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J. MERCIER ETAL

3,288,168

PRESSURE VESSEL

Filed Nov. 16, 1964

FIG. 1

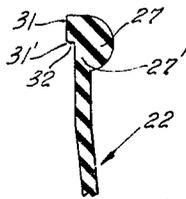
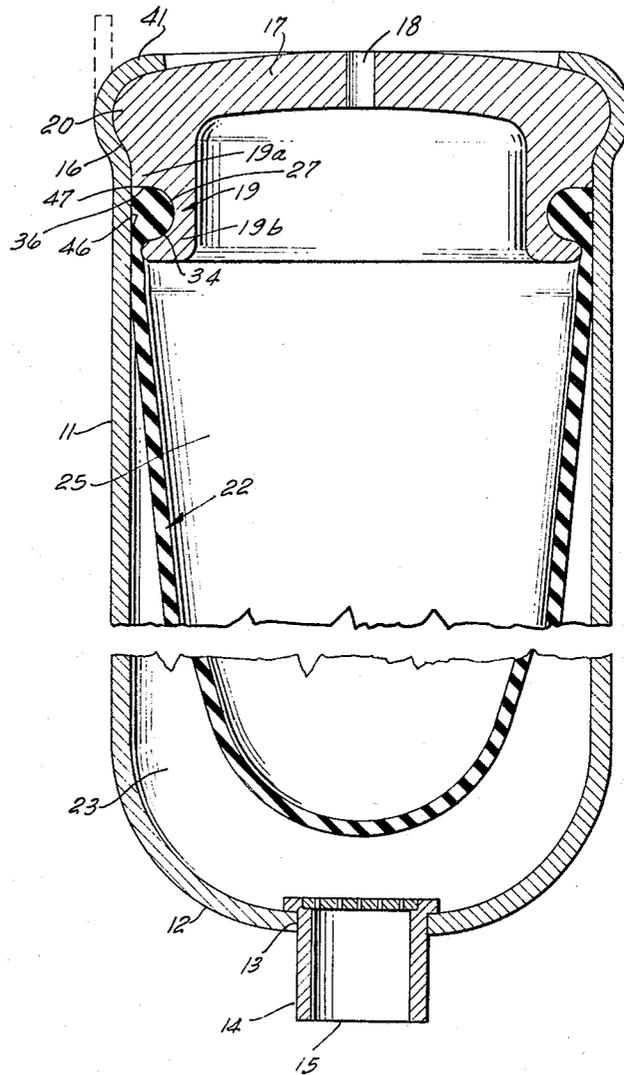


FIG. 2

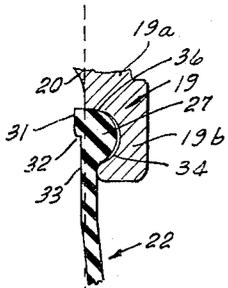


FIG. 3

INVENTORS
JEAN MERCIER
JACQUES MERCIER
BY
Dean, Fairbanks & Hirsch
ATTORNEYS

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PRESSURE VESSEL

Jean Mercier and Jacques H. Mercier, New York, N.Y.;
said Jacques H. Mercier assignor to Mercier Olaer Pat-
ent Corporation, Wilmington, Del., a corporation of
Delaware

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1 Claim. (Cl. 138—30)

This invention relates to the art of pressure vessels of
the type having a deformable partition intervening be-
tween the gas and oil port thereof and more particular-
ly to the mount for said partition.

It is among the objects of the invention to provide
a pressure vessel of the above type which may readily
be fabricated at relatively low cost and may readily be
assembled with assurance that a dependable seal will
be provided to prevent leakage of both the oil and gas
in the pressure vessel even with long continuous use
thereof.

According to the invention, these objects are accom-
plished by the arrangement and combination of elements
hereinafter described and more particularly recited in
the claims.

This application is a continuation-in-part of copend-
ing application Serial No. 317,584, filed June 1, 1964.

In the accompanying drawings in which is shown one
of various possible embodiments of the several features
of the invention,

FIG. 1 is a longitudinal sectional view of the pressure
vessel according to the invention,

FIG. 2 is a detail view of the periphery of the de-
formable partition, and

FIG. 3 is a detail view of the periphery of the partition
mounted on the closure member before it is positioned
in the container of the pressure vessel.

Referring now to the drawings, in the embodiment
shown in FIG. 1, the pressure vessel comprises a con-
tainer 11 of strong, rigid material such as steel or
aluminum capable of withstanding the pressure to which
the unit is subjected. The container is cylindrical along
the major portion of the body thereof and has a hemi-
spherical end 12 which has an opening 13 in which an
outlet member 14 is mounted having a port 15 through
which fluid such as oil under pressure may flow.

The cylindrical portion of the container 11 at the
mouth thereof is of larger diameter than the main body
of the container, defining a curved shoulder 16. The
mouth of the container 11 is designed to be closed by
a substantially cup-shaped cover member 17 which as
shown in FIG. 1 has an axial opening 18 designed to
receive a suitable air connection (not shown).

The side wall 19 of the cover member 17 defines
a substantially cylindrical portion adapted to fit into
the cylindrical mouth of the container 11.

As shown in FIG. 1, the outer periphery of the cover
member is curved in vertical cross section as at 20 so
that it may seat on the correspondingly curved shoulder
16 of the container. The portion 19a of said cylindrical
portion 19 is of outer diameter substantially the same
as the inner diameter of the container adjacent the
curved shoulder 16 thereof so that it will fit snugly
therein to center the cover member in the container.
The lower portion 19b of cylindrical portion 19 is of
outer diameter less than the inner diameter of the con-
tainer to define a space therebetween to receive the
periphery of a deformable partition 22.

The partition 22 illustratively is a collapsible and
expandable bladder having an enlarged mouth and which
desirably is of resilient material such as rubber or synthetic
plastic of like physical characteristic. The bladder de-
fines two chambers in the pressure vessel, i.e., an oil

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chamber 23 which is in communication with the passage-
way 15 through the outlet member 14 and a gas chamber
25 which is in communication with the opening 18.

The mouth of the bladder 22 on the inner surface
thereof has an annular bead 27, formed integral there-
with. As is clearly shown in FIG. 2, the outer surface
of the bladder 22 has an annular outwardly extending
flange 31 of length substantially equal to one-half the
length of the bead 27 with the lower surface of the flange
31 defining substantially a right angle as at 32 with re-
spect to the adjacent wall surface 33 of the bladder,
the lower corner of flange 31 being rounded as at 31'.

In order to support the bladder 22, the lower cylindri-
cal portion 19b of the cover member has an annular
groove 34 in its outer surface in which the annular bead
27 is positioned.

As is clearly shown in FIGS. 1 and 3, the groove 34
is of depth slightly less than the transverse thickness
of the bead 27 at the flange portion 31 thereof for the
purpose hereinafter to be described.

The bead 27 is of transverse thickness such that when
the bladder 22 is mounted on the cover member 17
with the bead 27 positioned in groove 34, prior to in-
sertion of the cover member and bladder 22 into the
container, as shown in FIG. 3, the outer wall surface 33
of the bladder will extend transversely beyond the cy-
lindrical portion 19a of the cover member 17. In ad-
dition, the annular flange 31 will also extend outwardly
beyond the wall surface 33.

With the arrangement above described, when the
depending portion 19 of the cover member 17 with the
bladder 22 mounted thereon is forced into the container
11 until the rounded portion 20 of the cover member
17 is against the curved shoulder 16, it is apparent that
the bead 27 will be transversely compressed, the rounded
corner 31' of flange 31 facilitating assembly of the unit
without damage to the flange 31. The cover member
17 is secured in position by bending over the rim 41
of the container from the position shown in broken
lines in FIG. 1 to the position shown in full lines.

With the cover member 17 so mounted, the bead 27
will be compressed into groove 34 and since the trans-
verse thickness of the bead 27 at the flange portion 31
thereof is slightly greater than the depth of the groove
34, such flange 31 which extends beyond the outer sur-
face 33 of the bladder, will be compressed even more
than the portion 27' of bead 27 inwardly thereof creat-
ing a sharply defined annular region 46 at the lower
edge of flange 31.

By reason of the compression of the flange portion
31 of the bead 27, the bead 27 will be pressed tightly
against the junction between the top wall 36 of groove
34 and the adjacent wall of container 11 to wedge into
such junction and will therefore ensure a good seal
even at very low pressure.

In operation of the pressure vessel, the gas chamber
25 defined by the bladder 22 is charged with gas under
pressure and then the oil chamber 23 is charged with oil
under pressure greater than that of the gas in chamber 25.

As the oil flows into and out of the chamber 23 dur-
ing use of the pressure vessel to dampen shock waves
in a pressure line, for example, the bladder 22 will con-
tract and expand exerting tension on the wall thereof.

The gas under pressure in chamber 25 will react
against the bead 27. However, since the pressure ex-
teriorly of annular groove 34 is atmospheric and the
gas pressure is much greater, the bead 27 will be further
pressed against the junction 47 and wedged harder into
such junction enhancing the tightness effect and ensur-
ing that a dependable gas seal is maintained.

Any oil under pressure in chamber 23 that would
tend to leak along the outer surface of the bladder will

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react against the shoulder 32 provided by the lower edge of flange 31, which will insure an oil seal. Also, due to this reaction of the oil pressure against the shoulder 32, the outer surface of the flange portion of bead 31 will be further pressed against the adjacent wall of container 11.

It will be appreciated that due to the provision of the protruding annular flange on the single bead of the bladder, and the tightness effects thereof as explained above, said single bead will provide a dependable gas and oil seal which shall not be impaired by tension on the wall of the bladder when the bladder expands.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

A pressure vessel comprising a rigid hollow container having a mouth at one end and a port at the other end, a cover member positioned in the mouth of the container, said cover member having a port, means to securely retain said cover member in place, said cover member having a cylindrical portion extending into the container and having its outer surface transversely spaced from the wall of said container, said cylindrical portion having an annular groove in its outer surface, a flexible partition of resilient deformable material positioned in

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said container and intervening between said ports, said partition having an annular bead at its periphery positioned in said annular groove, the diameter of the periphery of said partition being slightly less than that of said cylindrical portion so that said annular bead will be securely retained in said annular groove, said bead having a laterally outward extending annular flange on its outer surface, of length approximately one-half the length of said bead, the lower edge of said flange defining a relatively sharp step with respect to the outer surface of the partition material, the depth of said groove being slightly less than the transverse thickness of said bead at the flange portion thereof, whereby said flange portion will be under greater compression than the remaining portion of said sealing bead, the upper wall of said groove and the adjacent wall of said container defining a junction, said compressed flange being forced into said junction to define a seal.

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THERON E. CONDON, *Primary Examiner.*

RAPHAEL H. SCHWARTZ, *Examiner.*