March 30, 1948. D. P. MEIGS 2,438,513

CLOSURE FOR HIGH PRESSURE VESSELS

Original Filed Aug. 19, 1943

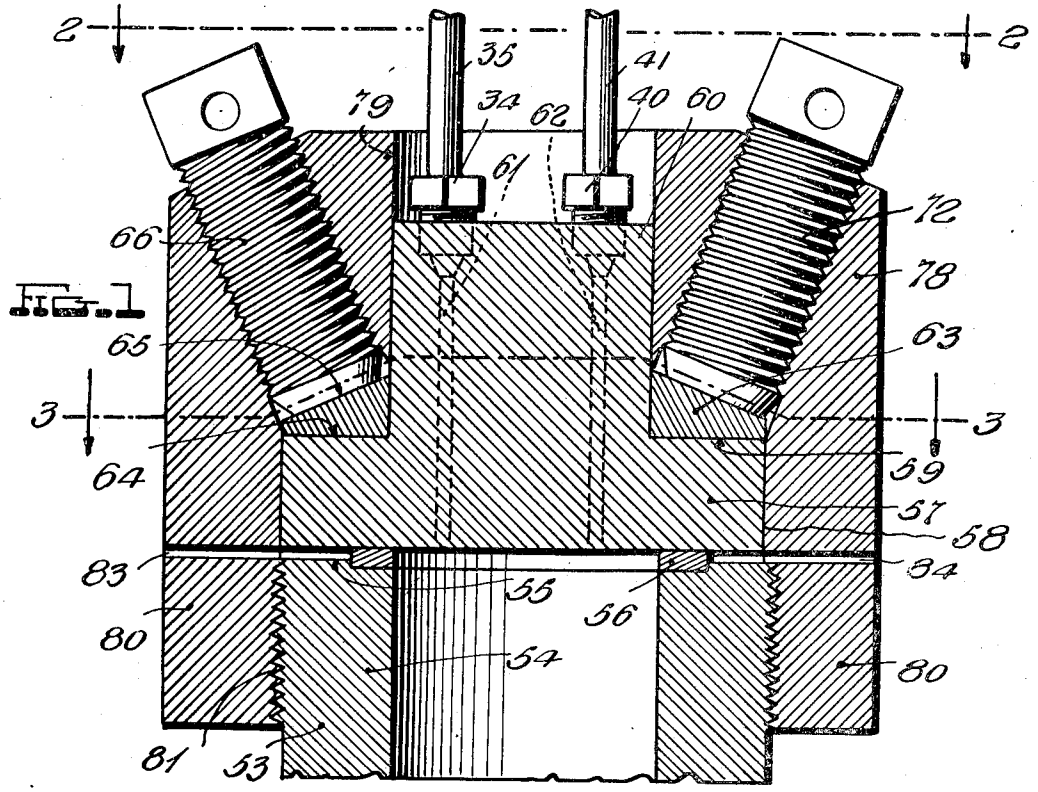


FIG. 1

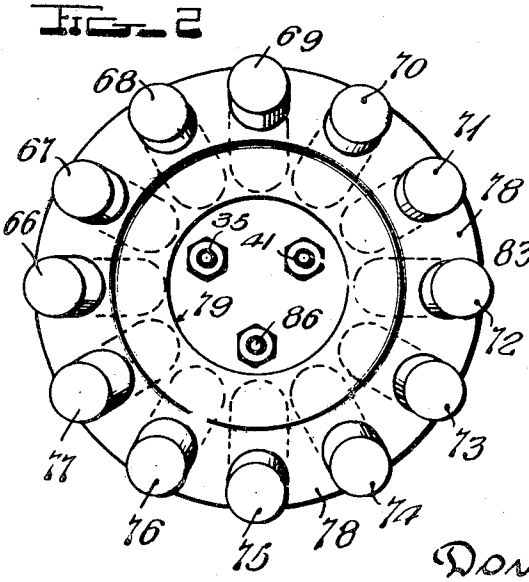


FIG. 2

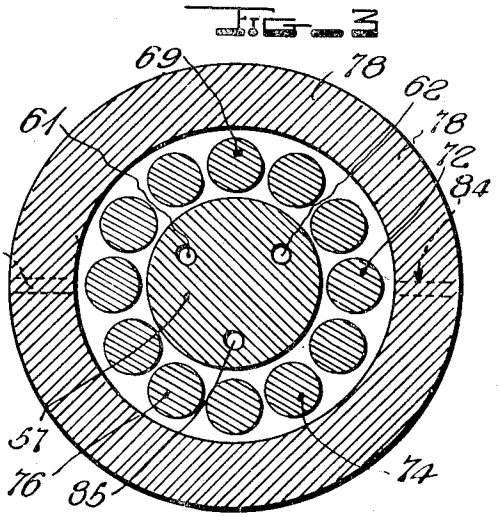


FIG. 3

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CLOSURE FOR HIGH-PRESSURE VESSELS

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Original application August 19, 1943, Serial No. 499,284. Divided and this application May 26, 1944, Serial No. 537,492

5 Claims. (Cl. 220—39)

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My invention relates broadly to closures for high pressure vessels and more particularly to a construction of reliable closure for chemical reaction bombs.

This application is a division of my application Serial No. 499,284, filed August 19, 1943, now abandoned, for Closure for high pressure vessels.

One of the objects of my invention is to provide a construction of closure for chemical reaction bombs which is capable of sealing moderate sized openings against very high pressures while still providing maximum strength of the vessel and enabling quick opening of the vessel by a workman with a minimum of special equipment.

Another object of my invention is to provide a simplified construction of closure for high pressure vessels which is reliable and is capable of quantity production at moderate cost.

Still another object of my invention is to provide a simplified construction of closure head internally screw-threaded to engage the screw-threaded end of a receptacle and operative to confine a closure member in sealing relation to the high pressure vessel with means extending at an angle through said closure head for maintaining the sealed relation of said closure member with respect to said receptacle.

Still another object of my invention is to provide a construction of closure for high pressure vessels in which a cover member internally screw-threaded to engage external screw threads on a mouth of a vessel is arranged to embrace and secure a closure member transversely of the mouth of the receptacle with a multiplicity of individually adjustable screw devices carried by the cover member and extending at an angle to the axis of the receptacle for maintaining the closure member in sealed relation with respect to the receptacle.

Other and further objects of my invention reside in a construction of closure for super-pressure bombs including facilities for establishing several connections with the bomb while insuring a reliable sealing against super pressures as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a vertical sectional view through the closure structure of my invention in which the cover member and several individual pressure maintaining members are illustrated in sealed position on the end of the bomb; Fig. 2 is a plan view of the closure illustrated in Fig. 1 looking down in the direction of line 2—2 of Fig. 1 and showing the inlet and outlet and the pressure determinative connections in transverse section; and Fig. 3 is a horizontal sectional view through the super-pressure closure taken on line 3—3 of Fig. 1.

The problem of providing a simple closure for

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vessels capable of withstanding pressures over 10,000 p. s. i. and yet capable of being opened and closed with a minimum of effort, becomes fairly serious when the size of the opening exceeds that of small laboratory experimental bombs, that is, anything over a few inches in diameter.

My invention comprises sealing means for a super-pressure bomb in which a cover member apertured at its center for the passage of inlet and outlet connections and a pressure gauge connection is internally threaded to engage external threads on the mouth of a super-pressure bomb. The cover member serves to seal the mouth of the super-pressure bomb with a gasket intermediate the mouth of the bomb and the cover member. The cover member has an annular shoulder thereon against which a thrust ring is seated. A multiplicity of cap screws are carried by the cover member and are arranged to exert pressure against the thrust ring for correspondingly exerting pressure against the cover member and effecting sealing relation thereof with respect to the mouth of the bomb. The cap screws are inclined at an angle to the axis of the bomb. The advantages of inclining the cap screws are: an increase in strength of the closure; the increase in accessibility to the connections and openings in the center of the head of the closure; the provision of greater space in which to apply the head securing and head removing tools and the increasing of the total area of the ends of the cap screws with respect to the head while spacing the heads further apart. For example, in the standard design of closures of this type, a 7" compression head might be secured in position for sixteen ¾" cap screws. In the construction shown in the drawings, twelve 1½" cap screws might be arranged in the same space occupied by sixteen ¾" cap screws, which arrangement raises the factor of safety to a higher value and provides for greater strength in the position which is normally one of the weakest points in a closure of this type.

Referring to the drawings in detail, the bomb is represented at 53 having an externally threaded neck 54 with an annular seat 55 formed in the periphery of the neck 53 for receiving the gasket 56. In this arrangement the head is represented at 57 having a shoulder 58 establishing sealing connection with the gasket 56. The head 57 has a central cylindrical projecting portion 60 through which the inlet passage 61 and outlet passage 62 extends. Connections are established with inlet pipe 35 through coupling 34 and outlet pipe 41 and coupling 40 with the inlet and outlet passages 61 and 62. A thrust ring 63 having a flat face 64 and an outwardly inclined face 65 is arranged to fit over the central cylindrical projecting portion 60 of the head 57 and seat

upon the annular shoulder 59 thereof as shown. The thrust ring 63 serves as a bearing surface against which the inclined cap screws 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76 and 77 are adapted to apply pressure for securing the head in position. The cap screws are screw threaded into the cap ring which I have represented at 78. The cap ring 78 is circular in shape and has an internal opening 79 which fits over the cylindrical projecting portion 60 of the head 57 and carries the several cap screws in their inclined positions in such manner that the ends of the cap screws bear against the inclined face 65 of the thrust ring 63 and converge on axes toward the center of pressure within the receptacle that contains the pressure medium.

The cap ring 78 is provided with a depending skirt shown at 80 which is internally screw threaded at 81 to engage the screw threads 54a on the neck of bomb 53. The skirt 80 of the cap ring 78 is provided with radially extending passages 83 and 84 therein which register with the juncture of head 57 and annular seat 55 of neck 53 when the cap ring is screwed to the limit of the closure position, whereby excessive pressures in bomb 53 may be released by blowing past the gasket 56 and through the safety passages 83 and 84 rather than creating a destructive force injurious to the structure of the bomb.

Each of the cap screws is provided with tool engaging heads and as heretofore explained these heads are rendered more accessible by reason of the increased spacing of the heads resulting from the angular disposition of the cap screws.

The head 57 carries in addition to the service connections, such pressure or temperature measuring connections as may be desirable. I have indicated the passage 85 in head 57 for connection to any suitable pressure or temperature measuring device which has further been indicated in Fig. 2 as leading to the connection 86.

While I have described my invention in one of its preferred embodiments, I realize that modifications in construction may be made and I intend no limitations upon my invention other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A closure for high pressure vessels comprising a receptacle enclosing a high pressure medium, a head engageable with said receptacle, a cap ring engageable with said receptacle, an annular member disposed between said cap ring and said head and a plurality of angularly disposed adjustable pressure applying members extending through said cap ring and engageable against said annular member and converging on axes in a direction toward the center of pressure within said receptacle for exerting pressure against said head for sealing said head with respect to said receptacle.

2. A closure for high pressure vessels comprising a receptacle enclosing a high pressure medium, a head engageable with said receptacle, a thrust ring superimposed upon said head, said thrust ring having a face inclined angularly with respect to said head, a cap ring engageable with said receptacle, and a plurality of pressure applying members extending through said cap ring and converging at an angle to the central axis of said receptacle and bearing against the angularly disposed face of said thrust ring for exerting pressure in a direction toward the center of pressure within said receptacle for applying pressure through said thrust ring against said head for sealing the receptacle.

3. A closure for high pressure vessels comprising a receptacle enclosing a high pressure medium and externally screw-threaded on the open end thereof, a closure member engageable in sealing relation to the open end of said receptacle, an internally threaded cover member enveloping said closure member and engageable with the external screw-threads on said vessel, a ring member intermediate said closure member and said cover member and a multiplicity of angularly converging pressure applying members screw-threaded through said cover member on axes all directed toward the center of pressure within said receptacle and operative to exert pressure against said ring member for maintaining a pressure-tight seal between said closure member and said receptacle.

4. A closure for high pressure vessels comprising a receptacle for a high pressure medium externally screw-threaded on the open end thereof, a closure member engageable in sealing relation to the open end of said receptacle, an internally threaded cover member enveloping said closure member and engageable with the external screw-threads on said vessel and a multiplicity of pressure applying members screw-threaded through said cover member and converging at an angle to the longitudinal axis of said receptacle in a direction toward the center of pressure within said receptacle, a thrust ring disposed between said cover member and said closure member, said pressure applying members being engageable against said thrust ring for effecting distribution of sealing pressure peripherally of said closure member.

5. A closure for high pressure vessels comprising a receptacle externally screw-threaded on the open end thereof, a closure member engageable in sealing relation to the open end of said receptacle, an internally threaded cover member enveloping said closure member and engageable with the external screw-threads on said vessel, said cover member being centrally apertured for the passage of a central projecting portion of said closure member, an annular shoulder formed on said closure member adjacent the central projecting portion thereof, an annular thrust ring carried by said shoulder, an inclined face on said thrust ring and a plurality of screw-threaded pressure applying members screw-threaded through said cover member and engageable against the inclined face of said thrust ring for distributing sealing pressure over said cover member with respect to the open end of said receptacle.

DOUGLAS P. MEIGS.

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