

Sept. 3, 1935.

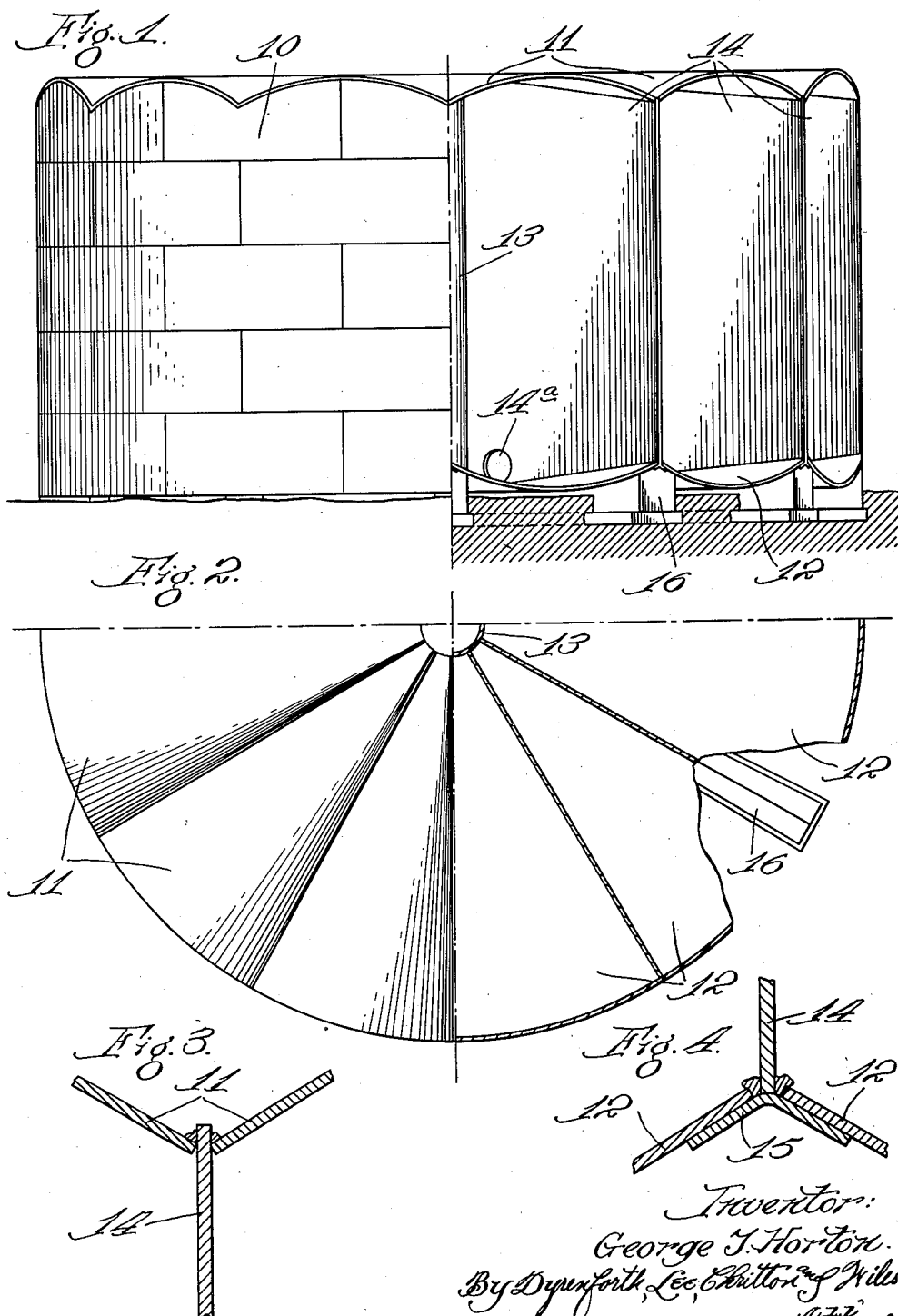
G. T. HORTON

2,012,964

TANK

Filed Dec. 8, 1932

3 Sheets-Sheet 1



Sept. 3, 1935.

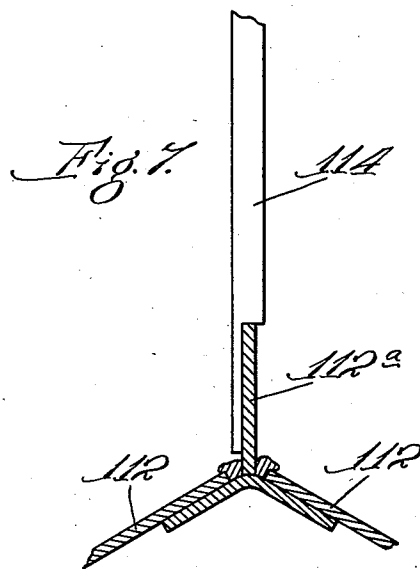
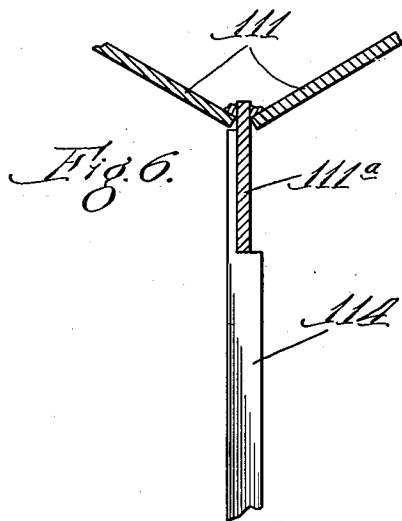
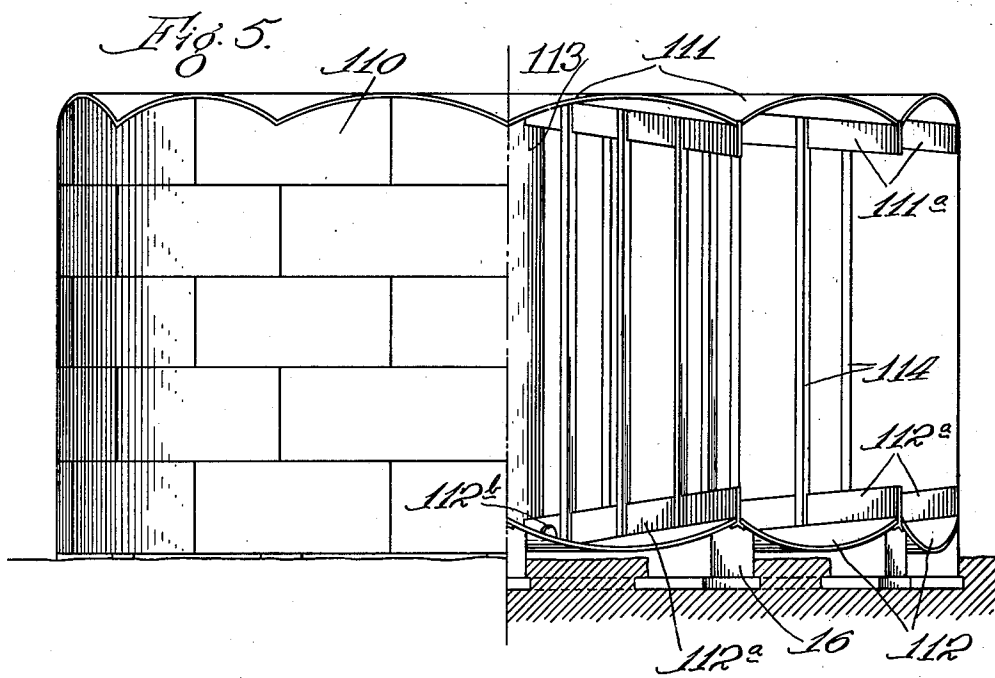
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Fig. 8.

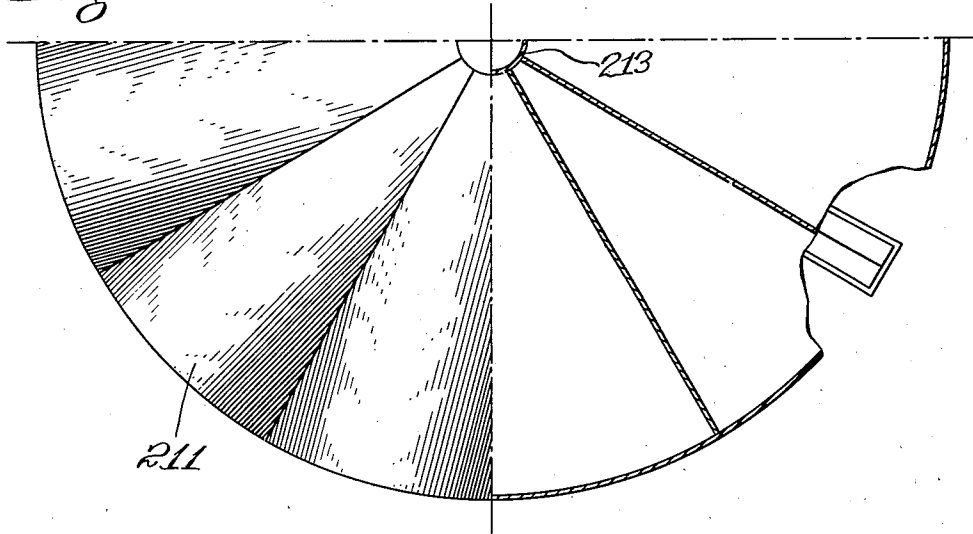
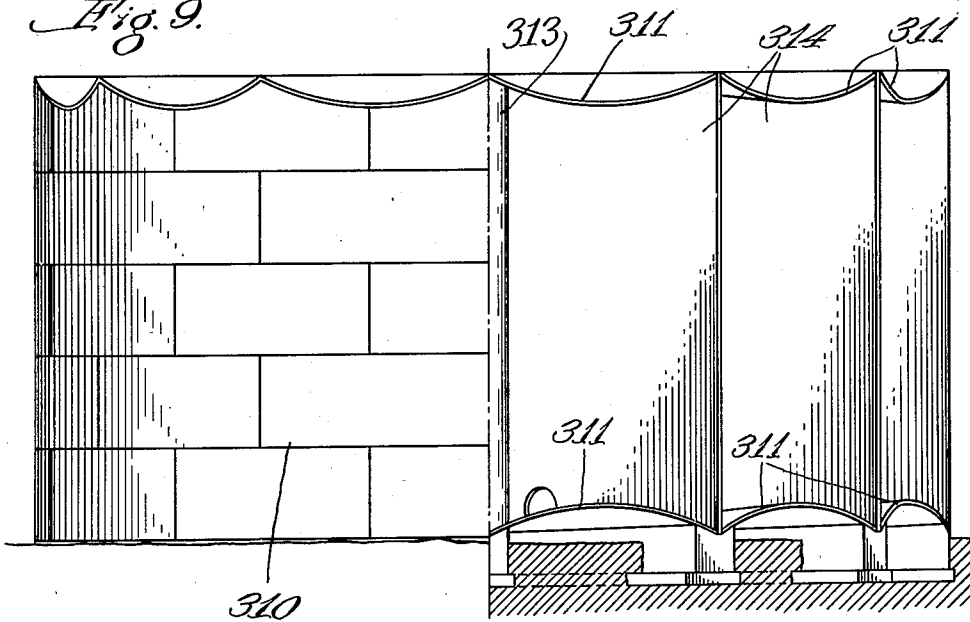


Fig. 9.



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UNITED STATES PATENT OFFICE

2,012,964

TANK

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Application December 8, 1932, Serial No. 646,319

1 Claim. (Cl. 220—1)

This invention relates to improvements in high and low pressure tanks, and vacuum tanks, and, more especially, to sheet metal tanks. My invention is applicable, for example, for use in connection with such tanks for the storage of volatile oils where it is necessary or desirable to maintain a certain amount of vapor pressure inside of the tank in order to reduce losses of evaporation.

By the use of my invention there is effected a marked saving in material, labor and space. My invention permits the use of relatively thin sheet metal in the heads of the tank, since each section is curved so that most of the stress will be a tensional one.

Other features and advantages of my invention will appear more fully as I proceed with my specification.

In those forms of devices embodying the features of my invention shown in the accompanying drawings—

Figure 1 is a view in side elevation with a portion of the shell being broken away; Fig. 2 is a view partly in top plan and partly in horizontal section; Fig. 3 is a vertical sectional view showing the junction of two adjacent sections of the upper head with one of the vertical diaphragms; Fig. 4 is a similar view of the lower head; Fig. 5 is a view similar to Fig. 1, showing a modified form; Fig. 6 is a vertical sectional view of the junction of two adjacent sections of the upper head showing a girder and column; Fig. 7 is a similar view of the lower head; Fig. 8 is a view similar to Fig. 2 showing the use of cylindrical sections instead of conical sections; and Fig. 9 is a view similar to Fig. 1, showing the invention adapted to vacuum or low pressure tanks.

As shown in the drawings, the pressure tank includes a shell 10, here shown as cylindrical and placed in a vertical position so that the two heads may be referred to as upper and lower heads. The shell 10 need not be perfectly or exactly cylindrical, but, for example, may be scalloped as shown in United States Patents Nos. 1,668,179, 1,864,759 and 1,864,931. As shown in both forms, the two heads of the tank are formed of radially arranged sector-shaped sheet metal sections. As here shown, these sections are curved or convexed outwardly, being substantially conical sections. In Fig. 1, these sections forming the upper head are indicated by 11, 11. The sections forming the lower head of Fig. 1 are indicated by 12, 12.

The sections of the heads do not extend to an extreme point at their inner ends but are cut

off somewhat to permit the insertion in the tank of a central vertical pipe member 13.

Each form of high pressure tank shown is provided with bracing members in the form of tension members between the heads, said tension members being fastened to the heads substantially at the junction of the conical sections. In the form shown in Figs. 1 to 4, inclusive, these tension members take the form of radial diaphragms 14, the upper edges of said diaphragms being welded to the adjacent edges of the sections 11, as shown in Fig. 2, and the lower edges to the sections 12, as shown in Fig. 4. Under the lower head, I also prefer to place radial reinforcing plates 15 under the lower edge of each of the diaphragms 14.

The tank may be supported in any substantial manner, for example, as shown in connection with each form, I prefer to support the same on radially extending foundations 16. These foundations coincide with the radial junctions of the lower sections, said sections bulging or curving downwardly between the foundations so that there will be imposed upon said sections a tensional stress.

The diaphragms 14 serve as tension members between the heads so that vapor pressure inside of the tank will impose a tensional stress upon the section 11 of the upper head because of their curvature. The members 14 also serve as compression members when the gas pressure is not sufficient to balance the weight of the roof or upper head.

In the form shown in Figs. 5 to 7, inclusive, there is likewise provided a cylindrical shell 10, and the upper and lower heads are formed of radial conical sections 111 and 112, respectively. Instead of providing the diaphragms 14, however, I provide radial girders 111^a welded to adjacent sections of the upper head and similar girders 112^a inside of the tank for the lower head. The opposed girders 111^a and 112^a are connected by vertical tension members in the form of columns 114.

The troughs formed on top of the roof between the junctions of the upper head sections may be sloped to drain outwardly or inwardly down through the central pipe 13. The bottom troughs may be sloped in either direction desired and suitable drainage means (not shown) is provided.

In the form of Figs. 1 to 4, inclusive, there may be provided holes 14^a through the diaphragms 14 near their lower edges at the center in order to permit communication of liquid from one compartment to another. Likewise, in the form of 55

Figs. 5 to 7, inclusive, there may be provided holes 112^b through the inner ends of the girders 112^a to prevent trapping of liquid.

In Fig. 8 I have indicated the sections of the head by 211 and shown such sections as being sections of a cylinder instead of sections of a cone, as shown in forms 11 and 111.

In Fig. 9 I have shown the invention applied to a vacuum, or low pressure tank. As here shown, the heads formed of the sector-shaped sections 311, 311 are curved or convex inwardly. Between the heads are vertical bracing members in the form of compression members 314 corresponding to the tension members 14 of Fig. 1.

The upper and lower edges of the cylindrical shell may be scalloped to conform to the curvature of the head sections or it may be left straight. In the forms here disclosed, I have shown the upper edge as scalloped and the lower edge as straight.

It is to be noted also that outward pressure on the heads of the tanks of Figs. 1-8 and inward pressure on the heads of the tank of Fig. 9 will cause the beams 111^a, 112^a, and the upper and lower edges of the partitions 14 and 314, to push or press radially inwardly. These beams and such edges of the partitions thus act as compression members and some means must be provided at the center to take their thrust. The pipe 13 in the device of Figs. 1 and 2 serves this purpose and thus acts as a compression member. The same is true of the pipe 313 of the device of Fig. 9. Likewise, the ends of the pipe 113 of

the device of Fig. 5 act as compression members and take the inward thrust of the girders 111^a and 112^a.

It is to be noted also that the heads of the tank are generally flat. I mean by this that the head when considered in its entirety (disregarding the curvature of the sector-shaped sections) is flat and not hemispherical or domed.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claim, in which it is my intention to claim all novelty inherent in my invention as broadly as permissible, in view of the prior art.

What I regard as new, and desire to secure by Letters Patent, is:

A sheet metal tank, including: a substantially cylindrical shell with a generally flat head formed of radially arranged sector-shaped sheet sections, each curved out of its plane, whereby differences in pressure between the inside and the outside of the tank will impose tensional stresses on said sections; radial bracing members attached to the head substantially at the junction of the sector-shaped sections; and a centrally arranged compression member adapted to take the inward radial thrust of said radial bracing members.

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