Sept. 15, 1936. F. EINBECK 2,054,693

WATERLESS GAS HOLDER

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Fig. 1.

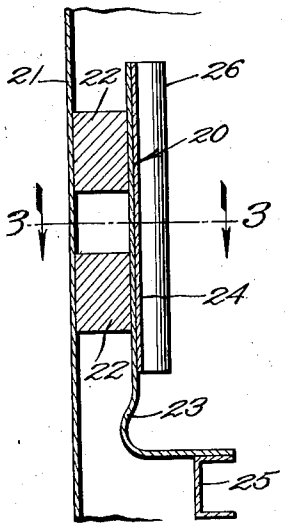


Fig. 2.

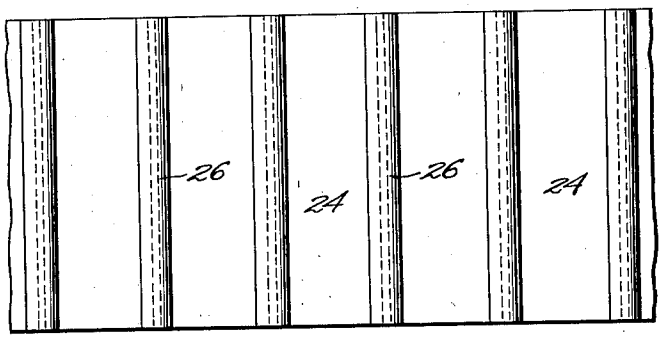


Fig. 3.

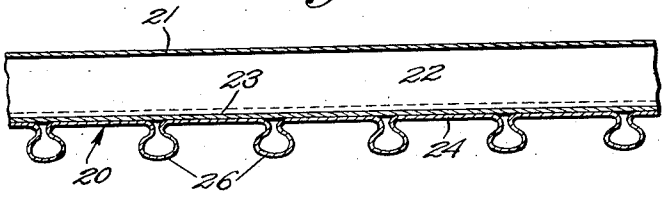


Fig. 4.

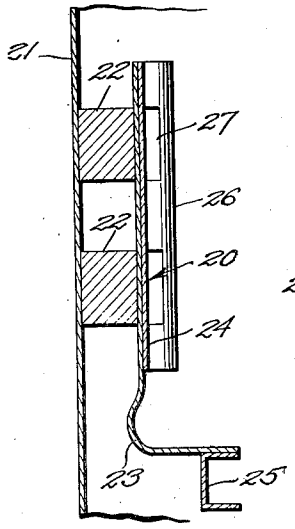
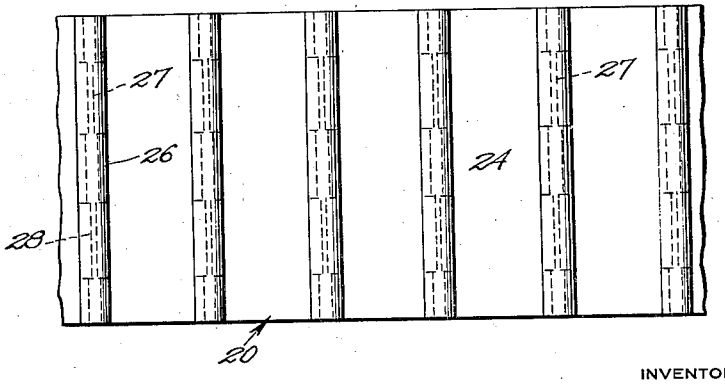


Fig. 5.



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Fig.6.

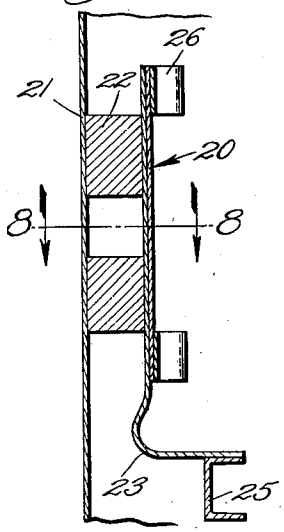


Fig.7.

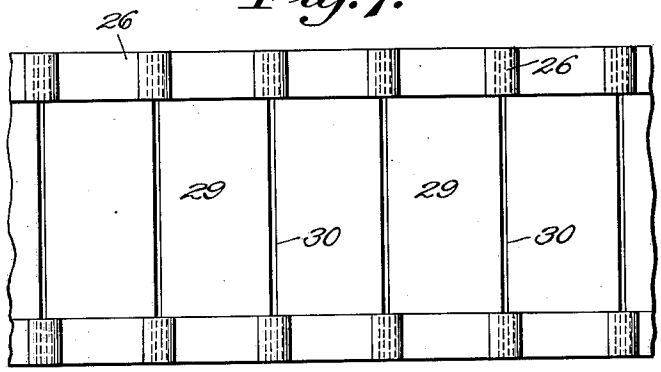


Fig.8.

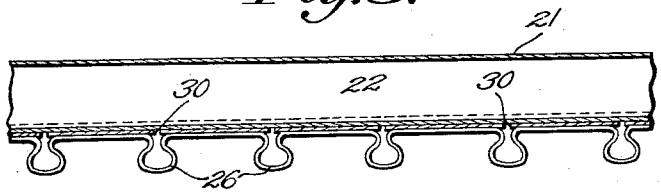


Fig.9.

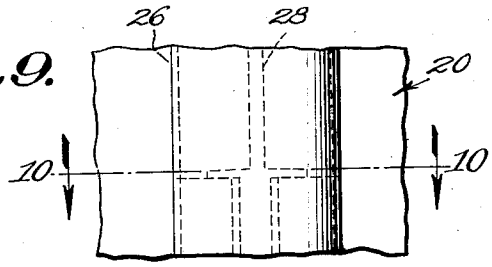


Fig.12.

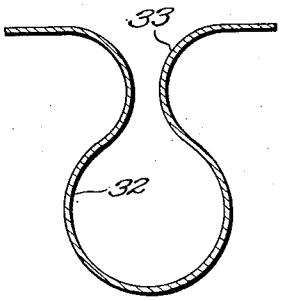


Fig.10.

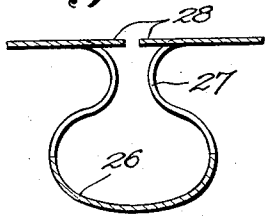
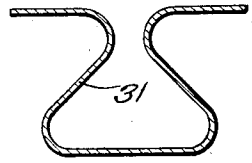


Fig.11.



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Fig. 13.

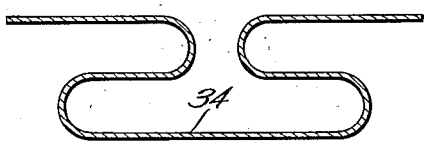


Fig. 14.

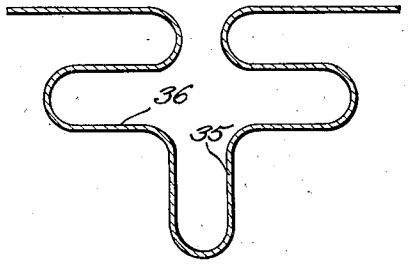


Fig. 15.

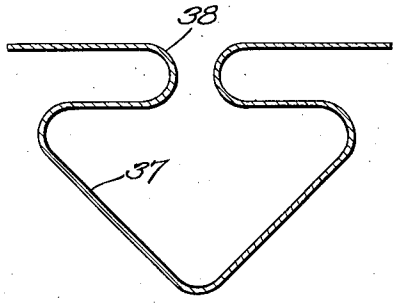
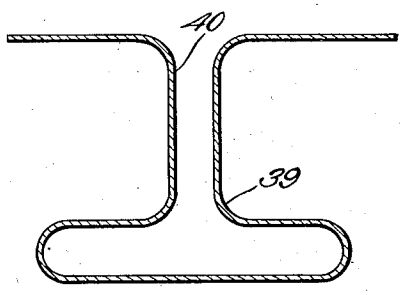


Fig. 16.



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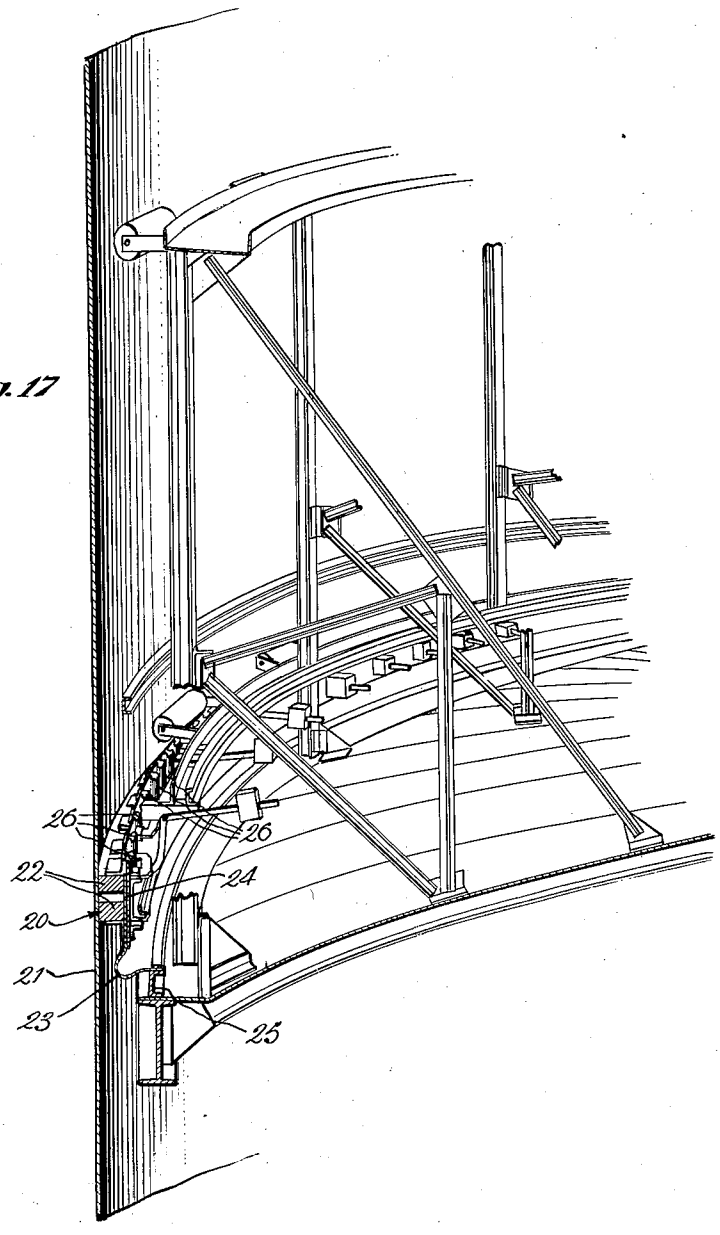
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Fig. 17



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UNITED STATES PATENT OFFICE

2,054,693

WATERLESS GAS HOLDER

Friedrich Einbeck, Dortmund, Germany, assignor to The Stacey Bros. Gas Construction Company, Cincinnati, Ohio, a corporation of Ohio

Application December 28, 1933, Serial No. 704,300
In Germany January 6, 1933

6 Claims. (Cl. 48—176)

This invention relates to storage reservoirs or holders for gas, steam or easy evaporating fluid, and is particularly directed to improvements in the separating vertically translatable piston or deck within the reservoir as a movable top closure therefor. The gas is confined in the space between the piston and the closed base of the holder, which piston by its weight maintains the gas under pressure and vertically adjusts to accommodate the gas supply contained in the reservoir. These types of gas holders are commercially referred to as waterless gas holders.

In conjunction with this piston, a solid or mechanical seal is employed for sealing the piston with the wall of the reservoir, which is preferably cylindrical. This seal incorporates an arrangement of one or several packing rings placed on a dilatable sheet metal ring constantly bearing, under pressure, against the wall of the holder under an influence such as levers and weights.

The sheet metal ring has been made dilatable by incorporating vertically disposed flutes or ribs therein. These flutes have been designed to permit the ring to dilate either in contractive or expansive movement and to bend to any irregular contour necessary for maintaining the mechanical seal or packing rings in uniform and positive contact with the wall of the holder throughout the entire inner circumference thereof.

It is the object of this invention to increase the flexibility or elasticity of the dilatable ring in the radial direction as well as in the circumferential so that despite local distortions of the wall of the holder or shell the rings shape to the wall for absolute contact. The purpose is to permit flexing of the ring over small portions of the circumference, such as over the space of one or two flutes, by the ability of the ring to flex directly radially as well as to stretch and contract circumferentially. This causes a perfect seal and a well fitted packing is always insured. It is an advantage that the flutes are more pliable or yielding and therefore the entire ring is more elastic with the result that less contact maintaining power is necessary to stretch and flex the flutes, which result is highly desirable.

It is a further object of this invention to provide that the flutes are cut out to some extent making the flutes more elastic, and to make use of flanges resulting from the cut-away portions for partially closing the openings to the flutes preventing entrance of the packing ring or lining into the interiors of the flutes.

Other objects and further advantages will be more fully apparent from a description of the accompanying drawings, in which:

Figure 1 is a fragmentary vertical sectional view of one side of a holder, showing the ring and packing relative thereto.

Figure 2 is an inner side view of a portion of the dilatable ring of Figure 1.

Figure 3 is a sectional view taken on line 3—3, Figure 1.

Figure 4 is a fragmentary vertical sectional view taken similar to Figure 1 but showing modified flutes.

Figure 5 is an inner side view of a portion of the dilatable ring of Figure 4.

Figure 6 is a fragmentary vertical sectional view taken similar to Figures 1 and 4, showing another modification of the dilatable ring structure.

Figure 7 is an inner side view of a portion of the dilatable ring of Figure 6.

Figure 8 is a sectional view taken on line 8—8, Figure 6.

Figure 9 is an enlarged fragmentary view of a flute of Figure 8.

Figure 10 is a sectional view taken on line 10—10, Figure 9.

Figures 11 to 16 inclusive are sectional views similar to Figure 10, taken transversely through flutes having modified shapes for flexibility.

Figure 17 is a general view of a holder showing the improved dilatable ring of the present invention incorporated therein.

The flutes, described generally, are enlarged either gradually or abruptly whereby each portion of dilatable ring may move independently directly radially an appropriate amount to fit snugly to locally distorted reservoir wall portions.

Referring to the drawings the sealing unit is indicated generally at 20. This sealing unit is attached to the piston structure so as to travel therewith and is urged outwardly into contact with the inner surface of the holder wall 21 by means of weight urged levers or other pressure devices such as air or fluid or any other well known means (not shown).

The sealing unit includes vertically spaced packing rings 22, a seal ring 23 and a dilatable ring 24. The packing rings 22 are supported in sealing contact against the inner wall 21 of the reservoir. The seal ring 23 is secured between the packing rings 22 and the dilatable ring 24. This seal ring which is of fabric or pliable character has its lower end connected to a channel iron 25 of the piston as shown.

The dilatable ring, which is on the inside of the unit adjacent the packing rings, is acted on by the pressure means for dilation of the unit.

Vertical flutes 26 are formed at spaced intervals around the circumference of the continuous one piece dilatable ring 24. These flutes are disposed inwardly and are enlarged as hereinafter described for the purpose of greater flexibility and dilatability of the ring for highly sensitive radial movement of the ring 24 at any point in its circumference, the ring fitting accurately to any irregularity or deviation of the shell 20 from true circular condition. The side walls of the flutes may be described as curved or undulating for the purpose of flexibility along these walls and greater general flexibility of the flutes permitting direct radial dilation of the portions of the dilatable ring between the flutes thereof.

The enlargement of the flutes, as shown in Figures 1 to 3, is accomplished by making the flutes bead-like or oval crosswise to the slot opening of the flute. It will be at once apparent that by the use of oval flutes the sections or portions of the dilatable ring between flutes can move or spring more freely radially because of the resilience or yieldability afforded by the circular disposition of the plate metal in the side walls of the flutes.

As shown in Figures 4 and 5, the flutes are cut out as at 27 in order to make the flutes still more yieldable. A portion of the metal of the cut-away portions or a flange 28 is bent outwardly into the same plane as the dilatable ring so as to partially close the slot opening into the flute. This prevents the material of the sealing or the packing from entering the interior of the flute.

As to the details of construction of the dilatable ring in which the flutes are cut-away, reference is made to Figures 9 and 10, the metal flanges 28 bent out of the flute sides being shown. In the construction shown in Figures 6 to 8 inclusive, the dilatable ring may be made up of a multiplicity of vertically disposed sheet metal strips 29 and top and bottom dilatable bands secured to the inside of the upper and lower ends of the middle strips or plates 29. These plate sections are spaced to leave slots or clearances 30 therebetween. The dilatable bands are of the same construction as the dilatable ring of the preceding form as viewed in horizontal cross section, but are of very little height or of narrow width. The flutes of the strips are disposed adjacent the clearances between the plates, overlapping these openings, the dilatability of this fabrication being the same as in the preceding form.

Referring to the different shapes for the flutes, it will be noted that the first figures and the detailed Figure 10 show an oval flute which has its long axis crosswise to the opening into the flute. Figure 11 discloses a triangular flute 31, whereas Figure 12 illustrates a perfectly round flute 32 with a wide curved opening or neck 33 to the flute.

In the form shown in Figure 13 the enlargement is quite abrupt and the flute 34 assumes a more or less flattened shape transverse to the opening into the flute. To the flattened flute of Figure 13 a radial projection 35 may be added in alignment with the slot so that the flute 36 as in Figure 14 has somewhat the appearance of a cross in section.

In Figure 15 the flute 37 has the appearance of an arrowhead being triangular with the narrow slot opening 38 into the flute intermediate of one side thereof. The flute 39 of Figure 16 is similar to Figure 13 but incorporates a longer neck or shank 40 for the flute projected to and supporting the flattened construction of Figure 13.

Having described my invention, I claim:

1. A dilatable ring for the sealing unit of a gas storage reservoir piston, said ring incorporating inwardly extended transverse flutes having undulating sides, and portions of said sides cut away whereby the flutes are more flexible for permitting easier direct radial dilation of local portions of the dilatable ring.

2. A dilatable ring for the sealing unit of a gas storage reservoir piston, said ring incorporating inwardly extended flutes, said flutes having portions of the side walls thereof cut away and bent into the general plane of the ring across the openings into the flutes.

3. A dilatable ring for the sealing unit of a gas storage reservoir, said ring comprising a plurality of plate elements and inwardly fluted bands securing said plate elements in circular relation, the flutes of said bands including secondary flutes in the walls thereof for increased flexibility of the ring.

4. A dilatable ring for the sealing unit of a gas storage reservoir, said ring having flutes transversely formed therein, the side walls of said flutes being spread apart beyond the opening into the flutes.

5. A dilatable ring for the sealing unit of a gas storage reservoir, said ring having flutes formed transversely thereof, said flutes being spread crosswise to the entrances thereof and having wall portions disposed generally parallel to the body of the ring.

6. A dilatable ring for the sealing unit of a gas storage reservoir piston, said ring incorporating transversely disposed flutes, said flutes extending inwardly from the body of the ring toward the center thereof, and the walls of said flutes including convolutions for increased flexibility of the ring.

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