

Dec. 6, 1927.

1,651,892

G. T. HORTON

GAS HOLDER

Filed Feb. 23, 1927

3 Sheets-Sheet 1

*Fig. 2.*

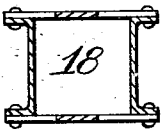


*Fig. 1.*

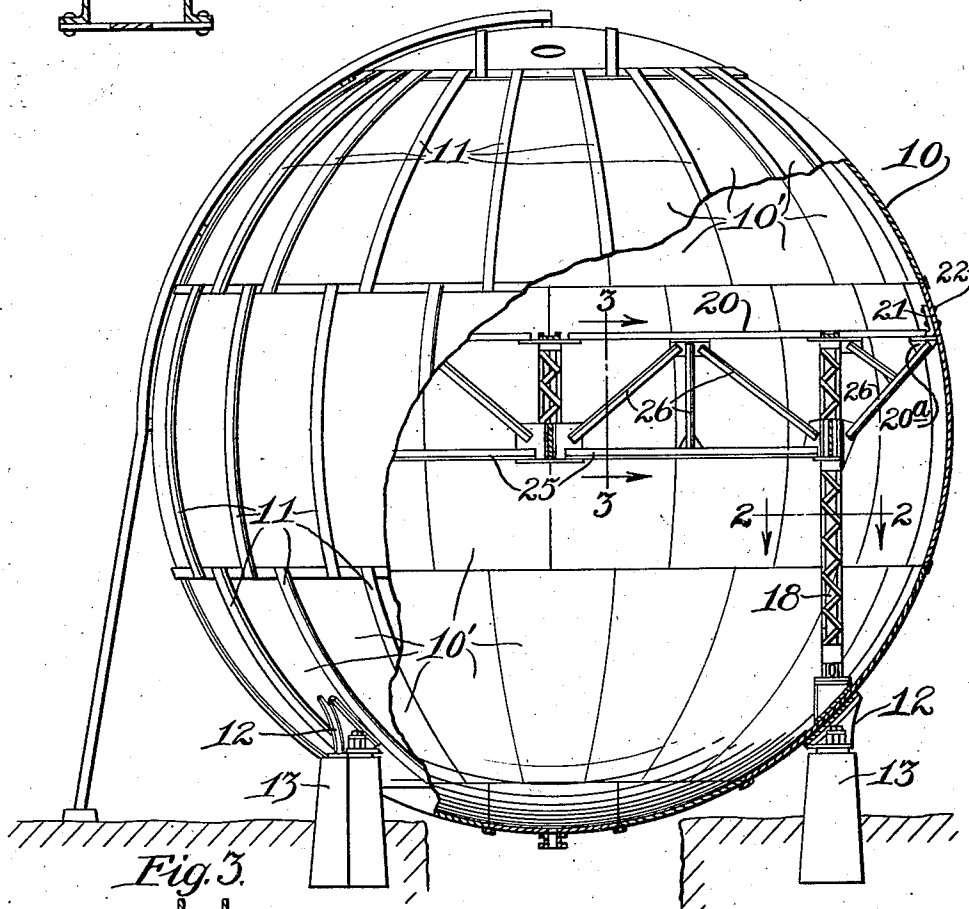
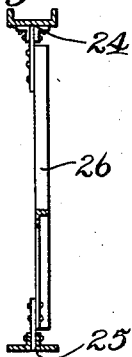


*Fig. 3.*



*Inventor:*  
**George T. Horton,**  
*By Dyrenforth, Lee, Chritton & Miles,*  
*Attys.*

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*Fig. 4.*

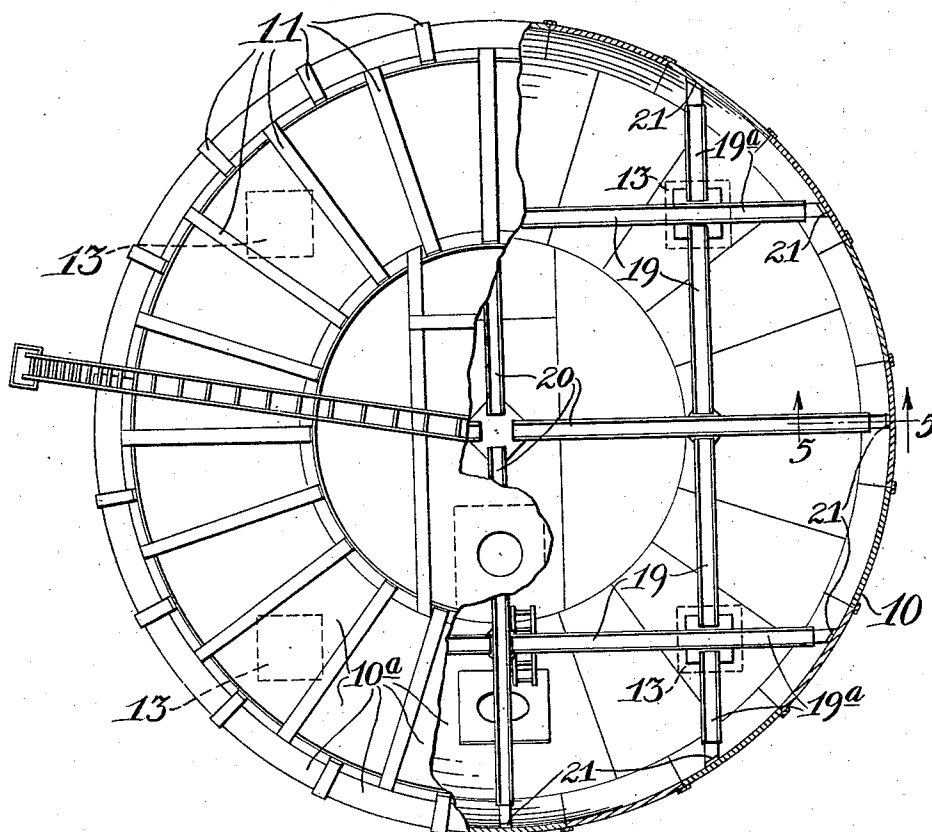
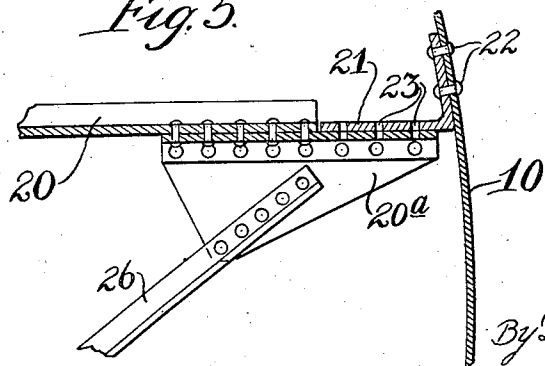


*Fig. 5.*



*Inventor:*  
*George T. Horton,*  
*By Dyrenforth, Lee, Chritton & Niles,*  
*Attys.*

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*Fig. 6.*

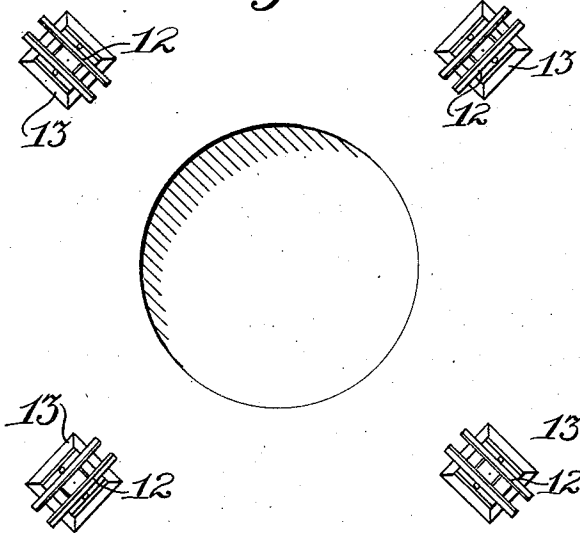


*Fig. 7.*

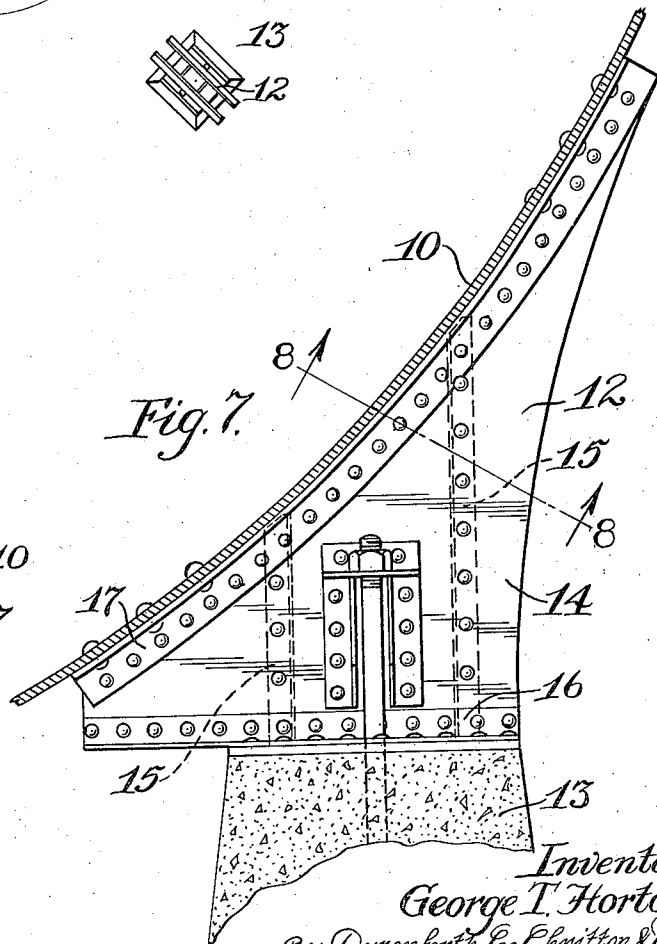
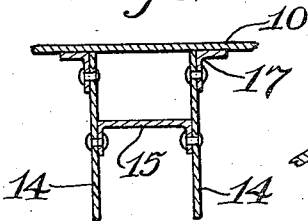


*Fig. 8.*



Inventor:  
George T. Horton,  
By Dyrenforth, Lee, Christon & Niles,  
Attys.

## UNITED STATES PATENT OFFICE.

GEORGE T. HORTON, OF CHICAGO, ILLINOIS.

GAS HOLDER.

Application filed February 23, 1927. Serial No. 170,250.

This invention relates to improvements in gas holders and more especially such a gas holder substantially in the shape of a sphere, and supported on legs attached to the sphere a substantial distance below, or inside of the "equator".

Obviously, there is a great advantage in supporting such a spherical type gas holder on legs attached to the shell on the line of a circle substantially smaller than the "equator", or great circle. When the legs are so arranged, they may be considerably shorter than if attached at the "equator", with a consequent saving in labor and material. Such legs being drawn in from the "equator", also effect a saving of space around the gas holder.

One of the features of my invention is the provision of means in connection with a gas holder of the type described, to prevent undue distortion of the shell from variations in the gas pressure inside. Obviously, a spherical shell so supported tends to flatten out to a certain extent when the gas pressure inside is lessened. This is due to the weight of the upper half of the shell bearing down on the rest of the structure when the gas pressure inside is diminished. When the gas pressure is increased, however, it supports the weight of the upper half to a large extent, causing the sphere to "round up" again. If such tendencies of the sphere to change its shape or be distorted are not prevented, there will be a straining at the joints with a consequent leakage and weakening of the structure.

Another feature of my invention is to provide means for so bracing the sphere against distortion, which means can also be used to assist in the erection of the gas holder.

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

In that form of the device embodying the features of my invention shown in the accompanying drawings, Fig. 1 is a view partially in side elevation and partially in vertical section, Fig. 2 is a view taken as indicated by the line 2 of Fig. 1, Fig. 3 is a view taken as indicated by the line 3 of Fig. 1, Fig. 4 is a view partially in top plan and partially in horizontal section, Fig. 5 is a view taken as indicated by the line 5 of Fig. 4, Fig. 6 is a view looking down on the

foundations and legs with the spherical shell removed, Fig. 7 is an enlarged view in side elevation of one of the legs, and Fig. 8 is a view taken as indicated by the line 8 of Fig. 7.

As shown in the drawings, the gas holder comprises a substantially spherical shell 10 made in any suitable manner, as, for example, by means of steel plates suitably joined together. For the purpose of illustration I have here shown a plurality of these plates as indicated by 10', each conformed to the necessary curvature so that when fastened together a substantially spherical shell 10 will be produced. For the purpose of illustration, also, I have shown the plates 10', 10' as joined together by means of the butt straps 11, it being understood that the joints may be formed in any well-known manner as, for example, by riveting or welding.

The shell 10 is supported on a plurality of relatively short legs, here shown as four in number, which are attached to the sphere on the line of a circle lying in a horizontal plane and having a diameter substantially less than the diameter of a great circle of the shell. That is, the legs are drawn in a substantial amount from the "equator" of the shell. When thus drawn in, obviously, they may be considerably shorter than if they were attached to the shell on the line of its "equator". As here shown, the legs indicated in general by 12, 12 are attached to the shell at points lying in a circle having a diameter of substantially two-thirds the diameter of a great circle of the shell.

The details of the leg construction are probably best shown in Figs. 7 and 8, where 13 indicates the foundation upon which the leg rests and 14, 14 indicate substantially triangular shaped flat plates parallel to each other and joined by two vertical channel irons 15, 15. The bottom edge of each of the plates 14 is straight and horizontal and rests upon the foundation 13. Each bottom edge is also stiffened and braced by means of an angle iron 16 riveted to its outer face. The upper edge of each of the plates 14 is curved to conform to the curvature of the shell 10 and is attached to the shell by means of a curved angle iron 17 riveted to the outer face of the upper edge of the plate 14 and also riveted to the shell 10.

I shall now describe the interior bracing

constituting the means for bracing the shell against distortion which might otherwise be caused by variations in the gas pressure inside of the shell. Such means comprises

5 four vertical posts 18, 18 inside of the shell, having their lower ends attached to the shell, one substantially above each of the legs 12. The posts 18 carry at their upper ends truss members having their ends extending close

10 to the wall of the shell; and the shell wall is provided with lugs or shoes adapted to rest upon the ends of such truss members. These lugs or shoes on the shell wall are arranged at points only a slight distance

15 above the "equator", so that the truss members may therefore carry a portion of the weight of substantially the upper half of the shell. Preferably, the lugs or shoes are not attached to the truss members, so that with

20 an increase of gas pressure they are free to be lifted off of or rise from the truss members. Obviously, the particular arrangement of the trusses and bracing inside of the shell may be considerably varied without

25 departing from the spirit of my invention. For the purpose of illustration, I have here shown the bracing as comprising four truss members 19, 19 arranged in the form of a square carried by the posts 18, the ends of

30 the members 19 crossing where supported by the posts so that their ends as indicated by 19<sup>a</sup>, project outwardly beyond such posts to points close to the wall of the shell. There are also provided two diametrically

35 arranged trusses 20, 20 crossing in the center, parallel with the trusses 19 and bi-secting the same. The trusses 20, 20 are carried by the trusses 19, 19, and the ends of the former also extend out to points near inner wall of

40 the shell where there are also provided additional lugs or shoes similar to those just described. It will be seen, therefore, that a portion of the weight of substantially the upper half of the shell may be carried on the

45 ends of these trusses at twelve points. In Fig. 5 I have shown the end of one of the trusses 20 and have indicated the lug or shoe on the inner wall of the shell 10 by 21, such lug or shoe here shown as comprising an L-shaped member having its vertical part fastened to the shell 10 by means of the rivets

50 22, and its horizontal part adapted to rest on the upper side of the triangular bearing plate 20<sup>a</sup> carried at the end of the truss 20. It is to be noted that the bearing plate 20<sup>a</sup> and the member 21 are provided with aligned holes

55 23, but such holes are provided merely for the purpose of temporary bolts during construction to assist in erection, after which

60 the bolts are removed. This permits the member 21 to rise off of the bearing plates or seats 20<sup>a</sup> in the event there is a tendency for this action due to increased gas pressure inside of the shell, or excessive heat.

65 Any suitable construction may be used for making the trusses 19, and 20; and for the purpose of illustration, I have here shown these trusses as comprising an upper chord 24 and lower chord 25 suitably joined by

70 struts and braces 26. The construction of the trusses 19 and 20 are substantially the same, and it is to be understood that the end of each truss extends out to a point close to the wall and carries a bearing plate or seat

75 20<sup>a</sup>, the shell at each of such points being provided with a shoe or lug as indicated by 21 in Fig. 5, to rest upon the bearing plate 20<sup>a</sup> and take some of the weight of the upper half of the shell when the gas pressure inside is diminished.

80 In the erection of the gas holder after the bottom plates are in place and the legs 12, 12 erected, the posts 18 and cross trusses 19 and 20 may then be put up and used as scaffolding to assist in the erection of the re-

85 mainder of the shell.

Although I have shown four legs to support the sphere, obviously more or possibly fewer, could be used without departing from the spirit of my invention. Also, there

90 could be considerable variation in the manner and detail of constructing the interior bracing. Preferably, however, such interior bracing should be supported substantially

95 above the legs, and so arranged that it can assist in supporting a portion of the weight of substantially the upper half of the shell when the gas pressure inside is diminished.

It will be seen that by the use of the interior bracing as shown with the members

100 21 resting on the ends of the trusses, that such interior bracing is adapted to carry a portion of the weight of most of the upper half of the shell directly on the legs. This prevents or substantially lessens the distortion that otherwise would be caused when

105 the gas pressure is diminished. The upper half of the shell is domed or arched, and hence will not itself distort materially if supported at points near its lower edge. It

110 is to be noted that it is so supported, since the lugs or shoes 21 are attached only a short distance above the "equator", thus permitting them to carry a portion of the weight of substantially the upper half of the shell.

115 When thus supported, a substantial part of the weight of the upper half is taken off of the rest of the shell, thus preventing or lessening the distortion of the shell at other

120 places.

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

125 without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my invention as

130 broadly as possible in view of the prior art.

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

1. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; an interior bracing in said shell adapted to carry a portion of the weight of substantially the upper half of said shell, said interior bracing supported in said shell on points lying substantially above said legs.

2. A gas holder comprising: a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially two-thirds that of a great circle; an interior bracing in said shell adapted to carry a portion of the weight of substantially the upper half of said shell, said interior bracing supported in said shell on points lying substantially above said legs.

3. A gas holder comprising, a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; an interior bracing in said shell adapted to carry a portion of the weight of substantially the upper half of said shell, but not attached thereto, said interior bracing supported in said shell on points lying substantially above said legs.

4. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; an interior bracing in said shell adapted to carry a portion of the weight of substantially the upper half of said shell, said interior bracing supported in said shell on posts resting on points lying substantially above said legs.

5. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; and means adapted to carry a portion of the weight of substantially the upper half of said shell directly on said legs, said means comprising interior bracing carried by members supported in said shell on points substantially above said legs, and members on the inner wall of the shell near the lower edge of the upper half thereof adapted to rest on said bracing, so that said bracing can bear a portion of the weight of substantially the upper half of said shell.

6. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; and means adapted to carry a portion of the weight of substantially the upper half of said shell directly on said legs, said means comprising interior

bracing carried by members supported in said shell on points substantially above said legs, and members on the inner wall of the shell near the lower edge of the upper half thereof adapted to rest on said bracing, but not attached thereto, so that said bracing can bear a portion of the weight of substantially the upper half of said shell.

7. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; and means for carrying a portion of the weight of substantially the upper half of the shell directly on the legs, said means including vertical posts inside of the shell substantially directly above the legs, truss members carried by the posts having their ends extending substantially to the wall of the shell, and members fastened to the wall of the shell near the lower edge of the upper half thereof and adapted to rest on the ends of said truss members.

8. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; and means for carrying a portion of the weight of substantially the upper half of the shell directly on the legs, said means including vertical posts inside of the shell substantially directly above the legs, but not attached thereto, truss members carried by the posts having their ends extending substantially to the wall of the shell, and members fastened to the wall of the shell near the lower edge of the upper half thereof and adapted to rest on the ends of said truss members.

9. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; and means for carrying a portion of the weight of substantially the upper half of the shell directly on the legs, said means including vertical posts inside of the shell substantially directly above the legs, crossed truss members carried by the posts and having their ends extending substantially to the wall of the shell, and members fastened to the wall of the shell near the lower edge of the upper half thereof and adapted to rest on the ends of said truss members.

10. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that of a great circle; and means for carrying a portion of the weight of substantially the upper half of the shell directly on the legs, said means including vertical posts inside of the shell substantially directly above the legs, but not attached thereto, crossed trussed members carried by the posts and

having their ends extending substantially to the wall of the shell, and members fastened to the wall of the shell near the lower edge of the upper half thereof and adapted to rest  
5 on the ends of said truss members.

11. A gas holder comprising; a substantially spherical shell supported on legs attached to the shell on the line of a circle having a diameter substantially less than that  
10 of a great circle; an interior bracing in said shell adapted to carry a portion of the weight of substantially the upper half of said shell, said interior bracing supported in  
15 said shell on points lying substantially above said legs, and said interior bracing capable of being erected before the completion of

the shell to serve as scaffolding to assist in completing the erection of the shell.

12. A gas holder comprising; a substantially spherical shell; means for supporting  
20 said shell, said supporting means lying inside of a circle substantially smaller in diameter than a great circle; and interior bracing in said shell adapted to carry a portion  
25 of the weight of substantially the upper half of said shell, said interior bracing supported in said shell on points lying substantially above the supports for the shell.

In witness whereof, I have hereunto set my hand this 21st of February, A. D. 1927.

GEORGE T. HORTON.