No. 646,459. Patented Apr. 3, 1900.

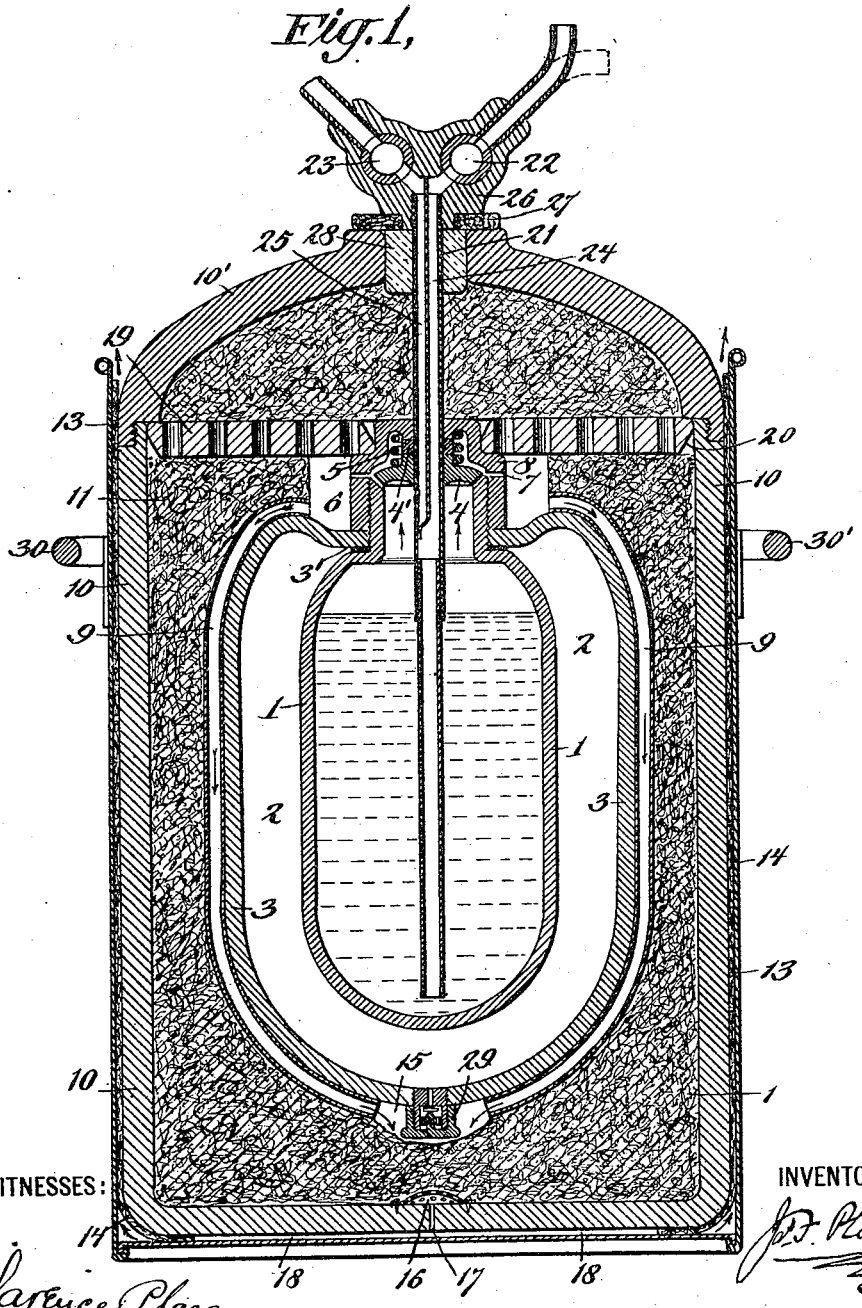
J. F. PLACE.

PORTABLE VESSEL OR BOTTLE FOR HOLDING AND SHIPPING LIQUID AIR OR OTHER LIQUID GASES.

(Application filed Dec. 18, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



WITNESSES:

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INVENTOR

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Fig. 4,

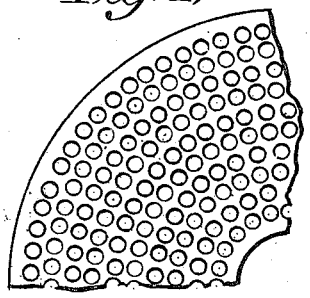


Fig. 3,

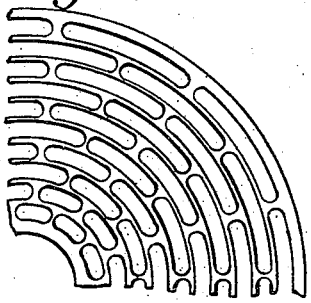
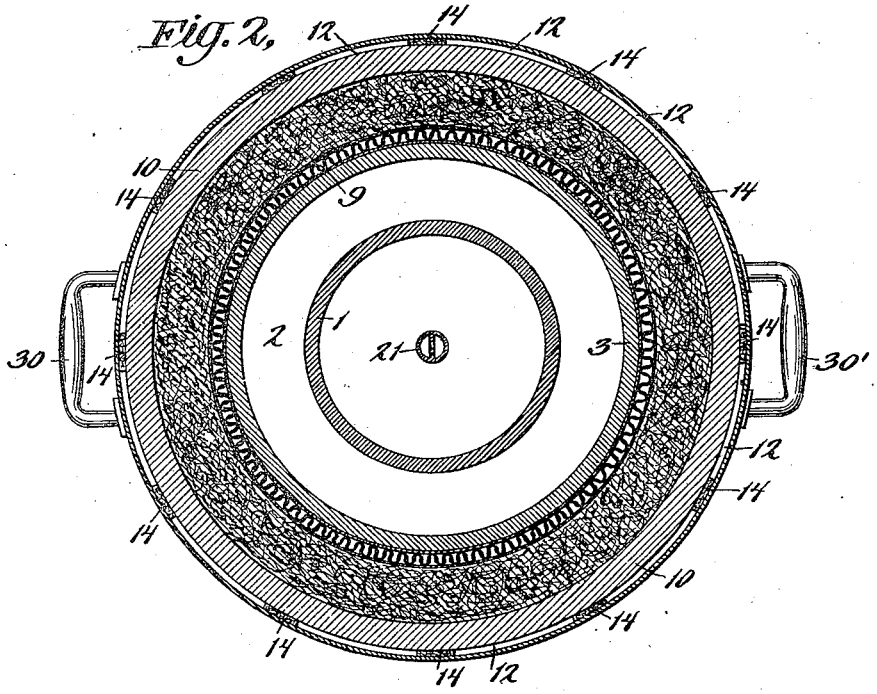


Fig. 2,



WITNESSES:

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UNITED STATES PATENT OFFICE.

JAMES F. PLACE, OF GLEN RIDGE, NEW JERSEY.

PORTABLE VESSEL OR BOTTLE FOR HOLDING AND SHIPPING LIQUID AIR OR OTHER LIQUID GASES.

SPECIFICATION forming part of Letters Patent No. 646,459, dated April 3, 1900.

Application filed December 18, 1899. Serial No. 740,634. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. PLACE, a citizen of the United States, and a resident of Glen Ridge, county of Essex, and State of New Jersey, have invented a new and useful Portable Bottle or Vessel for Holding and Shipping Liquid Air or other Liquid Gases, of which the following is a specification.

My invention relates to improvements in portable vessels or bottles for holding liquid air or other liquid gases.

The object of my invention is to thoroughly insulate the liquid-holding bottle from the heat of the atmosphere and to reinforce the insulation by making use of the refrigeration of such vapors as necessarily escape from the bottle.

My invention is more particularly an improvement on my improved liquid-air bottle or portable vessel as described in application for patent, Serial No. 737,395.

The objects sought I attain by the mechanism, construction, and methods illustrated in the accompanying drawings.

Figure 1 is a vertical section of my improved bottle for holding liquid air or other liquid gases, showing full details of construction and method of insulation. Fig. 2 is a cross or horizontal section of my portable bottle for holding liquid air or other liquid gases about midway between the handles and the bottom of outside case, wall, or receptacle. Fig. 3 is a plan view, showing perforations, of a section of the perforated annular fiber ring which incloses the neck of the liquid-holding bottle and separates the same from the outside case. Fig. 4 is a plan view of a section of same annular fiber ring as shown in Fig. 3, but with a modification in style or shape of the perforations.

Similar reference-marks refer to similar parts in all the drawings.

1 is the liquid-holding bottle, its outside surface being polished to lessen radiation of heat and having a vacuum or partial-vacuum insulating-space 2, inclosed by an air-tight case 3, which incloses the vacuum or partial-vacuum space 2 and immediately surrounds or incloses the liquid-holding bottle and which incloses and surrounds said neck 1. This air-tight case is securely fixed—either brazed, soldered, or screwed—air-tight around and to the neck of the bottle at 3'. At 4 is shown a relief-valve, held to its seat over the mouth of the liquid-holding bottle 1 by the spring 5, and 4' is a pliable washer or packing to make tight the valve in operation. At 6 I have an expansion-chamber outside of and surrounding the neck of said liquid-holding bottle, which expansion-chamber is connected with the opening of said relief-valve by the perforations or ports 7 in and around the cap 8, which is screwed onto or otherwise fixed to the neck of said liquid-holding bottle. This cap 8 also incloses and holds the relief-valve 4 in place. Under pressure exerted within the liquid-holding bottle 1 the valve 4 is opened against the spring 5 and the liquid gases, cold air, or vapors thereof are released and, passing through the ports 7, are expanded in the chamber 6, thus greatly increasing the refrigeration and absorbing any heat around the neck of the bottle. At 9 and 12 to reinforce the vacuum insulation I have a series of refrigerating downward and upward air-passages. These downward passages are formed by corrugated paper (or other material of low heat conductivity) folded around the outside of the air-tight vacuum inclosing case 3, as shown in Fig. 2. At 10, Figs. 1 and 2, is shown the outside case, wall, or receptacle, made of wood fiber or other material of low heat conductivity, which incloses or surrounds the liquid-holding bottle 1, with its vacuum or partial-vacuum insulating-space 2 inclosed by the air-tight vacuum inclosing case 3. This outside case is made in the form of a receptacle with a bottom and has a removable top or cover 10', its sides forming an annular wall, which separates the insulations or packing 11 and the series of downward refrigerating air-passages 9 from the outside or series of upward refrigerating air-passages 12, (see Fig. 2,) being fixed between said passages.

13 is a pail made of impervious material of low heat conductivity which incloses the whole vessel including outside case, liquid-holding bottle, vacuum inclosing case, refrigerating-passages, insulating-packings, &c. The outside or upward refrigerating air-passages 12 are formed between the outside case 10 and the pail 13 by the narrow strips of felt 14, (see Fig. 2,) which go down and bend under the bottom of the case 10, (see Fig. 1,) and

thus form a rest for said case. The downward refrigerating air-passages 9 end in an open chamber or space under the air-tight vacuum inclosing case 3 at 15. The cold air passes through the felt packing 11 and the perforated plate 16 into the aperture 17 through the bottom of the outside case and through the same into the space 18, between the bottom of the outside case 10 and the bottom of the impervious pail 13, thence into the upward refrigerating air-passages 12 (see Fig. 2) and out into the outside atmosphere. It will be seen that the series of downward refrigerating air-passages 9 on the inside of the annular wall 10 and the series of upward refrigerating air-passages 12 on the outside of said wall 10 are thus connected together in the chambers 15 and 18 through the outlet 17, and the whole forms a continuous conduit or conduits for the passage of the expanded cold air from the liquid-holding bottle and expansion-chamber 6 to the outside atmosphere.

19 is a perforated annular ring, made of wood fiber or other material of low heat conductivity, fixed between said liquid-holding bottle and said outside case or wall. The perforations in this ring are for the purpose of lessening the passage of heat from the outside case or wall to the bottle and are made oblong and in circles "staggered," as shown in Fig. 3. A modification in shape of holes is shown in Fig. 4. The points of contact are reduced by scarfing or beveling the outside edge of this ring, as shown at 20. At 21 I have a double-passage tube connecting the inside of said liquid-holding bottle with the outside atmosphere through the cocks 22 and 23. The siphon-passage 24 connects with the cock 22, and the vapor-passage 25 connects with the cock 23. This tube is made fast to the cap 8 and is screwed into the part 26, which holds the cocks 22 and 23, which by resting on the felt or fiber washer 27 holds or supports the liquid-holding bottle by suspending it from the top or cover 10' of the outside case. This construction makes it unnecessary to provide any rest for the liquid-holding bottle or the air-tight vacuum inclosing case, thereby reducing the point of contact between said bottle and the outside case and making it more difficult for the heat to penetrate to the bottle.

28 is a cork, felt, or fiber insulating stopper or ring inserted in the top of cover 10' to insulate the tube 21 from said cover. At 29 is shown an ordinary check-valve and protecting-cap for use in making and retaining the vacuum in space 2. At 30 and 30' I fix two handles to the pail 13 for convenience in handling.

Having thus described my invention, what I claim as new and original, and desire to secure by Letters Patent, is—

1. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; a series of refrigerating downward air-passages, and a series of refrigerating upward air-passages surrounding said air-tight case; and an outside case or wall of wood fiber, or other material of low heat conductivity, fixed between said upward and said downward refrigerating air-passages, and surrounding or inclosing said liquid-holding bottle, substantially as set forth.

2. In a vessel for holding liquid air or other liquid gases the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; a series of refrigerating downward air-passages and a series of refrigerating upward air-passages surrounding said air-tight case; an outside case or wall of wood fiber or other material of low heat conductivity fixed between said upward and said downward air-passages, and surrounding or inclosing said liquid-holding bottle; and a pail of impervious material of low heat conductivity inclosing or surrounding the whole, substantially as set forth.

3. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a polished outside surface; with a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; a series of refrigerating downward air-passages, and a series of refrigerating upward air-passages, surrounding said air-tight case; an outside case or wall of wood fiber or other material of low heat conductivity fixed between said upward and said downward air-passages, and surrounding or inclosing said liquid-holding bottle; and an impervious pail inclosing or surrounding the whole, substantially as set forth.

4. In a vessel for holding liquid air, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with a relief-valve held to its seat over the mouth of said bottle by a spring; a cap fixed to the neck of said bottle, and having perforations or ports which connect the opening of said valve with an expansion-chamber outside of and surrounding said neck, substantially as set forth.

5. In a vessel for holding liquid air, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with a relief-valve held to its seat over the mouth of said bottle by a spring; a cap fixed to the neck of said bottle, and having perforations or ports which connect the opening of said valve with an expansion-chamber outside of and surrounding said neck; and downward refrigerating air-passages surrounding said air-tight vacuum inclosing case, substantially as set forth.

6. In a vessel for holding liquid air or other

liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with a relief-valve held to its seat over the mouth of said bottle by a spring; a cap fixed to the neck of said bottle and having perforations or ports which connect the opening of said valve with an expansion-chamber outside of and surrounding said neck; and a series each of downward and upward refrigerating air-passages, surrounding said air-tight vacuum inclosing case, substantially as set forth.

7. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with a relief-valve held to its seat over the mouth of said bottle by a spring; a cap fixed to the neck of said bottle and having perforations or ports which connect the opening of said valve with an expansion-chamber outside of and surrounding said neck; a series each of downward and upward refrigerating air-passages surrounding said air-tight vacuum inclosing case; and an outside case or wall of wood fiber, or other material of low heat conductivity, fixed between said upward and said downward air-passages, substantially as set forth.

8. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with a relief-valve held to its seat over the mouth of said bottle by a spring; a cap fixed to the neck of said bottle and having perforations or ports which connect the opening of said valve with an expansion-chamber outside of and surrounding said neck; a series each of downward and upward refrigerating air-passages surrounding said air-tight vacuum inclosing case; an outside case or wall of wood fiber, or other material of low heat conductivity, fixed between said upward and said downward air-passages; and an impervious pail inclosing or surrounding the whole, substantially as set forth.

9. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with a relief-valve held to its seat over the mouth of said bottle by a spring; a cap fixed to the neck of said bottle and having perforations or ports which connect the opening of said valve with an expansion-chamber outside of and surrounding said neck; a series each of downward and connected therewith of upward refrigerating air-passages surrounding said air-tight vacuum inclosing case; and an outside case or wall of wood fiber, or other material of low heat conductivity, fixed between said upward and said downward air-passages, substantially as set forth.

10. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with downward refrigerating air-passages, surrounding said air-tight case; a relief-valve held to its seat over the mouth of said bottle by a spring; an outside case or wall of wood fiber or other material of low heat conductivity, surrounding or inclosing said liquid-holding bottle with its said air-tight vacuum inclosing case; and a perforated annular fiber ring fixed between said liquid-holding bottle and said outside case or wall, substantially as set forth.

11. In a vessel for holding liquid air or other gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, immediately surrounding said bottle; with downward refrigerating air-passages, surrounding said air-tight case; a relief-valve held to its seat over the mouth of said bottle by a spring; a cap fixed to the neck of said bottle, and having perforations or ports which connect the opening of said valve with an expansion-chamber, outside of and surrounding said neck; an outside case or wall of wood fiber or other material of low heat conductivity, surrounding or inclosing said liquid-holding bottle with its said air-tight vacuum inclosing case; and a perforated annular fiber ring fixed between said liquid-holding bottle and said outside case or wall, substantially as set forth.

12. In a vessel for holding liquid air or other liquid gases; the combination of a liquid-holding insulated bottle provided with a relief-valve and an insulating vacuum-chamber; with an outside case or receptacle, inclosing or surrounding said liquid-holding bottle; said liquid-holding bottle being suspended within said outside case by a tube from the top or cover of same—substantially as set forth.

13. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case; with an outside case or receptacle of low heat conductivity, inclosing or surrounding said liquid-holding bottle; insulations between said outside case and said bottle; said liquid-holding bottle being suspended within said outside case by a tube from the top of same—substantially as set forth.

14. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case; with an outside case or receptacle of low heat conductivity, inclosing or surrounding said liquid-holding bottle; a relief-valve held to its seat over the mouth of said bottle by a

spring; said liquid-holding bottle being suspended within said outside case by a tube from the top of same—substantially as set forth.

15. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case; with an outside case or receptacle of low heat conductivity, inclosing or surrounding said liquid-holding bottle; a relief-valve held to its seat over the mouth of said bottle by a spring; an expansion-chamber connected by ports to the opening of said valve; said liquid-holding bottle being suspended within said outside case by a tube from the top of same—substantially as set forth.

16. In a vessel for holding liquid air or other liquid gases, the combination of a liquid-holding bottle having a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case; with an outside case or receptacle of low heat conductivity, inclosing or surrounding said liquid-holding bottle; a relief-valve held to its seat over the mouth of said bottle by a spring; an expansion-chamber connected by ports to the opening of said valve; a tube connecting the inside of said bottle with the outside atmosphere through a cock; said liquid-holding bottle being suspended within said outside case by a tube from the top of same—substantially as set forth.

17. In the construction of a vessel for holding liquid air or other liquid gases, the liquid-holding bottle and a vacuum or partial-vacuum insulating-space, inclosed by an air-tight case, surrounding or inclosing said liquid-holding bottle, reinforced by downward and upward refrigerating air-passages outside of and around said air-tight vacuum inclosing case, said refrigerating passages being connected together and forming continuous conduits for passage of expanded cold air from the liquid-holding bottle to the atmosphere, but said downward and said upward part of said refrigerating air-passages being separated from each other by a wall of wood fiber or other material of low heat conductivity, substantially as set forth.

In witness whereof I have hereunto signed my name, this 16th day of December, 1899, in the presence of two subscribing witnesses.

JAS. F. PLACE.

Witnesses:
J. M. DOOLITTLE,
CLARENCE PLACE.