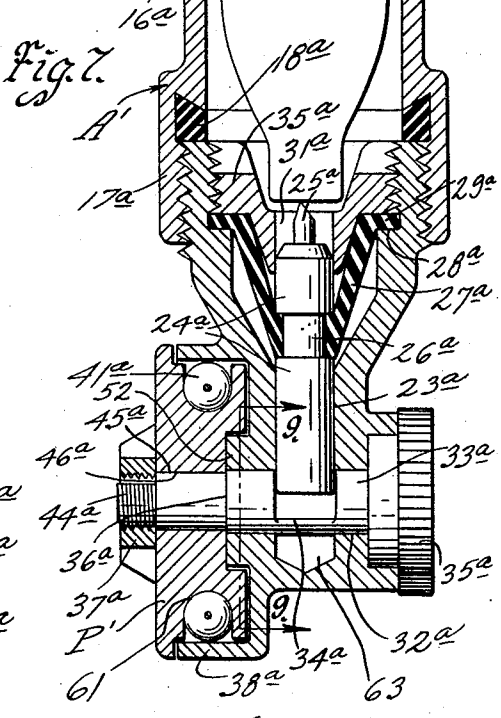


Fig. 10.

Fig. 11.

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2,347,010

LIFE JACKET INFLATOR

Lawrence T. Ward, Philadelphia, Pa., assignor to Knapp-Monarch Company, St. Louis, Mo., a corporation of Missouri

Application January 19, 1942, Serial No. 427,336

10 Claims. (Cl. 9—19)

This invention relates to inflating means for a life jacket, which means has operating mechanism for piercing a compressed gas bulb contained in the means and permitting passage of the gas therefrom into an inflatable jacket member.

One object of the invention is to provide a compressed gas bulb holding and piercing means of simple and inexpensive construction which may be readily operated by the user of the jacket.

A further object is to provide the bulb holding and piercing means arranged so that it can be readily taken apart for renewing the bulb therein and may be readily reset for a subsequent bulb piercing operation.

Still a further object is to provide a simple mechanical means for piercing the bulb in response to pulling downward on a knob depending from the bulb holder and piercing means.

Another object is to provide an effective sealing means for the movable piercing pin with respect to the bulb holder so that none of the gas expelled from the bulb in the holder passes to atmosphere.

Other objects, purposes and characteristic features of the present invention will be in part obvious from the accompanying drawings and in part pointed out as the description of the invention progresses. In describing the invention in detail, reference will be made to the accompanying drawings in which like reference characters designate corresponding parts throughout the several views, in which:

Figure 1 is a front elevation of one form of life jacket with my inflating means applied thereto;

Figure 2 is an enlarged sectional view on the line 2—2 of Figure 1 showing the parts in normal position;

Figure 3 is a sectional view on the line 3—3 of Figure 2 showing a piercing pin of the device in piercing position;

Figure 4 is a sectional view on the line 4—4 of Figure 2 showing a pulley and chain arrangement for operating the piercing pin;

Figure 5 is a sectional view on the line 5—5 of Figure 4 showing the cooperation of the chain with the pulley;

Figure 6 is a front elevation of another form of life jacket to which my inflating means is adaptable;

Figure 7 is an enlarged sectional view on the line 7—7 of Figure 6;

Figure 8 is a front elevation of the lower portion of Figure 7 with some parts broken away and others shown in section;

Figure 9 is a sectional view on the line 9—9 of Figure 7, showing a stop means for a piercing pin operating mechanism;

Figure 10 is a view similar to a portion of Figure 8 showing a slightly modified construction; and

Figure 11 is a similar view showing another modification.

On the accompanying drawings I have used the reference character J to indicate an inflatable life jacket made of rubberized fabric or the like. The jacket J has a strap 10 and buckle 12 for securing it around the waist of a person, an opening 13 being provided for the wearer's neck. The jacket J is formed with two compartments 14 and 15 respectively, and one of my inflating means, indicated generally at A, is associated with each compartment.

The inflating means A comprises a tubular holder 16 having an enlarged threaded portion 17. A body B is adapted for threading into the portion 17 against a sealing ring 18 therein. The upper end of the tubular holder 16 is thickened and provided with a seat at 19 for a gas bulb G to seat against. The outside of the tubular holder 16 is roughened, as indicated at 20, to which a neck portion 21 of the jacket J may be vulcanized for sealing the jacket compartments 14 and 15 relative to the inflating devices A. The inner end of each tubular holder 16 is also slotted, as at 22, to permit the passage of gas into the compartment 14 or 15.

The body B has a bore 23 for a piercing pin 24, the piercing point of which is indicated at 25. The piercing pin has an annular groove 26 in which the small end of a truncated, cone-shaped diaphragm 27 is vulcanized. The upper end of the diaphragm is provided with a flange 28 adapted to seat against a shoulder 29 of the body B.

For compressing the flange against the shoulder and thereby sealing the diaphragm relative to the body B, I provide a diaphragm retainer 30. The retainer 30 has a bore 31 for guiding the upper end of the piercing pin 24.

The body B is provided with a bore 32 for an operating shaft 33. The shaft 33 has an eccentric portion 34 formed or cut therein, and on one end has a knurled knob 35. On its other end a pulley P is secured against a shoulder 36 of the shaft by a nut 37.

The pulley P is located in a pulley housing 33 formed on the body B, and in the form of invention shown in Figures 1 to 5 consists of a pair of sheet metal disks forming the sides of the pulley,

as indicated at 39, each disk having radial indentations 40 to assume positions between the beads 41 of a bead chain. The central portions of the disks of the pulley P are formed hub-like, as indicated at 42, for confinement between the shoulder 36 and the nut 37. Each disk has a semi-circular opening 43 for a threaded portion 44 of the shaft 33 and a chord portion 45 for coaction with a flattened portion 46 of the shaft. The portions 45 and 46 prevent rotation of the pulley relative to the shaft.

The beaded chain 41 depends through a tangential opening 47 of the pulley housing 38 and is connected with a knob 48 by a bead chain sleeve 49.

In the form of invention shown in Figures 6, 7 and 8 many of the parts are identical or similar to those shown in Figures 1 to 5 and bear the same reference numerals, with the addition of *a*. A different form of jacket J' is disclosed, made in two sections having compartments 14ª and 15ª, superposed one upon the other. A modified form of inflating device A' communicates with each compartment 14ª and 15ª.

The modified form of device has a tubular bulb holder 16ª which, instead of being slotted at its upper end, has an opening 22ª through a partition 50. Above the partition 50 a lateral bore 51 is provided in which is threaded a check valve 52 such as one of the Schrader or Dill type, as ordinarily used in automobile tires. Since the valve is of well-known construction, it is not illustrated in detail, but, of course, is mounted so that flow is permitted from the passageway 22ª through the valve and out of its outlet end, indicated at 54, whereas reverse flow is prevented by the check valve. The valve has a hexagon portion 56 for screwing it into the bore 55 against a sealing gasket 57. The discharge end of the valve is roughened, as indicated at 58, so that it can be vulcanized in the neck 21ª of the jacket J'. The neck here illustrated is of rubber, the same as the jacket itself, and covered with fabric 59.

In the form of the invention shown in Figures 6, 7 and 8, a pulley P' of die-cast metal or the like is provided instead of the sheet metal formed pulley as shown in the previous figures. With both types of pulleys the inner end of the bead chain 41 is secured in the groove of the pulley as by welding or brazing 60. The pulley P' has a smooth annular groove 61 instead of the type of groove shown in Figure 5. A reservoir 63 is provided for lubricant.

Figure 9 shows stop lugs for relieving strain on the pull chain 41ª. This consists of an inwardly directed lug 50 of the pulley P' adapted to engage a stop lug 51 of the hub 52 that rotatably receives the shaft 33ª. The lug 50 is normally in the position illustrated by full lines, and when the pulley P' is rotated its full limit will finally assume a stopped position, indicated by dotted lines, against the other side of the stop lug 51. This tends to reduce the strain placed on the securing means, such as the welding 60 for the chain 41ª.

Figure 10 shows a modification wherein instead of the welding or brazing at 60, a cross-pin 53 is carried by the pulley P', the pin being located between the two last balls of the bead chain 41ª. Instead of the bead chain, a different type of flexible element, such as a cord or pulley 54, may be provided, as in Figure 11. The cord has a knot 55 in its inner end, which knot is received in a recess 56 of a pulley P''. The pulley P'' differs from the pulley P' in that its groove is designed for the cord 54 rather than for the chain 41.

Practical operation

In the operation of either form of my invention, when the user desires to inflate one or both compartments 14 and 15 to inflate the jacket, the knobs 48 may be grasped and pulled downwardly. This rotates the pulleys P or P' so that the eccentrics 34 or 34ª, during one-half of the revolution of the pulley, push the piercing point 25 into the neck of the gas bulb G. These bulbs may be the ordinary Sparklet bulb, or one containing highly compressed air.

As the chain is pulled further the pulley continues to rotate, and the eccentric 34 or 34ª recedes from the piercing pin. This permits the pin to be forced out of the gas bulb by the gas issuing therefrom, and by the cone-shaped diaphragm 27, tending to return to its initial shape so as to permit ready flow of gas into the holder 16 or 16ª and then upwardly around the outside of the gas bulb and through the slot 22 or the opening 22ª to the compartment in the life jacket. During the bulb piercing operation the diaphragm 27 will be deformed to the position shown in Figure 3, but in all positions will prevent any escape of the gas to atmosphere.

In order to recondition the mechanism for a subsequent inflating operation the knob 35 is rotated clockwise to wind the chain 41 back into the housing 38. The body B is then unscrewed from the holder 16 and a new bulb placed in position and the body replaced.

I have illustrated and described my improvement in embodiments which I have found very satisfactory. I have not attempted to illustrate or describe certain adaptations or modifications which I contemplate, or the various uses and adjustments possible, as it is believed that the foregoing disclosure will enable those skilled in the art to which this invention appertains to embody or adapt my improvements as may be desired.

I claim as my invention:

1. In a life jacket inflator, a tubular member adapted to receive a compressed gas bulb, means for connecting one end of said tubular member in communication with an inflatable jacket, a body screw-threadedly connected with the other end of said tubular member, a rotary shaft journaled in said body at right angles to the axis of said tubular member, an eccentric on said shaft, a piercing pin slidable in said body along the axis of the tubular member, a diaphragm sealing said pin relative to said body, a pulley on said shaft, a flexible element having one end connected with said pulley, and a knob on the other end of said flexible element to permit manual tensioning of the flexible element for the purpose of rotating said pulley and shaft and thereby said eccentric to cause said piercing pin to pierce a bulb held in said tubular member.

2. In a life jacket inflator, a tubular member adapted to receive a charging bulb, means of communication between said tubular member and an inflatable jacket, a body detachably connected with said tubular member and having a conical part terminating in a shaft housing, a shaft journaled therein, a bulb piercing pin slidable in said shaft housing and associated with said shaft to be operated by rotation thereof, a conical diaphragm in said conical part of said body and sealing said pin relative to said body,

a grooved pulley on said shaft, a flexible element having one end connected with said pulley, and a manually engageable knob on the other end of said flexible element, said shaft housing having an annular flange around the periphery of said pulley to retain said flexible element in the groove of said pulley, said flange having an opening at one point to permit said flexible element to depend from said pulley.

3. Life jacket inflating means comprising a holder adapted to receive a compressed gas bulb, a gas exit opening in one end of said holder, said holder being vulcanized into the wall of an inflatable jacket, a body screw-threadedly connected with the other end of said holder and having a conical part terminating in a shaft housing, an operating shaft journaled in said shaft housing, an eccentric on said shaft, a piercing pin slidable in said shaft housing and cooperating with said eccentric to be operated thereby upon rotation of said shaft, a conical diaphragm in said conical part of said body and sealing said pin relative to said body, a pulley on said shaft and a flexible element having one end connected with said pulley for the purpose of rotating the pulley and thereby said eccentric.

4. Life jacket inflating means comprising a holder to receive a compressed gas bulb, a check valve in said holder, means for communicating the outlet of said check valve with an inflatable jacket, a body detachably connected with said holder, a shaft journaled in said body, an eccentric operated by said shaft, a piercing pin slidable in said body at right angles to said shaft and aligned with said eccentric, a pulley on said shaft, and a flexible element for rotating said pulley to thereby operate said eccentric and effect longitudinal movement of said piercing pin to piercing position with respect to a compressed gas bulb held in said holder.

5. In a life jacket inflator, a tubular member adapted to receive a charging bulb, means for connecting one end thereof in communication with the interior of an inflatable jacket, a body connected with the other end of said tubular member, a sealing ring between said body and said tubular member, a truncated, cone-shaped diaphragm, a piercing pin slidable in said body, the small end of said diaphragm being vulcanized thereto and the other end of said diaphragm having an out-turned flange, a diaphragm retainer screwed into said body against said flange, an operating shaft rotatable in said body and having an eccentric portion in alignment with said piercing pin, said body having a pulley casing, a grooved pulley therein and secured to said shaft, a chain in the groove of said pulley, said pulley housing having a tangential opening for the passage of said chain to the exterior thereof, and a knob on the outer end of said chain.

6. In a life jacket inflator, a tubular member adapted to receive a charging bulb, means for connecting one end thereof in communication with the interior of an inflatable jacket, a body detachably connected with the other end of said tubular member, an operating shaft therefor rotatable in said body, a grooved pulley secured to said shaft, a beaded chain in the groove of said pulley, said pulley comprising a pair of spaced sheet metal discs for said chain to lie between, said discs having radially arranged ribs depressed toward each other therein to occupy positions between successive beads of said chain.

7. In a life jacket inflator, a tubular member adapted to receive a compressed gas bulb, means for connecting one end thereof in communication with the interior of an inflatable jacket, a body connected with the other end of said tubular member, a truncated, cone-shaped diaphragm, a piercing pin slidable in said body, the small end of said diaphragm being vulcanized thereto and the other end of said diaphragm having an out-turned flange, a diaphragm retainer screwed into said body against said flange, said diaphragm retainer having a guide opening for the inner end of said piercing pin, and means in said body for operating said piercing pin.

8. Life jacket inflating means comprising a holder adapted to receive a compressed gas bulb, a gas exit opening in one end of said holder, said holder being mounted in the wall of an inflatable jacket, a body connected with said holder, an operating shaft journaled in said body, an eccentric on said shaft, a piercing pin slidable in said body and cooperating with said eccentric to be operated thereby upon rotation of said shaft, a truncated, cone-shaped diaphragm having its small end vulcanized to said piercing pin and its large end sealed relative to said body, and means for rotating said shaft and thereby said eccentric.

9. Life jacket inflating means comprising a holder adapted to receive a charging bulb, a gas exit opening in one end of said holder, said holder being vulcanized into the wall of an inflatable jacket, a body connected with the other end of said holder, an operating shaft journaled in said body, an eccentric on said shaft, a piercing pin cooperating with said eccentric to be operated thereby to pierce the charging bulb upon rotation of said shaft, a pulley on said shaft and a flexible element for rotating said pulley and thereby said eccentric, said body and said pulley having cooperating stop lugs to limit the rotation of said pulley.

10. In a life jacket inflator, a tubular member adapted to receive a charging bulb, means for connecting one end thereof in communication with the interior of an inflatable jacket, a body connected with the other end of said tubular member, a sealing ring between said body and said tubular member, a truncated cone-shaped diaphragm, a piercing pin slidable in said body, the small end of said diaphragm being vulcanized thereto and the other end of said diaphragm having an out-turned flange, a diaphragm retainer screwed into said body against said flange, an operating shaft rotatable in said body and having an eccentric portion in alignment with said piercing pin, a grooved pulley secured to said shaft, a flexible element in the groove of said pulley, and a knob on the outer end of said flexible element for rotating said eccentric to cause said piercing pin to be extended, said flexible element, upon further rotation, permitting said cone-shaped diaphragm to return said piercing pin toward its initial position as the eccentric recedes therefrom.

LAWRENCE T. WARD.