March 21, 1933. G. T. HORTON 1,901,874

FLOATING ROOF AND SEALING MEANS THEREFOR

Filed Jan. 14, 1931 3 Sheets-Sheet 1

Fig. 1.

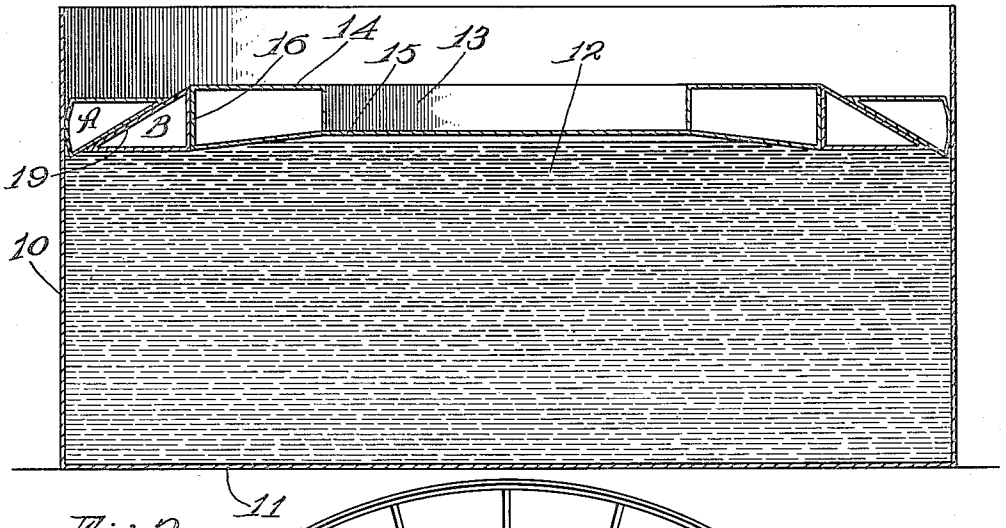
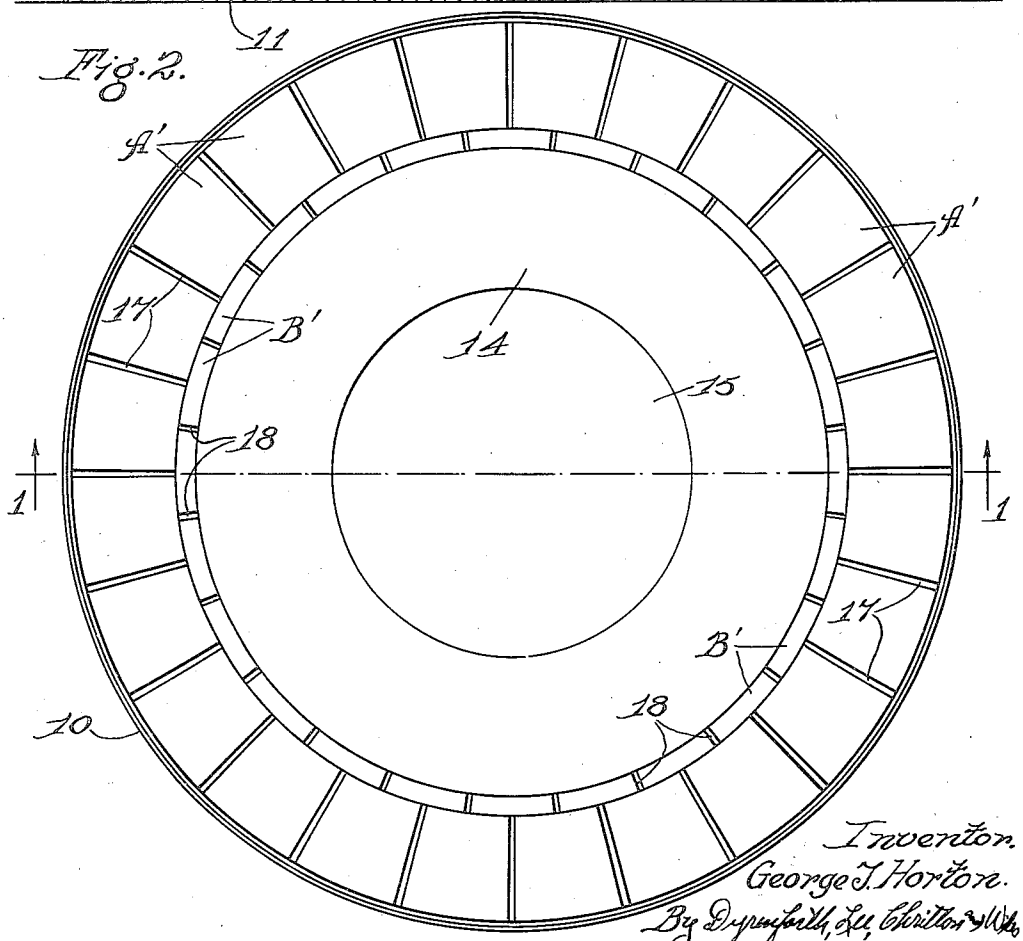


Fig. 2.



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Filed Jan. 14, 1931 3 Sheets-Sheet 2

Fig. 3.

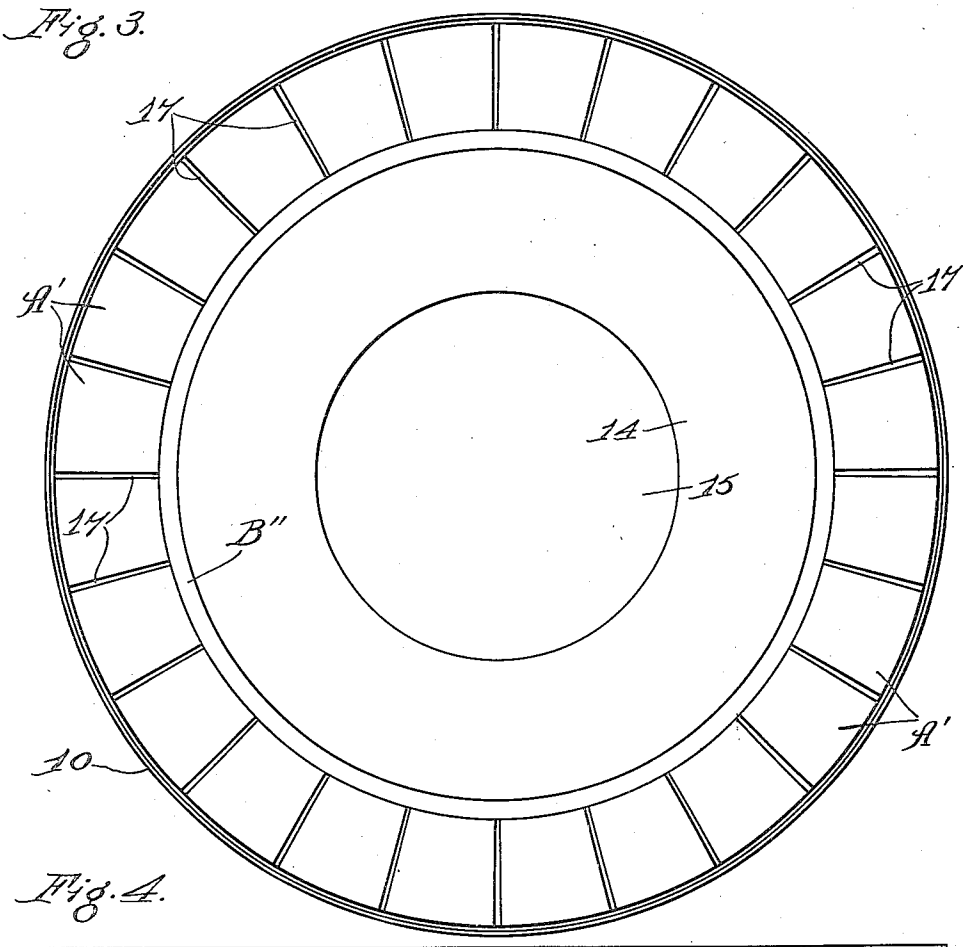
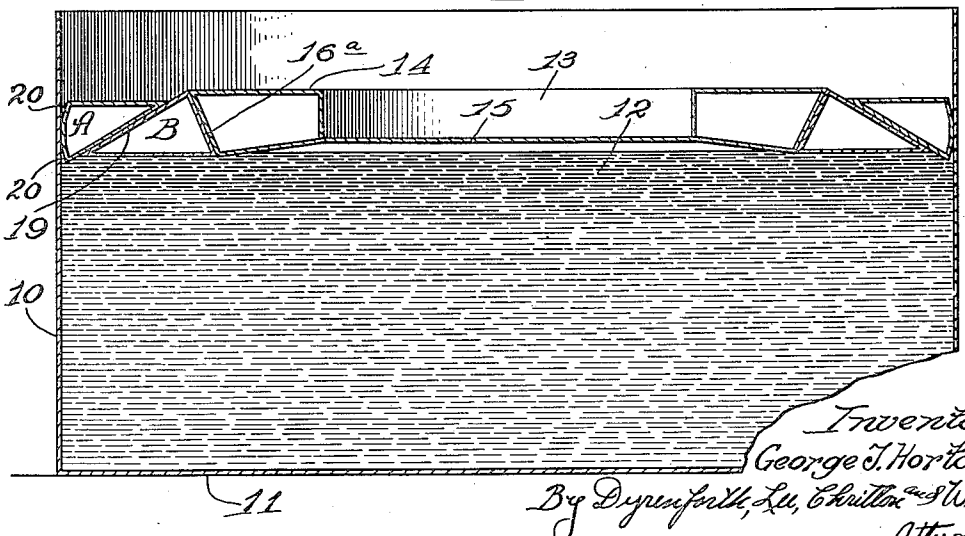


Fig. 4.



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March 21, 1933. G. T. HORTON 1,901,874

FLOATING ROOF AND SEALING MEANS THEREFOR

Filed Jan. 14, 1931 3 Sheets-Sheet 3

Fig. 5.

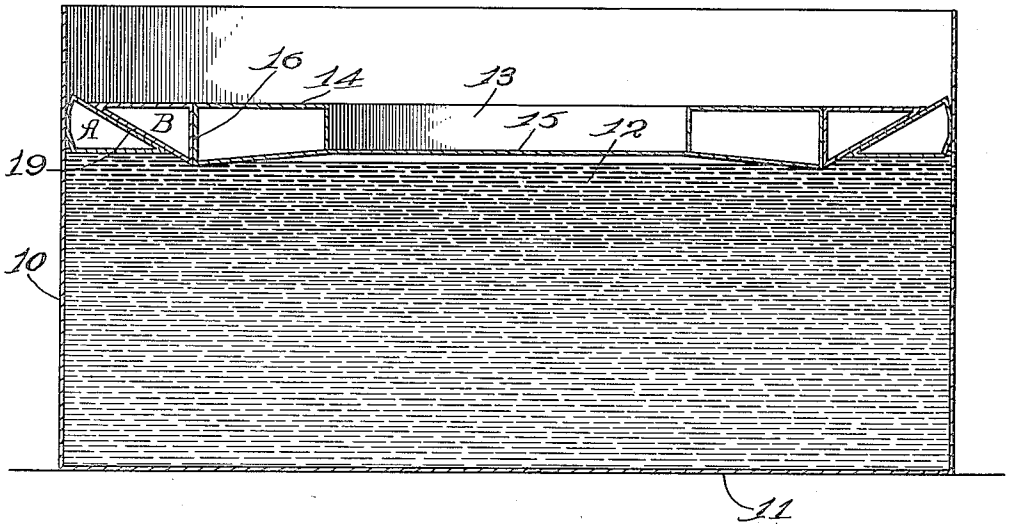
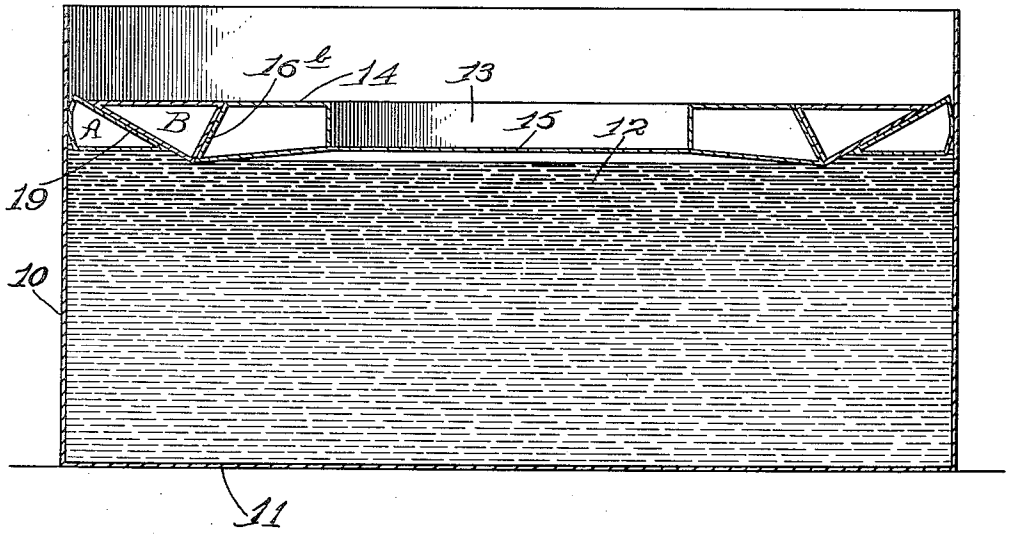


Fig. 6.



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Patented Mar. 21, 1933 1,901,874

UNITED STATES PATENT OFFICE

GEORGE T. HORTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO CHICAGO BRIDGE & IRON COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

FLOATING ROOF AND SEALING MEANS THEREFOR

Application filed January 14, 1931. Serial No. 508,744.

This invention relates to improvements in floating roofs and sealing means therefor and, more especially, floating roofs adapted for use in liquid storage tanks. My invention is particularly applicable for use in connection with a floating roof in a cylindrical tank, and provides means for sealing the space between the periphery of the roof and the wall of the tank.

Among the features of my invention is the provision of simple and effective means for sealing the space referred to. This is accomplished without the use of flexible fabrics, and the like, which are relatively short-lived.

Another feature of my invention is the provision of a sealing means that also acts as an insulating means.

My improved sealing means is formed of independent members which are easily removable for inspection, replacement, repair, and the like.

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 vertical sectional view; Fig. 2 is a top plan view; Fig. 3 is a top plan view of a modified form of inner ring that may be used in connection with the devices shown in Figs. 4 and 6; and Figs. 4, 5 and 6 are views similar to Fig. 1, showing modified forms.

As shown in the drawings, 10 may indicate a cylindrical tank with a bottom 11 containing the liquid 12. Numeral 13 indicates, in general, a floating roof, such as is frequently used in oil storage tanks to lessen losses by evaporation. As here shown, this roof includes the annular pontoon 14 with the central sheet portion 15. The periphery of the floating roof shown in Fig. 1 is vertical, as indicated by 16. In the forms shown in Figs. 4 and 6, the periphery of the roof is beveled, such beveled surface being slanted outwardly and upwardly, as indicated by 16^a in Fig. 4, and outwardly and downwardly, as indicated by 16^b in Fig. 6. In the form shown in Fig. 5, the periphery of the roof is vertical, as indicated by 16, the same as shown in Fig. 1.

The principal feature of this invention is the provision of means for sealing the space between the periphery of the roof and the wall of the tank. In general, it may be stated that this sealing means includes an outer ring of radially movable members with beveled inner surfaces and an inner ring with an outer co-operating beveled surface, the buoyancy of one of the rings and the weight of the other urging the beveled surfaces of the two rings into sliding contact. This causes relative sliding movement of the two rings with respect to each other, causing the outer ring to tend to move outwardly and the inner ring to tend to move inwardly. This causes the two rings to fill the space between the periphery of the roof and the wall of the tank.

The rings may take various forms. Throughout the drawings, I have indicated, in general, the outer ring by A and the inner ring by B. In Figs. 1 and 4, the inner ring is buoyant. In Figs. 5 and 6, the outer ring is buoyant. In all cases, the outer ring is composed of a plurality of members radially movable with respect to each other, that is, in no case is A a continuous ring. As shown in the plan views in Figs. 2 and 3, which are plans of the devices shown in Figs. 1 and 4, the outer rings are composed of a plurality of separate radially movable box-like members A′, which are flat on top and have their inner surfaces beveled, the bevel slanting downwardly and outwardly. It is to be understood that the outer ring of the devices shown in Figs. 5 and 6 is very similar, except that the members A′ are turned over. That is, the outer ring A in the devices of Figs. 5 and 6 is also made up of separate radially movable box-like members having their under surfaces flat and provided with beveled inner surfaces slanting outwardly and upwardly. There are slight spaces 17 left between the members A′ in order to permit the requisite amount of circumferential variation in the

ring A caused by radial movement of the members A'.

The inner ring B may likewise be made up of a plurality of independent members B', B' with spaces 18 therebetween. In the form shown in Figs. 4 and 6, however, where the outer surface of the roof is beveled and the inner surface of the inner ring correspondingly beveled, the inner ring B may be a continuous ring, as shown in Fig. 3 and indicated by B''. In the form shown in Figs. 1 and 4, the inner ring B is buoyant. In each case, the inner ring B has its outer surface provided with a co-operating bevel in sliding contact with the beveled inner surface of the outer ring A. In each of the views in Figs. 1, 4, 5 and 6, the co-operating beveled surfaces of the two rings are indicated by 19. These surfaces are in sliding contact and the buoyancy of one ring and the weight of the other urges them together. This causes a tendency for the rings to separate. That is, the outer ring will be urged outwardly and the inner ring inwardly (with relation to each other) to cause said rings to keep the space between the periphery of the floating roof and the wall of the tank filled.

To obtain the desired buoyancy, I have here shown the inner rings in the devices of Figs. 1 and 4 and the outer rings in the devices of Figs. 5 and 6 made hollow as pontoons so that they will float on the liquid and have sufficient buoyancy to cause them to be urged against the other rings to cause the sliding contact referred to. I have also chosen to make the outer rings in the devices of Figs. 1 and 4 and the inner rings of the devices of Figs. 5 and 6 hollow or box-like in construction, thus causing said rings to operate more effectually as insulating media. It will be seen, therefore, that in all the forms of the device, the two rings afford an insulating means for the space between the periphery of the roof and the wall of the tank. For example, the liquid, such as oil, stored in the tank, is insulated from the heat of the sun by these rings near the wall of the tank.

By the provision of the two rings, sticking or jamming of the sealing means is prevented or lessened. In the forms shown in Figs. 4 and 6, the outer periphery of the roof is beveled, as indicated by 16^a or 16^b, respectively, and the inner surface of the inner ring B provided with a corresponding bevel. The provision of such co-operating beveled surfaces will still further lessen the possibility of the sealing means sticking or becoming jammed. It will be seen that in either of the devices shown in Figs. 4 or 6, if the outer ring sticks against the wall of the tank, either upward or downward movement of the floating roof will cause a lessening of the two rings with a corresponding release of the ring A.

The radial spaces 17 and 18 between the members should be sufficient to allow them to adjust themselves to varying tank diameters and unevennesses in the periphery of the tank or roof.

The top and bottom outer edges of the members A' are tapered, as indicated by 20, to permit them to pass over rivet heads and other unevennesses, projections, or obstructions that there may be on the inner wall of the tank.

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 claims, 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:

1. A floating roof and means for sealing the space between the wall of a cylindrical tank and the periphery of said roof, said means including an outer ring of radially movable members with beveled inner surfaces and an inner ring with an outer co-operating beveled surface, one of said rings being made buoyant and adapted to float on liquid in the tank, the buoyancy of said ring and the weight of the other ring urging the beveled surfaces of the two rings into sliding contact, the inner surface of the inner ring and the outer peripheral surface of the floating roof being provided with co-operating beveled surfaces, said beveled surfaces being oppositely inclined from the cooperating beveled surfaces of the rings.

2. Apparatus as claimed in claim 1, in which the sealing means embody a hollow box-like construction.

In witness whereof, I have hereunto set my hand, this 12th day of January, 1931.

GEORGE T. HORTON.