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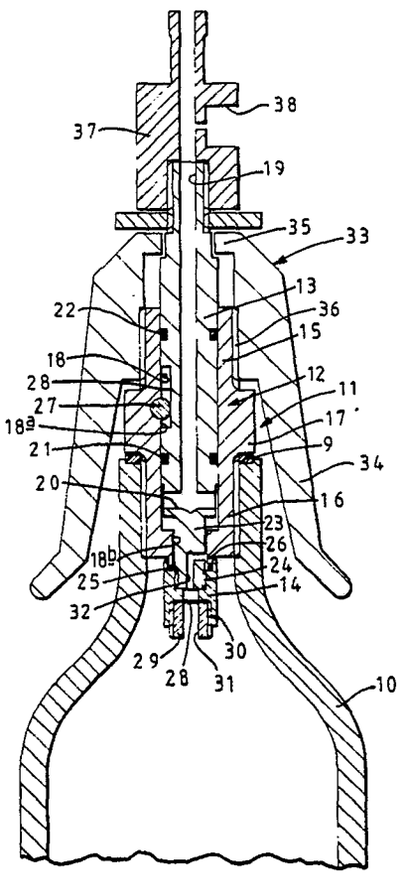
(54) Pressurised containers.

(57) A container (10) for pressurised fluid, e.g. carbon dioxide, is fitted with a self-sealing valve (11) comprising a valve body (12), a valve stem (13) mounted in the valve body for axial movement relative thereto, and a valve member (14) connected to the inner end of the valve stem. A first 'O' ring seal (21) creates a seal between the valve stem and the valve body and a second 'O' ring seal (25) creates a seal between the valve member and the valve body under the urging force of pressurised fluid in the container. The valve stem has an axially extending discharge passage (19) which communicates with the outside of the valve stem at a position intermediate the seals (21 and 25) and a valve operating member (33) is threadably connected to the valve body so that when it is turned in an appropriate direction the operating member engages with an abutment (37) on the valve stem to move the valve stem and valve member against the urging force of the pressurised fluid to break the seal between the valve member and the valve body and so allow fluid within the container to pass through the discharge passage in the valve stem. The valve member is equipped with a pressure relief valve which includes a burstable metal disc (29).



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Pressurised Containers

This invention relates to containers for pressurised fluids, and more particularly to a self-sealing valve on such a container.

According to the invention there is provided a container for pressurised fluid fitted with a valve comprising a valve body, a valve stem mounted in the valve body for axial movement relative thereto, means creating a first seal between the valve stem and the valve body, and a valve member connected to the inner end of the valve stem for creating a second seal between the valve member and the valve body under the urging force of pressurised fluid within the container, the valve stem having an axially extending discharge passage communicating with the outside of the valve stem at a position intermediate the first and second seals and there being valve operating means for moving the valve stem and valve member against the urging force of pressurised fluid within the container to break the second seal between the valve member and the valve body and so allow fluid within the container to pass through the discharge passage in the valve stem.

Preferably, the valve operating means comprises an operating member which is threadably connected to the valve body and which has a part engageable with the valve stem. In this case, the operating member may be of inverted cup-shape and may be provided with a skirt portion, which extends over and which is screw-threadably connected to the valve body, and an apertured end portion engageable with an abutment on the valve stem.

Conveniently, the valve member is equipped with a pressure relief valve for by-passing the seal between the valve member and the valve body if the pressure of fluid in the container exceeds a certain value. In this case, the pressure relief valve may include a thin burstable metal seal.

Preferably, the valve body, valve stem and valve member are formed of metal and sealing means are provided on the valve member and/or valve body for creating the seal therebetween.

The container preferably contains pressurised carbon dioxide and is supplied with attachments so that it can be used as a fire extinguisher or an inflator.

The invention will now be more particularly described, by way of example only, with reference to the accompanying drawing which is a sectional view through one end of one embodiment of a container according to the invention fitted with a self-sealing valve and part of a tyre inflator.

Referring to the drawings, there is shown therein a pressure vessel in the form of a container 10 filled with carbon dioxide to a pressure of about 700 p.s.i. (4826KN/m^2). The container 10 is formed from a seamless tube of carbon steel having welded rolled ends and is fitted at one end with a self-sealing valve 11.

The valve 11 comprises a valve body 12, a valve stem 13, and a valve member 14 connected to the inner end of the valve stem 13, the body 12, stem 13, and valve member 14 being formed of metal, typically brass.

The valve body 12 has two externally threaded portions 15 and 16 separated by a thicker intermediate portion 17, and a stepped through bore 18 therein. The threaded portion 16 engages with an internal thread in the container 10 and a seal 9 is trapped between the container 10 and the thicker portion 17 of the valve body 12. The larger diameter portion 18a of the bore 18 communicates directly with the outer end of the valve body 12 and extends over a large part of the length of the valve body 12, whilst the smaller diameter portion 18b is at the inner end of the valve body 12.

The valve stem 13 is mounted in the valve body 12 so as to project outwardly from inner and outer ends of the valve body 12. The valve stem 13 has therein an axially extending discharge passage 19 which communicates at its inner end with radially extending passages 20. Two nitrile 'O' ring seals 21 and 22 are located in respective spaced apart grooves in the valve stem 13 to create seals between the valve stem 13 and the larger diameter portion 18a of the bore 18.

An inner end portion 23 of the valve stem 13 passes through the smaller diameter portion 18b of the bore 18 with a small clearance and is connected to the valve member 14 by screw threads 24. The end of the valve member 14 facing the valve body 12 is recessed to locate a nitrile 'O'ring seal 25. The inner end of the valve body 12 has an integral axially extending annular lip 26 which enters the recessed end of the valve member 14 to make contact with the seal 25 when the valve 11 is closed.

When the valve 11 is open carbon dioxide flows through the clearance between the valve stem 13 and the portion 18b of the bore 18, through the radially extending passages 20 and out through the discharge passage 19. The seal 21 prevents the carbon dioxide from passing along the outside of the valve stem 13 and the seal 22 prevents the ingress of moisture and/or dirt. The valve stem 13 is fixed against angular movement relative to the valve body 12 by a pin 27 which extends through the valve body and which makes contact with a flat 28 provided on the valve stem

13 between the seals 21 and 22.

The valve member 14 is equipped with a pressure relief valve comprising a thin copper disc 28 which is trapped in a recess in the valve member 14 by a plug 29 connected to the valve member 14 by screw threads 30. The plug 29 has a through bore 31, communicating with one side of the disc 28 and the valve stem 13 has a pressure relief passage 32 communicating the other side of the disc 28 with the clearance between the valve stem 13 and the portion 18b of the bore 18. If the pressure in the container 10 exceeds a certain value, the disc 28 will burst and the pressure in the container will be relieved through the discharge passage 19.

The valve 11 is opened by a plastics operating member 33 of cup-shaped form. The operating member 33 has a skirt portion 34 which extends over the valve body 12 and an apertured end wall 35. The skirt portion 34 is internally threaded at 36 for engagement with the threaded portion 15 of the valve body and the outer end of the valve stem 13 passes through the apertured end wall 33.

When it is desired to open the valve 11, the operating member 33 is turned in the appropriate direction so that the end wall 35 comes into contact with a shoulder 37 on the valve stem 13 and moves the valve stem 13 and valve member 14 against the urging force of the pressurised carbon dioxide within the container 10.

To close the valve 11, the operating member 33 is turned in an opposite direction and the urging force of the pressurised carbon dioxide will cause the valve member 14 to move towards the valve body 12 to bring the seal 25 into sealing contact with the lip 26.

The outer end of the valve stem is externally threaded for receiving any one of a number of different attachments.

One such attachment is an inflator for tyres and the like, comprising a flexible tube (not shown) provided with a threaded adapter 37 at one end for fixing to the valve stem 13 and a conventional socket (not shown) at the other end for connection to a tyre valve. The threaded adapter 37 includes a restrictor valve (not shown) for limiting the flow rate of carbon dioxide therethrough and has a recess 38 for receiving a pressure gauge (not shown) to give an indication of the pressure in the tyre.

Another such attachment is a plastics fire diffuser which adapts the container for use as a fire extinguisher. If, as is envisaged, the fire diffuser is rigid with the valve stem 13, the fire extinguisher will have the advantage that carbon dioxide will be discharged in a direction which is aligned with the axis of the container 10 and this makes it easy to aim the extinguisher at a fire.

Claims

1. A container (10) for pressurised fluid fitted with a valve (11) comprising a valve body (12) and a valve stem (13) mounted in the valve body for axial movement relative thereto, characterised by means (21) creating a first seal between the valve stem and the valve body, and a valve member (14) connected to the inner end of the valve stem (13) for creating a second seal (25) between the valve member and the valve body under the urging force of the pressurised fluid within the container, the valve stem (13) having an axially extending discharge passage (19) communicating with the outside of the valve stem at a position intermediate the first and second seals and there being valve operating means (33) for moving the valve stem (13) and valve member (14) against the urging force of pressurised fluid within the container to break the second seal (25) between the valve member and the valve body and so allow fluid within the container to pass through the discharge passage (19) in the valve stem.

2. A container as claimed in Claim 1, characterised in that the valve operating means comprises an operating member (33) which is threadably connected to the valve body and which has a part (35) engageable with the valve stem.

3. A container as claimed in Claim 2, characterised in that the operating member (33) is of inverted cup-shape and has a skirt (34) portion which extends over and which is threadably connected to the valve body (12) and an apertured end portion (35) engageable with an abutment on the valve stem.

4. A container as claimed in any one of Claims 1 to 3, characterised in that the valve member (12) is equipped with a pressure relief valve (28) for bypassing the seal (25) between the valve member and the valve body if the pressure of fluid in the container exceeds a certain value.

5. A container as claimed in Claim 4, characterised in that the pressure relief valve includes a burstable thin metal seal (28).

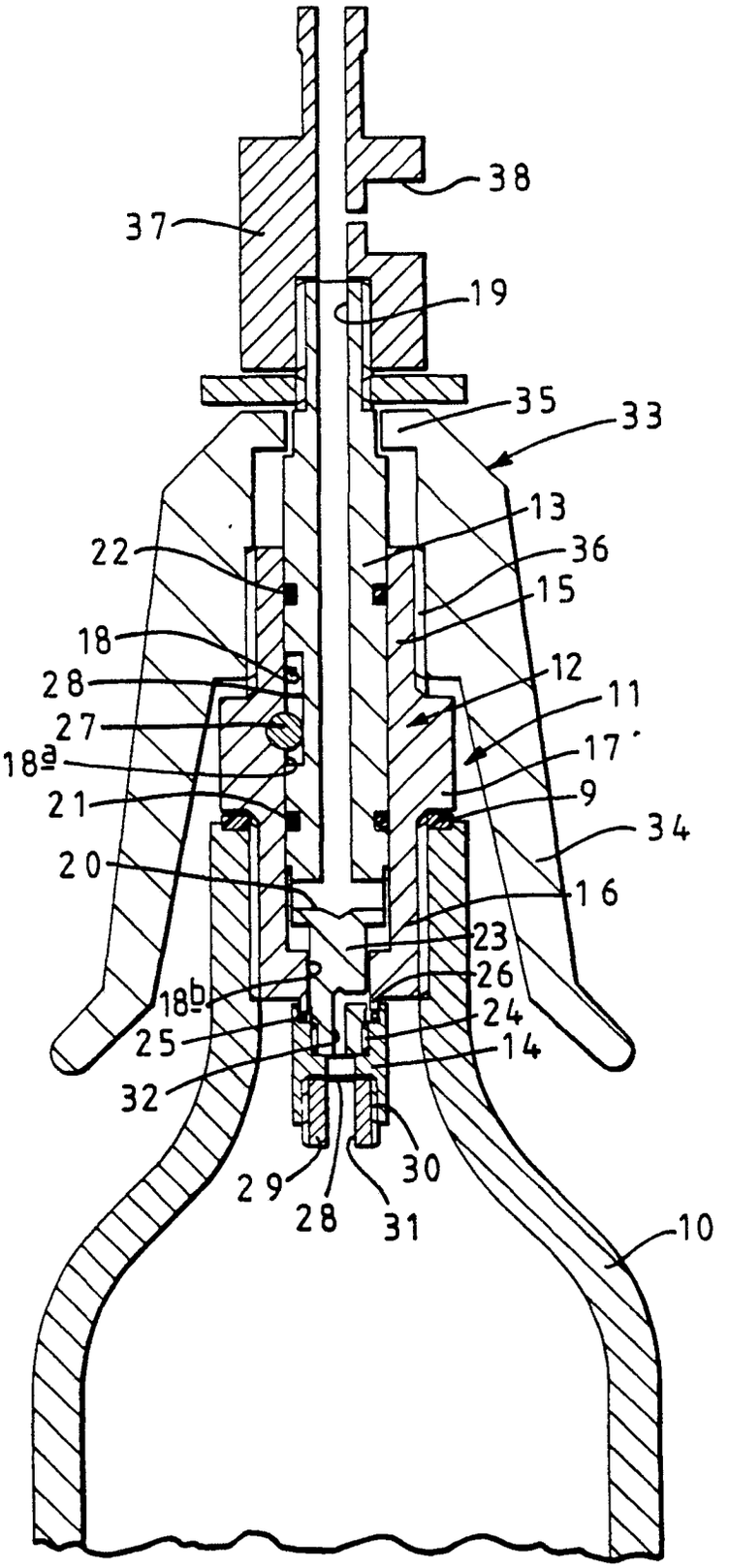
6. A container as claimed in any one of the preceding claims, characterised in that the valve stem (13) is fixed against angular movement relative to the valve body (12).

7. A container as claimed in any one of the preceding claims, characterised in that the valve body (12), valve stem (13) and valve member (14) are formed of metal and sealing means (25) are provided on the valve member and/or valve body for creating the seal therebetween.

8. A fire extinguisher comprising a container as claimed in any one of the preceding claims and a fire diffuser connected to the outer end of the valve stem.

9. A tyre inflator comprising a container as claimed in any one of Claims 1 to 7 and an inflation device (37) connected to the outer end of the valve stem.

10. A tyre inflator container as claimed in Claim 9, characterised in that the inflation device includes a restrictor valve and a pressure gauge.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