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(54) Storage container for tennis balls and the like.

(57) A storage container (1) for maintaining/restoring the internal pressure of objects such as tennis balls and the like comprises two hollow substantially cylindrical body parts (2,3) each having one open and one closed end and one of which (3) is of slightly smaller diameter than the other (2) and slides within the other in an axial direction. O-rings (11) are provided between the two body parts to form a seal. A retaining arrangement of grooves (5,6) and projections (8) is provided on facing walls of the two body parts to enable the storage container to be closed using a push and twist and/or screwing action.

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Description

STORAGE CONTAINER FOR TENNIS BALLS AND THE LIKE

The present invention relates to a container for tennis balls and the like and, in particular, to a storage container.

The phrase "tennis balls and the like" refers to objects containing fluid under pressure having walls which are to some extent permeable, eg in the games field,squash balls.

A tennis ball consists of a hollow rubberized shell with cover material applied to the outside thereof and filled with gas under pressure. The tennis ball body is to a certain degree gas permeable and over a period of time gas from the inside of the ball diffuses outward. The resulting loss of internal gas pressure leads the tennis ball to lose its bounce, a phenomenon which is well known to tennis ball manufacturers and users alike. It would be wasteful to discard a tennis ball when it has "lost its bounce" because generally the tennis ball cover is still in good condition at that time.

For tennis balls a number of solutions to this problem have been proposed falling generally into two categories: apparatus/methods for repressurizing a depressurized tennis ball (often termed "reflating" the "deflated" tennis ball), and apparatus/methods for maintaining the internal gas pressure of a pressurized or partially depressurized tennis ball. Solutions falling into the first category mentioned above are generally used a single time on any given ball once it is deflated to give a one-off increase in internal gas pressure. Solutions falling into the second category are generally used "continuously" on a given ball in order to inhibit, or retard, the loss of internal gas pressure in the first place and thus are particularly suited to implementation in ball storage containers.

It has been found that the loss of bounce in the tennis ball is more successfully combatted using apparatus/methods of the second category noted above, ie apparatus/methods which inhibit the dropping of internal gas pressure of the tennis ball.

Embodiments of the present invention provide improved storage containers for tennis balls, and other objects containing fluid under pressure, wherein the expected reduction of internal gas pressure is retarded. The invention can be implemented in storage containers which are cheap to manufacture, simple in construction, and easy to use.

The present invention provides a container for storing one or more objects containing fluid under pressure, comprising: first and second hollow cylindical body parts each having one open and one closed end, the second body part being adapted for insertion into the first body part; sealing means between the first and second body parts, which body parts are moveable between a first relative position, at which the body parts define a first volume, and a second relative position at which the body parts define a second, smaller, volume in which an elevated pressure has been produced; and retaining means for retaining the body parts in said second position.

In a preferred embodiment of the invention the sealing means takes the form of one or more O-rings provided between the inner wall of the first body part and the outer wall of the second body part, three O-rings being particularly preferred.

The retaining means may comprise complementary screw threads on the first and second body parts. In this case, relative rotary motion of the two body parts with the screw threads engaged will cause movement of the body parts from one of the relative positions towards the other.

The screw threads may be arranged to interengage after the body parts have been moved from said first position towards said second position. Alternatively, movement of the body parts from the first to the second position may be brought about entirely by screwing action.

In another preferred embodiment of the invention the retaining means takes the form of grooves and projections, provided on facing walls of the body parts to form a so-called "bayonet" mechanism so that the storage container can be closed using a push and twist action.

Alternatively a combination of screw threads or grooves and projections may be provided.

The container according to the invention may advantageously include additional sealing means arranged to operate only when said body parts are in said second relative position. Such sealing means have the advantage that they are not damaged as the parts move from one relative position towards the other. The additional sealing means may be provided on the peripheral edge of the second body part and arranged to contact the closed end of the first body part when the parts are in the second relative position. However, the additional sealing means is preferably provided on the closed end of the first body part so that the second body part engages the sealing means when the parts are in the second relative position. The additional sealing means may comprise a gasket arranged to contact the peripheral edge of the second body part when the parts are in the second relative position.

Features and advantages of the invention will become apparent from the following description of two embodiments thereof, given by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a longitudinal sectional view of a storage container for tennis balls according to a first embodiment of the present invention in a "closed" position;

Figure 2 shows a section along the line A-A of Figure 1; and

Figure 3 shows a longitudinal elevation, partly in section, of a storage container for tennis balls according to a second embodiment of the invention.

A storage container is for tennis balls according to one embodiment of the invention shown in Figure 1

(in section). The storage container (generally indicated by reference numeral 1) is made up of two body parts 2,3 made of a plastics material. The body parts are cylindrical in shape, hollow, and each have one open and one closed end. The inner diameter of a first body part 2 is approximately equal to the outer diameter of the second body part 3 enabling the second body part to be inserted into the first as a push fit and to slide therein in an axial direction. An arrangement of grooves 5,6 and complementary projections 8 are provided on the first 2 and second 3 body parts respectively to enable the body parts to be fixed in a chosen interlocked position as will be described below. The body parts define a storage chamber 9 when in the interlocked position.

A seal arrangement (generally indicated by reference numeral 10) is provided between the inner wall of the first body part and the outer wall of the second body part so as to substantially prevent the escape of gas from the storage chamber 9. The seal arrangement is made up of three O-rings 11 made of rubber. Three spaced shallow annular grooves are provided on the inner wall of the first body part 2 and on the outer wall of the second body part 3 to accommodate the O-rings.

The retaining arrangement of grooves 5,6 and projections 8 is shown in detail in Figure 2.

The inner wall of body part 2 has two longitudinal grooves 5 formed therein at opposite sides thereof, each beginning at the open end of body part 2 and ending in a short transverse groove 6 (thus forming an L-shape overall. The length of each transverse groove is approximately twice the width of the corresponding longitudinal groove.

The second body part 8 has two projections 8 formed on opposite sides of the outer wall thereof and located roughly halfway along its length. The width of each projection is slightly less than the width of a corresponding longitudinal groove on the first body part and thus the projections can be accomodated in and slide along the longitudinal grooves when the second body part is inserted into the first body part. The length of the longitudinal grooves 5 determines the maximum distance of travel of the projections 8 and thus sets a maximum distance along the first body part 2 which the second body part 3 can travel (ie the point of maximum overlap, or interlock, of the body parts).

The provision of the transverse grooves 6 enables the two body parts to be fixed in an interlocked position by a simple rotation of one body part relative to the other.

Such a rotation moves the projections 8 along the respective transverse grooves 6 until the projections no longer lie in the longitudinal grooves 5. Thus following such a rotation the second body part 3 cannot slide axially within the first body part because the projections 8 are not free. To disengage the body parts it is only necessary to use a relative rotation in the reverse direction to that used previously, in order to restore the projections 8 to locations within longitudinal grooves 5 where they are free to travel.

The storage container described above may be used to store tennis balls as follows. This description assumes that the container is initially empty, and that the two body parts are completely disengaged from one another. A number of tennis balls may be placed within second body part 3 to rest as shown in dashed lines in Figure 1. The first body part 2 is then presented to the second body part 3 with the longitudinal grooves 5 in alignment with the projections 8. The two body parts are then pushed together so that the second body part passes inside the first body part.

The sealing arrangement prevents the escape of air which has been trapped between the two body parts and thus as the second body part is pushed further inside the first body part the pressure in the storage chamber 9 increases. when the projections 8 reach the ends of the longitudinal grooves 5 one body part may be twisted to engage projections 8 in transverse grooves 6.

The storage container described above can develop an excess pressure (ie pressure above atmospheric) of 6 to 18 pounds per square inch within the storage chamber; this is quite sufficient to replenish the internal gas pressure of partially depressurized tennis balls placed therein. As mentioned above best results would be achieved by storing tennis balls in a storage container such as the above at all times when they are not being used, rather than waiting until the balls have "lost their bounce" and then placing them in such a storage container.

The above described embodiment may be modified to include a plug portion on one of the body parts extending into the storage chamber so as to contact the objects held therein and prevent them from moving about. An example of such a plug position is shown in Figure 1 in dotted lines referenced by the numeral 15.

Alternative embodiments of the invention may have retaining arrangements different from that described above. The number of projection/groove pairs may be altered, the projections need not be located on the inner body part but can be located on the outer body part with corresponding grooves provided in the inner body part, and a mixture of grooves and projections may be provided on one body part with a corresponding mixture of projections and grooves on the other.

Similarly embodiments of the invention can incorporate retaining arrangements which allow the body parts to be retained in more than one relative position. This may be achieved by providing a plurality of transverse grooves in communication with and spaced along the or each longitudinal groove.

Alternatively, or additionally, to the retaining arrangements, a screw thread may be provided on the outer wall of the inner body part and the inner wall of the outer body part so that the body parts will be retained in position by a relative rotation which causes the screw threads to engage. This latter construction can be used in combination with an end seal provided on the inside surface of the closed end of the outer body part so that as the screw thread is engaged because the inner body part advances a little further inside the outer body part the end of the inner body part will contact, and form a seal against,

the end seal.

Cooperating screw threads may be provided along the entire length one or both of the mating surfaces of the body parts so that the relative movement between the first and second body parts from the first to the second position is brought about by the operation of the screw thread. Alternatively, each body part may have a smooth surfaced portion and a threaded portion so that a "push and twist" motion is required. An arrangement of this type is shown in Figure 3.

The embodiment of the invention shown in Figure 3 is a container for tennis balls and the like again comprising first and second body parts 22,23. Both body parts 22,23 are generally cylindrical each having one closed end and one open end.

The first body part 22 has a first portion 22a adjacent the closed end with a generally smooth inner surface and a second portion 22b with a screw thread on at least part of its inner surface. The second body part 23 has a first portion 23a having a smooth outer surface and a second portion 23b adjacent the closed end having a screw thread on at least part of its outer surface. The screw threads on the respective second portions 22b 23b are arranged to cooperate in a manner to be described below. The outer diameter of the first portion 23a of the second body part is approximately equal to the inner diameter of the first portion of the first body part so that the portion 23a can be received in the portion 22a as a push fit.

A seal 24, preferably in the form of an O-ring seals the mating surfaces of the portions 22a and 23a. The seal is located in a channel 25 provided in the outer surface of the portion 23a. A second seal 26 is located on the end wall of the first body part 22, preferably in the form of a gasket.

The container illustrated in Figure 3 is operated as follows: A number of tennis balls may be placed in the first body part 23 to rest on its closed end. The second body part is then presented to the first body part so that its first portion 23a slides within the second portion 22b of the first body part. The first and second body parts are pushed together in the axial direction until the portion 22a meets the portion 23a in the region X shown in the drawing. The seal 24 then seals the surfaces of the respective body portions 22a and 23a together. The two body parts are pushed together a little further until the screw threads meet and the parts are then rotated relative to each other so that the screw threads engage and the two parts cannot move axially apart. Continued relative rotary motion between the parts causes further axial movement of the parts due to the operation of the screw threads and contributes to the build up of pressure within the container. The body parts are dimensioned such that the second body part can be screwed into the first until its annular edge 23c abuts against the closed end face of the first body part.

The seal 26 is arranged so that the edge 23c seats on the seal so that when the container is fully closed fluid cannot escape between the edge 23c and the body part 22. Because the seal 26 is located inside the container it is less likely to be damaged in use than the seal 24. It is possible for the seal 24 to be damaged so that although pressure can be built up within the container, it escapes over a prolonged period. The additional seal is provided to prevent the escape of fluid once the high pressure has been built up.

Other embodiments of the present invention may be constructed which differ from those described above e.g. in features of shape, sealing arrangement, retaining arrangement, attainable internal pressure and object for storage.

For example, the dimensions of a storage container embodying the invention may be selected to enable a different number of tennis balls to be stored therein ranging from a single ball to a relatively large number of balls stacked in layers and/or columns. Also, of course, embodiments of the invention adapted for storing objects other than tennis balls will be constructed of appropriate dimensions.

Preferred embodiments of the invention in which the sealing arrangement uses O-rings are not limited to the numbers and dispositions of O-rings as shown above. However it has been found that the sealing arrangement works particularly well for higher pressures in the storage chamber when the sealing arrangement consists of one or more O-rings located as near as possible to the end of the inner body part (i.e. the end which is inside the outer body part).

Embodiments of the invention requiring different pressure values in the storage chamber may be made of different materials, e.g. steel.

Claims

1. A container for storing one or more objects containing fluid under pressure, comprising: first and second hollow cylindrical body parts each having one open and one closed end, the second body part being adapted for insertion into the first body part, and sealing means between the first and second body parts which body parts are movable between a first relative position, at which the body parts define a first volume and a second relative position at which the body parts define a second, smaller, volume in which an elevated pressure has been produced; and retaining means for retaining the body parts in said second position.

2. A storage container as claimed in claim 1 wherein the retaining means comprises cooperating screw threads on the first and second body parts.

3. A storage container as claimed in claim 2 in which the screw threads are arranged to inter-engage after the body parts have been moved from said first relative position towards said second relative position.

4. A storage container according to any previous claim, wherein: the retaining means comprises a longitudinal groove and a transverse groove in communication with said longitudinal groove both provided on the inner wall of one of the parts and a projection provided on

the outer wall of the other part; said projection is locatable in and moveable along said longitudinal groove; and the retaining means is actuated, when the body parts are in said second position, by a relative rotation of said body so as to engage the projection in the transverse groove.

5. A storage container according to claim 4 wherein the retaining means comprises a plurality of said longitudinal grooves, and a plurality of projections each locatable in and moveable along a corresponding longitudinal groove.

6. A storage container according to any previous claim, wherein the body parts are made of plastics material.

7. A storage container according to any previous claim, and further comprising stop means provided on at least one of the body parts and projecting into the volume defined by the body parts when inter-engaged whereby to prevent movement of objects stored in the storage container when the body parts are in said second position.

8. A storage container according to any preceding claim, wherein the sealing means comprises one or more O-rings.

9. A storage container according to claim 8, wherein the sealing means comprises three O-rings provided between the inner wall of the first body part and the outer wall of the second body part, and at least one of the body parts bears three spaced annular grooves adapted to accommodate said three O-rings.

10. A storage container as claimed in any preceding claim comprising further sealing means which operate only when the body parts are in said second relative position.

11. A storage container as claimed in claim 10 in which said further sealing means is provided on the closed end of the first body part and the open end of the second body part is arranged to engage the sealing means in said second relative position.

Fig. 1

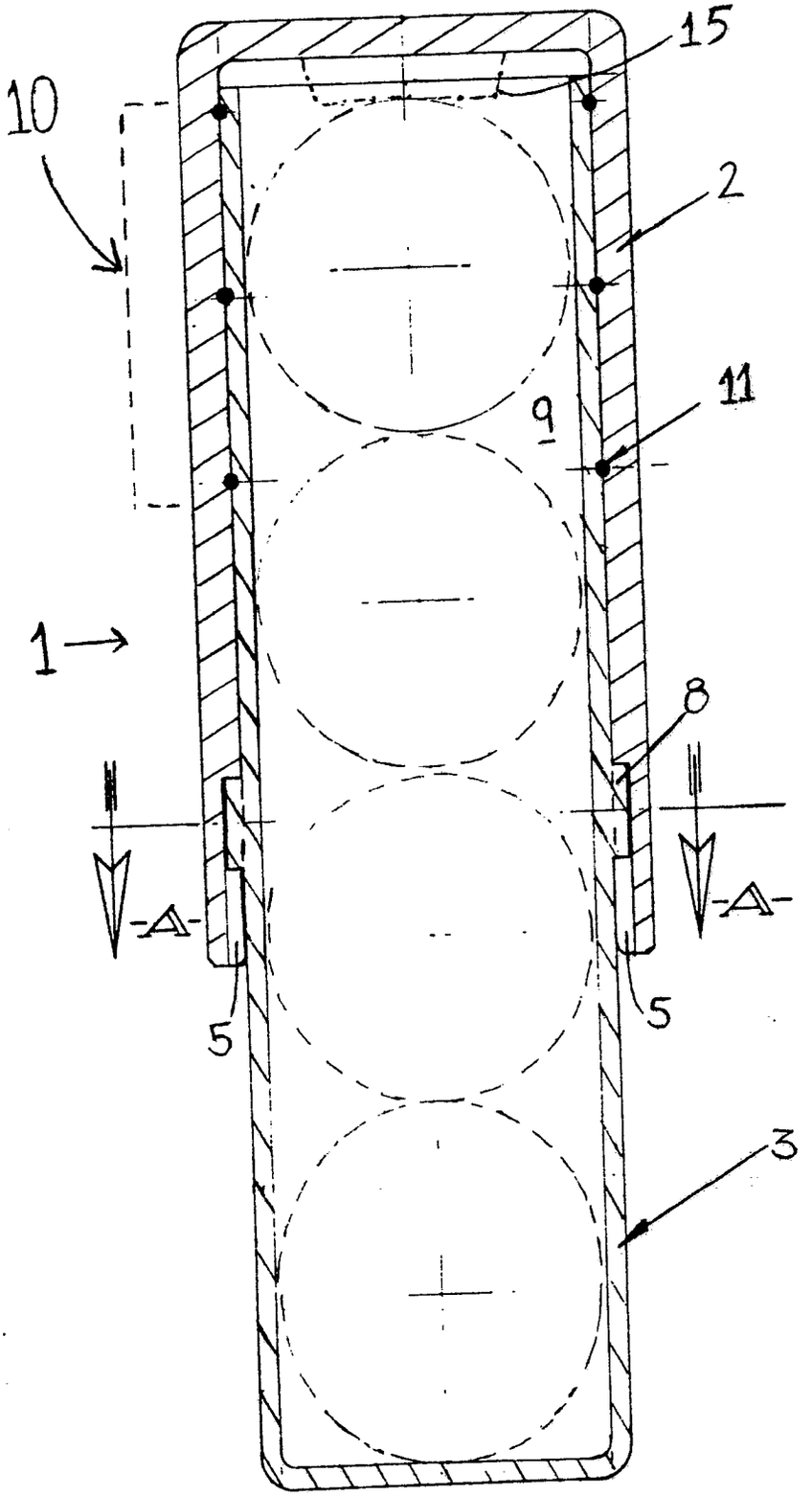

Fig. 2

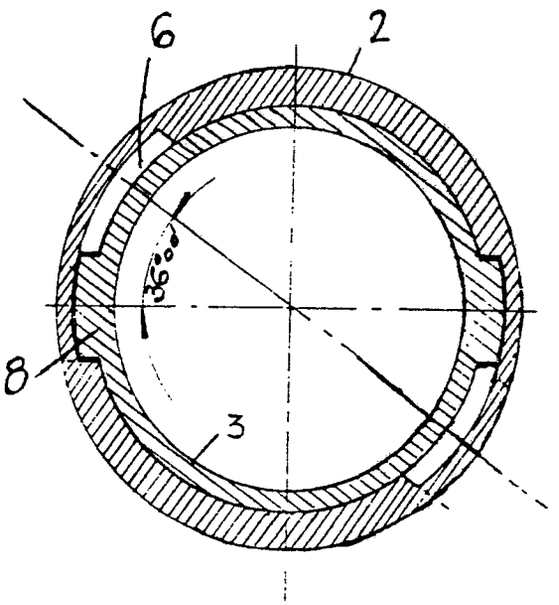

Fig 3