

Jan. 6, 1970

KARL-AUGUST WACHTER

3,487,973

GASTIGHT CONTAINER

Filed April 21, 1967

3 Sheets-Sheet 1

Fig. 1

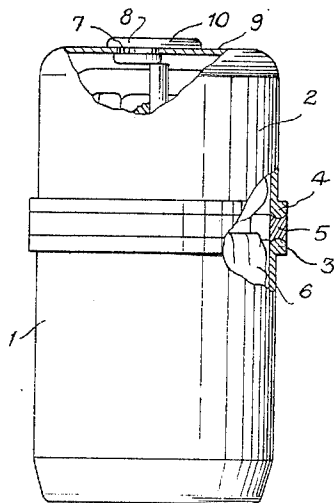
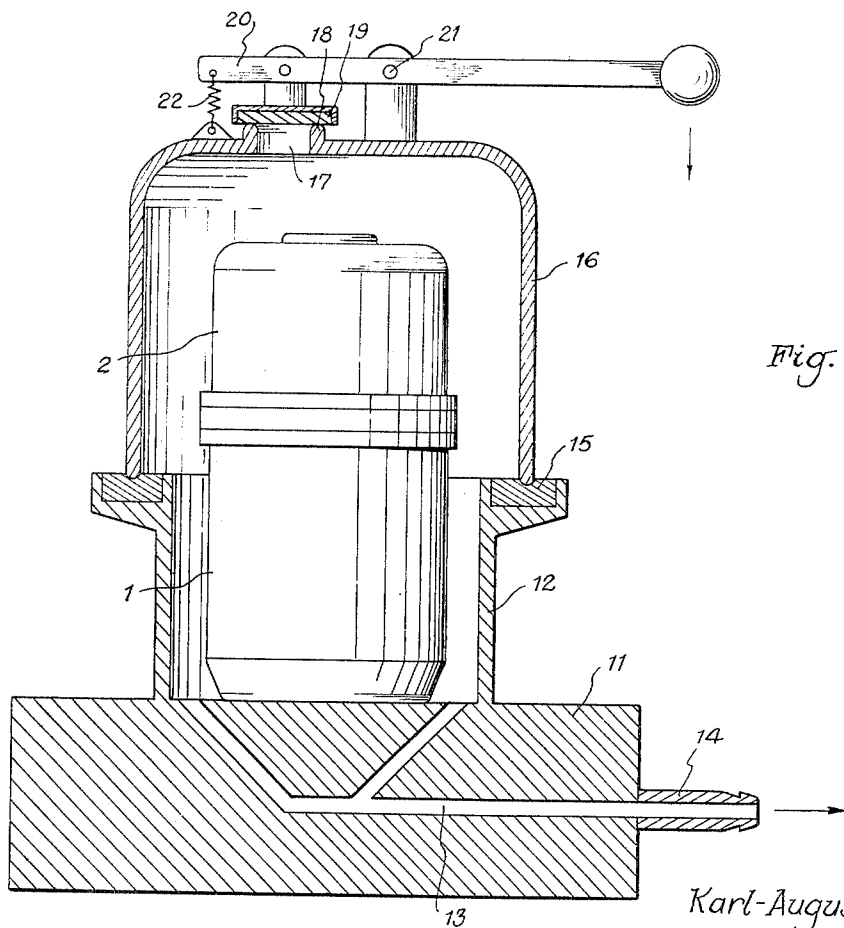


Fig. 2



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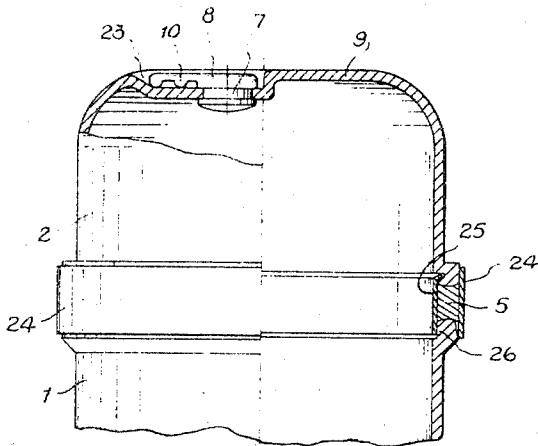


Fig. 3

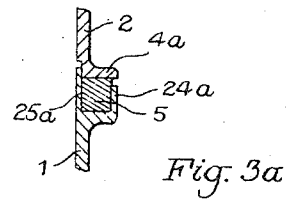


Fig. 3a

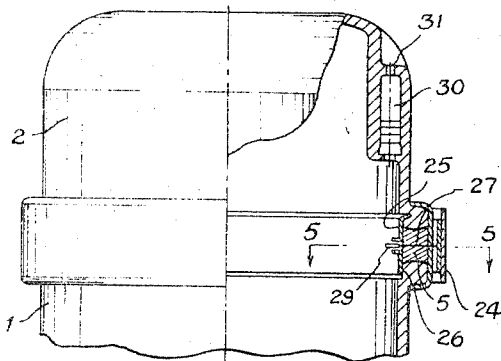


Fig. 4

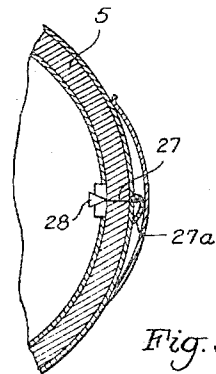


Fig. 5

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Fig. 6

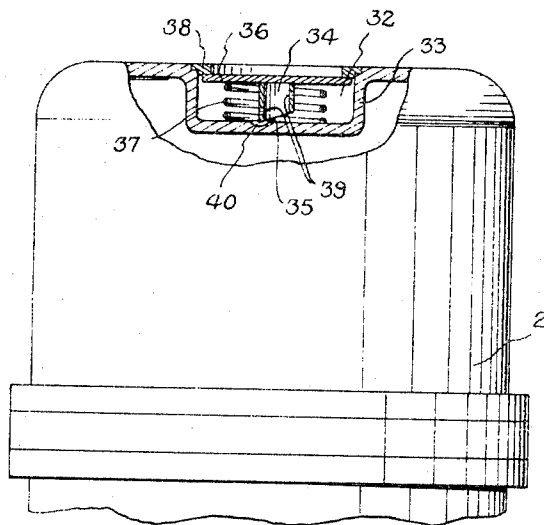
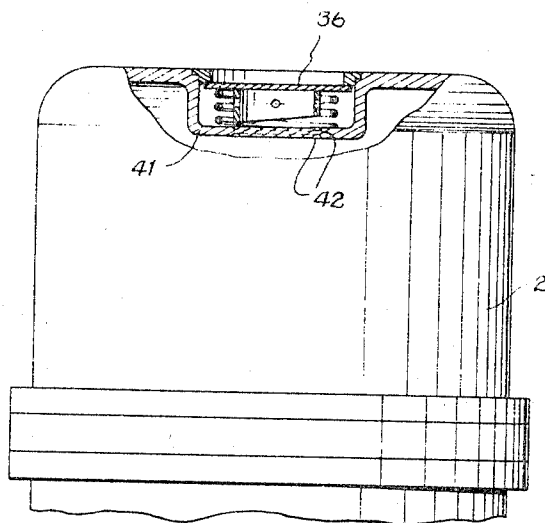


Fig. 7



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## GASTIGHT CONTAINER

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D 50,008

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5 Claims

### ABSTRACT OF THE DISCLOSURE

Air is evacuated from a two-part container so that atmospheric pressure holds the two parts closed against a sealing ring joint, the container being thus hermetically sealed.

Rescue apparatus and especially those sensitive to gas and water vapor have been stored in containers which have a cover sealed with a rubber ring. Such containers have the disadvantage in that, even if there is only a small leakage by the cover, atmospheric pressure changes can introduce atmospheric air in the container and leave water vapor in the container. It has been suggested that the cover for the container can include, preferably, a flexible thick-walled rubber cap lying beneath the cover. This rubber cap is to prevent moisture-laden air from entering the container if a leak should occur in the cover.

In the mining industry, a rescue apparatus container has been considered which consists of two or more shells joined by a tightened closure device in the form of a wire, band or the like surrounding the container.

This latter type of container has been used for breathing apparatus with the edges of the two container parts abutting each other being provided with outwardly projecting rims, which rims contact a sealing ring. The two outwardly projecting rims can be clamped together. Therefore, for all practical purposes, the two container parts are joined so that they cannot be pulled from the seal. To facilitate the opening of the container, one end of the sealing ring is fastened to the container and the other end of the ring has a tear strip. The longitudinal edges of the ring are bent inwardly and under the rims to clamp the rims. Also the tear wire attached to one end of the sealing ring and extends into the interior of the container. In such a container, it is conventional to construct the abutting edges of the container parts as double walls to form a trough for receiving the sealing medium. This is a very clumsy sealing structure and requires several steps in the sealing of mass-produced containers. Also, it is impossible to tell whether the container closure is still airtight.

The object of this invention is to produce a simply constructed, airtight container for holding a breathing apparatus. A further object is to produce a simple and quick manner of securely closing the container for a permanent hermetic sealing of the container. The airtight container of this invention is especially for holding a breathing apparatus having a filter medium which is sensitive to moisture. The container is composed of a lower container portion and an upper cover portion which are joined to a sealing ring. In this invention, the container interior is at such a less than atmospheric pressure that the exterior of the container being under normal outside pressure forces the container portions together under atmospheric pressure alone. In this invention, a sufficiently high vacuum is produced in the container interior so that the lower container portion and upper cover portion are pressed against a sealing ring to produce a satisfactory tight seal.

A further feature of the invention is to the method of closing the container in which the container portions are

placed in a chamber subjected to the amount of less than atmospheric pressure under which the container is to be eventually stored and after the interior of the container has been evacuated of air. The chamber is open to the atmosphere so that the container portions are sealed to each other by atmospheric pressure before a pressure rise can occur in the interior of the container.

The means by which the objects of the invention are obtained are described more fully with reference to the accompanying schematic drawings in which:

FIGURE 1 is a front view of the container of this invention, partly shown in section;

FIGURE 2 is a cross-sectional view through a chamber for evacuating air from the container;

FIGURE 3 is a view similar to FIGURE 1 showing a modification;

FIGURE 3a is a cross-sectional view of a detail showing a modified rim construction;

FIGURE 4 is a view similar to FIGURE 3 of a further modified form of the invention;

FIGURE 5 is a cross-sectional view taken on the line 5—5 of FIGURE 4;

FIGURE 6 is a front view, partly in section, showing a modified valve form; and

FIGURE 7 is a view similar to FIGURE 6 of another modified valve form.

As shown in FIGURE 1, the airtight container is composed of a lower container portion 1 made of sheet metal or extruded synthetic resin and a removable cover portion 2 composed of the same material. The rounded beaded abutting edges 3 and 4 form the upper edge of the portion 1 and the lower edge of the portion 2, respectively. A sealing ring 5 is mounted between these edges. The breathing apparatus 6 is placed within the container.

The cover portion 2 has an opening 7 which is closed by a snap plug 8. The top 9 of the cover portion supports a tongue 10 which is preferably integral with the plug 8.

After the container has been assembled as shown in FIGURE 1, it is placed in the chamber of the apparatus shown in FIGURE 2. This apparatus is composed of a base 11 supporting a cylinder 12 and which has a bore 13 leading to the connecting fitting 14. The upper edge of the cylinder 12 is formed as a gutter containing a rubber ring 15 onto which the top 16 can be fitted airtight. Top 16 has an opening 17 surrounded by a valve seat 18 and enclosed by the valve head 19 containing a rubber seal. The valve head is actuated by a double-arm lever 20 connected by a fulcrum 21 connected to the top 16. The valve head 19 is held closed by a spring 22.

After the container has been placed in the cylinder 12, the top 16 is put in place. The cylinder 12 and the top 16 are of a size such that the interior volume of the chamber is only slightly larger than the container holding the breathing apparatus. Fitting 14 is connected to a vacuum pump to evacuate air in the container to at least the less than atmospheric pressure desired within the container. After the desired vacuum has been obtained within the container and in the chamber formed by the cylinder 12 and top 16, valve 18 is suddenly opened by means of hand lever 20 so that atmospheric pressure is quickly re-established within the chamber. The container portions 1 and 2 are in this manner pressed against the sealing ring 5 before it is possible for an increase in air pressure to occur within the container. This pressure of the portions 1 and 2 against the sealing ring 5 is sufficient to produce a satisfactory and permanent hermetically sealed container.

In order to open the container, it is only necessary to pull on the tongue 10 to remove the plug 8 from the hole 7.

This brings the interior of the container up to atmos-

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pheric pressure so that the portions 1 and 2 can be easily separated.

In FIGURE 3, the top 9 of the cover portion 2 has a recess 23 in which the top of the plug 8 and the tongue 10 lie. Therefore, the plug and tongue do not extend outwardly of the outer surface of the cover portion.

Also, as shown in FIGURE 3, the sealing ring 5 is enclosed by a ring 24 in order to prevent the sealing ring 5 from mechanical damage.

Also, the cover portion 2 is provided with a cylindrical metal guide flange 25. This flange, when the container is closed, extends into a corresponding shoulder 26 in the container portion 1. Sealing ring 5 bears against flange 25.

In the modification of FIGURE 3a, the cylindrical flange 25 is replaced by a flange 25a integral with container portion 1 and the ring 24 is replaced by a circular flange 24a also integral with portion 1. A trough is thus formed which holds the sealing ring 5. The lower edge of the cover portion 2 can either be beaded or in the form of a flat flange 4a.

As shown in FIGURES 4 and 5, a tear wire 27 is joined to a handle 27a on the cover ring 24. Tear wire 27 extends through sealing ring 5 and terminates in a cutting piece 28 which lies in an opening through the guide flange 25. When cover ring 24 is removed, the cutting piece 28 can be pulled to cut through the sealing ring 5 so that the portions 1 and 2 can be easily separated.

FIGURE 4 also shows a less than atmospheric pressure valve 30 mounted in cover portion 2. This valve includes an opening 31 which can be connected to a less than atmospheric pressure line in order to evacuate the interior of the container to less than atmospheric pressure. This makes it possible to evacuate the container without using the apparatus of FIGURE 2. After the container has been evacuated to the desired less than atmospheric pressure, then the connecting line to opening 31 is removed. The valve 30 is constructed as a self-closing check valve.

In FIGURE 6, the cover portion 2 has a recess 32. The wall 33 of this recess is as thick as the remaining portion of the cover. A cutting tube 34 is inserted in the recess 32, which tube has a slanted forward end 35. The other end is attached to pressure plate 36. The latter serves as an abutment for a compression spring 37 which bears on the bottom of recess 32. Plate 36 engages a flange ring 38 which can be welded on during final assembly. Cutting tube 34 has circumferentially positioned bores 39. To make the cutting of the bottom of the recess 32 more easy, a groove or notch 40 is formed in the bottom of the recess and is engaged by the lower edge 35 of the tube 34.

To open the container, it is only necessary to hand press the cutting tube into the container by bearing on plate 36. As soon as the bottom of the recess is cut through, air flows into the interior of the container.

The modification of FIGURE 7 differs from that of FIGURE 6 in that the bottom 41 of the recess has in-

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dentations 42 formed in a circle to define a breakaway line. When plate 36 is pushed downwardly, the bottom tears away at the intended place.

In FIGURES 3 and 4, the flange 25 can be composed of synthetic material and be extruded along with either the container portion 1 or the cover portion 2. The same is true with regard to the outer ring 24, such as shown in FIGURE 3.

Having now described the means by which the objects of the invention are obtained, I claim:

1. An airtight container for a breathing apparatus and especially for an apparatus having a moisture sensitive filter medium comprising a lower container portion, an upper cover portion, airtight sealing ring means joining the container portion to the cover portion, rounded beaded edges on said container portion and cover portion engaging said sealing ring means, cutting tool means mounted on said cover portion for punching a hole through said cover portion, and the interior of said container being under less than atmospheric pressure to hold the container portion and cover portion against said sealing ring means solely by the normal exterior atmospheric pressure.

2. A container as in claim 1, further comprising spring means engaging said cutting tool means for urging said cutting tool means away from said cover portion.

3. A container as in claim 2, further comprising pressure plate means mounted over said spring means and engaging said cover portion, and said spring means bearing on said pressure plate means and said cover portion, respectively.

4. A container as in claim 3, further comprising a recess in the exterior surface of said cover portion, and said spring means being mounted in said recess inwardly of said exterior surface.

5. A container as in claim 4, further comprising break-away indentations in said recess outlining the area to be punched out by said cutting tool means.

#### References Cited

##### UNITED STATES PATENTS

1,356,224	10/1920	Sager	215—1
1,863,122	6/1932	Matthews	220—46 X
1,985,788	12/1934	Gore-Lloyd	220—44 X
2,092,671	9/1937	Hildebrandt	220—48
2,742,178	4/1956	Morewood	220—50
3,133,664	5/1964	Koch	220—44
3,283,941	11/1966	Rollins	220—44 X

##### FOREIGN PATENTS

Ad. 61,054	3/1955	France.
852,814	10/1952	Germany.
1,039,367	9/1958	Germany.

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U.S. Cl. X.R.

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