Aug. 4, 1953 A. CIBULKA 2,647,654

FLOATING ROOF FOR TANKS

Filed July 3, 1950

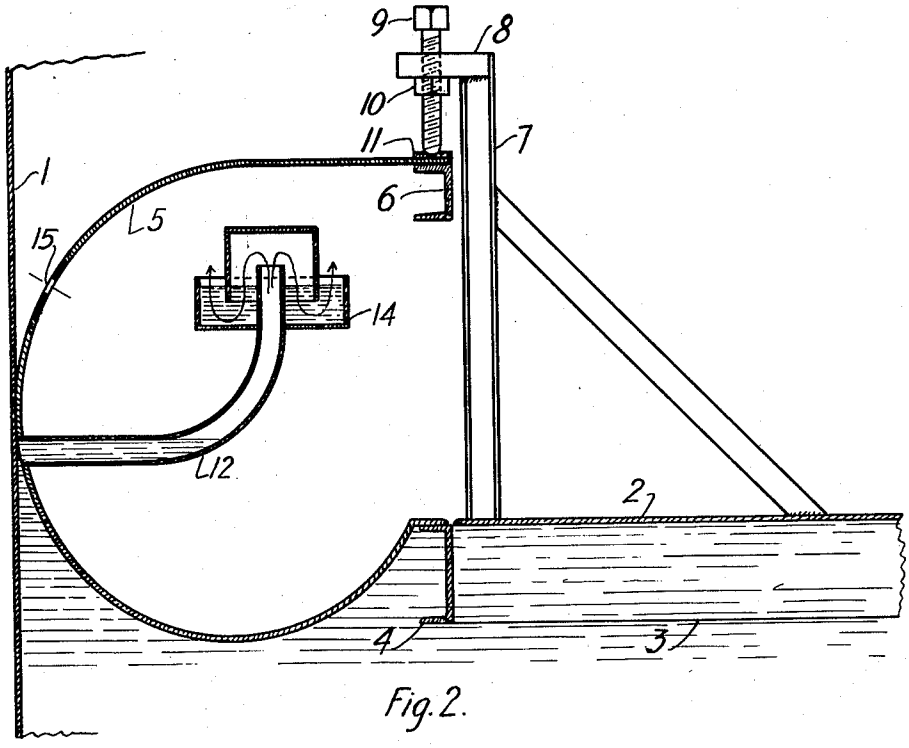


Fig. 2.

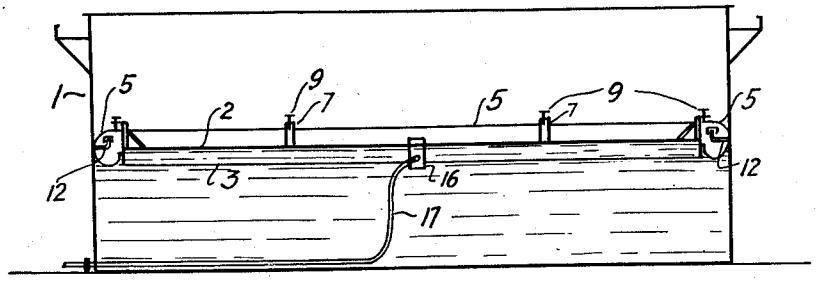


Fig. 1

INVENTOR.
Alois Cibulka
BY
Charles E. Lightfoot
ATTORNEY

Patented Aug. 4, 1953 2,647,654

UNITED STATES PATENT OFFICE

2,647,654

FLOATING ROOF FOR TANKS

Alois Cibulka, Highlands, Tex.

Application July 3, 1950, Serial No. 171,978

2 Claims. (Cl. 220—26)

1

This invention relates to a floating roof for tanks, and more particularly to an improved closure structure for use with a tank roof having a floating deck and forming an adjustable seal between the roof edge and the tank shell.

The invention finds particular application in connection with the floating roof structures of metal tanks of large capacity such as those used for the storage of petroleum and petroleum products such as gasoline. The floating roofs of tanks for the storage of liquids of this character are usually provided with some form of sealing means for engagement with the shell of the tank to prevent loss by evaporation from the upper surface of the liquid while permitting free vertical movement of the floating roof with changes in the level of the liquid in the tank. One of the difficulties encountered in the use of floating tank roofs is the accumulation of vapor or gas beneath the sealing means and in contact with the interior surface of the shell. Such vapors or gases frequently contain material such as sulfides which are highly corrosive in character, and capable of rapidly corroding the metal adjacent the seal, resulting in costly damage or destruction of the shell of the tank.

It is an important object of the present invention to provide a sealing structure for use with the floating roofs of tanks whereby the accumulation of vapor or gas adjacent the shell of the tank is prevented, thus eliminating corrosion above the liquid level therein.

Another object of the invention is the provision of a floating roof structure for tanks wherein the entire upper surface of the liquid is in contact with the under side of the roof.

A further object of the invention is to provide a floating roof structure for liquid tanks having means for the escape of any gases or the like which find their way to the upper surface of the liquid.

A further object of the invention is the provision of a floating roof structure for liquid tanks having sealing means which is adjustable to assure uniform contact between the roof and the shell of the tank about the entire perimeter of the shell at the level of the liquid therein.

Another object of the invention is to provide a floating roof structure for liquid tanks which may be loaded to any extent desired without interference with the free floating function of the tank or otherwise adversely affecting its operation.

A still further object of the invention is to provide a floating roof structure for tanks having

2

sealing means of simple design and rugged construction, capable of long withstanding the extreme conditions of exposure and constant wear to which such a device is subjected in use.

The construction and mode of operation of the invention will best be understood from the following detailed description of a preferred embodiment of the same, when taken in conjunction with the annexed drawings, wherein

Figure 1 is a vertical, central, cross-sectional view of the invention as applied to a tank; and,

Figure 2 is a fragmentary cross-sectional detail view on an enlarged scale, showing the structure and manner of adjustment of the sealing means between the floating roof and shell of the tank.

Referring now to the drawings in greater detail, the numeral 1 indicates the shell of a liquid tank of conventional design having a floating roof therein, generally designated by the numeral 2. The roof may be of any desired construction suitable for the purpose, and may have a central pontoon 3 of somewhat smaller diameter than the shell of the tank. A reenforcing ring 4 of suitable character, such as the channel member shown in the present illustration, may encircle the pontoon, which ring may also serve as a support for the attachment of sealing means between the roof and the shell.

The sealing means in the present illustration may take the form of a flexible metal plate 5, made in sections of suitable length, welded or otherwise secured together in fluid tight relation and secured at the lower edge to the ring 4 to form a flexible ring extending entirely about the roof in contact with the shell.

Along its upper edge the flexible ring member 5 preferably has a reenforcing and supporting ring 6 of suitable character, such as the channel member shown. At spaced intervals about the pontoon 3 adjacent its perimeter, upstanding brackets 7 are provided, these brackets carrying outwardly perforated extending supports 8, for the reception of bolts 9 threadably secured to the supports and having lock nuts 10 thereon. The bolts 9 bear at their lower ends upon bearing plates 11 secured upon the upper margin of the flexible seal member 5, and are adjustable to regulate the outward bowing of the flexible ring member to bring the same into uniform sealing contact with the shell of the tank.

The flexible seal member 5 is provided with a suitably spaced interval with openings mediate its upper and lower edges, into which outlet pipes 12 are secured, and each of the outlet pipes

may carry at its outer end a trap indicated generally at 14 adapted to contain a sealing liquid, whereby gas or vapor may pass out from the liquid in the tank through the trap, but air above the roof is prevented from entering.

Openings 15 may also be provided in the flexible seal member 5 for the escape of excess rain water or the like from between the seal member and the shell.

At the center of the roof or in some other suitable location a drain 16 of conventional type is provided, which is connected by a flexible pipe 17 to the exterior of the tank for draining away excess water accumulating on the roof. This drain may extend above the upper surface of the roof to any desired distance to permit the application of water to the roof to a desired depth for the purpose of loading the same.

In use the sealing member 5 is adjusted into contact with the inner surface of the shell by applying pressure to its upper margin through the bolts 9, the pipes 12 opening at all times close to the point of contact between the seal member and the shell. It will be seen that the liquid in the tank is in engagement with the roof and the seal member throughout the entire surface of the liquid, and any gas escaping from the liquid will pass out through the pipes 12 and traps 14, thus leaving no space for the accumulation of corrosive material at the liquid level which might cause damage to the shell. As seen in the drawings the seal member is of such shape as to permit the introduction of gravel, water, or other weighting means therein if desired, and sealing liquid such as water may also be applied between the outside of the sealing member and the shell below the holes 15 to provide additional assurance of a perfect seal between the seal member and the shell.

It will thus be seen that the invention, as described above, provides a floating roof structure for tanks, which is of simple design, and having sealing means which is readily adjustable and forms an efficient seal to effectively eliminate loss by evaporation or damage to the shell from the accumulation of corrosive vapor or gases.

While the invention has been described in connection with a specific embodiment of the same, it will be understood that this is for the purpose of illustration only, and numerous changes can be made in the construction and arrangement of the parts without departing from the spirit of the invention or the scope of the appended claims.

Having thus clearly shown and described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In a storage tank for liquid having a vertical cylindrical wall and a roof floated upon the liquid in the tank and having its periphery spaced annularly inwardly of the tank wall, a flexible outwardly and downwardly bowed annular sealing member carried by said roof spanning said space and engaging said tank wall, means carried by the roof and cooperable with the sealing member for varying the outward bowing thereof, outlet means on said sealing member in communication with the liquid in the tank below the line of contact and between said member and said tank wall, and means cooperable with said outlet means to close said outlet means against inflow of fluid therethrough.

2. In a storage tank for liquid having a vertical cylindrical wall and a roof floated upon the liquid in the tank and having its periphery spaced annularly inwardly of the tank wall, a flexible outwardly and downwardly bowed annular sealing member carried by said roof spanning said space and engaging said tank wall, means carried by the roof and cooperable with the sealing member for varying the outward bowing thereof, outlet means on said sealing member in communication with the liquid in the tank below the line of contact between said member and said tank wall and including means closing the outlet means against an inflow of fluid therethrough, and drain means in said member above the line of contact between said member and said tank wall for the escape of water from above said member.

ALOIS CIBULKA.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,056,842	Sharp	Mar. 25, 1913
1,426,998	Leland	Aug. 22, 1922
1,426,999	Leland et al.	Aug. 22, 1922
1,831,020	Maker	Nov. 10, 1931
1,913,643	Smith	June 13, 1933
1,975,144	Gates	Oct. 2, 1934
1,992,875	Mobley	Feb. 26, 1935
2,516,101	Boberg	July 25, 1950
2,531,424	Goldsby	Nov. 28, 1950
2,538,875	Laird	Jan. 23, 1951

FOREIGN PATENTS

Number	Country	Date
516,530	Germany	Jan. 24, 1931