May 9, 1933. E. R. SCHAEFFER 1,907,590

EAVES CONSTRUCTION FOR WOOD DECK STORAGE TANKS

Filed Aug. 12, 1930

Fig. 1

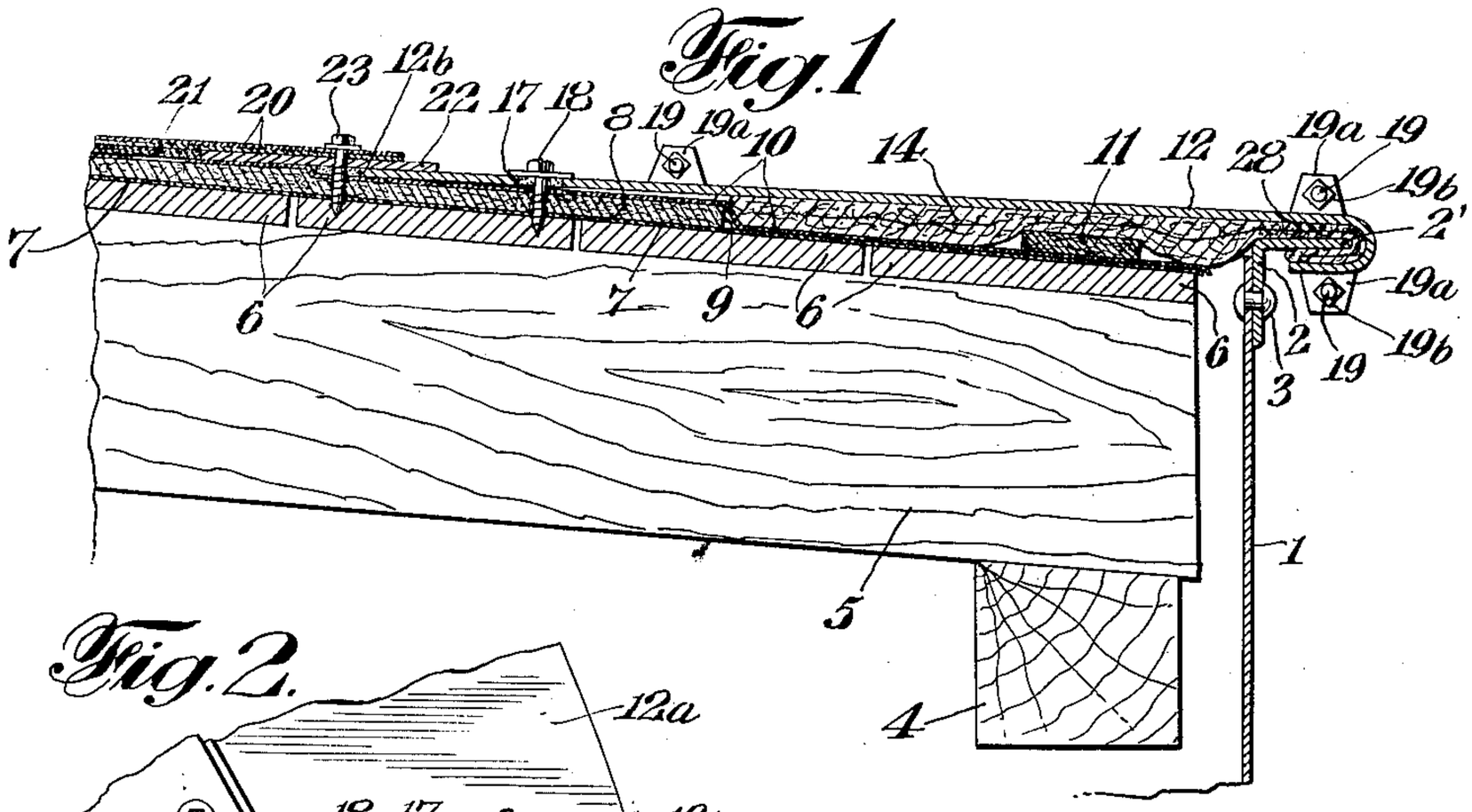


Fig. 2.

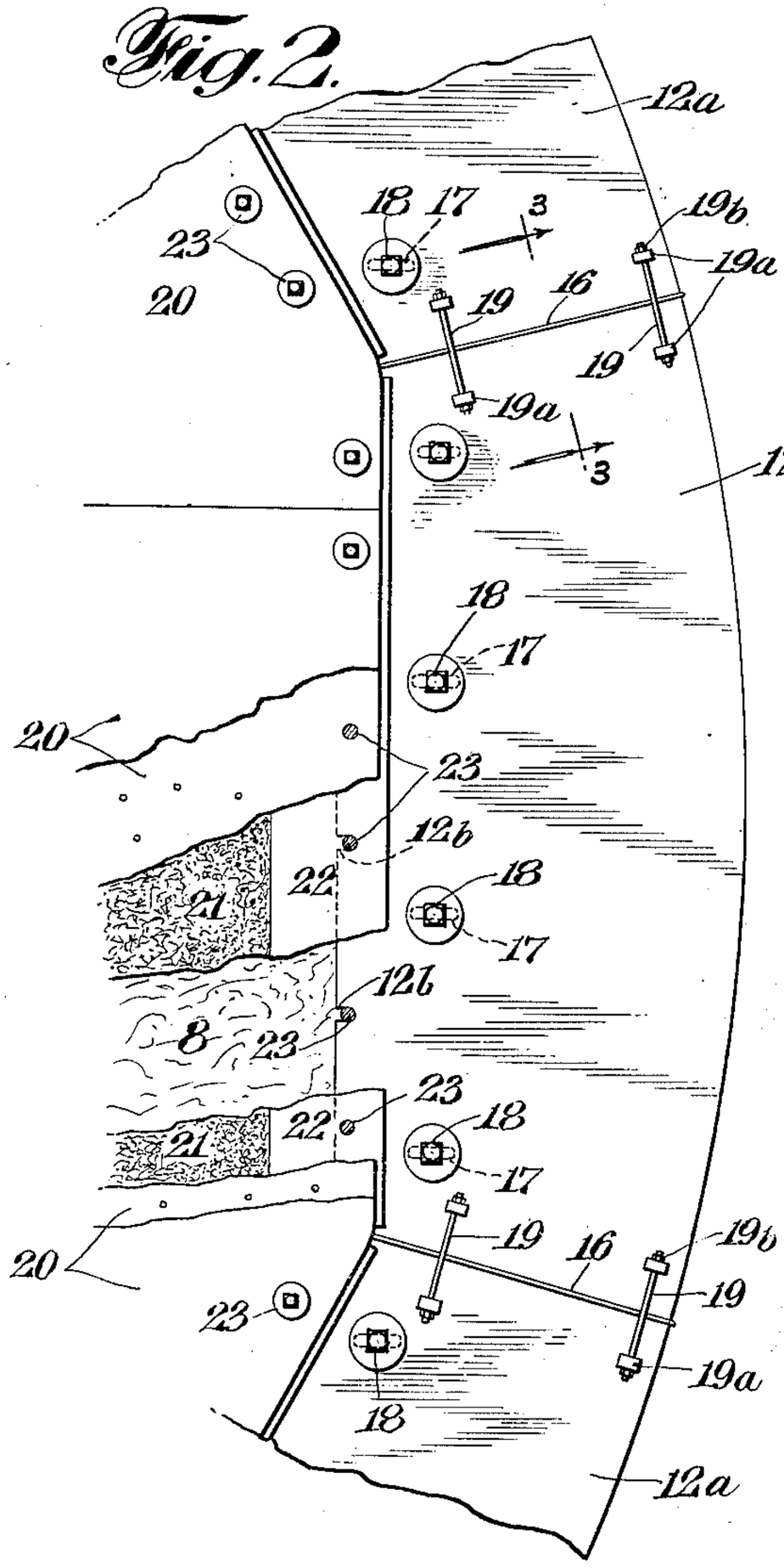
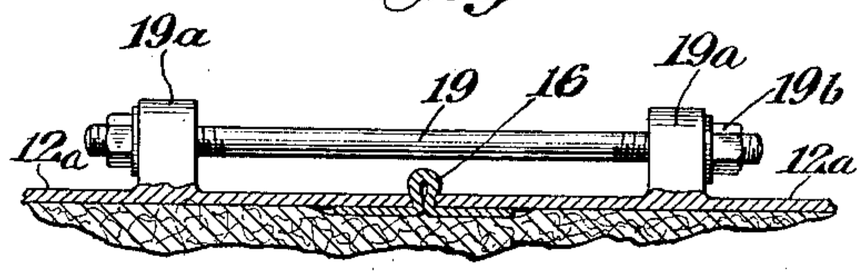


Fig. 3



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UNITED STATES PATENT OFFICE

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EAVES CONSTRUCTION FOR WOOD DECK STORAGE TANKS

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My invention relates to structures, such as tank roofs and more particularly to roofs for oil storage tanks.

In cases where the contents of the tank (such as various sulphur containing oils) would cause corrosion to a steel cover or deck, and sometimes for economy, it is customary to make the tank roof of wood and cover it with roofing material. It has heretofore been found difficult to make and keep such a roof vapor tight at the eaves, since the steel shell or side wall of the tank is subject to a considerable amount of movement incidental to filling and emptying and to temperature changes. Losses due to evaporation where the tank cover is not tight amount to very large sums.

An object of the invention is to provide an improved roof having a flexible gas tight connection between the metal shell or side walls and the wooden roof, whereby the normal movement of the metal shell is permitted without interrupting the gas tightness of the tank.

Other objects, novel features and advantages of this invention will be apparent from the following specification and accompanying drawing, wherein:

Fig. 1 is a fragmentary vertical sectional view of the tank;

Fig. 2 is a fragmentary plan view partially broken away, and

Fig. 3 is a fragmentary section on the line 3—3 of Fig. 2.

Referring to Fig. 1, the tank has the usual cylindrical steel shell or side wall 1 around the upper rim of which an angle iron 2 is secured, as by rivets 3. The angle iron is arranged with one of its flanges 2′ horizontal and preferably slightly above the upper edge of the shell 1. Within the shell there are the usual wooden vertical stanchions or supports 4 supporting wooden rafters 5 upon which rest the wooden sheathing 6 enclosing the top of the tank.

The sheathing 6 is covered with a layer 7 of roofing such as any flexible roofing material which is designed to a considerable degree to be impervious to the vapor in the tank. To this end it may comprise the usual flexible roofing formed of asbestos felt or paper impregnated with bituminous composition such as asphalt or coal tar. This flexible roofing sheet covers the entire sheathing 6.

Overlying the roofing sheet 7 is a layer or cover 8 of suitable heat insulating material, preferably of a rigid board-like form such as the well known products Celotex, Masonite, etc. This material extends over the entire central portion of roofing sheet 7 but terminates, as shown at 9, a slight distance inwardly of the shell 1. A second layer 10 of like flexible roofing is superposed upon the material 8 but is turned downwardly at the outer edge of the said material into contact with the layer 7, thereby forming near the eaves of the roof two superposed layers 7 and 10 of flexible roofing. Between the outer edge of the heat insulating material 8 and the angle member 2 is arranged a ring 11 of heat insulating material similar to that shown at 8, this ring resting on the superposed layers 7 and 10 of flexible roofing material.

To add to the rigidity of the shell and to provide a strong construction, I secure to the flange 2′ of the angle member a rigid metallic ring 12; and in order to provide a vapor tight seal or gasket at the eaves portion of the tank, I arrange between this plate and the roofing 10 and ring 11 a sheet of resilient material which is substantially impervious to the hydrocarbon vapors within the tank. This sheet 14, as shown, has its inner portion arranged adjacent the edge 9 of the central cover of heat insulating material and extends outwardly therefrom over ring 11 of heat insulating material between the upper surface of the said ring and the plate 12 and then outwardly between the flange 2′ and the metallic plate 12. The resilient sheet is doubled over at its outer portion so as to have two layers of the sheet over the flange 2′, over the outer portion of the roofing 10 and over the ring 11. A seal is thus formed at the angle member 2; and another seal is formed at the ring 11. Between the angle member 2 and the ring 11, the resilient sheet 14 is compressed in a

radial direction and thus permits considerable motion between the shell 1 and the wooden roof without tearing the resilient sheet. When the plate 12 is securely fastened in place, this resilient sheet 14 thus forms a gasket which prevents escape of vapor and at the same time permits such relative movement as occurs between the sheathing 6 and the metallic shell 1 and between the sheathing 6 and the plate 12 without breaking the vapor seal.

While the resilient sheet 14 forming the gasket may be made of various materials, I prefer to make the same of a felt, such as hair felt, which is made impervious to vapor by saturating the same with a suitable composition. I have found that a suitable composition for this purpose is formed by adding to a vegetable oil, such as corn oil, some form of sulphur such as from 20% to 25% sulphur chloride. When these materials are used a chemical action takes place which causes the oil to change to a thick rubber-like material which is practically insoluble in gasoline and impervious to hydrocarbons. The rubber-like material is applied to the hair felt while the compound is hot and thereby caused to thoroughly impregnate the felt.

The ring 12 is preferably made up of sector-shaped plates 12^a such as shown in Fig. 2. These plates are provided with return bend edges which fit over the flange 2′, the resilient sheet 14 being also turned over the flange 2′. The plates are secured to the sheet in such a way as to leave the plates and sheathing free for such relative movement as takes place in service. To this end the various plates are provided with slots 17 extending transversely to the outer or peripheral edges of the plates. Through these slots, lag screws 18 are passed into the sheathing to secure the plates to the sheathing. With this arrangement, the plates are held firmly in place while at the same time allowing freedom between the plates and the sheathing. The adjacent plates are secured together by bolts 19 passing through apertured lugs 19^a, the bolts being provided with nuts 19^b threaded on the ends thereof and engaging the faces of the lugs. Preferably, three sets of bolts and lugs are provided for attaching together adjacent plates. One set is arranged on the return bend edge of the plates while another set is located above the first set. The third set is located near the lag screws 18. Between the edges of adjacent plates are provided gaskets 16 comprising strips of lead having the central portions formed into loops which are gripped between the edges of the adjacent plates. The arrangement of bolts and lugs is such that when the bolts are drawn up, the plates will tend to correct any out-of-round condition that may exist in the shell.

I also place between the upper edge of the metal shell and angle member 2 and rivet heads a mass 28 of a sealing cement which is impervious to and unaffected by the hydrocarbon vapors in the tank. A suitable cement for this purpose is pitch containing a filler of asbestos.

The tank roof is covered with a suitable roofing material 20. This material may be any suitable roofing, such as a built-up roofing formed of a plurality of layers of flexible roofing, such as asbestos roofing. This is preferably capped with an asbestos felt impregnated with a bituminous composition, such as asphalt, and coated with a suitable coating material such as asphalt and surfaced with a finely divided aluminum. To secure this roofing in place and also to provide over the center of the tank a sealing layer of material which is impervious to hydrocarbon vapors, the roofing sheet 10 is covered with a layer 21 of asphalt upon which the roofing 20 is placed before the asphalt has hardened.

Between the roofing 20 and the metallic ring 12 there is formed a slip connection which provides a tight joint and at the same time permits freedom of relative movement between the ring 12 and the roof 20. A flashing plate 22 overlies the inner edge of the ring 12 and extends beneath the outer edge of the roofing 20. Lag screws 23 pass through the roofing 20, flash plate 22, recesses 12^b in the inner edge of the ring 12 and into the sheathing 6. Movement of the eaves plates 12^a relative to the flash plate is permitted by reason of the slots 12^b.

The structure above disclosed permits such movement of the roof as is incidental to filling and emptying and to temperature changes and at the same time provides a tank which is closed tight at all times. The structure of the eaves plates is such as to draw the tank into cylindrical form when the bolts are drawn up and provide a durable and efficient connection with the shell.

Although the above described movement of the invention is preferred, it is to be understood that various modifications within the scope of the appended claims may be made, without in any way departing from the spirit of the invention.

I claim:

1. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, means for drawing together adjacent plates with their adjacent edges in abutting relation, and means forming a vapor tight seal between said roof and said tank.

2. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said

roof and having their peripheral edges turned over to receive said flange, alined lugs on said plates, bolts extending through said lugs for drawing said plates together with their adjacent edges in abutting relation, and means forming a vapor tight seal between said roof and tank.

3. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, a plurality of sets of lugs and bolts for attaching together adjacent plates, one set of bolts and lugs being arranged beneath said flange, and means forming a vapor tight seal between said roof and tank.

4. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, soft metal strips having loops projecting between adjacent edges of said plates, means connecting together adjacent plates, and means forming a vapor tight seal between said roof and tank.

5. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, soft metal strips having loops projecting between adjacent edges of said plates, aligned lugs on said plates, bolts extending through said lugs to fasten together adjacent plates, and means forming a vapor tight seal between said roof and tank.

6. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, soft metal strips having loops projecting between adjacent edges of said plates, a plurality of sets of aligned lugs and bolts for attaching together adjacent plates, one set of lugs being arranged beneath said flange, and means forming a vapor tight seal between said roof and tank.

7. In combination, a tank, a roof, eaves plates secured to said roof and to said tank, roofing material overlying the inner edges of said eaves plates, an annular plate interposed between the roofing material and the eaves plates, and means for securing said roofing material and ring to said roof.

8. In combination, a cylindrical tank having a horizontal flange, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, means connecting together adjacent plates, means forming a vapor tight seal between the roof and tank, roofing material overlying the inner edges of said plates, an annular plate interposed between the roofing material and said plates, and means for securing said roofing material and plate to said roof.

9. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, and means for drawing together adjacent plates with their adjacent edges in abutting relation.

10. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, alined lugs on said plates, and bolts extending through said lugs for drawing said plates together with their adjacent edges in abutting relationship.

11. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, and a plurality of sets of lugs and bolts for attaching together adjacent plates, one set of bolts and lugs being arranged beneath said flange.

12. In combination, a cylindrical tank, a roof, eaves plates secured to said roof and to said tank, soft metal strips having loops projecting between adjacent edges of said plates, and means connecting together adjacent plates.

13. In combination, a cylindrical tank, a roof, eaves plates secured to said roof and to said tank, soft metal strips having loops projecting between adjacent edges of said plates, aligned lugs on said plates, and bolts extending through said lugs to fasten together adjacent plates.

14. In combination, a cylindrical tank, a roof, eaves plates secured to said roof and to said tank, soft metal strips having loops projecting between adjacent edges of said plates, means connecting together adjacent plates, and means for forming a vapor tight seal between said roof and tank.

15. In combination, a cylindrical tank, a roof, eaves plates secured to said roof and to said tank, soft metal strips having loops projecting between adjacent edges of said plates, aligned lugs on said plates, bolts extending through said lugs to fasten together adjacent plates, and means for forming a vapor tight seal between said roof and tank.

16. In combination, a cylindrical tank having a horizontal flange at its upper edge, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, soft metal strips having loops projecting between adjacent edges of said plates, and a plurality of sets of aligned lugs and bolts for attach-

ing together adjacent plates, one set of lugs being arranged beneath said flange.

17. In combination, a cylindrical tank having a horizontal flange, a roof, segmental eaves plates attached to said roof and having their peripheral edges turned over to receive said flange, means connecting together adjacent plates, roofing material overlying the inner edges of said plates, an annular plate interposed between the roofing material and said plates, and means for securing said roofing material and plate to said roof.

18. In combination, a tank, a roof, eaves plates secured to said roof and to said tank, roofing material overlying the inner edges of said eaves plates, an annular plate interposed between the roofing material and the eaves plates, means for securing said roofing material and said ring to said roof, means connecting together adjacent plates, and soft metal strips having loops projecting between adjacent edges of said plates.

19. In combination, a cylindrical tank having a horizontal flange at its upper end, a roof, segmental eaves plates attached to said roof for slight relative movement, said plates having their peripheral edges turned over to receive said flange, means for drawing adjacent edges of said eaves plates into contact to form an annulus, and means forming a vapor tight seal between said roof and tank.

In testimony whereof, I have signed my name to this specification.

ELMER R. SCHAEFFER.