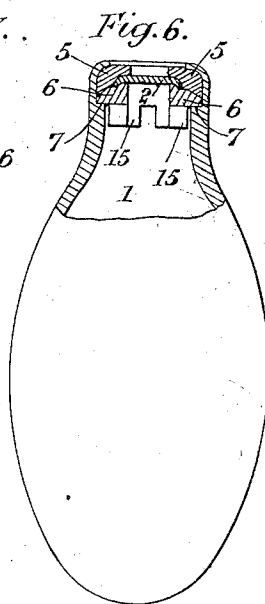
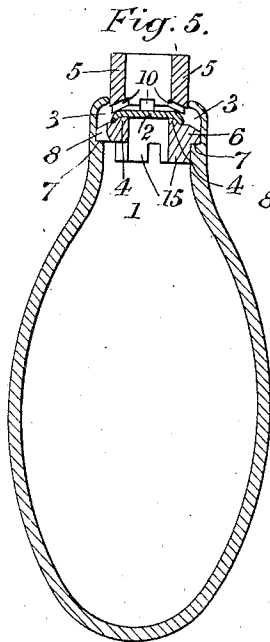
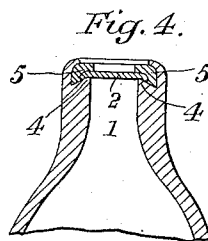
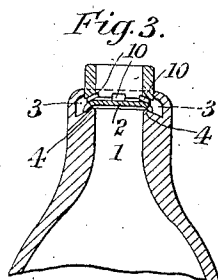
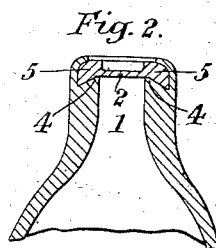
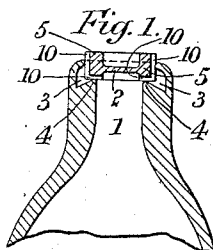


R. H. CAMPBELL.
CAPSULE OR CONTAINER FOR COMPRESSED OR LIQUEFIED GASES.
APPLICATION FILED FEB. 18, 1911.

1,038,285.

Patented Sept. 10, 1912.

2 SHEETS—SHEET 1.



WITNESSES
L. H. Grote
W. E. Kier

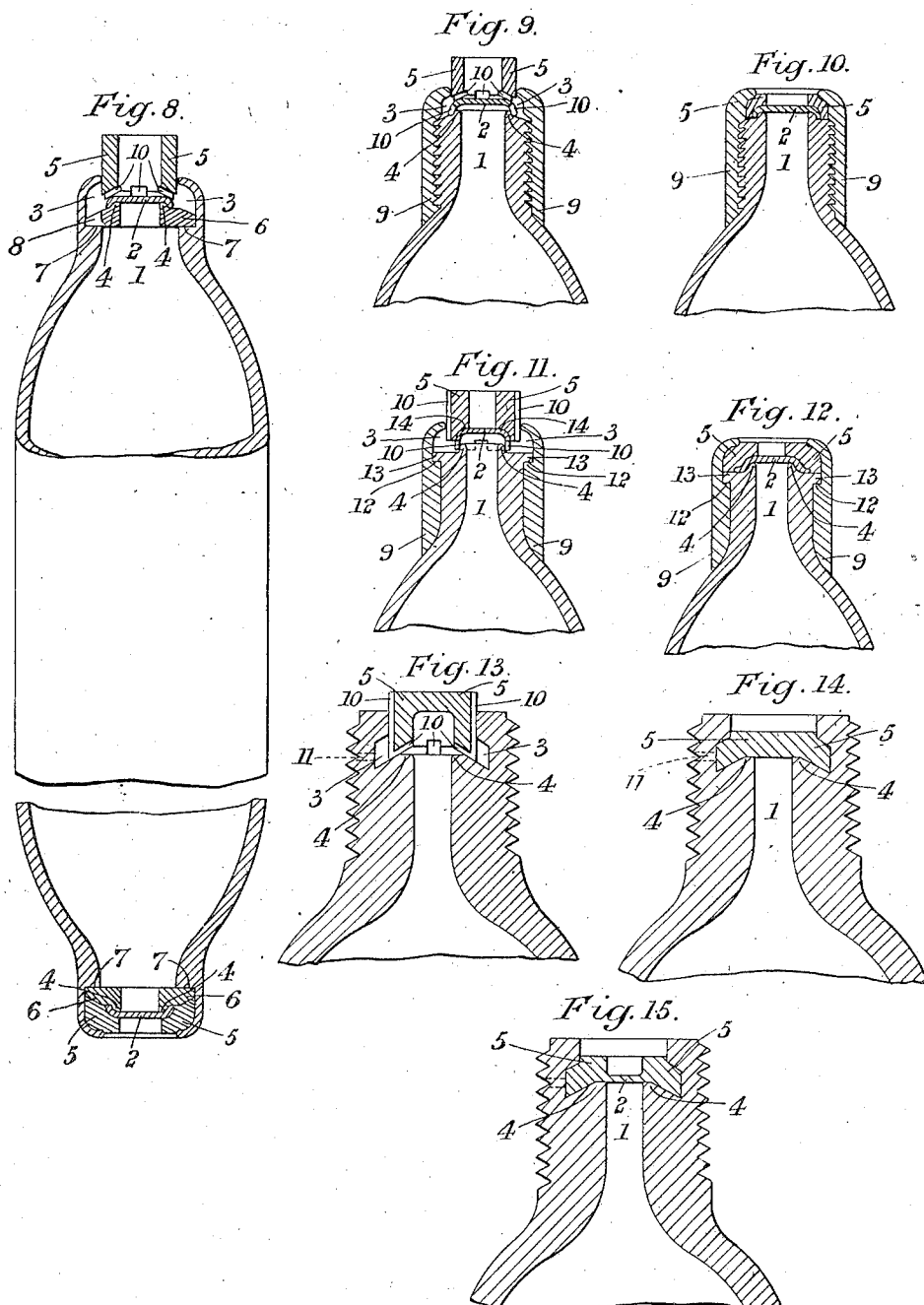
INVENTOR
Robert Hunter Campbell
BY
Hornum and Hornum
his ATTORNEYS

R. H. CAMPBELL.
CAPSULE OR CONTAINER FOR COMPRESSED OR LIQUEFIED GASES.
APPLICATION FILED FEB. 18, 1911.

1,038,285.

Patented Sept. 10, 1912.

2 SHEETS—SHEET 2.



WITNESSES

L. H. Grote
W. E. Keir

INVENTOR

Robert Hunter Campbell
BY

Harmon & Harmon
his ATTORNEYS

UNITED STATES PATENT OFFICE

ROBERT HUNTER CAMPBELL, OF EDMONTON, ENGLAND.

CAPSULE OR CONTAINER FOR COMPRESSED OR LIQUEFIED GASES.

1,038,285.

Specification of Letters Patent.

Patented Sept. 10, 1912.

Application filed February 18, 1911. Serial No. 609,368.

To all whom it may concern:

Be it known that I, ROBERT HUNTER CAMPBELL, a subject of the King of Great Britain and Ireland, of Angel Road, Edmonton, in the county of Middlesex, England, have invented new and useful Improvements in Capsules or Containers for Compressed or Liquefied Gases, of which the following is a specification.

10 This invention relates to capsules, or containers, for compressed, or liquefied, gases, which capsules, or containers, are closed by a device which has to be perforated when gas is to be released from the capsules, or
15 containers, and the object of this invention is to provide means whereby the closure is effected in a very ready, economical and efficient way and so also that when it is desired to re-use the capsules, or containers,
20 the perforated closing device can be readily removed and a new one be put in place for closing the capsule, or container, after it is recharged with compressed, or liquefied, gas.

25 The inside of the neck of the capsule, or container, to which this invention is applied is formed with an annular groove, or space, which can be cut in the metal of the neck itself, or in a piece fixed thereto, or be
30 otherwise formed, the lower, or inner, surface, or boundary, of the said groove, or space, constituting a seat for the closing device and extending inward beyond the upper and outer surface, or boundary, of
35 the groove, or space, the said closing device consisting of a disk, or piece, of metal of a strength sufficient to withstand the internal pressure and capable of being readily pierced, and provided with projections, or
40 grooves, and being of a diameter which will allow of its being inserted into the neck of the capsule, or container, so as to rest upon the lower, or inner, surface, or
45 boundary, of the annular groove, or space, a passage, or passages, being left for the admission of gas in charging.

According to this invention the edge of the said disk, or piece, is formed, or thickened, or an additional ring is, or additional
50 rings are, provided, so that, when, after charging, pressure, in the direction of the length of the capsule, or container, is exerted upon the said disk, or piece, or upon
55 its edge, or upon the additional ring, or rings, the said disk, or piece, is pressed upon the seat (formed by the lower sur-

face, or boundary, of the groove, or space,) and the metal of its edge, or the metal of the additional ring, or rings, is displaced, causing the solid metal to spread, flow, or
60 squirt, inward, and outward, sidewise, so as to enter, and be firmly held in, the said annular groove, or space, and in conjunction with the said disk, or piece, effect a tight closure of the capsule, or container. 65

The annular groove, or space, may be plain, or it may, if desired, be undercut, or formed in any way so as to properly receive, and hold, the metal which has been displaced and caused to spread, flow, or
70 squirt, as aforesaid, and hold the disk, or piece, in position to form a tight closure of the capsule, or container. The gas can be admitted, from the charging machine, at the top of the neck as usual, or it can be
75 admitted by an opening at the side of the neck leading into the groove, or space, so that the said opening is closed by the metal which fixes the closing piece, or disk, in position. 80

The accompanying drawings represent, in vertical sections, various ways in which this invention can be performed.

Figures 1 and 2 show the neck of a capsule in which the metal to be forced into the
85 groove, or space, is part of the closing disk, or piece, itself. Figs. 3 and 4 show the neck of a capsule in which the metal to be forced into the groove, or space, is separate from the closing disk, or piece. 90
Figs. 5 and 6 are respectively vertical section and broken side elevations of a capsule showing another modification; Fig. 7 is a plan of the annulus 6 of this modification; Fig. 8 is a broken side elevation of
95 another form of capsule with a modified form of the closure, the latter shown at one end closed and the other end in position for charging; Figs. 9 and 10; 11 and 12, 13 and 14 are vertical sections of a capsule neck
100 showing different modifications of the closure device in charging and sealed positions respectively; and Fig. 15 is a modified form of the sealed cap shown in Fig. 14.

In the several figures the neck of the container, or capsule, is marked 1, the closing
105 disk, or piece is marked 2, the groove, or space, to receive the securing metal is marked 3 and the seat, against which the said disk, or piece, makes a closure, is
110 marked 4, and the metal which is pressed into the groove, or space, 3 is marked 5.

In Figs. 1 and 2 the groove 3 is shown as being formed in the metal of the neck the lower part being formed with the seat 4, for the closing disk, or piece, 2, which is made with a considerable amount of metal at the edge, this metal constituting the metal which is to be pressed into the groove 3. Fig. 1 shows the parts as arranged before charging, and Fig. 2 shows the disk secured in its closing position by forcing the metal of its thickened edge into the groove 3. The thickened edge of the disk 2 is formed, or perforated, to constitute a passage, or passages, for the gas in charging, this passage, or these passages, being closed when the pressure is put on the edge of the disk to close the capsule.

In Figs. 3 and 4 the groove is shown made as in Figs. 1 and 2, but the metal 5, which is to be pressed into the groove 3, is separate from the disk 2. Fig. 3 shows the parts in the position before charging and Fig. 4 shows the capsule closed.

Figs. 5 and 6 show, respectively in the position for charging and in the closed condition, a capsule with an ordinary recessed neck, the seating for the disk 2, being formed on a hard metal annulus 6, resting on the ledge 7, of the recess, in the neck and having a portion 15 projecting into the neck below the said ledge 7, the upper part of the neck being turned over to form the upper part of the groove, or recess, to receive the securing metal 5.

Fig. 7 shows the annulus 6, separately, the nick 8, being formed in it for the passage of the gas in charging.

Fig. 8 shows a similar arrangement applied to a container with a closure at each end, the parts being shown, at the upper end, in the position for charging and, at the lower end, in the closed position. In this case the annulus 6 is shown as being without a portion projecting into the neck below the ledge 7 as in Figs. 5 and 6.

Figs. 9 and 10 show a like arrangement, but with the seat 4, formed around the end of the neck and with the groove, or space, 3, for the securing of metal 5, formed by a piece 9, screwed onto the neck.

Figs. 11 and 12 show a similar arrangement but with the piece 9 secured to the capsule by turning down, over the ledge 12 on the piece 9, a flange 13, which, and the seat 4, can be formed by cutting a groove in the end of the neck. In these figures the metal piece 5 is made with a recess 14, to receive the disk 2, which is made cup-shaped and the gas, in charging, passes through grooves in the side of the piece 5 and through a slot in the sides of the cup-shaped disk.

Figs. 13, 14, and 15 show an arrangement wherein the metal to form the closing piece 2, and the metal to be forced into the groove,

or space, 3, are made in one, the metal being pressed (as shown in Fig. 14) so as to spread into the groove, or space, 3, the disk, or portion, 2, to be pierced being formed by displacing or turning out, some of the metal, as shown in Fig. 15. The ways for gas in charging are indicated in the various arrangements at 10. The closing disk, or piece, 2, is made so that it will allow the gas to pass in charging, for example, it may be made with a corrugated edge, or with projections, or be otherwise formed to afford passages, these being closed when the disk, or piece, is pressed onto its seat on forcing the metal 5, into the space 3.

In the various arrangements illustrated, the part which forms the seat 4, is of smaller diameter than the upper margin of the groove, or space, 3, so as to allow of the introduction of the closing disk, or piece, and the securing metal 5. The metal 5, can be pressed into the groove, or space, 3, by any suitable arrangement of the charging plunger of the charging machine, for instance, by making the said plunger with a part corresponding in shape and area, with the upper surface of the metal 5, and independently movable relatively to the other part, or parts of the plunger, so that the metal 5, can be acted upon by the said movable part to effect the closure while the other part, or parts, remain in position to bear on the container, or capsule, and, where necessary, to fill the central space in the metal piece 5 above the closing disk, or piece, 2.

In Figs. 13, 14, and 15, there is indicated, in dotted lines, at 11, a side passage which, in either arrangement, can be used for admitting gas in charging, instead of forming passages in the metal piece 5.

Various other modifications of the device which do not depart from my invention will readily suggest themselves and I do not limit myself to those specifically shown. In the following claims when I speak of a recessed neck I use the expression in a sense broad enough to include all the modifications shown—viz. whether the recess be formed by an offset in the metal of the capsule neck proper as in Figs. 1 and 2, or a recess formed between an independent annulus and the inner face of the neck as in Figs. 5 and 6 or between an external sleeve and the outer face of the neck as Figs. 9—10. Similarly when I speak of a seat for the closure disk I use the expression in a sense broad enough to include the various forms shown—whether the seat be formed upon the metal of the neck proper as in Figs. 1 and 2 or upon the independent annulus of Figs. 5—6. Likewise when I speak of a filling ring I use this expression in a sense broad enough to cover a filling bead integral with the closure disk (as in Figs. 1, 2, 13, 14, 15).

14 and 15) or independent thereof, as in the remaining figures.

With these explanations I claim as my invention:—

5 1. A capsule for compressed gas, having a neck with internal lateral recess through which the gas passes during filling, a perforable disk closure for the discharge passage in said neck, and a crushable filling and retaining member above the disk and recessed to afford a fill passage adapted to be crushed into said lateral recess to close the same and to force said disk closure to its seat and retain the same in its closure position.

15 2. A capsule for compressed gas, having a neck with annular internal recess through which the gas passes during filling, a perforable disk closure for the discharge passage in said neck, and a crushable filling and retaining ring above the disk and recessed to afford a fill passage adapted to be crushed into said lateral recess to close the same and to force said disk closure to its seat and retain the same in its closure position.

20 3. A capsule for compressed gas, having at each end a neck with internal lateral recess through which the gas passes during filling, a perforable disk closure for the discharge passage in said neck, and a

crushable filling and retaining member above the disk and recessed to afford a fill passage adapted to be crushed into said lateral recess to close the same and to force said disk closure to its seat and retain the same in its closure position.

4. A capsule for compressed gas, having a discharge outlet, a perforable disk closure therefor, and crushable means above the disk for closing said fill passage and holding said closure disk to its seat after the capsule has been filled, said crushable means being recessed to afford a fill passage, substantially as described.

5. A capsule for compressed gas, having a neck internally undercut at its rigid upper edge, a closure disk, a seat for the closure disk and a closure ring of soft metal above the disk and recessed to afford a passage during filling but crushed into said undercut in the neck, in closed condition, to force and hold said disk to its seat, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT HUNTER CAMPBELL.

Witnesses:

RIPLEY WILSON,
C. P. LIDDON.