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PRESSURE CONTAINER AND PROCESS OF MAKING SAME

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PRESSURE CONTAINER AND PROCESS OF MAKING SAME

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This invention relates to containers for highly compressed or liquefied gases.

In my applications, Serial Nos. 459,455, 675,681, and 682,525, issued January 23, 1938, as Patents Nos. 2,106,494, 2,106,495, and 2,106,496, I have disclosed various processes for manufacturing pressure containers of metal consisting of interconnected spheroidal zones. For example, pressure-tight rings, bands or similar metal members may be located at suitable intervals around a cylindrical hollow metal body, such hollow body being then distended in either a cold or a warm state to expand into spherical shape the zones between the spaces circumferential rings or bands. Also, cylindrical vessels may be subjected to inward pressure at suitable spaced intervals to constrict the same to a reduced diameter, after which the intermediate zones may be expanded to spheroidal shape. Such pressure containers may also be produced by casting, or by appropriately rolling, pressing or hammering tubes.

According to the present invention, a pressure container of the type described may be economically produced from a number of separate parts. The individual parts may be produced in a swage by a pressing or hammering operation, by casting in a chill mold, or by electrolytic means. These parts may then be properly assembled and welded together into a unitary hollow metal pressure vessel consisting of a series of interconnected spheroidal zones which possess the characteristics of the pressure containers disclosed in my prior applications.

The single figure of the accompanying drawing illustrates one form of an improved pressure container produced in accordance with the principles of the present invention.

As shown by the drawing, an improved pressure container embodying this invention may be built up of a number of separately formed metal sections A, B and C which, when properly assembled, may be united by fusion welding (using the oxy-acetylene flame or the electric arc and with or without added weld metal) to form a rigid unitary container adapted to withstand high internal pressure. These individual sections may be separately formed in any appropriate manner, as by pressing, casting, etc.

The hollow top section A has a substantially hemi-spherical portion and is provided with a neck N to receive the closure fitting of the container. The hollow bottom section C also is hemi-spherical in shape. One or more hollow intermediate sections, similar to section B, may be disposed between and united to and in axial alignment with the top and bottom sections. To simplify the illustration, only a single section B is shown disposed between and united to the top section A and the bottom section C. The intermediate section B, which is of generally hour-glass shape, consists of two substantially hemi-spherical zones or portions B' and B'', disposed back to back and integrally united circumferentially along their adjoining portions at the restriction R. The section B may be constructed from a cylindrical metal tube by appropriately shaping the latter, as by restricting the mid-portion of a tube of the maximum diameter of the container while pressing the portions B', B'' to hemi-spherical shape; or by starting with a tube having the diameter of the constriction R and by flaring or pressing out the end hemi-spherical portions B', B''.

The hemi-spherical portions of the several sections are of the same diameter. After the several sections have been properly assembled in axial alignment, they may be united by forming circumferential fusion welds W, W' along the opposed edges of the section A and portion B', and along the opposed edges of the section C and the portion B'', respectively. The girth welds W, W' may be of any type adapted to provide a strong joint that will withstand the high internal pressure. As shown, the open ends of the sections A and C, as well as the ends of the section B may be flanged or bent inwardly as at X and Y, respectively, to provide welding grooves G, G' when the sections are assembled in position for welding. The circumferentially extending weld metal may fill the grooves G, G' substantially flush with the outer surfaces of the spherical zones thus formed. The flanges X may be somewhat shorter than the flanges Y so that the ends of the former will abut against the sides of the latter. These internal flanges and the co-extensive circumferential welds uniting them provide girth reinforcements for the container about each spheroidal zone in the plane of its great diameter perpendicular to the container axis.

It will be obvious that substantially the same procedure as that just described may be followed in constructing a container embodying more than one intermediate section B. In this case, the several intermediate sections may be joined to one another by circumferential welds similar to those shown at W and W', preferably before the top and bottom sections A and C are welded into place.

By means of the hereindescribed process it is possible to more economically construct a metallic...
pressure container comprising a plurality of interconnected spheroidal zones and having a maximum capacity for a given weight and strength. While a typical embodiment of my invention has been shown and described, it will be understood that various changes may be made in the construction disclosed without departing from the principles of this invention or sacrificing its advantages.

What is claimed is:

1. Process for producing a rigid metallic pressure container having a plurality of substantially spherical zones which comprises separately forming hollow substantially hemi-spherical end sections, forming one or more separate intermediate sections each comprising a pair of substantially hemi-spherical portions disposed back to back, assembling said sections in alignment and welding the open ends of said end sections to the similar opposed open ends of such intermediate sections.

2. Process according to claim 1 in which the opposed ends of the several sections are flanged inwardly to provide a circumferential welding groove at each joint and to reinforce said joint.

3. Process according to claim 1 in which each intermediate section is formed in one piece from a tubular metal body, and the opposed ends of the several sections are flanged inwardly to provide a circumferential welding groove at each joint, and weld metal is deposited in each groove to fill the same substantially flush with the outer surface of the container.

4. In the process of producing a pressure container of assembled hollow substantially hemispherical sections, the steps comprising flanging the adjacent ends of the several sections inwardly to provide a circumferential welding groove at each joint, one flange of each joint being formed shorter than the adjoining flange.

5. In the process of producing a pressure container of assembled hollow substantially hemispherical sections, the steps comprising flanging the adjacent ends of the several sections inwardly to provide a circumferential welding groove at each joint, one flange of each joint being formed so that its edge abuts against the face of the adjoining flange.

6. In the process of producing a pressure container of assembled hollow substantially hemispherical sections, the steps comprising flanging the adjacent ends of the several sections inwardly to form substantially a right-angled circumferential welding groove, one flange of each joint being formed shorter than the adjoining flange so that the edge of the shorter flange becomes flush with the face of the adjoining flange when in assembled relation.

7. A rigid pressure container having a plurality of substantially spherical zones comprising top and bottom sections having substantially hemispherical portions; one or more separate intermediate sections in axial alignment therewith and having substantially hemi-spherical portions disposed back to back; and welded circumferential joints severally uniting the open ends of the top and bottom sections to the opposed open ends of the adjoining intermediate section.

8. A pressure container as claimed in claim 7, in which said intermediate section is unitary and formed from a tube.

9. A pressure container as claimed in claim 7, in which the opposed parts of the several sections are shaped to form circumferential welding grooves when assembled, and said grooves are filled with weld metal.

10. A metallic pressure container adapted to withstand high internal pressure and having a plurality of axially aligned interconnected spheroidal zones, said container comprising a top section having a neck adapted to receive a closure fitting and also having a hemi-spherical portion; a bottom section having a hemi-spherical portion; and one or more intermediate sections, each intermediate section comprising a pair of hemi-spherical portions disposed back to back, the hemi-spherical portions of the several sections being of the same diameter and the several sections being welded together in axial alignment so as to form a series of interconnected and substantially complete spheroidal zones, the opposed ends of the several sections being united by welds extending circumferentially of the zones at their greatest girth.

11. A rigid pressure container having a plurality of substantially spherical zones comprising top and bottom sections having substantially hemispherical portions; one or more separately formed intermediate sections comprising hollow elements of generally hour-glass shape; and welded circumferential joints severally uniting the open ends of said top and bottom sections to the opposed open ends of the adjoining intermediate section.

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