May 18, 1937. J. HOENIGHAUSEN 2,080,568

FLOATING ROOF CONSTRUCTION

Filed April 10, 1936

Fig. 1,

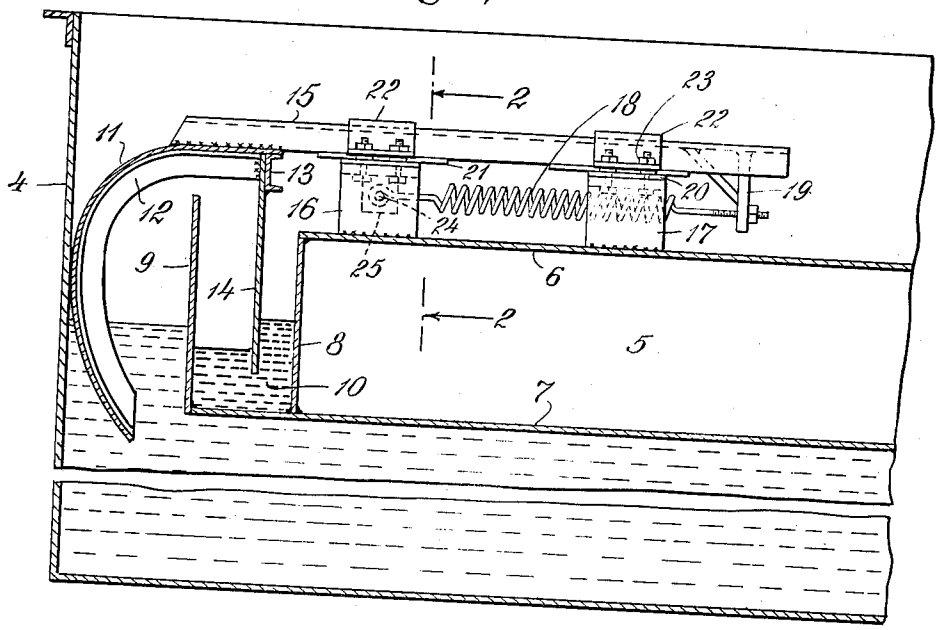


Fig. 2,

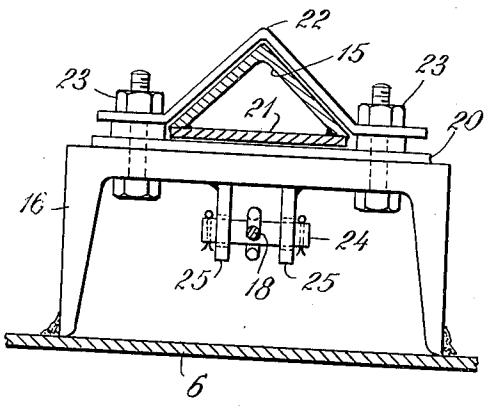
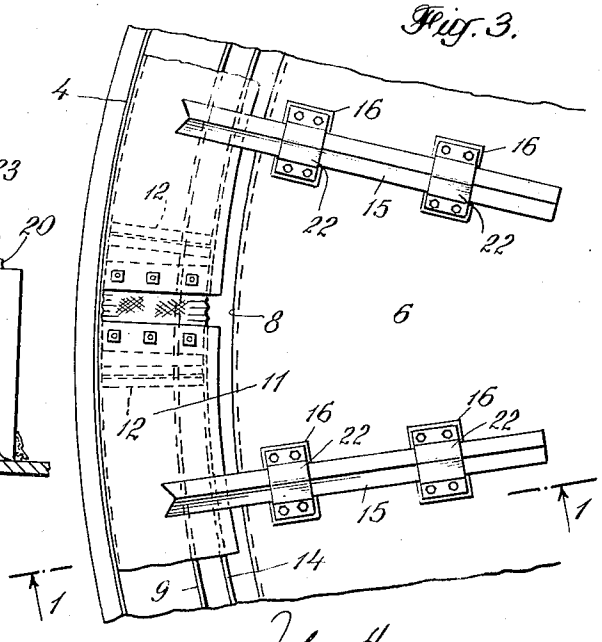


Fig. 3.



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FLOATING ROOF CONSTRUCTION

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Application April 10, 1936, Serial No. 73,655

1 Claim. (Cl. 220—26)

This invention is directed to improvements in storage tanks having floating roofs, such as tanks for the storage of liquid oils tending to evaporate readily, which are equipped with roofs adapted to rest upon the surface of the stored liquid in the tank and to move up and down therewith within the circular enclosing wall of the tank. In tanks of this type, the roof is usually composed of two main portions, viz., the so-called "pontoon" portion, which may be in one or more sections and is essentially a floating pan, of somewhat smaller dimensions than the tank in which it is placed, and the seal mechanism, which serves to seal the variable annular space between the pontoon and the tank wall. This invention is directly concerned with improvements in the construction of this sealing mechanism.

Sealing mechanisms for tank roofs of this type are of several sorts. Most of them depend for seal against the tank wall upon the contact of the tank wall metal with a sliding metal shoe plate which either effects metal to metal contact sufficiently close to prevent substantially the diffusion of vapors from the surface of the stored oil, or establishes a narrow passage of comparatively great depth through which the vapors have little tendency to diffuse and escape. In general, this detail of the construction has been satisfactory, even in tanks of riveted construction, and will be more effective in tanks having welded seams, without rivets, laps, etc., projecting from the interior surface of the tank wall. Greater difficulty has been had with the seal between the shoe-piece and the pontoon. To allow for the necessarily large degree of radial motion of the shoe-piece with respect to the pontoon, the space to be bridged is wide, and comparatively great flexibility of sealing means is required. A fabric, such as asbestos cloth, etc., has frequently been stretched between the shoe-piece and the pontoon, but the difficulties of maintenance of such sealing means and the possibilities of its disastrous failure in case of fire or explosion are too obvious to require further comment. Metal to metal seals, by means of sloping surfaced sectional pontoons sliding over each other have been proposed, but have not proven highly effective, the surfaces in contact becoming roughened due to atmospheric corrosion and the like and not moving smoothly, resulting in frequent failure of sealing means. The most effective type of seal is the liquid seal. This invention is particularly directed to roofs of this type, adapted to float upon the surface of the liquid and to move therewith, and provided with a liquid sealed shoe construction.

The principal object of this invention is to provide a floating roof having a liquid sealed shoe, the construction of which is simple, sturdy, capable of ready maintenance and adjustment, and free to as great a degree as possible from sealing members depending for their efficiency upon the continued efficiency of a flexible metal sheet or textile fabric.

In order that my invention may be understood conveniently, reference is made to the drawing which is attached to this specification. In this drawing, Figure 1 shows a vertical section through the floating roof adjacent the tank wall. Figure 2 is a section showing detailed construction of the sliding support for the shoe-piece, and Figure 3 shows in plan, a partial view of the assembled roof. In Figure 1, **4** is the tank wall, and **5** is the floating roof pontoon, composed of deck plate **6**, floor plate **7**, wall plate **8**, and seal plate **9**, with **8**, **9**, and the extension of **7** cooperating to form a liquid seal trough **10**. Seal at the tank wall is effected by a shoe-piece consisting of shoe plate **11**, attached to and supported by a properly bent T bar **12**, and terminating at its inner periphery with a curb formed by channel bar **13**, from which depends dip ring sheet **14**, which extends into the liquid in sealing trough **10**. These structures may be assembled most conveniently by welding, as is shown here, although riveting or bolting may be used if desired. The shoe-piece is supported in place by a sliding bar **15**, working through two supports **16** and **17**, and is maintained in position against the tank wall by the action of spring **18**, whose fixed end is supported by **16**, and whose free end is attached to sliding bar **15** by bracket **19**. Figure 2 shows the detailed assembly at support **16**. Support **16** may be formed conveniently from a large channel bar, or a heavy sheet bent to the same shape, and is fixed to deck plate **6** by welding or other suitable assembly. Upon support **16** there rests a bearing plate **20**, of brass or other suitable material, across which the sliding bar **15** may travel. Bar **15**, at the points where it rests upon the supports is provided with a steel base plate **21**, welded to the sliding bar **15**, which may be formed most conveniently from a heavy angle iron, as shown. Bar **15** is held down to support **16** by a retainer formed of steel strap **22**, properly shaped, and the whole of the bearing assembly on support **16** is held together by bolts **23**. On the under side of support **16**, the spring **18** is anchored

by means of a pin 24, supported in two lugs 25. Support 17 is the same as 16 except that the spring support lugs 25 are omitted. Figure 3 shows a plan view of a portion of the roof. Since the shoe-piece must be composed of short sections to permit it to accommodate itself to irregularities in the tank wall, those sections are sealed together by short pieces of flexible fabric, capable of resisting oil and having a high resistance to flexure cracking, such as a sheet of "Duprene", the synthetic rubber product of the Du Pont Company, or other material. These joints are the only points where dependence is had upon any material under flexure, and their extent is quite minimized, so that the general efficiency of the structure as a whole, either to prevent evaporation or to protect against fire would not be seriously lowered even by failure of several such joints.

I claim:

In tanks for the storage of volatile liquids having floating roofs composed of a central pontoon and surrounding shoe-pieces to contact with the tank side, a shoe-piece supporting mechanism comprising two or more bearing supports disposed radially of the tank upon the pontoon deck, bearing plates upon such supports, retention plates above bearing plates defining a passage above each bearing plate, a sliding shoe-piece support bar mounted in said passages to reciprocate on said bearing plate, a spring, anchorage means for said spring on the support nearest the pontoon edge, and attachment means for the opposite end of the spring on the innermost end of the shoe-piece support bar.

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