April 25, 1950 M. M. CUNNINGHAM 2,505,348

FLEXIBLE CONTAINER

Filed Aug. 11, 1945

Fig. 1

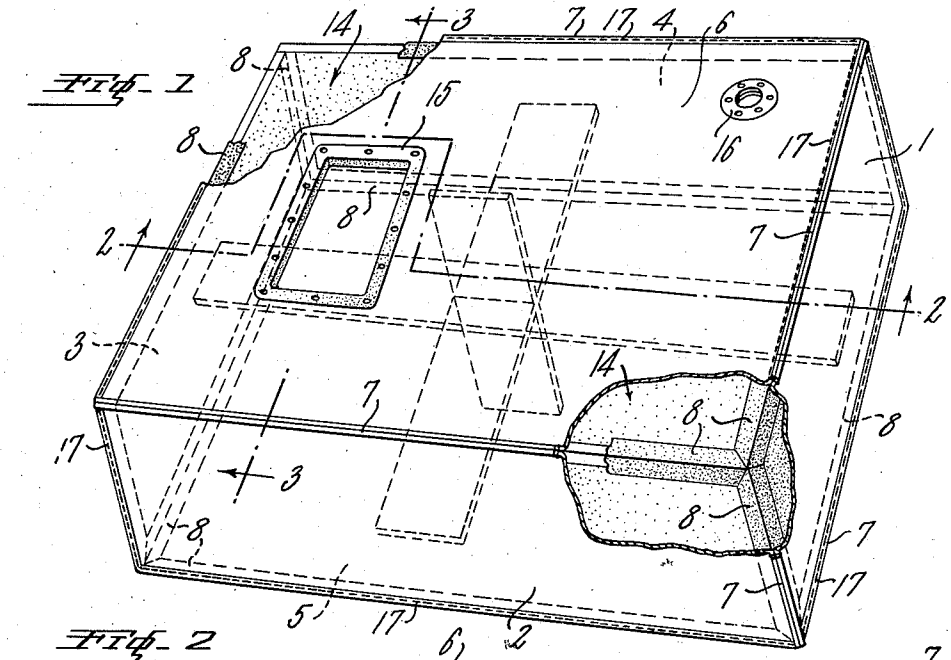
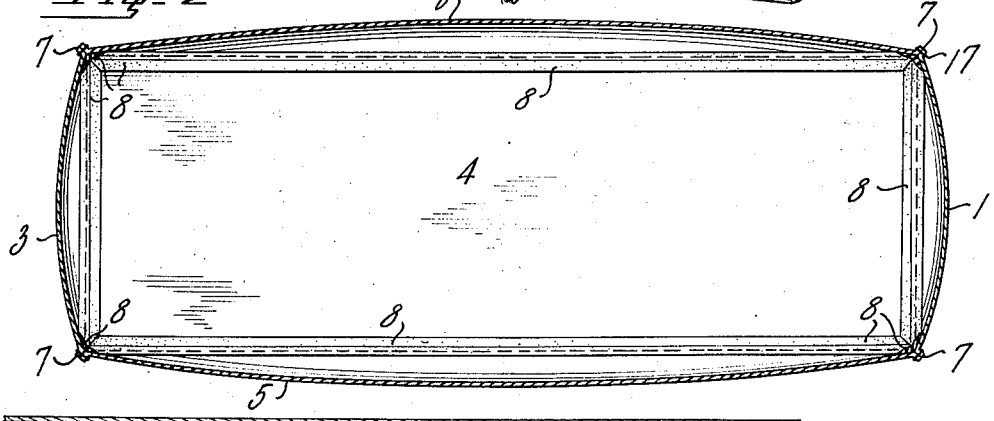


Fig. 2



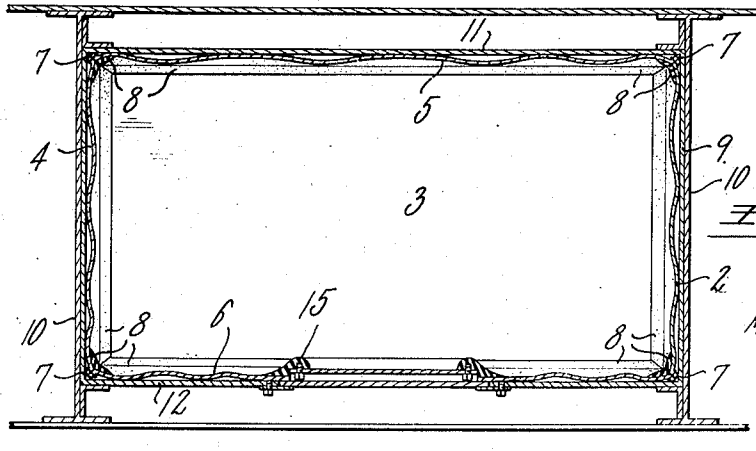


Fig. 3

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Patented Apr. 25, 1950

2,505,348

UNITED STATES PATENT OFFICE

2,505,348

FLEXIBLE CONTAINER

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Application August 11, 1945, Serial No. 610,289

3 Claims. (Cl. 220—63)

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My invention relates to liquid containers and more particularly to fuel cells of the coated flexible fabric type, one form of which is extensively used in carrying fuel in airplanes.

In the Gray and Zivi Patent No. 2,102,590, issued December 21, 1937, there is shown and described a liquid container for aircraft in which the general dimensions of the confining structural elements are such that the weight and impact forces of the liquid content ultimately react with the structural elements of the aircraft, rather than being resisted solely by the material of the container.

In some containers it is desirable to use reinforcing strips of the character shown in a prior application, in which I am a joint applicant, Serial No. 573,128, filed January 16, 1945, wherein the reinforcing strips are shaped to closely conform to the corners or edges defined by the plane structural members. Also, in general, the supporting aircraft structural members have greater flexibility in the areas intermediate their edges than at the edges. Accordingly, I have found that the advantages of the Gray and Zivi construction can be obtained by making the edges of the panels of the container substantially conform to the shape defined by the structural elements of the plane and by doming the areas of the panels intermediate the edges thereof.

The accompanying drawings illustrate a present preferred form of the invention, in which—

Fig. 1 is a broken perspective view of the container mounted on a forming frame and turned bottom side upwards;

Fig. 2 is a cross-sectional view of the container after removal of a form taken substantially along the section line 2—2 of Fig. 1; and

Fig. 3 is a cross-sectional view of a portion of an airplane wing, with a container mounted therein, the container being shown on the cross-section line 3—3 of Fig. 1, and without the form.

A liquid container preferably of the fuel cell type is provided with side walls 1, 2, 3 and 4, a top wall 5 and a bottom wall 6, some of which are united by reinforced seams 7 which are underlaid by flexible reinforcing and stiffening strips 8. The seams and reinforcing strips are described and claimed in said application Serial No. 573,128. In the present application the side walls and top and bottom walls are given an outward or convex curvature such that when the container with the seams 7 and the reinforcing strips 8 is inserted in a metal housing 9 formed in part by the structural elements 10, 11, and 12 of a metallic structure, which is illustrated in Fig. 3 as a portion of an airplane wing, the corners of the container fit snugly into the corners of the housing while the side walls and top and bottom walls are free to engage and be supported by the housing 9, thereby obtaining the advantages of the structures described in the Gray and Zivi Patent No. 2,102,590.

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In the manufacture of my improved container a form 14 of a soluble cardboard construction is provided in which the side, top and bottom walls are given an outward or convex curvature, or dome shape, with reference to the corners of the container as is particularly shown in Fig. 2. The reinforcing strips 8 are placed along the desired edges of the form 14. Provision is made in the form for a manhole mounting 15 and pipe fittings, one of which is shown at 16. The coated fabric forming the side, top and bottom walls of the container is then stretched over and around the frame 14 so that the fabric conforms to the shape of the frame. The seams 7 are completed to unite them to the strips 8. Reinforcing stitching 17 may be employed. The edges of the fabric are trimmed to the resulting shape. As is shown in Fig. 2, the seams 7 lie within the projection of the outwardly curved portions of the side, top and bottom walls of the containers. The container is cured on the frame 14, which is thereafter removed by a dissolving and washing operation which is well known in the art.

As is shown in Fig. 3, when the container is mounted in the supporting structure, the seams 7 snugly fit into the corners or joints of the housing 9 and the intermediate fabric of the side, top and bottom walls or panels, which have the resultant domed shapes, are confined by the structural elements so that the weight of their contents is transmitted to the structural elements without imposing extensive strains on the fabric. In such construction the joints between the sides of the supporting construction resist distortion to a greater degree than the areas of the sides away from the joints, and such areas are sometimes expanded or domed outwardly by the kinetic force of the fluid contents. Since the fabric panels of the flexible container have been pre-domed, they are adapted to follow the outward movement of the walls of the supporting structure without staining the fabric. Since the joints of the supporting construction are relatively free from distortion, the joints of the flexible container closely fitting therein are continuously supported without making them oversize in respect to the supporting joints, which

oversize dimension would tend to cause them to leak as a result of the wrinkling.

Furthermore, with the above construction the advantage of the reinforced corners or seams is obtained without sacrificing any of the space available in the supporting housing and without excessively stressing the fabric.

While I have shown and described a present preferred embodiment of my invention, it is to be understood that the invention may be otherwise embodied within the spirit of the invention and the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. The combination of a cell having flexible sides and a confining structure having sides adapted to support the sides of said cell sides, the joints between said cell sides being preformed to fit the corresponding joints between said supporting structure sides, and the sides of said cell within the borders of their joints having a substantially greater area than the area of the corresponding sides of said supporting structure and said differential in area increasing from said joints towards the center of said sides.

2. The combination of a cell for containing liquids and a supporting structure, said supporting structure comprising outwardly expansible panels united by more rigid joints to other panels arranged angularly thereto to form an enclosure for said cell, said cell having correspondingly flexible panels of a substantially greater area than the corresponding panels of said supporting structure, said differential in area increasing from the edges of said panels towards their centers, preformed joints uniting said flexible panels, and the outside length of said joints in said cell being substantially equal to the inside length of the corresponding joints in said supporting structure.

3. The combination of a cell having flexible sides and a confining structure having sides adapted to support the sides of said cell sides, the juncture between the sides of said cell being preformed and of a length substantially equal to the length of the corresponding juncture of the sides of said supporting structure, and each side of said cell having a substantially greater surface area than the surface area of the corresponding side of the supporting structure, which differential in area increases progressively from the juncture of said cell sides towards the centers thereof.

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