July 3, 1928. 1,675,354

R. T. KEMPER

OIL TANK INSULATION

Filed March 6, 1925 2 Sheets-Sheet 1

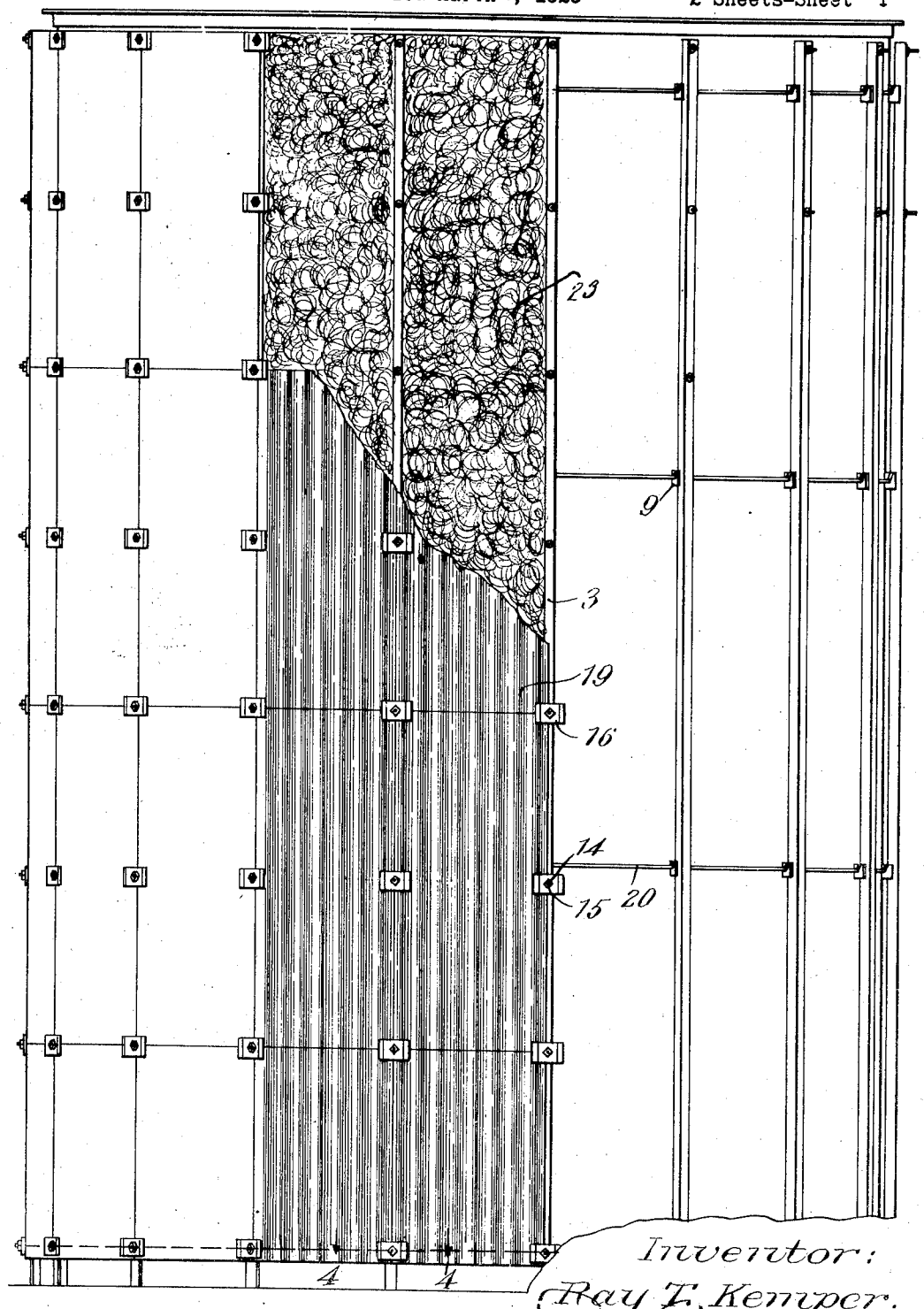


Fig. 1

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by [illegible]
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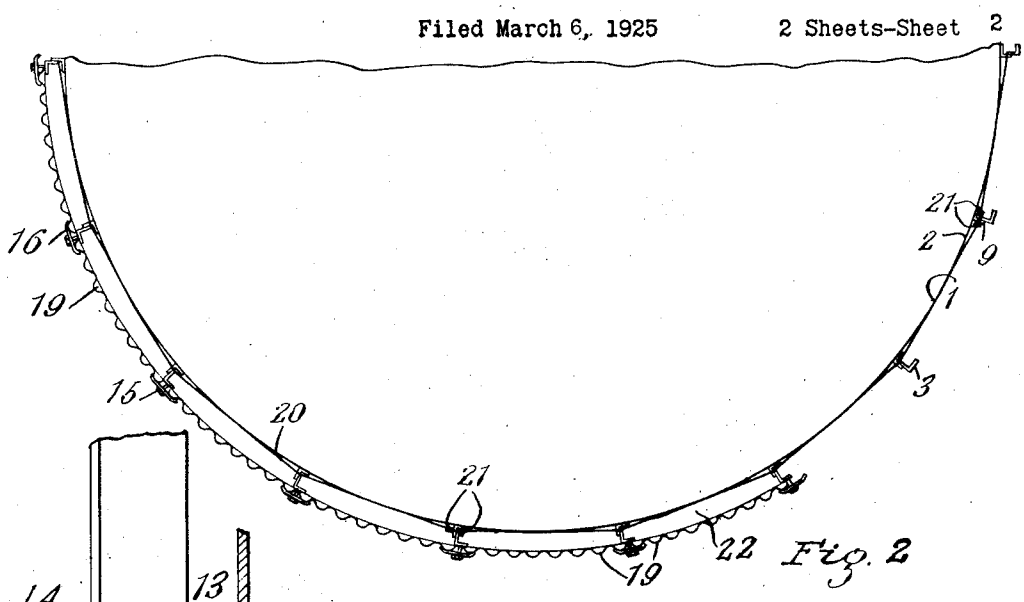


Fig. 2

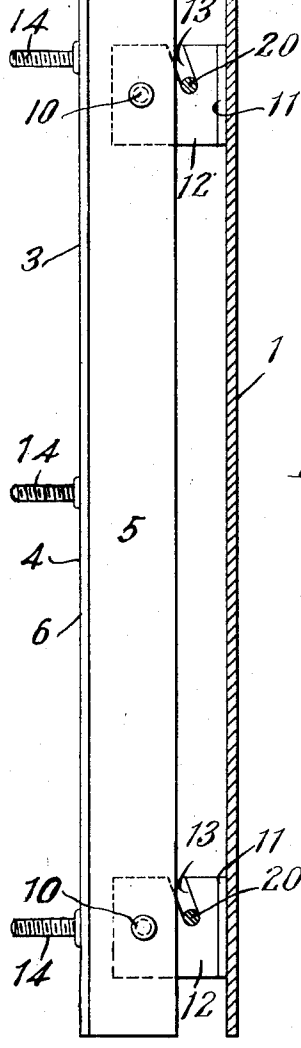


Fig. 3

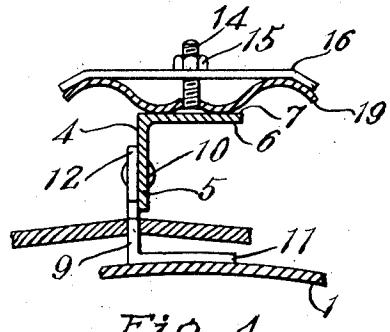


Fig. 4

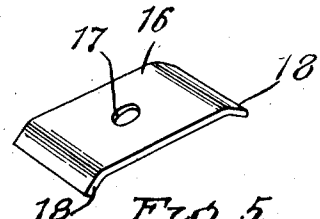


Fig. 5

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UNITED STATES PATENT OFFICE.

RAY T. KEMPER, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO JOHNS-MANVILLE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

OIL-TANK INSULATION.

Application filed March 6, 1925. Serial No. 13,497.

This invention relates to apparatus for protecting tanks from temperature conditions conducive to rapid evaporation and to a method of providing insulation for tanks.

The standard receptacle for the storage of volatile petroleum or its derivatives is a circular metallic tank having lateral walls built up of courses of plates. The tops of these tanks are often of insulating construction, but the peripheral walls which are in direct contact with the contained liquid and which generally far exceed the top surface in area are ordinarily wholly unprotected. Under such conditions the diurnal change of temperature of the contents and consequent evaporation loss is necessarily large. The losses are greatly reduced by the proper protection of the roof and eaves of the tank.

The provision of an insulating covering for the lateral walls of such tanks may reduce the remaining losses due to evaporation by as much as 80 per cent. The provision of a practical covering is not, however, a simple matter. A suitable wall spaced from the outer surface of the tank to provide either a dead air space or an air circulation space, or to support and protect an insulating material, according to the requirements of the situation, is substantially requisite. To support such a sheathing wall by spot welding the necessary substructure or supporting framework to the outside of the tank would be an extremely troublesome job, and drilling the walls for rivets is precluded by the greatly increased liability to leakage. Moreover, the shape of the tank wall varies with the liquid level and with temperature conditions to such an extent that breakage of any such holding means could not well be avoided.

One object of the present invention is to provide a protective covering for tanks which will avoid the constructional difficulties mentioned. Another object is to provide an improved method of supporting upon a tank in spaced relation to its periphery, a sheathing wall. Further objects will appear from the specification and appended claims.

In one of its aspects the invention includes the feature of securing to the outside of a tank, without welding or drilling below the liquid level therein, as for example by binding to its periphery, a substructure or framework upon which a sheathing wall may be secured. As a preferred method, binding is accomplished by the use of twisted wire cables extending around the outside of the tank between portions of the substructure and the sheathing wall. The sheathing wall may cooperate with the substructure to position the elements of the latter. With such a construction a covering capable of yielding in accordance with the expansion of the tank, but securely held thereto is produced. The space between the sheathing wall and the tank wall may be employed as a dead air space or as an air circulation space, or as a chamber to receive insulating material of any description, according to the requirements of the case.

In the accompanying drawings, in which one illustrative embodiment which the invention may assume in practice is shown for purposes of illustration,

Fig. 1 is a side elevation with parts omitted and broken away, of a tank provided with a protective covering constructed in accordance with the illustrative embodiment of the invention;

Fig. 2 is a horizontal sectional view, with parts omitted, of one side of a tank;

Fig. 3 is an elevation of a portion of a supporting member;

Fig. 4 is a detail horizontal sectional view on a plane corresponding to the line 4—4 of Fig. 1; and

Fig. 5 is a perspective of a clamp plate.

In the drawings, 1 represents a tank having a metallic peripheral wall 2. Arranged in preferably equally spaced relation around the wall 2 and in contact with the latter are a number of supporting or frame members generally designated 3. In the illustrative form these are of built-up construction and comprise each an angle iron 4 of which a web 5 lies radially of the tank. The other web 6 of each angle iron provides a surface 7 which sheathing plates 19, later described, may engage. At correspondingly spaced points along their lengths, the several supporting members 3 have riveted or otherwise suitably secured thereto, as at 10, feet 9 of angle iron of which the webs 11 rest against the outer surface of the tank wall when the members 3 are in position, the other webs 12 being secured to the webs 5 of the members 3. The webs 12 are provided with slots

13 which extend towards the webs 11 (and, by preference, downwardly) so that a flexible tension rod, wire or cable 20 supported therein and horizontally surrounding any substantial arc of the tank wall will, when tightened, occupy a position in the bottom of each such slot.

To provide for securing sheathing wall sections to the members 3, threaded studs 14 are spot welded to the surfaces 7 of the angle iron verticals 3 and nuts 15 cooperating therewith are adapted to engage clamp plates 16, apertured at 17 for engagement with the studs 14, and also having bent ends 18 to overlie the edges of sheets 19, which may be corrugated sheets, as shown to clamp the latter to the frame members 3.

In erecting the framework of the insulating sheathing the members 3 are first placed and appropriately spaced around it, the feet 11 resting on the outer surface of the tank. The cables 20 are then passed around outside of the frame members so as to lie in the bottoms of the recesses 15. The cables are then drawn taut and their respective ends are clamped together by one or more cable clamps, not shown, of any usual kind to prevent slippage. Since several of these cables surround the tank at different levels the supporting members 3 are securely supported. When the framework is thus erected, an outer sheathing covering of sheets 19 is clamped to the frame members 3 by the clamp plates 16, and the members having been so spaced that the sheets abut opposite the members 6 of the verticals 3, against which the sheathing plates are held in correctly spaced relation. The space 22 enclosed between the sheets 19 and the tank wall 2 may be used as a dead air space or may receive a heat insulating material 23, which may be asbestos board or other like substance, or may be granulated or loose fibrous material, or even concrete. The sheets 19 may be metallic or of any suitable hard conducting or non-conducting material.

It will be apparent that by this mode of constructing an insulating covering all necessity for drilling in or spot welding to the tank wall itself is completely eliminated and that the framework provided for the covering is very effectually held in position whatever the shape of the tank may be under expansion and contraction of internal pressure. The sheets 19 serve to space the latter and maintain the entire covering in its intended relation to the tank. Owing to the arrangement of the parts the cables elastically respond to stresses tending to breakage of the insulating structure. This method of holding a protective covering to a tank may obviously be used with tanks of any construction and is subject to a wide range of modification within the scope of the appended claims.

I claim:

1. In a tank protecting structure, a series of supporting members, each parallel to the axis of the tank, arranged in spaced relation about the periphery of the tank, and means for holding said supporting members in position, comprising tension means extending circumferentially of said tank and operatively connected to said supporting members at points nearer the axis of the tank than the outer limits of said members, and sheathing sheets secured to said supporting members outside said tension means.

2. In a tank protecting system, a series of supporting members, each provided with feet adapted to rest against the side of a tank, said feet provided with notches, flexible tension means extending circumferentially of the tank and lodged in said notches, and sheathing sheets attached to said supporting members and spanning the spaces between them, and spaced from the tank side.

Signed by me at Los Angeles, California, this 21st day of February, 1925.

RAY T. KEMPER.

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