July 6, 1965 H. PFLÜGER ETAL 3,193,129

MULTIPLE SECTION CONTAINER

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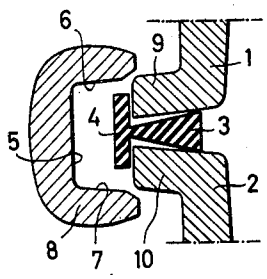


Fig. 1

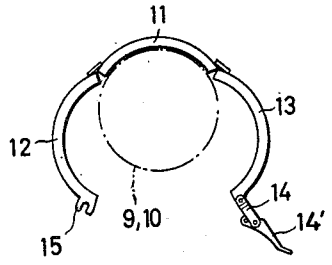


Fig. 6

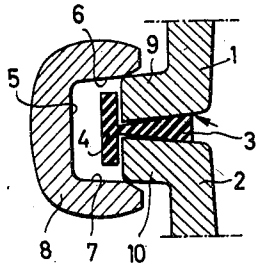


Fig. 2

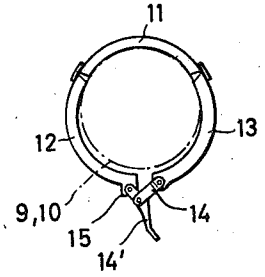


Fig. 7

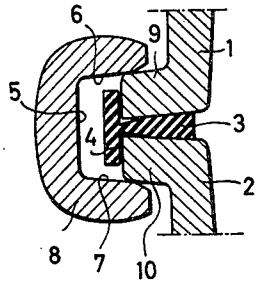


Fig. 3

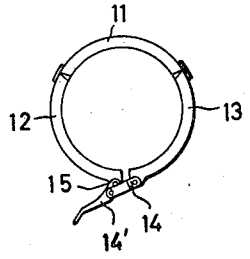


Fig. 8

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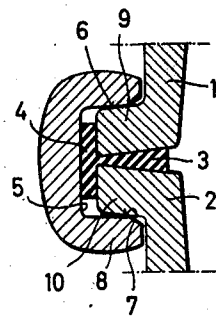


Fig. 4

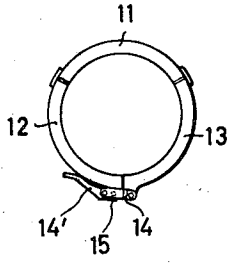


Fig. 9

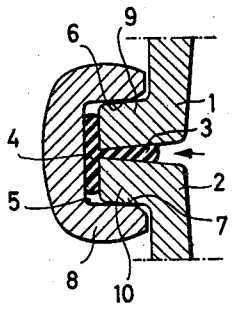


Fig. 5

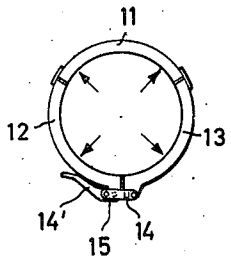


Fig. 10

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MULTIPLE SECTION CONTAINER

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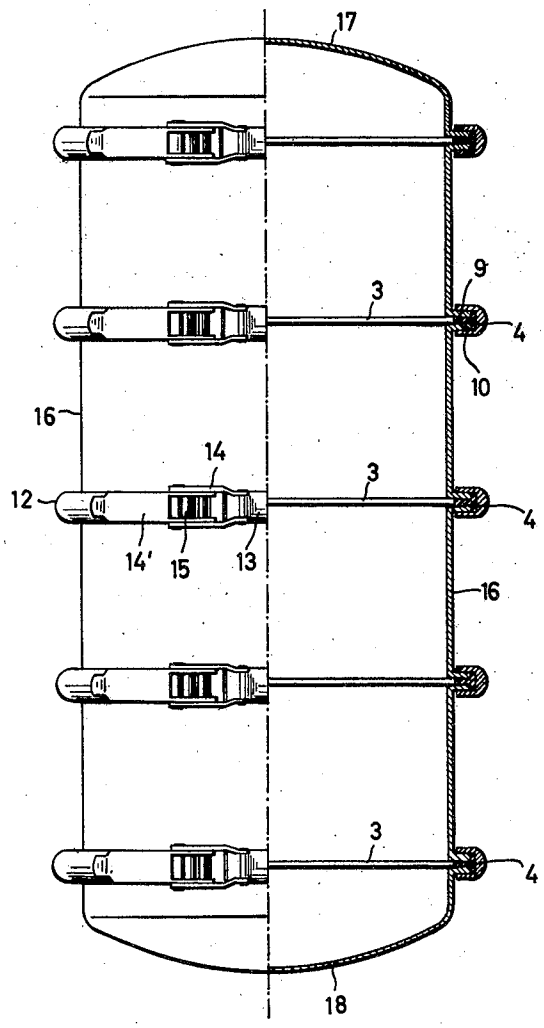


Fig.11

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MULTIPLE SECTION CONTAINER

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Filed Jan. 31, 1963, Ser. No. 255,366
1 Claim. (Cl. 220—5)

This invention relates to pressure containers, and more particularly to a container which may be readily assembled from individual sections.

An object of the invention is the provision of a container which consists of a plurality of individual sections, and may be assembled from as many sections as are needed to enclose a cavity of desired volume.

Another object is the provision of a multiple section container which is capable of containing a fluid under pressure without leakage.

A further object is a container of the type described in which the tightness of the connection between the individual sections is increased as the internal pressure rises.

With these and other objects in view, the invention in one of its aspects mainly resides in a plurality of container sections and in the sealing connections between the sections. To provide such sealing connections, each container section has an annular rim portion defining an opening and an annular flange on the rim portion. The flanges project from the respective rim portions in a direction away from the opening. Each flange has two opposite annular faces, hereinafter referred to as the inner and outer face.

The inner face of each flange is arranged spacedly opposite the inner face of a coordinated flange on another container section. The two coordinated inner faces jointly define an annular gap which tapers in the direction away from the openings in the corresponding rims. The outer faces of the coordinated flanges approach each other in the aforementioned direction.

The gap receives an annular gasket member of yieldably resilient material which simultaneously abuts against the two inner flange faces. A clamping ring of substantially U-shaped cross section is arranged outside the gap. The clamping ring has a central annular web portion and two spaced annular flange portions extending inward from the web portion. The flange portions of the clamping ring respectively engage the outer faces mentioned above. The clamping ring may be tightened sealingly to connect the two container sections.

Other features and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description of a preferred embodiment when considered in connection with the accompanying drawings wherein:

FIGS. 1 to 5 show sealing elements of a generally cylindrical pressure container of the invention in elevational axially sectional views, FIGS. 1 to 4 illustrating consecutive positions of the elements during the clamping operation, and FIG. 5 showing their position under internal fluid pressure in the container;

FIGS. 6 to 10 show a clamping ring which is one of the sealing elements of FIGS. 1 to 5 in plan views on a reduced scale, the ring being illustrated in consecutive positions corresponding to those respectively illustrated in FIGS. 1 to 5; and

FIG. 11 is an elevational view of the pressure container partly seen in FIGS. 1 to 5, partly in axial section.

Referring now to the drawing in detail, and initially to FIG. 11, there is seen a pressure vessel assembled from four identical substantially cylindrical coaxial tubular sections 16, a dished cover 17, and a dished bottom 18.

Identical terminal flanges 9, 10 on each container section are spacedly juxtaposed, and the gaps formed between adjacent flanges receive respective web portions 3 of a resilient gasket of T-shaped cross section. The flange portion 4 of the gasket forms two lips which abut from the outside against the flanges 9, 10. A clamping ring 8 of substantially U-shaped cross section envelops each pair of flanges 9, 10 and the interposed gasket.

The sealing elements of the container of FIG. 11 are shown on a larger scale in FIGS. 1 to 5 which consecutively show the elements in partly assembled condition, during the several assembly stages, and finally under the pressure of a fluid in the assembled and sealed container.

FIG. 1 shows the rim portions 1, 2 of any two adjacent container sections 16, 17, or 18. The flanges 9, 10 are integral with the respective rim portions 1, 2. The flanges have approximately conical annular inner and outer faces. The inner faces are opposite each other and define a gap which tapers in an outwardly radial direction at a small acute angle. The web portion 3 of the resilient gasket is in the fully relaxed condition in which it tapers more sharply in an outwardly radial direction than the gap in which it is inserted. The flange portion 4 of the gasket forms a sealing lip about cylindrical faces of the two flanges 9, 10.

The clamping ring 8 is seen open in FIG. 6. It consists of three hingedly connected portions, each of the terminal portions 12, 13 being pivotally attached to a central portion 11. The free end of the terminal portion 12 forms an integral double hook 15, and the free end of terminal portion 13 carries a tightening arrangement consisting of a link 14 and a lever 14'. The link is pivoted on the terminal ring portion 13, and the lever 14' on the link 14. As sequentially shown in FIGS. 7 to 9, the shorter arm of the lever 14', which is apertured, may be pivotally engaged with the hook 15, and the ring 8 is clamped tight about the container by pivoting the lever 14' through an angle of slightly more than 90° by means of the longer arm of the lever which serves as an operating handle.

As better seen from FIGS. 1 to 5, the sections of the ring 8 are U-channels. The inner faces 6 and 7 of the flange portions of each channel flare toward the container walls at the same angle at which the conical outer faces of the flanges 9, 10 approach each other in a radially outward direction.

When the clamping ring 8 is closed and tightened, the flange faces 6, 7 of the ring 8 slide radially inward along the outer faces of the flanges 9, 10 and thereby force the flanges axially toward each other against the resilient resistance of the gasket web 3. The resulting resilient deformation of the gasket begins at the axial end face of the web portion 3 in the gap between the flanges 9, 10, and progresses from there outward. When the ring 8 is fully tightened as shown in FIGS. 4 and 9, the internal surface 5 of its web portion presses the flange portion 4 of the gasket against the cylindrical faces of the flanges 9, 10, and the web portion of the gasket is in conforming sealing abutment against the inner faces of the flanges 9, 10. The gasket substantially fills the gap.

Internal fluid pressure in the sealed container urges the web portion 3 of the gasket outward in the gap, thereby sealing the gap even tighter because of the wedging engagement between the inner faces of the flanges 9, 10 and the gasket.

The force required for tightening the clamping ring 8 is largely determined by the resilient resistance of the gasket. In the initial stage of ring tightening, only the thickest portion of the gasket adjacent the container cavity is compressed. The mechanical advantage of the lever 14' is at a minimum at this stage, but sufficient to permit the resistance of the gasket to be overcome by relatively

little manually applied force. During further tightening, the resistance offered by the gasket increases, but so does the mechanical advantage afforded by the lever **14'** as is apparent from FIGS. 7 to 9. The ring is therefore easily tightened, and is secured in the tightened position by the resilience of the gasket member when the two pivots of the link **14** are in a position in which a line connecting them passes radially inward of the pivoting axis of the lever **14'** on the hook **15**.

Bung holes and valved plugs or other conventional means for filling the container and for withdrawing its contents will be understood to be provided on the portion of the container not visible in FIG. 11. They are not directly relevent to this invention.

The pressure container of the invention is assembled from individual tubular, bottom, and top sections which are simple to manufacture and simple to assemble in any desired combination. They are joined in such a manner that the internal surface of the container may have any desired configuration without interfering with the tightness of the seal between the individual sections. The force required in clamping the sections together is small because of the relationship between the taper angles of the gap defined by adjacent section flanges and of the gasket portion retained in the gap. The seal initially formed by tightening a clamping ring about the section flanges and the interposed gasket need not be resistant to the ultimate fluid pressure in the container. The pressure resistance of the seal is increased by the action of the rising internal pressure.

Various modifications are contemplated, and may obviously be resorted to by those skilled in the art without departing from the spirit and scope of the invention as hereinafter defined by the appended claim, as only a preferred embodiment thereof has been disclosed.

What we claim is:

A multiple section container comprising, in combination:

(a) a plurality of container sections, each section having an annular rim portion defining an opening;

(b) an annular flange on each rim portion and projecting therefrom in a direction away from said opening,

(1) each flange having an inner annular face and an outer annular face opposite said inner face,

(2) the inner face of each flange being spacedly opposite the inner face of a coordinated flange of another container section and defining therewith an annular gap tapering in said direction at an acute angle,

(3) the outer faces of said coordinated flanges approaching each other in said direction;

(c) an annular gasket member of yieldably resilient material and of substantially T-shaped cross section, said gasket member having

(1) a web portion in said gap in simultaneous abutting engagement with said inner faces, said web portion having an axial end face in said gap and, when in the relaxed condition, tapering from said end face in said direction at an angle greater than said acute angle, and

(2) a flange portion;

(d) a releasable clamping ring of substantially U-shaped cross section having a central web portion and two spaced flange portions extending inward from said web portion,

(1) said flange portions of said clamping ring respectively engaging said outer faces on said container sections,

(2) the flange portion of said gasket member being interposed in simultaneous abutting engagement between said coordinated flanges of said container sections and the central web portion of said clamping ring.

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