

Nov. 26, 1935.

F. C. SECK

2,021,967

LIQUEFIER

Filed April 9, 1934

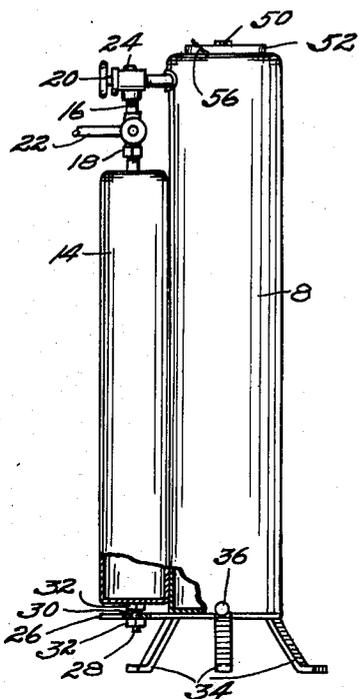


Fig. 1

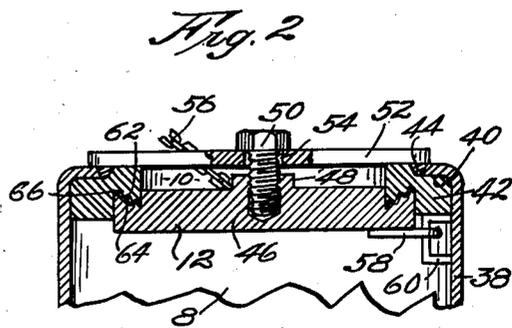


Fig. 2

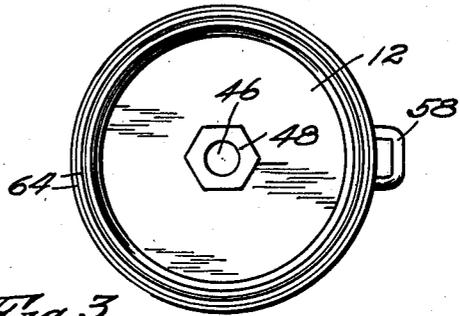


Fig. 3

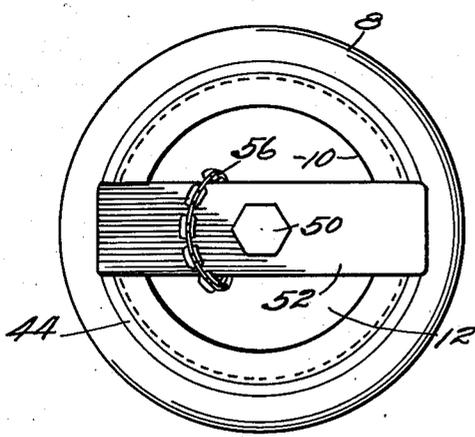


Fig. 4

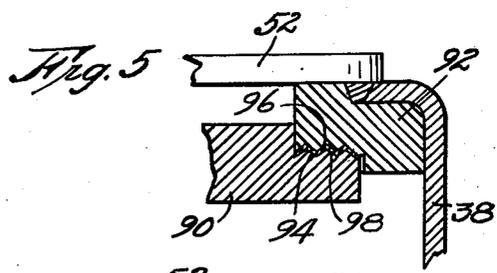


Fig. 5

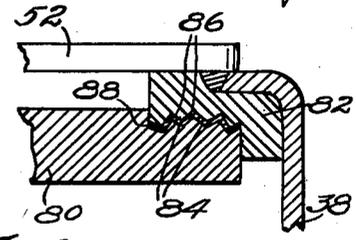


Fig. 6

INVENTOR,
Frank C. Seck.
BY *Honey & Hamilton,*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,021,967

LIQUEFIER

Frank C. Seck, Oklahoma City, Okla.

Application April 9, 1934, Serial No. 719,740

11 Claims. (Cl. 220-3)

This invention relates to liquefier for solidified carbon dioxide and has for its primary object, improvements in such devices and especially of the type shown in my United States Letters Patent No. 1,928,396, issued September 26, 1933.

One of the important aims of the instant invention is the provision of a unique combination of containers whereby a reserve supply of carbon dioxide gas might be maintained under pressure close to the main reservoir, wherein the carbon dioxide gas is produced from solidified carbon dioxide.

Another object of this invention is to provide a unique, novel and exceptionally desirable manner of assembling a reservoir wherein carbon dioxide gas is generated and which is called upon to withstand high pressures from within.

A yet further object of the invention is to provide positive sealing means between the opening formed in the main reservoir and the cover for said opening, said sealing means comprising a series of continuous serrations disposed in such a manner as to directly oppose gas from within the reservoir so that by the time this gas has traveled over the many undulations, its force has been spent to the point where further release is precluded.

Other objects of this invention, including the unique manner of drawing the reservoir cover to the closed position, will appear during the course of the following specification, referring to the accompanying drawing, wherein:

Figure 1 is a side elevation of a liquefier embodying this invention.

Fig. 2 is an enlarged, fragmentary, detailed, central section through the upper portion of the main reservoir of the liquefier.

Fig. 3 is a top plan view of the cover, with the same entirely removed from its operative position.

Fig. 4 is a top plan view of the main reservoir, and,

Figs. 5 and 6 are enlarged, fragmentary, sectional, detail views of modified forms of the invention as it pertains to the specific seat established between cover and reservoir head.

It is well known in this art that it takes some time to generate carbon dioxide gas to a sufficient pressure from a cake of solidified carbon dioxide, and within a tank, for the gas to be utilized commercially. This invention contemplates a unique assembly of containers in the form of a main reservoir 8, wherein is positioned the cake of carbon dioxide. To place this cake it becomes necessary to provide reservoir 8 with an opening

10, having a cover 12 and related parts such as detailed in Fig. 2.

It is in this main reservoir that the carbon dioxide gas is created and when the liquefier is first brought into use, reserve tank 14 is connected to reservoir 8 through the medium of pipe 16 and is allowed to completely fill before closing valve 18 interposed in said pipe 16. After reserve tank 14 has been filled, valve 18 is closed and valve 20 allowed to remain open so that gas may be sent through take-off tube 22 from main reservoir 8. Valve 20 has a safety "pop-off" element 24 so that in case excessive pressures are built up, danger to the liquefier will be eliminated by the action of this member 24. In practice, when all the carbon dioxide within reservoir 8 has been consumed, it is only required that valve 20 be closed while reloading reservoir 8, whereupon valve 18 is opened and a supply of gas is available that will carry over until the new solidified carbon dioxide has released enough gas within main reservoir 8 to again take up the task of supplying the gas through tube 22.

Connections at pipe 16 sometimes become loose and adjustment of reserve tank 14 longitudinally along main reservoir 8 is necessary. To provide for this requirement, tank 14 is supported by member 26 that projects laterally from the bottom of reservoir 8. A screw 28, rigid to the bottom of tank 14, extends through an opening formed in member 28 and lock nuts 32 may be adjusted to raise and lower tank 14 as desired. Legs 34 support the liquefier and a drain 36 is provided at the bottom of reservoir 8.

In constructing main reservoir 8, its cylindrical side wall 38 is forced inwardly at its upper edge to present an overhanging lip 40 which engages the top of head 42 as shown in Fig. 2. This construction is desirable in that the outward force on head 42 is directly opposed by the inturned lip 40. It is desired to have the top of head 42 smooth and to further provide positive connection and to accomplish this purpose the upper face of head 42 is stepped to present an annular face at the outer periphery of the head that is on a plane spaced from the plane of the remaining upper face. Thus a small ring-shaped space 44 may be filled with the welding material and a positive seal and joint formed.

Cover 12 has a socket 46 formed centrally thereof that may be supplemented by the formation, in any suitable manner, of a boss 48 that extends upwardly from the top of cover 12. This socket 46 is tapped inwardly for at least a portion of its depth and when drawing cover 12 to

position, a cap screw 50 is used as illustrated. A locking bar 52 extends across the top of reservoir 8 and bridges opening 10 in head 42. An aperture 54 through bar 52 intermediate its ends receives cap screw 50.

A chain 56 has its ends attached to the top of cover 12 and may be looped over bar 52 so that cover 12 may be raised and lowered when placing material in reservoir 8. It is desirable also to provide interengaging loops 58 and 60 on cover and wall 12 and 38 respectively so that cover 12 will not drop to the bottom of reservoir 8 where it is out of convenient reach.

Head 42 has an annular shoulder formed in the annular inner wall thereof which forms opening 10 and it is on the under side of this overhanging shoulder that a series of continuous serrations 62 are formed. These serrations are in the form of alternate ridges and grooves and completely circumscribe opening 10. The upper face of cover 12 has a marginal shoulder formed therein which is likewise serrated as at 64 in a way that is complementary to serrations 62. A gasket 66 of pliable material is interposed between these two serrated faces so that when screw 50 is tightened, a positive seal will be formed. The use of such members as serrations 62 and 64 to form a sealing seat causes a complete breaking up of the escaping forces of gases and insures that there will be no leakage through opening 10.

While it is not necessary, it is desirable, to disclose the faces of head 42 and cover 12 which have serrations 62 and 64 respectively formed thereon at an angle to the major plane of cover 12 and opening 10. This disposition further tends to break up the forces of the gas at the joint.

In Fig. 6 the form of joint between cover 80 and head 82 is shown to be arcuate. Serrations 84 formed in cover 80 mate with serrations formed in head 82 and a gasket 88 of the aforementioned character conforms itself to the contour of the mating surfaces. In Fig. 5 a further modification illustrates the manner of forming a sealing seat between cover 90 and head 92 which is not inclined. Serrations 94 on cover 90 and serrations 96 on head 92 interengage as shown and a gasket 98 is interposed at this seat. Obviously, in all instances the gasket should be continuous to circumscribe opening 10 and to the commensurate with the mating serrations or grooves and ridges. It has been found that using a large number of interengaging grooves and ridges along the face of the seat will effectively seal a top without the necessity of placing undue strain on the mechanical holding means such as cap screw 50 and bar 52 herein described.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A liquefier of the class described having a reservoir comprising one closed end, and an intumed, continuous annular lip at the other end, defining an opening; a head having an opening formed therethrough, underlying said lip and having its innermost face shaped to form a seat; a cover for the opening against the said head interiorly of the reservoir; a series of complementary continuous, alternate grooves and ridges formed in the said seat and cover; and common means for drawing the cover against said head and the head against the intumed annular lip.

2. A liquefier of the class described having a reservoir comprising one closed end, and an intumed, continuous annular lip at the other end,

defining an opening; a head having an opening formed therethrough, underlying said lip and having its innermost face shaped to form a seat; a cover for the opening against the said head interiorly of the reservoir; a series of complementary continuous, alternate grooves and ridges formed in the said seat and cover; and means for drawing the cover against said head comprising a bar bridging said opening and extending over upon the intumed annular lip, and a member adjustably interconnecting the said bar and cover.

3. A liquefier for solidified carbon dioxide comprising a reservoir for the same and the gas evolved therefrom; a head having an opening formed therethrough at one end of said reservoir; and a closure for said opening within the reservoir, said closure and head having annular overlapping margins angled out of the major planes of the closure and head and provided with continuous, annular, complementary serrations that are forced into engagement as the gases within the reservoir create high pressures therein.

4. A liquefier for solidified carbon dioxide comprising a reservoir for the same and the gas evolved therefrom; a head having an opening formed therethrough at one end of said reservoir; and a closure for said opening within the reservoir, said closure and head having annular overlapping margins angled out of the major planes of the closure and head and provided with continuous, annular, complementary serrations that are forced into engagement as the gases within the reservoir create high pressures therein, said closure having adjustable means for holding the said serrations in engagement before the gas pressure is created within the reservoir.

5. A liquefier for solidified carbon dioxide and the gas evolved therefrom comprising a hollow cylindrical member permanently closed at one end and having an intumed, continuous annular lip at the other end extending perpendicularly to the wall of the cylinder member; a head provided with an opening within the cylindrical member and underlying said lip with the lip against the outer face of the head; a closure for said opening in the head disposed against the inner face thereof when in the operative position; a bar spanning the opening in the head and extending over upon the upper surface of the said annular lip; and adjustable means carried by the said bar and in connection with the closure for drawing the same against the inner face of the closure, said means serving to draw together the head and annular lip.

6. A liquefier for solidified carbon dioxide and the gas evolved therefrom comprising a hollow cylindrical member permanently closed at one end and having an intumed, continuous annular lip at the other end extending perpendicularly to the wall of the cylinder member; a head provided with an opening within the cylindrical member and underlying said lip with the lip against the outer face of the head; a closure for said opening in the head disposed against the inner face thereof when in the operative position; a bar spanning the opening in the head and extending over upon the upper surface of the said annular lip; and adjustable means carried by the said bar and in connection with the closure for drawing the same against the inner face of the closure, said means serving to draw together the head and annular lip, said head having an annular stepped upper face, the intumed lip resting upon the face of the outer lowermost face

whereby to present a smooth planar surface to receive the overlying bar.

5 7. A liquefier for solidified carbon dioxide and the gas evolved therefrom comprising a hollow cylindrical member permanently closed at one end and having an inturned, continuous annular lip at the other end extending perpendicularly to the wall of the cylinder member; a head, provided with an opening, within the cylindrical member and underlying said lip with the lip against the outer face of the head; a closure for said opening in the head disposed against the inner face thereof when in the operative position; a bar spanning the opening in the head and extending over upon the upper surface of the said annular lip; and adjustable means carried by the said bar and in connection with the closure for drawing the same against the inner face of the closure, said means serving to draw together the head and annular lip, said head having an annular stepped upper face, the inturned lip resting upon the face of the outer and lowermost face and terminating in spaced relation to the higher face whereby to form a ring-shaped space, said head and lip being secured together by filling said ring-shaped space with a sealing and securing material.

10 8. In a liquefier of the class described, a reservoir having an opening formed in one end thereof; a serrated seat formed on the inner face of the end of the reservoir around said opening; a closure for the opening inside of the reservoir having a serrated surface opposed to said seat; a gasket interposed between said serrated seat and surface; means for exerting a pressure upon said closure to hold the same in operative position; and means formed by said reservoir to prevent spreading of the gasket laterally in one direction from between the opposed serrated seat and surface as pressure within the reservoir is increased by the liquefying of the solidified carbon dioxide therein contained.

15 9. In a liquefier of the class described, a reservoir having an opening formed in one end thereof; a serrated seat formed on the inner face of

the end of the reservoir around said opening; a closure for the opening inside of the reservoir having a serrated surface opposed to said seat; a gasket interposed between said serrated seat and surface; means for exerting a pressure upon said closure to hold the same in operative position; and means formed by said closure to prevent spreading of the gasket laterally in one direction from between the opposed serrated seat and surface as pressure within the reservoir is increased by the liquefying of the solidified carbon dioxide therein contained.

20 10. In a liquefier of the class described, a reservoir having an opening formed in one end thereof; a serrated seat formed on the inner face of the end of the reservoir around said opening; a closure for the opening inside of the reservoir having a serrated surface opposed to said seat; a gasket interposed between said serrated seat and surface; means for exerting a pressure upon said closure to hold the same in operative position; and means formed by reservoir and closure to prevent spreading of the gasket laterally from between the opposed serrated seat and surface as pressure within the reservoir is increased by the liquefying of the solidified carbon dioxide therein contained.

25 11. In a liquefier of the class described, a reservoir having an opening formed in one end thereof; a shoulder formed on the inner face of the end of said reservoir, circumscribing said opening; a closure for said opening bearing against one surface of the said shoulder and having a part thereof extending into the opening; complementary serrations formed in opposed surfaces of said end and closure; and a sealing gasket interposed between the said opposed surfaces, said end having a wall coextensive with and along one edge of the said gasket, said closure having a wall coextensive with and along the other edge of the gasket to preclude spreading of the gasket as pressure is applied to the closure.

FRANK C. SECK. 45