SEALING ASSEMBLY FOR REUSABLE BARRELS

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ABSTRACT

A releasable sealing assembly for rigidly and hermetically joining the two frustrum-shaped opposed halves of a reusable barrel assembly. A thin annular ring is interposed as a central stiffening member between two resilient gaskets, and this three-layer combination is, in turn, interposed between outwardly projecting peripheral flanges formed on the respective open ends of a pair of barrel half sections. The two barrel half sections are joined at the middle and releasably clamped together by a pair of clamp rings which fit over and engage the respective barrel flanges and are fastened to each other or, alternatively, by a plurality of unitary C-shaped clamps which engage the barrel flanges at spaced locations around the seal periphery.

12 Claims, 6 Drawing Figures
SEALING ASSEMBLY FOR REUSABLE BARRELS

BACKGROUND OF THE INVENTION

This invention relates to improvements in a sealing assembly for joining the two frustum-shaped opposed halves of a reusable barrel assembly.

Reusable barrel assemblies, of the type comprising two frustum-shaped shell-like half sections which are releasably assembled together to form a closed container for fluids and other materials with their respective larger ends opposed and sealed by a central joint at their middle and which when disassembled are adapted to stackingly nest together, are well known to the art. As it is a common experience for such barrels to receive frequent and severe impact to their sides in handling and during storage and transport it is important that the barrels be able to withstand a substantial amount of lateral force, especially at the joint line, so that they will not be crushed or forced open, particularly when they are used for the shipment of toxic, volatile, caustic, sterile or air-damagable fluids. Joint arrangements for sealing the middle of such reusable barrel assemblies, such as those disclosed in applicant's pending application, Ser. No. 255,977, filed May 22, 1972, provide satisfactory strength, comparable to that of an unreinforced barrel structure, for resisting both longitudinal and lateral forces; however, it would be desirable in certain applications to utilize the joint assembly to impart even greater structural rigidity and impact resistance to such barrel assemblies.

SUMMARY OF THE PRESENT INVENTION

To impart greater strength to a barrel assembly of the type described, and to the integrity of its seal, the present invention includes a central stiffener ring as part of the joint assembly for sealing the two barrel halves. The central stiffener ring is interposed between two resilient ring-type gaskets of crescent, circular, rectangular, oval or other cross-section, and this three-layer combination is, in turn, interposed between outwardly projecting flanges formed on the opposed open ends of the two barrel half sections. The barrel halves with the interposed stiffener ring-gasket sandwich are releasably held together, either by a pair of clamp rings or by a spaced plurality of unitary C-shaped clamps which fit over and engage the flanges of both barrel halves.

The central stiffener ring is in the form of a thin annular disc and is provided with concentric grooves on both sides around its outer periphery, for holding the two gaskets in place between the barrel flanges, and with concentric ribs near its inner periphery for increasing the ring's strength against buckling and thus the ability of the barrel to withstand severe lateral forces.

It is therefore a principal objective of this invention to provide a novel and improved seal for releasably and hermetically joining the two halves of a reusable barrel assembly of the type described.

It is another objective to provide an improved seal for a reusable barrel assembly of the type described which will enable the barrel to withstand severe lateral forces without seal failure or buckling.

It is a principal feature of the present invention to provide, for lateral reinforcing purposes, a central stiffening ring interposed between the two frustum-shaped half sections of a reusable barrel assembly of the type described.

The foregoing and other objectives, features, and advantages of the present invention will be readily understood upon consideration of the following detailed description of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of an embodiment of the seal assembly of the present invention for joining together two frustum-shaped half sections into a reusable barrel.

FIG. 2 is a sectional detail view of the seal embodiment of FIG. 1 with the clamp rings held together by threaded bolt fasteners.

FIG. 2A is a sectional detail view showing a modification of the seal assembly wherein the clamp rings are held together by clips.

FIG. 3 is a sectional detail view of a further modification of the seal assembly wherein the barrel halves are held together by a spaced plurality of unitary C-clamps.

FIG. 4 is a perspective view of the barrel sections and joint components disassembled and compacted for storage and transport.

FIG. 5 is a sectional detail view of the nested barrel half sections shown in FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the barrel assembly shown in FIGS. 1 and 2, in one embodiment of the seal assembly for joining together two frustum-shaped barrel half section 16 a stiffener ring 10 in the form of an annular disc is interposed between two resilient O-ring gaskets 12 and this three-layer combination is, in turn, interposed between the outwardly projecting peripheral flanges 14 of the barrel half sections. The central stiffener ring and two gaskets are held between the two flanges 14 by a pair of clamp rings 18 and 20 of L-shaped cross-section which are secured together by fasteners so that their respective outer lip portions 18a, 20a are brought into near abutment and overlapping grasp the two flanges of the respective barrel sections, holding them in close non-contacting proximity. This arrangement provides a strong, leak-proof seal at the point where the two barrel half sections 16 of the reusable barrel assembly are jointed.

The relatively large radial thickness of the thin central stiffener ring 10 gives it sufficient strength to resist bending under the influence of lateral forces applied to the barrel joint. At the same time, the central opening defined by the inside diameter of the annular ring is sufficiently large that any flowable contents in the barrel can move freely from one end to the other, insuring a low center of gravity when the barrel is not full, and facilitating the emptying of the barrel contents from either end. In contrast, since the stiffener member 10 is in the form of a thin disc, the two barrel half sections 16 may be joined close together and reinforced at the middle point joint with a minimum amount of weight being added to the barrel. The concentric ribs 24 provided on the faces of the ring near its inner periphery impart additional axial reinforcement to the ring to resist buckling and crushing under lateral stress.

Concentric grooves 26 are formed on each face of the central stiffener ring 10 near its outer periphery for seating the resilient gaskets 12 and the peripheral flanges 14 on the barrel sections, as shown in FIG. 2.
The grooves in the central stiffener ring 10 are slightly greater than the rounded edges of the peripheral flanges 14 of the barrel sections so that there is some clearance room for the gaskets 12 as they are compressed in the assembly of the seal. Thus when the sealing assembly is tightened down, the resilient gaskets can expand toward their edges as they are compressed in thickness. The grooves 26 may be rounded, as shown in FIG. 2, or squared as shown in FIG. 3, or they may be of other suitable shape to mate with the peripheral flanges 14 formed on the barrel sections.

The O-ring gaskets 12 may be made of various resilient materials such as rubber, neoprene or the like having high or low density and differing chemical properties depending upon the strength of the joint required and the nature of the material to be contained within the barrel assembly. Similarly, the barrel half sections, central stiffener rings and other parts may be made of metal such as aluminum, prefabricated steel, die casting alloy, or other suitable material, such as plastic, depending upon the nature of the contents, the strength required, the disposability needed, and other factors significant to a particular application.

Several different clamping embodiments may be used for holding the joint seal formed by the two barrel half sections 16, the central stiffener ring 10 and the interposed gasket pair 12 in close non-contacting proximity. Referring to the particular embodiment shown in FIGS. 1 and 2, the clamp rings 18 and 20 slip over the ends of the barrel half sections 16, overlapping the flanges 14, and are fastened together by a plurality of threaded bolts 32 spaced about the periphery of the rings.

In FIG. 2A a clamping embodiment similar to that of FIG. 2 is shown which utilizes spring clips 38 rather than threaded bolts to fasten the clamp rings 18 and 20 together. In this case the two clamp rings may be identical, each having indentations 40 near its inside edge for engagement by corresponding ridges 42 on clips 38, locking the clips into place. The clips, which may be of various arcuate lengths when installed around the periphery of the clamp ring assembly, are preferably of unitary construction and fabricated of a strong spring-like material such as spring steel or nylon so that they will snap into place and yet be readily removable when desired.

Turning now to FIG. 3, a third clamp is shown similar to that disclosed in applicant's previously filed pending application Ser. No. 255,597. In this embodiment the rounded projecting flanges of the barrel half sections shown in FIGS. 2 and 2A are replaced by squared flanges 14' with upwardly bent lips 44, the grooves 26' of the central stiffener ring 10' are similarly squared rather than rounded, and the clamp rings are replaced by a plurality of unitary C-clamps 46 having inwardly bent tips 48 which are regularly spaced around the periphery of the flanges and interlockingly engage the lips 44 thereof. In order to further insure that the clamps 46 will not be inadvertently released during handling of the barrel, a binder strap 50 may be provided which is stretched tightly around the exterior groove 52 formed in back of the eight portion of the clamps. The clamps 46 are held in place by the resilient force of the gaskets 12, which are in a partial state of compression, pressing against the central stiffener ring 10' and the flanges 14' which are forced against the tips 48 of the C-shaped clamps 44.

The clamping arrangement of the embodiment of FIG. 3 is readily attached by the steps of momentarily applying force to the peripheral flanges 14' which overcompresses the resilient gaskets 12; placing the unitary C-clamps 46 over the lips 44 of the barrel flanges; releasing the pressure on the flanges which permits the resilient gaskets to expand (but only to a state of partial compression); and placing the binder strap 50 around the exterior eight portion of the clamps. To facilitate the insertion of the clamps 46 a special tool 54 may be utilized to apply the necessary compressive force on the barrel flanges so as to compress the gaskets sufficiently to allow the clamps to be slipped on.

In the use of the sealing assembly disclosed herein with reusable barrels of the type described, the parts are assembled as depicted in FIG. 1 and one of the three embodiments of clamping mechanisms described above utilized to releasably hold the two barrel halves together. The threaded bolt arrangement shown in FIG. 2 is particularly secure, but requires considerable time and effort to attach, as each of the bolts must be tightened down with a wrench. The clamp arrangement of FIG. 2A is easier to attach, merely requiring force to be momentarily applied to the ends of the two barrel half sections in order to compress the resilient gaskets while the clips are snapped into place over the two clamp rings; however, this mechanism is considerably less secure than the bolted mechanism since the clips may be accidentally knocked off during unusually rough handling of the barrel. The clamping arrangement of FIG. 3 is especially desirable for many applications, as the clamp rings are dispensed with, the C-shaped clamps are inexpensively fabricated and can be disposed of after one use, like staples or paper clips, and the joint seal is highly secure due to the interlocking connection of the clamps with the flanges.

Each of the clamp embodiments described above may be readily removed by the reverse of their attachment process, permitting the sealing apparatus to be taken apart and a multitude of the barrel half sections stackingly nested together, as shown in FIG. 4, for storage or shipment. In the case of the clamp arrangement of FIG. 2, upon dismantling of the barrel assembly the clamp rings 18 and 20 of the joint assembly may be secured on the flange of a single barrel half section of a pair by bolting them together as shown in FIG. 5, with the resilient gaskets 12 and the central stiffener ring 10 strapped together separately from the nested barrel sections, as depicted in FIG. 4.

The terms and expressions which have been employed in the foregoing abstract and specification are used therein as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding equivalents of the features shown and described or portions thereof, it being recognized that the scope of the invention is defined and limited only by the claims which follow.

What is claimed is:

1. In a reusable barrel assembly of the type having a pair of substantially identical shell-like barrel half sections, each having a closed end and an open end, with a sealing means for detachably joining said ends of said barrel sections together with the respective interiors of said barrel sections facing one another, the improvement wherein said sealing means comprises:
a. a pair of projecting flanges extending peripherally around the respective open ends of said barrel half sections;
b. a pair of resilient annular gaskets for insertion between said flange pair;
c. a central stiffener member in the form of a thin annular disc for insertion between said two resilient gaskets;
d. a plurality of unitary C-shaped clamp means spaced around the periphery of said flange pair of releasably holding said flange pair in non-contacting close proximity with said gaskets compressed between said central stiffener member and said flange pair; and
e. means associated with said flange pair and said clamp means for interlockingly engaging said flange pair and clamp means while permitting said clamp means to be detached from both barrel sections by the pressing of said barrel sections together momentarily to increase the compression of said resilient gaskets, thereby freeing both flanges of said flange pair from engagement with said clamp means.

2. The barrel assembly of claim 1 wherein said central stiffener member of said sealing means includes a pair of concentric grooves respectively formed on each side of said stiffener member for seating said gaskets therein.

3. The barrel assembly of claim 1 wherein said central stiffener member of said sealing means includes a projecting rib formed on at least one of its disc faces for resistance against buckling of said stiffener member.

4. The barrel assembly of claim 3 wherein said rib formed on said central stiffener member is arcuate in shape and concentric with said stiffener member.

5. A method for detachably joining together a pair of barrel half sections to form a leak-proof barrel assembly for storage and shipment of fluids and other materials, said barrel half sections each having a respective projecting flange extending peripherally around the open end thereof, comprising the steps of:
   a. placing a resilient annular gasket member adjacent each side of an annular stiffener member to form a sandwich thereof;
   b. inserting said sandwich between said respective flanges as a pair of said half barrel sections are positioned with their respective ends opposed to each other and separated by the thickness of said sandwich;
   c. momentarily pressing said opposed barrel half sections together to compress said interposed sandwich;
   d. while said pressure is continued, moving a plurality of unitary C-shaped clamp members from positions independent of said barrel sections to peripherally spaced locations around the joint line of said barrel sections and placing said clamp members over said flange pair at said peripheral locations; and
   e. thereafter releasing said pressure on said opposed barrel half sections, whereby the gasket members forming said sandwich urge said barrel half sections apart and thereby lock said flanges against the respective ends of said C-shaped clamp members.

7. The barrel assembly of claim 1 wherein said C-shaped clamp means (d) each have a groove formed on their outside bight portions, and a binder strap is provided for extending around the periphery of said flanges and seating within said grooves for holding said clamp means onto said flanges.

8. In a reusable barrel assembly of the type having a pair of substantially identical shell-like barrel half sections, each having a closed end and an open end, with a sealing means for detachably joining said ends of said barrel sections together with the respective interiors of said barrel sections facing one another, the improvement wherein said sealing means comprises:
   a. a pair of projecting flanges extending peripherally around the respective open ends of said barrel half sections;
   b. a pair of resilient annular gaskets for insertion between said flange pair;
   c. a central stiffener member in the form of a thin annular disc for insertion between said two resilient gaskets;
   d. a pair of annular clamp members which fit respectively over said pair of barrel half sections and engage said projecting flanges; and
   e. a plurality of U-shaped spring clips spaced around the periphery of the joint line of said barrel sections which respectively snap into place over said pair of clamp members.

9. In a reusable barrel assembly of the type having a pair of substantially identical shell-like barrel half sections, each having a closed end and an open end, with a sealing means for detachably joining said ends of said barrel sections together with the respective interiors of said barrel sections facing one another, the improvement wherein said sealing means comprises:
   a. a pair of projecting flanges extending peripherally around the respective open ends of said barrel half sections;
   b. a pair of resilient annular gaskets for insertion between said flange pair;
   c. a central stiffener member in the form of a thin annular disc for insertion between said two resilient gaskets, said stiffener member including a pair of concentric grooves respectively formed on each side of said stiffener member for seating said gaskets therein, said grooves having an interior configuration complementary to the configuration of said projecting flanges at the interface of the joint line between said barrel sections; and
d. a plurality of unitary C-shaped clamp means spaced around the periphery of said flanges pair of releasably holding said flange pair in non-contacting close proximity with said gaskets compressed between said central stiffener member and said flanges whereby said clamp means are detachable from said flange pair by the pressing of said barrel sections together momentarily to increase the compression of said resilient gaskets, thereby freeing said flange pair from engagement with said clamp members.

10. In a reusable barrel assembly of the type having a pair of substantially identical shell-like barrel half sections, each having a closed end and an open end, with a sealing means for detachably joining said ends of said barrel sections together with the respective interiors of said barrel sections facing one another, the improvement wherein said sealing means comprises:
   a. a pair of projecting flanges extending peripherally around the respective open ends of said barrel half sections, said flange pair having a respective pair of lips formed peripherally around the edges thereof.
   b. a pair of resilient annular gaskets for insertion between said flange pair;
   c. a central stiffener member in the form of a thin annular disc for insertion between said two resilient gaskets; and
   d. a plurality of unitary C-shaped clamp means having their respective ends bent inwardly toward one another for interlocking with said respective pair of lips formed around the edges of said flange pair, said clamp means being spaced around the periphery of said flange pair for releasably holding said flange pair in non-contacting close proximity with said gaskets compressed between said central stiffener member and said flange pair, whereby said clamp means are detachable from said flange pair by the pressing of said barrel sections together momentarily to increase the compression of said resilient gaskets, thereby freeing said flange pair from engagement with said clamp members.

11. The barrel assembly of claim 10 wherein said C-shaped clamp means (d) each have a groove formed on their respective outside height portions, and a binder strap is provided for extending around the periphery of said flanges and seating within said grooves for holding said clamp means onto said flanges.

12. A method for disassembling a leak-proof barrel assembly adapted for storage and shipment of fluids and other materials, said barrel assembly comprising a pair of barrel half sections each having an open end with a respective projecting flange extending around the periphery thereof, said open ends being placed opposing one another, an annular stiffener member sandwiched between a pair of annular gasket members, said sandwich of stiffener member and gasket member pairs being interposed between said half sections, and a plurality of unitary C-shaped clamp members disposed over said flange pair at peripherally spaced locations along the joint line of said barrel sections, said method comprising:
   a. momentarily pressing said opposed barrel half sections together to compress said gasket members, thereby releasing said C-shaped clamp members;
   b. detaching said clamp members from both of said flanges of said flange pair; and
   c. thereafter releasing said pressure on said opposed barrel half sections, thereby permitting said barrel half sections and interposed sandwich of said stiffener member and gasket member pairs to be separated.
UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.: 3,923,186
DATED: December 2, 1975
INVENTOR(S): Robert D. Flanders

It is certified that error appears in the above-identified patent and that said Letters Patent
are hereby corrected as shown below:

Col. 2, Line 2 Before the word "readily" insert --more--;
Line 33 Change "gaskets" to --gaskets--;
Line 41 Change "overlapping" to --overlappingly--;
Line 46 Change "jointed" to --joined--;
Line 62 Change "reinforcement" to --reinforcement--.

Col. 3, Line 65 Change "l4°" to --l4'--.

Col. 4, Line 2 Change "momentarily" to --momentarily--;
Line 3 Change "l4°" to --l4'--;
Line 24 Change "momentarily" to --momentarily--;
Line 29 Change "then" to --than--;

Col. 5, Line 10 Change "of" to --for-- second occurrence;

Col. 7, Line 2 Change "flanges" to --flange--;
Line 2 Change "of" to --for-- second occurrence;
Line 21 Change "thereof." to --thereof;--.

Col. 8, Line 1 Change "momentarily" to --momentarily--.

Signed and Sealed this
eighth Day of June 1976

[SEAL]

Attest:

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