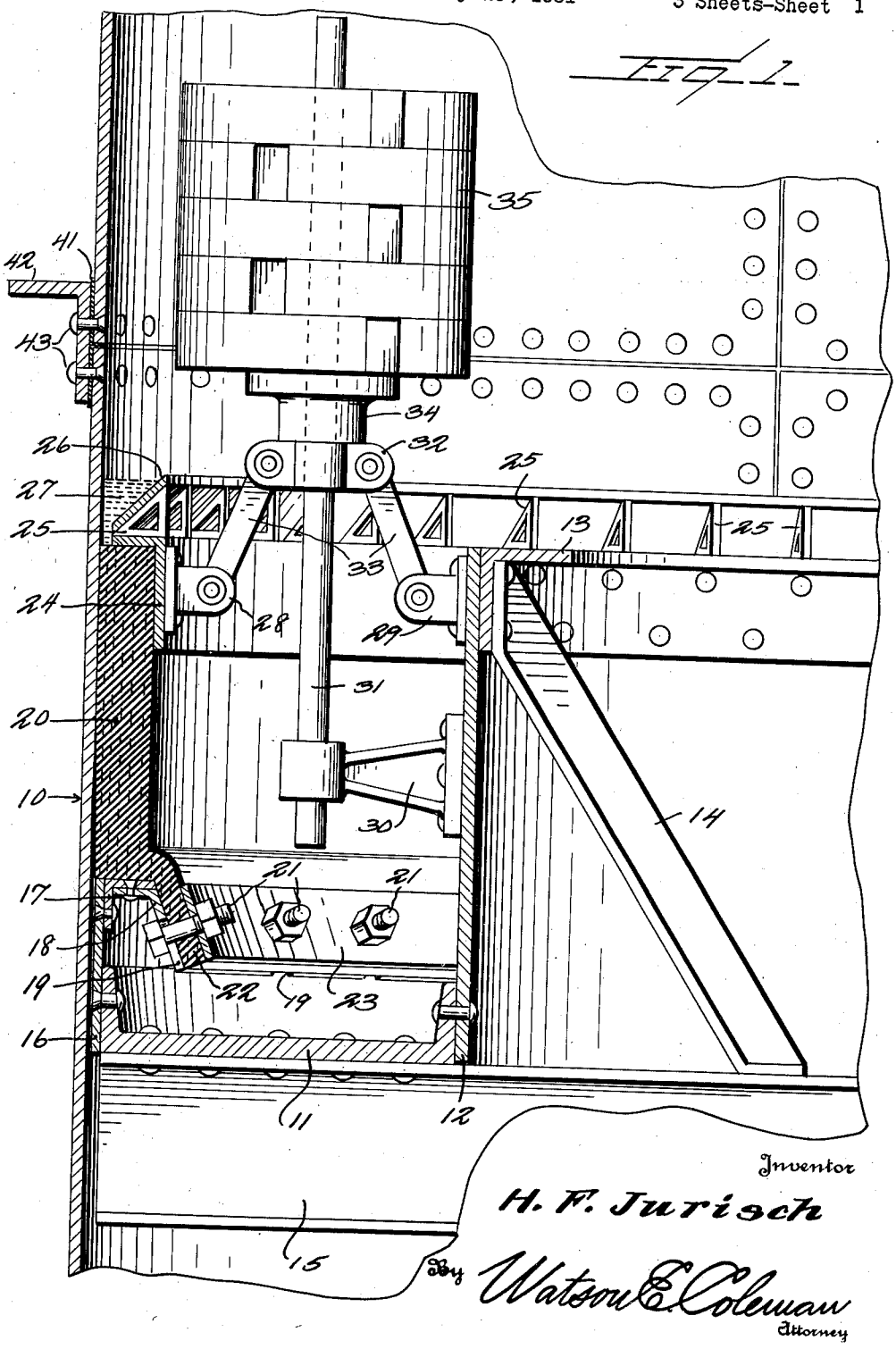
May 23, 1933. H. F. JURISCH 1,910,922

GAS HOLDER

Filed May 29, 1931 3 Sheets-Sheet 1

Fig. 1.



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GAS HOLDER

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Fig. 2.

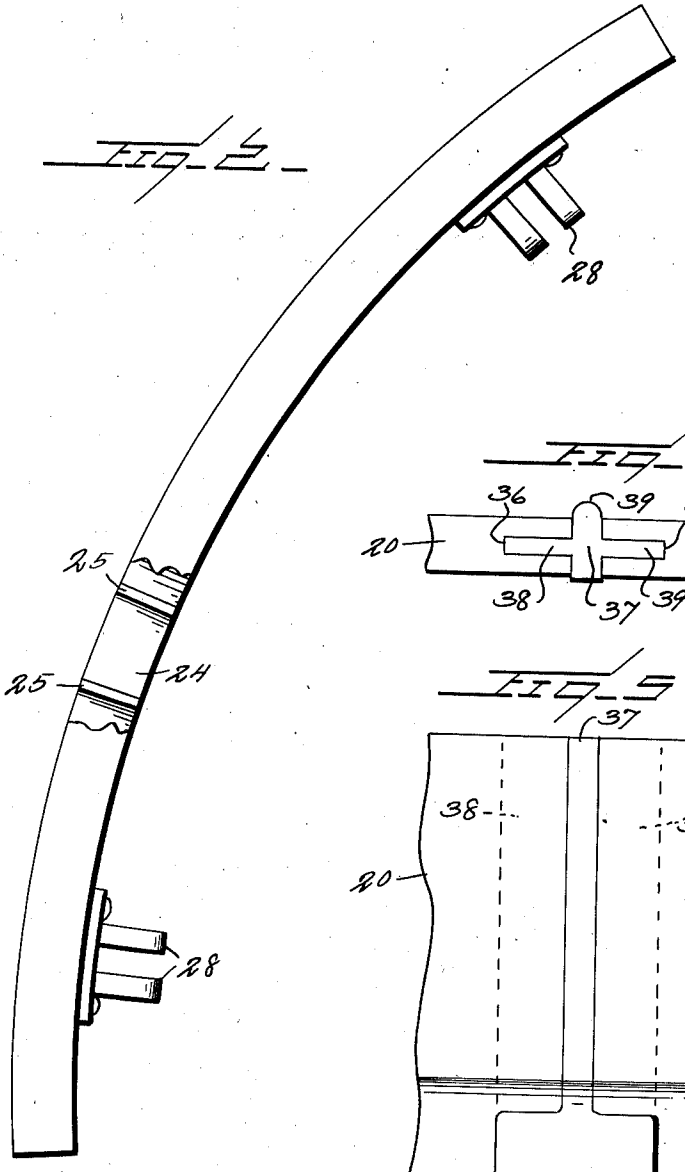


Fig. 7.

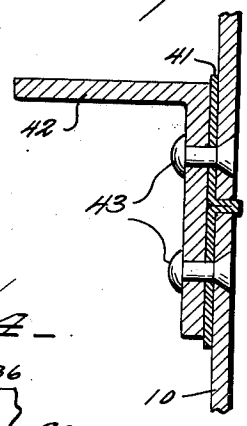


Fig. 4.

Fig. 5.

Fig. 6.

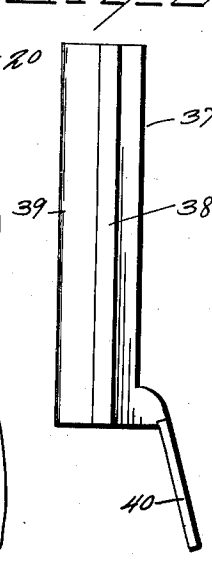
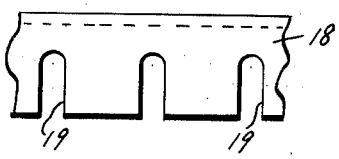


Fig. 3.



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GAS HOLDER

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Fig. 8.

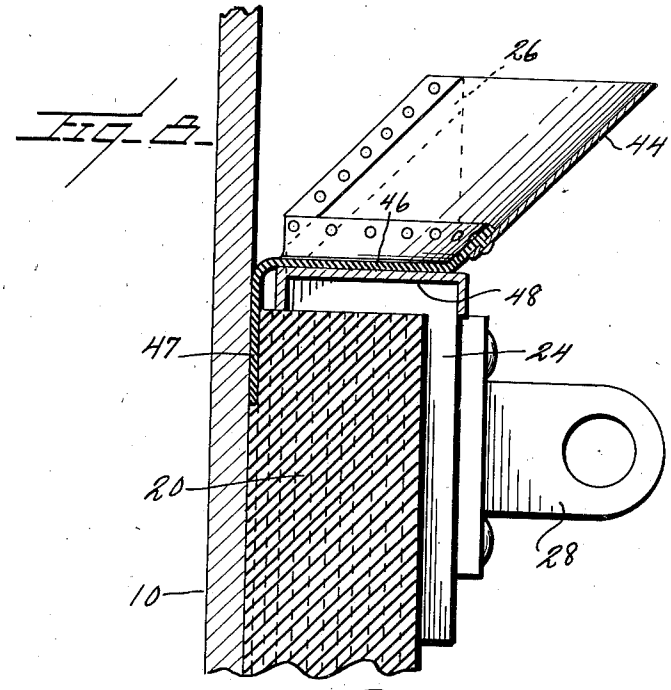


Fig. 10.

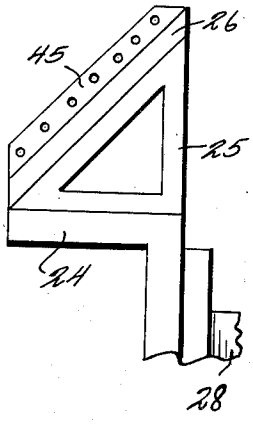


Fig. 9.

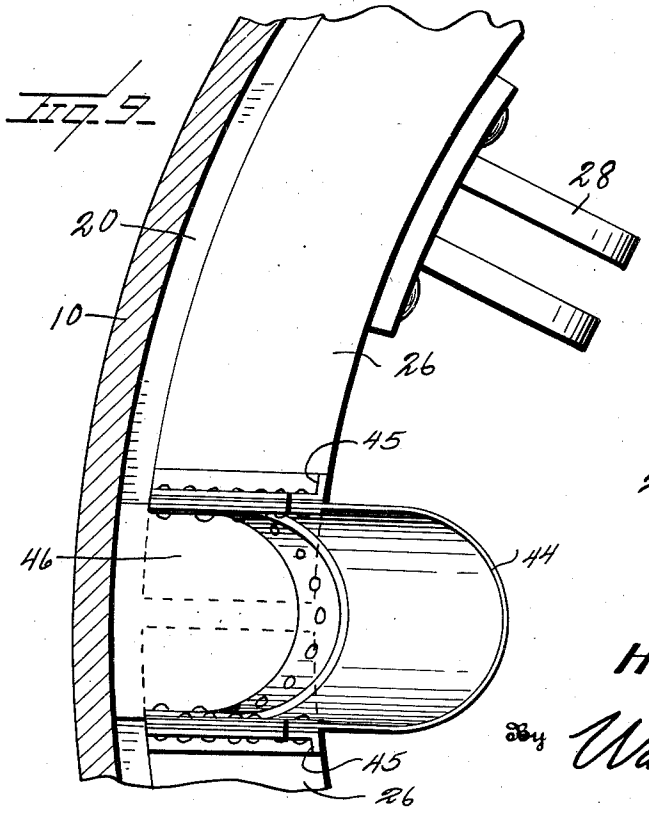
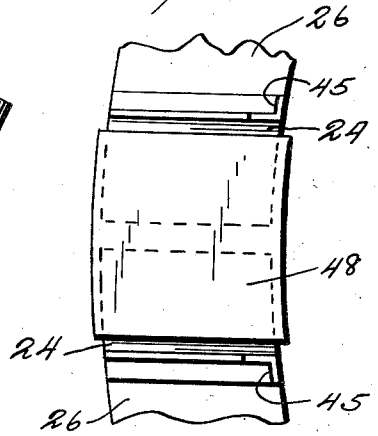


Fig. 11.



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Patented May 23, 1933 1,910,922

UNITED STATES PATENT OFFICE

HERMAN F. JURISCH, OF CINCINNATI, OHIO

GAS HOLDER

Application filed May 29, 1931. Serial No. 541,084.

This invention relates to gasometers or gas holders and particularly to dry seal or waterless gas holders in which the outer shell is stationary and a piston moves vertically within the outer shell.

The general object of the invention is to provide an improved dry seal for gas holders of this character and one of the particular objects of the invention is to provide a dry seal of a particular construction which will be at all times urged into close contact with the shell or holder proper, and secure a gas-tight joint or seal between the two.

A further object is the provision of a seal of this character formed in sections as regards certain parts of the seal, these sectional parts of the seal being urged against the inner face of the shell by means of constantly acting weights preferably acting through toggle links.

A further object is to provide an improved detailed construction for the sealing element proper and including a mounting therefor and still another object is to provide an improved splice or joint between the sectional parts of the packing and provide improved means for sealing the joints between the sheets of which the shell is formed.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a fragmentary vertical sectional view through a gas holder and piston showing my improved packing therefor;

Figure 2 is a top plan view of the annulus resting on top of the packing;

Figure 3 is a fragmentary face view of the angle iron which supports the strip of the packing;

Figure 4 is a fragmentary top plan view of two adjacent portions of the packing sections showing the joint between the two;

Figure 5 is an elevation of the construction shown in Figure 4;

Figure 6 is a side elevation of the joint between the ring sections;

Figure 7 is an enlarged section of the joint between the sections of which the holder is composed;

Figure 8 is a fragmentary vertical sectional view through the shell, packing ring and showing the means for sealing the joint between the ends of the angle irons supported on the packing ring;

Figure 9 is a fragmentary top plan view of the structure shown in Figure 8, the shell being in section;

Fig. 10 is an end elevation of one of the sections of the angle iron and bottom of the lubricant trough, showing the flange whereby the U-shaped sheet metal joint is attached to the trough bottom;

Figure 11 is a fragmentary top plan view of the adjoining ends of two sections of the trough bottom, showing the plate which rests upon the upper surface of the angle iron.

Referring to these drawings, 10 designates the waterless gas holder or shell proper and 11 the piston closure of the gas holder, 12 an annular upwardly extending wall riveted to the inner flange of the piston 11 and extending upward and formed at its upper end with the angle iron 13. This wall may be braced at any suitable points as, for instance, by brace 14. The piston 11 and the brace 14 are shown as connected to an I beam 15. Attached to the outer flange of the piston 11 is an annular plate 16 riveted thereto which does not quite contact with the inner face of the shell 10. To the upper margin of this annular plate 16, there is riveted the angle iron 17.

Riveted in turn to this angle iron 17 is an angle iron 18 annular in form which extends outward and then downward and is formed with a plurality of vertically extending slots 19 as shown in Figure 3.

Resting upon the angle iron 17 is the main sealing or packing member 20. This is made of flexible rubber fabric and is firmly bolted to the angle iron 18 by the bolts 21 which pass through the slots 19, but pass through perforations in the flange or skirt 22 which extends downward and inward from the body of the packing member 20. A metallic plate 23 is disposed upon the interior

face of this skirt 22, this being also slotted for the passage of the bolts 21. Nuts on these bolts 21 bear against this plate and clamp this skirt firmly between the angle iron 18 and the annular plate 23. Thus the packing or seal member 20 is held firmly in place and its outer face extends upward and outward until it bears against the inner face of the shell 10.

Resting upon the upper face of the member 20 and upon the inside of this member 20 adjacent the upper face is an angle iron section 24. There are a plurality of these sections all of the same length and all arcuate in form and these sections when placed together define an annulus or ring bearing against the inner face of the seal 20.

Mounted upon the upper face of each of these sections 24 are a plurality of triangular knee braces 25 which support a downwardly and outwardly inclined plate 26 welded at its lower edge to section 24. It is to be noticed that the upper flange of the angle iron 24 does not extend outward to the inner face of the shell and neither does the plate 26 extend outward to the inner face of the shell. This plate 26 forms a sort of gutter or reservoir for lubricant of any suitable kind, this lubricant being designated 27. A special splice or joint is used between the sections 24 as will be later stated.

Each of the sections 24 adjacent its end is formed with the outwardly projecting pairs of ears 28 and the wall 12 adjacent its upper edge is also formed with pairs of outwardly projecting ears 29 disposed in radial relation to the ears 28. Also mounted upon the wall 12 and projecting from this wall toward the shell 10 are a plurality of brackets 30 having eyes at their outer ends. These brackets 30 support a spindle or stem 31 which is guided in the eye of the corresponding bracket 30. Clamped upon this spindle or stem 31 is a shackle 32 which is clamped upon the rod 31 and moves therewith. This shackle is connected by the two toggle links 33 to the ears 28 and 29 respectively.

Mounted upon the rod 31 is a collar 34 which rests upon the shackle 32 and supports upon it the weights 35 which are removable from the guide rod 31 so that any desired number of weights may be placed upon the guide rod. The action of these weights, of course, is to force downward and outward on the toggle links 33 and this action tends to force the angle iron 24 outward against the upper margin of the packing 20 with all the force that can be exerted by the weights 35. It will be understood that there are two sets of these weights 35 and the corresponding toggle mechanism to each section 24. By making this packing engaging ring 24 in sections, I have found that the seal is more readily made tight. Even if the holder shell 10 is not a correct circle, the sectional angle iron 24 will bring the sealing member 20 always tight against this shell. The knee braces 25 and the plate 26 are welded to the angle 24.

I have heretofore spoken of the packing element 20 as if it was formed of one piece of material extending entirely around the shell. As a matter of fact, this packing member 20 is conveniently formed in sections and these sections are spliced or joined to each other as shown most clearly in Figure 4. The lateral edges of the packing 20 are vertically slotted as at 36 and disposed between the abutting ends of these packing sections is a splicing member 37 of soft rubber having wings 38 which extend into the slots, the depth of these splicing members 37 from front to rear being slightly greater than the thickness of the packing member 20. The outer edge of the member 37 is rounded as at 39 and it is this edge which bears against the inner face of the shell 10. This splicing member 37 extends down to the bottom of the packing ring 20 and is formed with an outwardly extending skirt 40 which is riveted to an angle iron 18. This splice 37 is formed of soft rubber. The rounded part 39 comes in contact with the shell 10 and this rounded portion has a tendency to straighten out flat and, therefore, make a tight edge over the joint between the sections 20. The bottom of the rubber splice lies between the angle 18 and the skirt of the packing 20.

At the junction of the sheets from which the shell 10 is made, the packing is provided as follows:

A packing strip 41 is disposed to extend across the joint between the two sheets and is held in place by an angle 42. Rivets 43 pass through this angle and through the packing strip 41. This forms a true and tight connection between the sheets. The packing strips are made of $\frac{1}{16}$ soft metal such as Shelby iron tubing metal. Each packing strip is approximately T-shaped in cross section and extends inward between the adjacent sheets of the shell about 3/16ths of an inch. After the packing strip and angle are riveted in place, it is caulked so as to seal the gas entirely. After caulking, the packing strip is smoothly ground with a portable hand grinder so as to provide a smooth surface on the inside of the shell. If there should be a leak, this leak could be remedied immediately by caulking the outside edge of the packing strip. This is a great advantage for the erector of the gas holder as he can correct any leakage from the outside should there be any.

The sections of packing 20, the angle iron 24 and the angularly disposed portion 26 are preferably seven feet in length from center to center. In order to prevent leak-

age of lubricant at the joints between the lubricant containing trough 26 and the leakage of lubricant from between the lower edge of the trough 26 and the upper face of the angle iron 24, I attach to the adjacent ends of each section of the trough 26 the U-shaped member designated generally 44 which is made of thin sheet metal. At the joints between the members 26, there are formed the inwardly extending flanges 45 which may be either welded to the bottom 26 of the trough or formed integral therewith. This U-shaped sheet metal member 44 extends reentrantly toward the center of the tongue and has its margins riveted to the angular flanges 45. At the lower end of each of these members 44 is attached a sheet of rubber designated generally 46. This sheet of rubber is formed to fit the lower edge of the U-shaped member 44 and is attached thereto in any suitable manner as by the rivets 47 and reinforcing irons 48. The sheet of rubber extends toward the wall 10 beyond the U-shaped member 44 so as to form an apron designated generally 47.

This apron is carried down beyond the inner edge of the angle iron 24 and so as to overlap the upper edge of the packing 20, as shown most clearly in Figure 8. It is to be understood that the joint between the adjacent angle irons 24 is disposed immediately beneath this U-shaped member 44 and beneath the rubber apron 47 and over the top of the angle 24 there is disposed a plate 48 of sheet iron which is bent at right angles at both ends so as to fit over the upper flange of the angle iron 24. This forms a bearing for the under face of the apron 48 and prevents the expansion and contraction of the adjacent angle irons 24 from injuring the rubber apron because this sliding movement occurs beneath the apron 47. It is to be understood that the lubricant trough straddles the joint between the packing 20. The sheet metal member 44 being capable of yielding in opposite directions and the rubber apron being capable of yielding, it follows that the expansion and contraction between the sections of the trough 26 and the expansion and contraction of the members 24 is provided for and at the same time, of course, the lubricant is prevented from leaking out at the joints between the sections. The center of the piston 11 is closed by a decking primarily shown in Figure 1 and designated 49, which decking is preferably slightly conical. This forms no part of my present invention.

It will be seen that the gas cannot pass upward much beyond the lower edge of the packing or seal ring 20. The upper portion of the ring is lubricated as by light grease or heavy oil which may be contained within the gutter 26 and this places a coating of lubricant upon the inner face of the shell to permit its ready movement up and down.

The sectional angle iron 24 urges the sectional packing ring 20 into close engagement with the inner face of the shell 10 under all circumstances and because the packing ring 20 is made in sections, it follows that the packing ring will maintain a much closer engagement with the inner face of the shell than would be the case were this packing ring made of one single piece unless the shell were 100 per cent truly circular. All of the parts are so constructed that they may be readily assembled and relatively cheaply made.

It will be understood, of course, with this particular construction the piston or closure formed by the parts 11 and 12 rises and falls to decrease or increase the amount of gas space within the shell above as is the case in all gas holders constructed on this principle and that the packing 20 moves constantly against the inner face of the shell, this packing being lubricated by the lubricant 27, the packing being constantly urged against the inner face of the shell.

I do not wish to be limited to the particular construction of the piston itsef with its parts 11, 12 and 13 except insofar as the piston requires a structure which will afford a support for the bracket 30 and for the lugs 29.

I claim:—

1. In a gas holder, a shell, a piston movable vertically therein, angle iron sections attached to the piston adjacent the inner face of the shell and extending circumferentially around the piston, a sealing ring mounted at its lower edge upon said angle iron sections and extending upward and bearing against the inner face of the shell, an angle iron engaging the upper margin of the sealing ring and extending over the top and down over the inside face of the ring, a plurality of pairs of toggle links respectively connected to the piston and to the last named angle iron, the toggle links extending upward and toward each other and being operatively connected at their upper ends, and weights bearing against the connected ends of the toggle links and urging their lower ends apart and the sealing ring into engagement with the inner face of the shell.

2. In a gas holder, a shell, a piston operating therein and having a central upwardly extending portion, a plurality of angle irons mounted upon the outer margin of the piston and extending circumferentially around the shell, a plurality of angle iron sections attached to the first named angle irons and extending downward and inward therefrom, a sealing ring resting at its lower edge upon the first named angle irons and having a skirt portion extending down over the second named angle irons and bolted thereto, the sealing ring being formed of

arcuate sections, angle iron sections mounted upon the upper edges of the sealing ring sections and gravity actuated means operatively supported by the upwardly extending central portion of the piston, and operatively engaging the last named angle iron sections to force said sections and the sections of the sealing ring outward against the inner face of the shell.

3. In a gas holder, a shell, a piston operating therein and having a central upwardly extending portion, a plurality of angle irons mounted upon the outer margin of the piston and extending circumferentially around the shell, a plurality of angle iron sections attached to the first named angle irons and extending downward and inward therefrom, a sealing ring resting at its lower edge upon the first named angle irons and having a skirt portion extending down over the second named angle irons and bolted thereto, the sealing ring being formed of arcuate sections, angle iron sections mounted upon the upper edges of the sealing ring sections, and gravity actuated means operatively supported by the upwardly extending central portion of the piston and operatively engaging the last named angle iron sections to force said sections and the sections of the sealing ring outward against the inner face of the shell, said last named angle iron sections carrying upon it upwardly and inwardly extending sectional members constituting a lubricant containing trough.

4. In a gas holder, a shell, a piston operating therein and having an upwardly extending central portion, the outer margin of the piston extending upward adjacent to the inner face of the shell, a plurality of arcuate sealing ring sections mounted upon said upwardly extending portion of the piston and bearing against the inner face of the shell, a plurality of arcuate angle iron sections bearing upon the top and the upper end faces of said packing ring sections, a plurality of pairs of toggle links pivotally connected respectively to the angle iron sections and to the upwardly extending central portion of the piston, the links extending upward and inward toward each other and being connected at their upper ends, brackets mounted upon the upwardly projecting central portion of the piston, rods extending downward through said brackets and through the connected portions of the toggle links, and weights operatively supported upon said rods and bearing against the upper ends of the toggle links.

5. In a gas holder, a shell, a piston operating therein and having a central upwardly extending portion, a plurality of angle iron sections mounted upon the piston adjacent the inner face of the shell, a plurality of angle iron sections mounted upon the first named sections and having flanges extending downward and outward, said flanges being vertically slotted, a plurality of sealing ring sections having their lower edges resting upon the angle iron sections and having skirt portions extending over the second-named angle iron sections, bolts passing through said slots and through the skirt of the sealing ring, the sealing ring sections bearing against the inner face of the shell, angle iron sections engaging over the upper end of the sealing ring sections and supporting upwardly and outwardly extending gutter sections, the gutter sections being adapted to contain lubricant, a plurality of pairs of ears projecting from each of the last named angle iron sections, corresponding ears projecting from the upwardly extending central portion of the piston, toggle links connected at their lower ends to said ears, a shackle connecting the upper ends of each pair of toggle links, a rod extending downward through each shackle, a guide mounted upon the central portion of each piston through which the rod slides, and weights carried by said rod and operatively bearing against the shackle of each pair of toggle links.

6. In a gas holder, a shell, a piston therefor and sealing means between the shell and piston including a sealing ring formed in sections supported upon the piston bearing against the inner face of the shell, gravity actuated means urging the upper end of each section of the sealing ring toward and against the inner face of the shell, the adjacent ends of each sealing ring being vertically grooved, and packing elements of soft rubber disposed between the adjacent ends of the sealing ring sections and extending into said grooves, the lower end of each sealing ring section having a downwardly and inwardly extending skirt, angle iron sections attached to the piston and supporting said skirt, the lower ends of the packing elements being extended downward and outward and engaging over the skirt portion, and bolts holding the skirt portions of the sealing ring and the lower ends of the packing elements to said angle iron sections.

7. In a gas holder, an outer shell, a piston movable vertically therein, angle iron sections attached to the piston adjacent the inner face of the shell and extending circumferentially around the piston, the sections being spaced slightly from each other, a sealing ring mounted at its lower edge upon said angle iron sections and extending upward and bearing against the inner face of the shell, the sealing ring beig formed in sections, a lubricant containing trough disposed above and supported on the sealing ring and formed of sections, expansible joints between the sections of the trough, and means urging the sections of the seal-

ing ring into engagement with the inner face of the shell.

8. In a gas holder, a shell, a piston movable vertically therein, angle iron sections attached to the piston adjacent the inner face of the shell and extending circumferentially around the piston, a sealing ring formed of sections, the ring being mounted at its lower end upon said angle iron sections and extending upward and bearing against the inner face of the shell, an angle iron engaging the upper margin of the sealing ring and having an outwardly extending flange bearing upon the upper edge of the sealing ring, the angle iron being formed of sections, a downwardly and outwardly extending member formed in sections and constituting the bottom of a lubricant trough, said member being disposed above the angle iron, a U-shaped yielding member attached at its margins to the ends of the lubricant trough bottom sections, the bight of the U-shaped member extending inward, a sheet of rubber attached to the lower margins of the U-shaped member and forming an apron, the outer end of the apron being extended downward between the outer shell and the sealing ring and over the edge of the sub-adjacent iron, and means urging the sealing ring into engagement with the inner face of the shell.

9. In a gas holder, a shell, a piston movable vertically therein, angle iron sections attached to the piston adjacent the inner face of the shell and extending circumferentially around the piston, a sealing ring formed of sections, the ring being mounted at its lower end upon said angle iron sections and extending upward and bearing against the inner face of the shell, an angle iron engaging the upper margin of the sealing ring and having an outwardly extending flange bearing upon the upper edge of the sealing ring, the angle iron being formed of sections, a downwardly and outwardly extending member formed in sections and constituting the bottom of a lubricant trough, said member being disposed above the angle iron, a U-shaped yielding member attached at its margins to the ends of the lubricant trough bottom sections, the bight of the U-shaped member extending inward, a sheet of rubber attached to the lower margin of the U-shaped member and forming an apron, the other end of the apron being extended downward between the outer shell and the sealing ring and over the edge of the sub-adjacent angle iron, and a plate of sheet metal having its outer and inner ends bent downward to embrace the upper flange of the angle iron and disposed between the upper face of the angle iron and the sheet rubber, and means urging the sealing ring into engagement with the inner face of the shell.

10. In a gas holder, a shell, a piston movable vertically therein, a sealing ring carried by the piston and movable vertically within the shell and bearing against the inner face of the shell, the sealing ring being formed in sections, means sealing the joints between the sections of the sealing ring, but permitting expansion and contraction, a sectional lubricant containing trough operatively mounted upon the upper edge of the sealing ring, the trough being formed in sections, expansible means for sealing the spaces between said sections of the trough, and gravity actuated means urging the sections of the sealing ring into engagement with the inner face of the shell.

In testimony whereof I hereunto affix my signature.

HERMAN F. JURISCH.