July 19, 1949. P. G. MacGREGOR 2,476,748

FRANGIBLE SEALING CLOSURE

Original Filed Nov. 7, 1944

Fig.1.

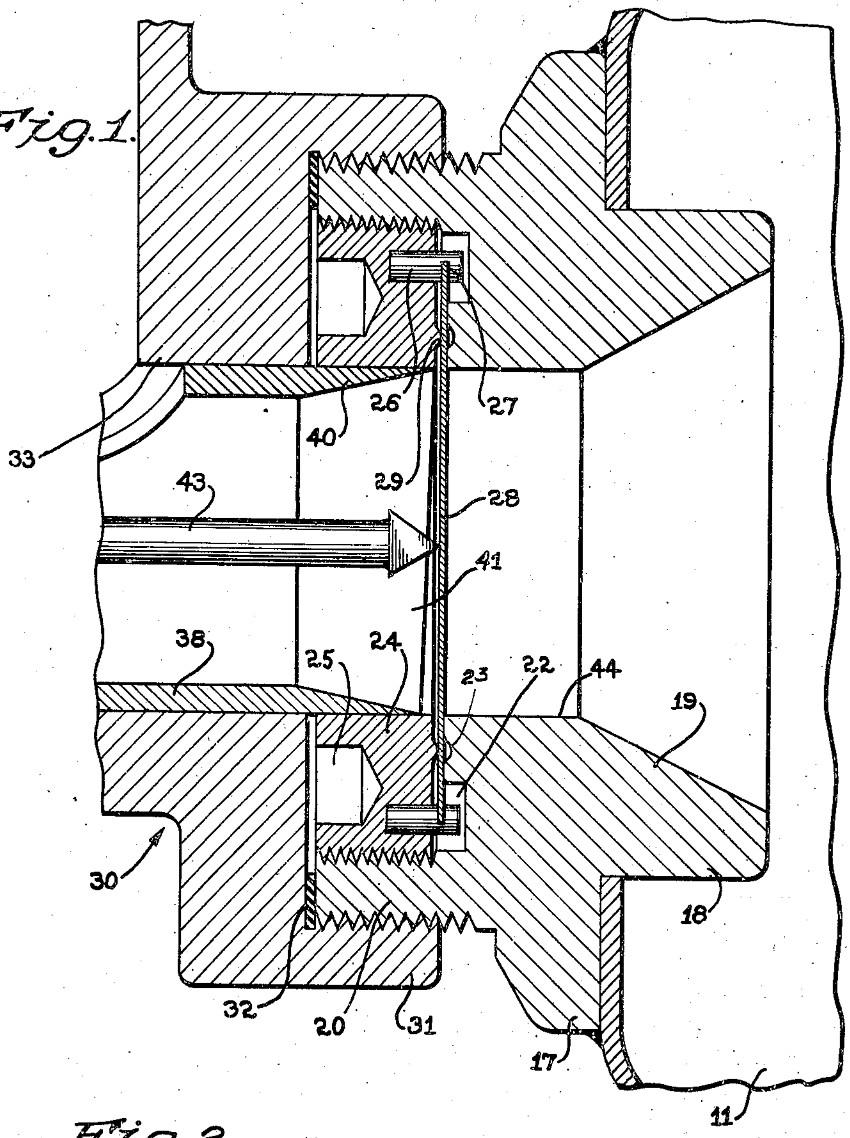
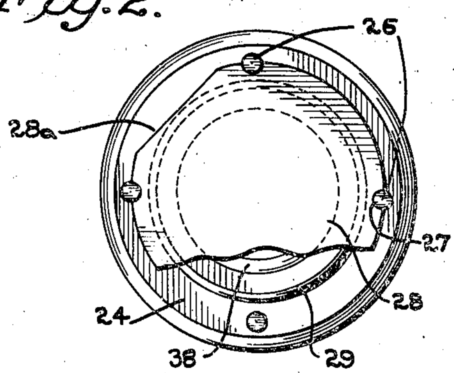


Fig.2.



INVENTOR.

Peter G. MacGregor

BY

[signature]

ATTORNEY

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FRANGIBLE SEALING CLOSURE

Peter Graham MacGregor, Pequannock, N. J., assignor to Pyrene Manufacturing Company, Newark, N. J., a corporation of Delaware

Original application November 7, 1944, Serial No. 562,300. Divided and this application September 12, 1946, Serial No. 696,535

4 Claims. (Cl. 220—27)

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This invention relates to sealing means for a tank or other container adapted to retain a gas or liquid under high pressure for indefinite periods. More particularly it relates to the type of sealing means for such a tank or container which is adapted to be readily and quickly broken or sheared, or otherwise destroyed, when it is desired to make use of the contents of the tank. This application is a division of an application, Serial No. 562,300, now matured into Patent No. 2,419,826, filed by Frederick A. Dodelin and Peter Graham MacGregor on November 7, 1944.

A primary object of the invention has been to provide a simple but effective means, which may be readily renewed or replaced, for sealing a tank or other vessel more or less permanently against the escape of gas or liquid under high pressure.

Another object has been to provide sealing means of the character indicated, which includes a frangible or readily shearable disc, or other closure member adapted to be broken or punctured or sheared to permit the discharge of the contents of the tank when desired. This disc or closure member is so constructed and mounted as to enable its ready replacement, after use, and the production of a new and effective seal to permit refilling of the tank.

Other objects, features, and advantages of the invention will appear from a detailed description of an illustrative form of the invention, which will now be given in conjunction with the accompanying drawings, in which:

Fig. 1 is an axial sectional view through a discharge fitting for a high pressure tank and shows the sealing disc and retaining means therefor and associated devices forming part of the present invention and its setting; and

Fig. 2 is an inner face view on a smaller scale of the sealing disc and its retaining means, the disc being partially broken away to disclose the construction beneath it.

The sealing means of the present invention is applicable to a variety of uses and circumstances, but it is of particular utility in connection with systems in which a fluid is maintained in a tank or similar container under relatively high pressure and is required to be released quickly and in relatively large volume when some condition requiring its use arises. More particularly, the invention is concerned with systems of this type in which the tank is adapted to be refilled after its contents has been discharged so that a new seal is required for the discharge opening. The conditions which the present invention is especially intended to meet are to be found, for example, in connection with fire extinguishing systems applied to airplanes and the like which require the rapid release from a high pressure tank of a suitable fire extinguishing fluid, such as methyl bromide, carbon tetrachloride, carbon dioxide, or the like. In the operation of systems of this type for the extinguishment of fires which develop in the engine of an airplane, for example, it has been found to be either necessary or desirable to discharge the contents of a tank containing an appropriate fire extinguishing fluid within only a few seconds. To enable such quick delivery of the fluid to the seat of the fire a comparatively large opening must be provided through the tank wall for the discharge of the fluid. This opening must normally be effectively sealed, but when the contents of the tank are to be used, the seal must be broken to provide a large discharge passage and this is ordinarily accomplished by a suitable shearing device which may be propelled by an explosive charge, as disclosed in said parent application.

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Turning now to Fig. 1, there is shown a portion of a tank 11 adapted to retain a fluid under relatively high pressure. The tank is provided at some suitable point, such as at one end, with a fitting 17 having a portion 18 extending through a suitable aperture in the wall of the tank. This fitting is secured to the tank in any suitable way as by welding or the like. A discharge passage is provided through the center of the fitting, this passage being of appropriate size to permit fire extinguishing fluid or the like to be delivered to the point of use within the brief time interval permitted for this purpose. Fitting 17 preferably has an inwardly extending annular portion 18 which projects a slight distance into the interior of the tank. The passage through the annular portion 18 is preferably flared, as indicated at 19. At its outer end 20 the fitting 17 is screw-threaded both internally and externally. At the base of the threaded portion 20 there is provided a transversely extending shoulder which has a relatively deep and wide annular recess 22 formed therein, this lying adjacent the base of the threaded part 20. Between the central passage through the fitting 17 and the annular channel 22 there is provided an annular depression 23 which is preferably semi-circular in cross-section, as indicated in Fig. 1.

An annular member 24 having an internal opening of the same size as the cylindrical portion of the central passage through the fitting 17 is provided with external screw threads adapted to cooperate with the internal threads on the portion

20. Spanner wrench openings 25 are provided in the outer surface of the member 24 to permit it to be screwed into place within the fitting 17. A series of pins 26, preferably four in number, is fixedly mounted in the opposite face of the member 24, these pins projecting a slight distance from said opposite face but less than the depth of the groove 22 into which they project. Pins 26 are grooved, as indicated at 27, on their inner faces to receive the edge of a sealing disc 28 formed of any suitable material such as copper or other appropriate metal, or a suitable plastic. The grooves 27 may suitably extend half way through the pins 26 and they are so disposed as to face radially inwardly toward the axis of the member 24. One face or wall of the groove in each pin is preferably substantially flush with the outer face of the member 24, while the opposite face of each groove is spaced sufficiently from the face of member 24 to permit the ready insertion of a sealing disc of appropriate thickness. Disc 28 is preferably provided with a flat side or straight edge portion 28*a* of sufficient length to enable the disc to be readily inserted in the grooves 27 of three of the pins with the flat side opposite the fourth pin, the disc then being readily rotated to position the flat side intermediate two pins, as shown in Fig. 2. The disc is then quite firmly held by the grooves in all four of the pins. Intermediate the central opening through the member 24 and the circle formed by the series of pins 26, the inner face of the member 24 is provided with an annular bead or rib 29 adapted to cooperate with the recess 23 in the fitting 17. The arrangement is such that when the member 24 is screwed tightly into place in the fitting the rib 29 will squeeze a portion of the sealing disc into the depression 23 and thus form an effective seal which remains effective for relatively long periods of time. The relation between the sealing disc and the slots in the pins is such that when the disc is gripped between the rib 29 and groove 23 the member 24 may be rotated relative to the disc.

For the purpose of breaking the seal whenever desired and for delivering the contents of the tank to the desired point of use, a valve unit of any appropriate construction may be provided. A suitable unit for this purpose is disclosed in said parent application, Serial No. 562,300. It may comprise an outer casing or housing 30 having at its inner end an annular axially extending flange 31 which is screw-threaded to cooperate with the external threads on the portion 20 of fitting 17. A washer or gasket 32 formed of copper or any other suitable material, may be provided within the base of the housing 30 to cooperate with the end of the portion 20 of fitting 17 to thereby form a tight seal therewith. Since the details of the valve unit form no part of the invention to which the present case is directed, they are not disclosed herein. For the purposes of the present invention it is sufficient to understand that the interior of the housing 30 provides a chamber or bore 33 which is aligned axially with the passage through the fitting 17 and member 24. A shearing member 38 in the form of a piston slidable within the bore 33 has its outer end tapered as shown at 40 to provide a relatively sharp shearing edge 41 which is preferably disposed in a plane inclined slightly to the axis of the unit. A pin or spike 43, which is carried by the shearing member 38, is adapted to pierce the center of the sealing disc 28 slightly in advance of the shearing action of the cutting edge 41 cooperating with the outer edge of the portion 44 of the passage through the fitting 17.

After the contents of the tank has been discharged, due to the operation of the shearing and puncturing member, the valve unit may be removed by unscrewing the casing 30 and the member 24 may then be removed from the fitting 17 by the use of a spanner wrench. The remaining portion of the sealing disc 28 may then be removed from the member 24 and a new sealing disc inserted in the same manner as explained above. Upon the return of the member 24 to the fitting 17 and the application of the casing 30 to this fitting, after properly recharging, or otherwise conditioning the valve unit and also the tank 11, the system is again ready for use.

While an illustrative form of the invention has been described in detail, it should be understood that various changes may be made in the construction and arrangement of the several parts without departing from the general principles and scope of the invention.

What is claimed is:

1. Sealing means for a container adapted to retain a fluid under high pressure which comprises means providing an opening through the wall of the container, a member having an opening adapted to be alined with said opening in the container, inter-engaging means on said member and said first mentioned means for firmly securing said member to the container, a plurality of slotted pins on said member for retaining a sealing disc over the opening therein when said member is detached from the container, and means on said member and said first mentioned means for gripping said sealing disc along a line surrounding said openings when said member is secured to the container.

2. Sealing means for a container adapted to retain a fluid under high pressure which comprises means providing an opening through the wall of the container, a member having an opening adapted to be alined with said opening in the container, inter-engaging means on said member and said first mentioned means for firmly securing said member to the container, a plurality of pins projecting from one face of said member with transversely extending slots disposed in a circle about and facing toward the axis of said openings, a sealing disc adapted to be received by said slots and thereby retained by said pins, and means on said member and said first mentioned means for gripping said sealing disc along an area surrounding said openings when said member is secured to the container.

3. Sealing means for a container adapted to retain a fluid under high pressure which comprises means providing an opening through the wall of the container, a member having an opening adapted to be alined with said opening in the container, inter-engaging means on said member and said first mentioned means for firmly securing said member to the container, a plurality of pins projecting from one face of said member with transversely extending slots disposed in a circle about and facing toward the axis of said openings, at least a portion of each of said slots being disposed in the plane of said face of said member, a sealing disc adapted to be received by said slots and thereby retained by said pins, and means on said member and said first mentioned means for gripping said sealing disc along an area surrounding said openings when said member is secured to the container.

4. Sealing means for a container adapted to re-

tain a fluid under high pressure which comprises means providing an opening through the wall of the container, a member having an opening adapted to be alined with said opening in the container, inter-engaging means on said member and said first mentioned means for firmly securing said member to the container, a plurality of pins projecting from one face of said member with transversely extending slots disposed in a circle about and facing toward the axis of said openings, a sealing disc adapted to be received by said slots and thereby retained by said pins, said disc being substantially circular but having a segment removed to provide a flat edge along a portion of its periphery to facilitate insertion in the slots of said pins, and means on said member and said

first mentioned means for gripping said sealing disc along an area surrounding said openings when said member is secured to the container.

PETER GRAHAM MACGREGOR.

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The following references are of record in the file of this patent:

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