Sept. 26, 1950 F. L. GOLDSBY ET AL 2,523,292

FLOATING ROOF SEAL

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Fig. 1.

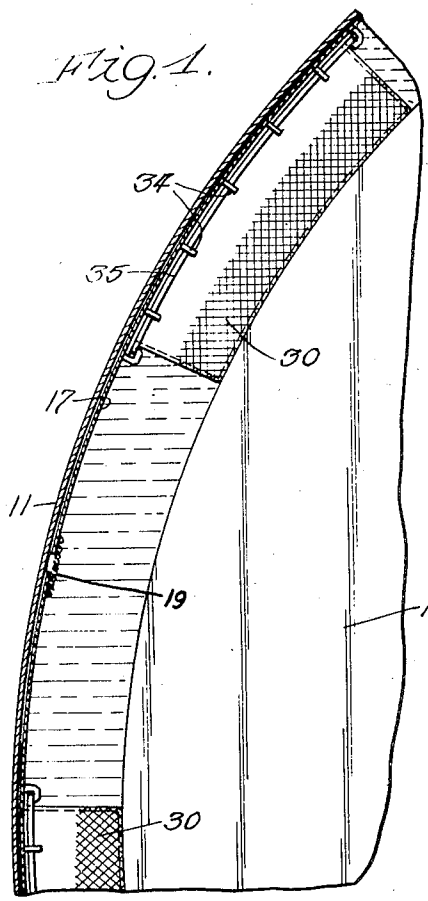


Fig. 3.

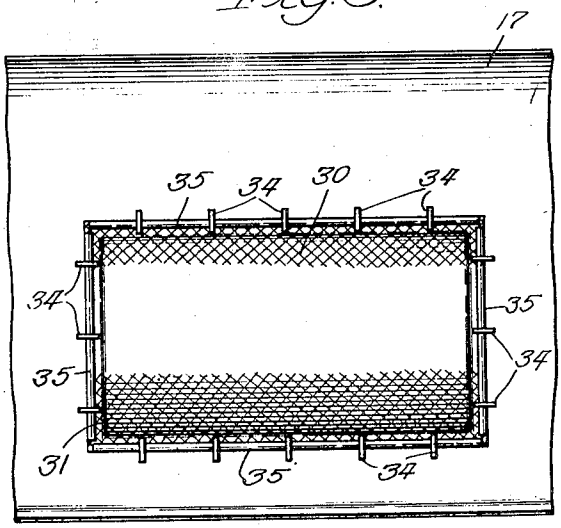


Fig. 4.

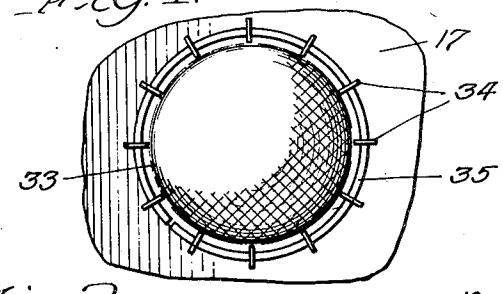
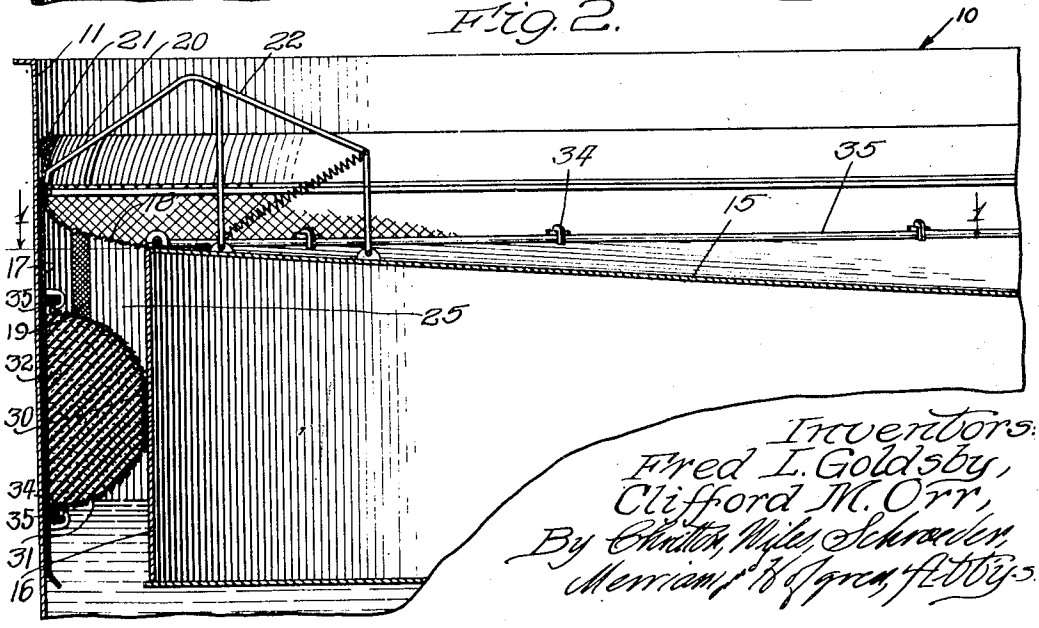


Fig. 2.



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Fig. 5.

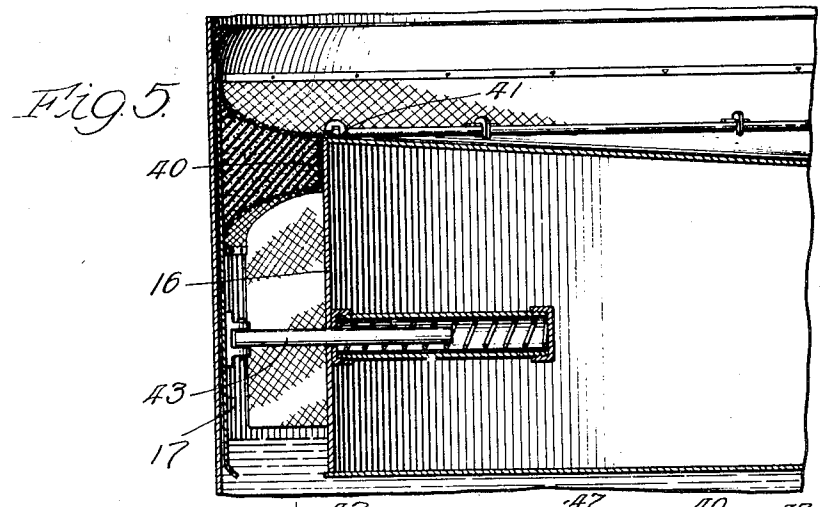


Fig. 6.

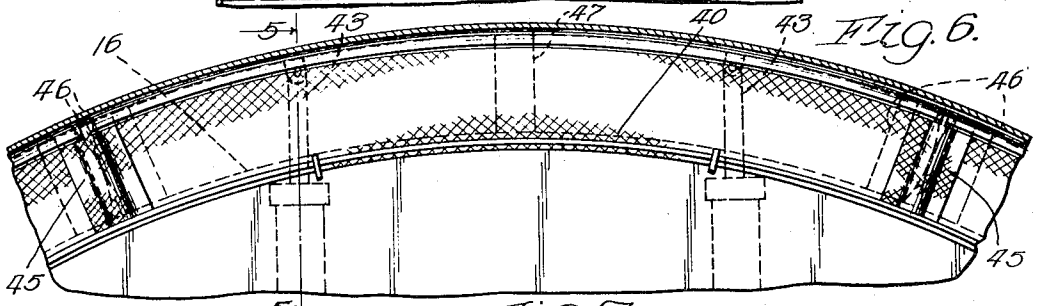
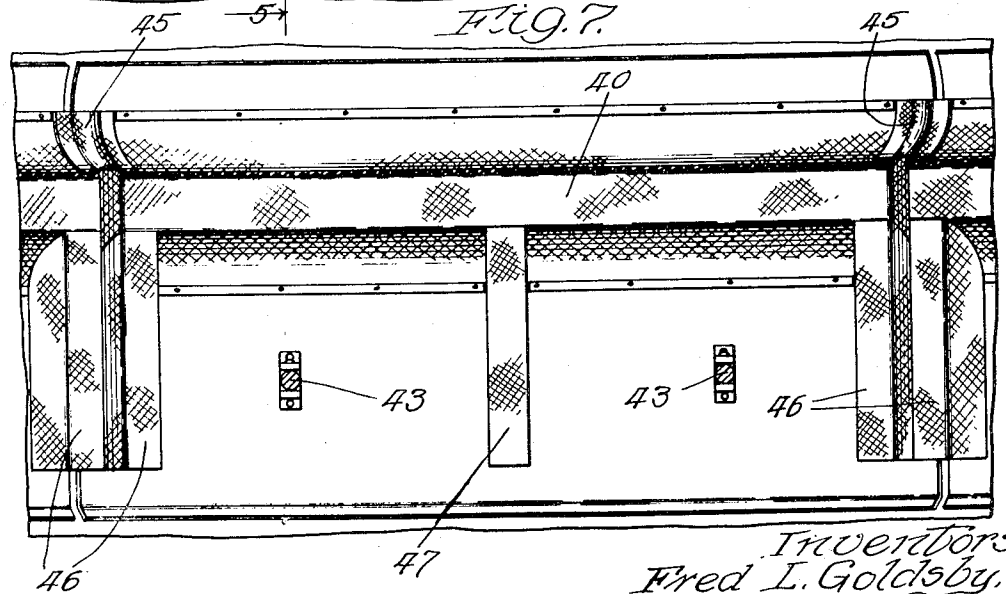


Fig. 7.



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2,523,292

FLOATING ROOF SEAL

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8 Claims. (Cl. 220—26)

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This invention relates to a floating roof seal, and more particularly to a seal in which the floating roof carries a shoe in opposed relation to the wall of the tank, and separated from the roof by a vapor space. The shoe is maintained in its spaced relationship, at least in part, by compressed sponge rubber held in a container within the vapor space.

It is common practice in floating roofs to employ a deck which has a smaller diameter than the minimum diameter of the tank. Inasmuch as the tank diameter varies often as much as a foot between minimum and maximum, means must be provided which can vary in diameter enough to accommodate itself to the tank. This is commonly a shoe or other device which is urged outwardly against the wall from the roof or deck portion. While springs of all types have been suggested for this purpose, none of them have proved entirely satisfactory. In the present invention sponge rubber is held under pressure within a fabric or other flexible container in such a manner that it can accommodate itself to the maximum change of the diameter of the tank and still maintain the fabric in contact, both with the shoe and with the deck or roof proper. These sponge rubber pushers may be provided at suitable intervals, or they may form a complete ring around the deck.

The invention is illustrated in the drawings in which:

Fig. 1 is a fragmentary top plan view in section, illustrating one form of the invention;

Fig. 2 is a fragmentary sectional elevation corresponding to Fig. 1;

Fig. 3 is a detail view from the front of one of the pushers;

Fig. 4 is a similar view of a modified form of a pusher;

Fig. 5 is a sectional elevation of another modified form;

Fig. 6 is a fragmentary plan sectional view thereof; and

Fig. 7 is a side elevation thereof.

As shown in the drawings, a tank 10, having a side wall 11, is provided with a floating roof 15 which includes a deck having a vertical rim 16. A vertical shoe 17 is normally opposed to the side wall in substantially parallel arrangement and is spaced from the rim 16. A flexible fabric seal 18 connects the shoe 17 and the rim 16. The shoe 17 is arranged in any suitable manner so that it may adapt itself to the changes in diameter of the tank. This may be accomplished by flexibility, or by providing a plurality of segments connected by fabric interseals 19.

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The shoe 17 is preferably of double curvature, being flanged at the top and the bottom. The top flange 20 preferably carries a secondary seal 21 which may be of the same form as the pushers hereinafter described, and may be a ring about the vessel.

The shoe is supported in any suitable manner from the roof, as, for example, by the toggle arrangement 22.

It will be observed that a vapor space 25 is formed between the rim 16 and the shoe 17. Within this space is mounted the pusher 30 which comprises a flexible fabric bag 31 which is stuffed with sponge rubber 32. This rubber is of a type unaffected by the liquid being stored in the container. If this liquid is gasoline or the like, the rubber should be unaffected by gasoline, and is preferably neoprene. Scrap sponge neoprene may be employed. Rubberized hair may also be employed.

In the forms shown in Figures 1, 2, 3 and 4 the pushers 30 are provided at intervals, say at six feet around the tank.

In the form shown in Fig. 3, the pusher is held within a rectangular bag 31, whereas in the form shown in Fig. 4, it is held within a circular bag 33. The edges of the fabric are preferably clamped to the face of the shoe by means of hooks 34 and rods 35.

In the form shown in Fig. 5, the pusher 40 itself forms a seal for the vapor space and is mounted at the top of the rim 16. It is also provided with an overlapping fabric portion 41 which forms a further seal. In this case it is preferred to employ a secondary pusher 43, for example, of the common plunger type. This pusher, however, serves primarily as a hanger for the shoe and the force of the spring employed in the plunger need only be enough to keep the shoe in vertical arrangement.

In this form of device the shoes are, for example, twelve feet long and the pusher 40 is preferably made in an equal number of sections to form a continuous ring along the shoe. The edges of the pusher sections are, however, joined by a fabric seal 45. Vertical elastic pushers 46 are provided along the edges of the shoe with their edges joined by the seal 45 and additional vertical elastic pushers are preferably provided intermediate thereof, as indicated at 47.

The foregoing detailed description has been given for clearness of understanding only, and

no unnecessary limitations should be understood therefrom.

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

1. A floating roof comprising a deck having a vertical rim member, a vertical shoe member carried by the deck in opposed relation to the side wall of the vessel spaced from the rim to form a gas space therebetween, a seal above the gas space, and presser means in the gas space secured to one of said members and in free contact with the other member, said presser means comprising a liquidproof bag and rubbery material in compression within the bag urging the shoe from the deck during all relative positions of roof to deck.

2. A floating roof as set forth in claim 1 in which the bag is secured to the inner face of the shoe.

3. A floating roof as set forth in claim 1 in which the upper edge of the shoe is bent inwardly and the outer face of the bent in portion carries a seal of rubbery material normally urged against the side wall of the vessel.

4. A floating roof as set forth in claim 1 in which the bag containing the rubbery material extends completely around the roof in the form of an annulus to form a seal for said gas space.

5. In a liquid storage tank having a floating roof, a plurality of shoes adapted to slidably contact the side walls of the tank, and a primary seal between the shoes and the roof, a secondary seal comprising an annulus of flexible sealing material secured to the upper surface of the shoes in opposed relation to the tank wall, said annulus being maintained under tension by rubbery material under compression within the annulus.

6. Apparatus of the character described in claim 5 in which the upper edge of the shoes is bent inwardly and said annulus is carried on the outer face of the bent portion.

7. In a liquid storage tank having a floating roof and a plurality of shoes adapted to slidably contact the side walls of the tank, the upper edge of said shoes being bent inwardly, an annular seal for sealing the space between the roof and the shoes, and a secondary seal secured to the outer face of the bent-in portion of the shoe, said secondary seal comprising an annulus of flexible sealing material maintained under tension by rubbery material under compression within the annulus to press the same against the side walls of the tank.

8. Apparatus of the character described in claim 7 in which said annular seal comprises a liquid-proof bag attached to the shoe and in contact with the roof and containing compressed rubbery material, said material being adapted to remain under compression while expanding at least several inches from minimum size.

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