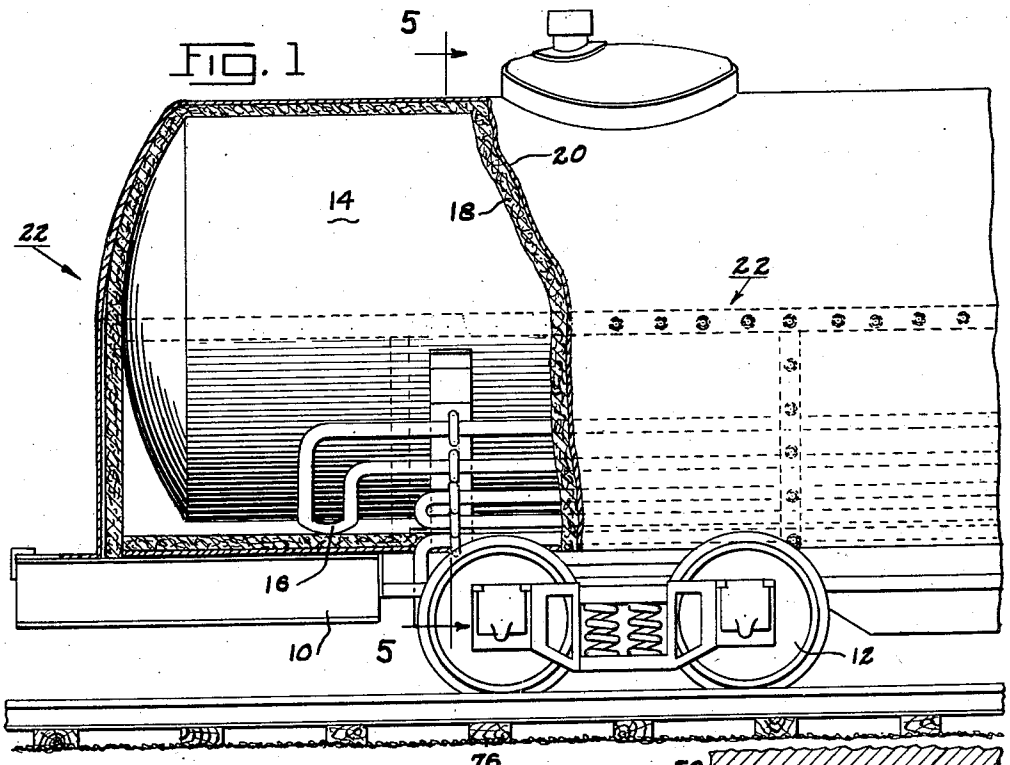
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APPARATUS FOR TRANSPORTING MATERIALS

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Fig. 1



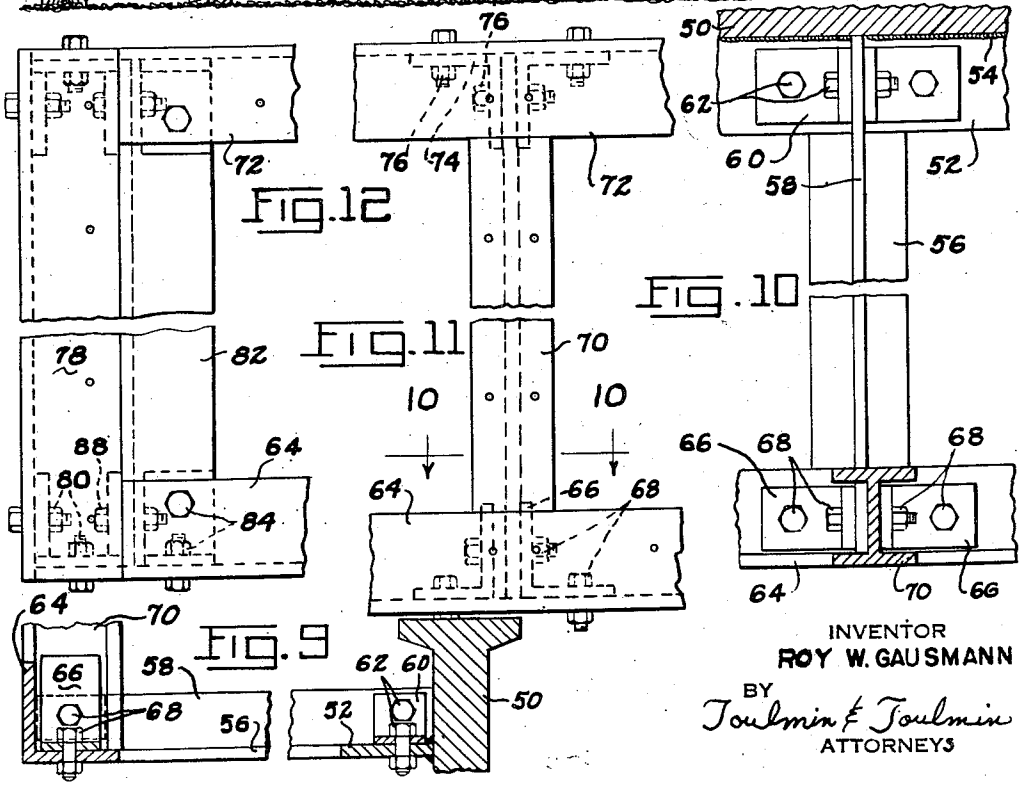


Fig. 12

Fig. 11

Fig. 10

Fig. 9

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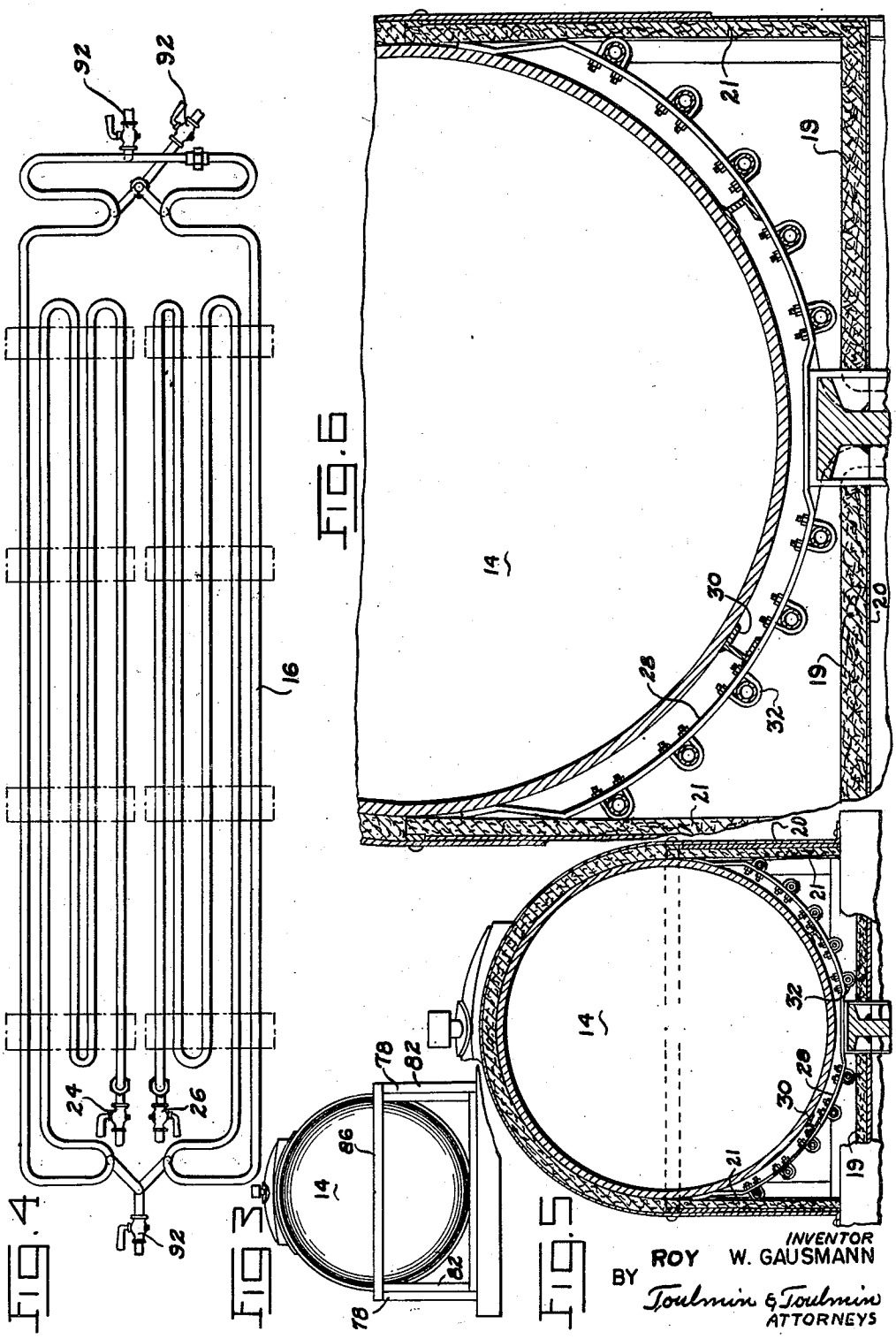


FIG. 4

FIG. 3

FIG. 5

FIG. 6

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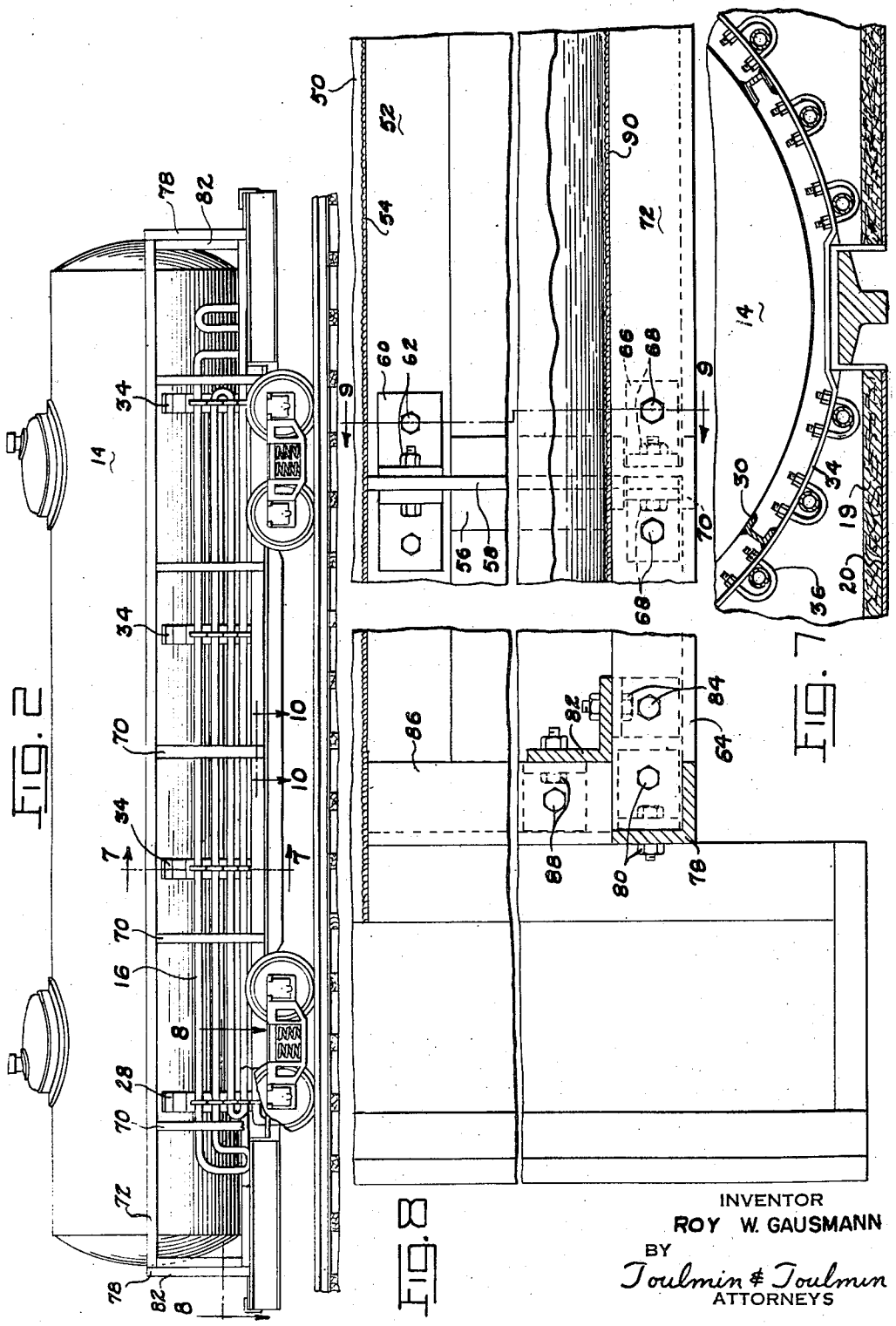


FIG. 2

FIG. 7

FIG. 8

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APPARATUS FOR TRANSPORTING MATERIALS

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4 Claims. (Cl. 257—198)

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This invention relates to a method and apparatus for heating and transporting substances, especially liquids, and particularly such methods and apparatus in connection with rail mounted cars and the like.

While the use of refrigerated railway cars for keeping foodstuffs cold during transportation is well known, heretofore it has not been possible to accomplish an opposite result and to maintain substances heated to a predetermined temperature during transportation by rail.

This is sometimes of advantage because it may be necessary to prevent chemical changes in the material being transported, or to prevent it from solidifying within the car whereupon it would have to be heated to be removed therefrom. Often it would offer an economy for the material to be hot when it reaches its destination in order to permit it to be used immediately.

Accordingly, the primary object of the present invention is to provide a method and apparatus for heating and maintaining heated substances being conveyed in a tank car.

Another object is the provision of a relatively simple arrangement for applying heat to a substance being conveyed in a tank car.

It is another object to provide a heating arrangement for a tank car which will not interfere in any way with the normal use of the car.

A still further object is to provide a method and apparatus for heating a tank car employing steam.

A still further object is the provision of a steam heating system for a tank car which is economical to operate.

These and other objects and advantages will become more apparent upon reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a view of one end of a car constructed according to this invention and having a portion of the insulating covering thereof broken away;

Figure 2 is a side elevation of a car constructed according to this invention before the covering of insulation and the sheet metal shield thereover has been applied;

Figure 3 is an end view of the car looking from the left end of Figure 2;

Figure 4 is a development of the heating coils which lie along the lower surface of the tank of the car and transmit heat therethrough to the substance carried by the car;

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Figure 5 is a vertical section through the car and is indicated by the line 5—5 on Figure 1;

Figure 6 is a view similar to Figure 5 but considerably enlarged to show the details of construction;

Figure 7 is a fragmentary view indicated by the line 7—7 on Figure 2 and showing details in connection with the expansion hangers for the heating coils.

Figure 8 is a plan section indicated by the line 8—8 on Figure 2 and taken over one end of the car frame or chassis and shows details of construction in connection with the frame which supports the insulation and covering of this invention on the car;

Figure 9 is a section taken on the line 9—9 of Figure 7 and shows the manner of securing the frame of this invention to the central I beam which forms a part of the car frame;

Figure 10 is a section indicated by the line 10—10 on Figure 11 and shows the appearance of the connection of the frame of this invention to the central I beam of the car frame in plan;

Figure 11 is a side view of a part of the frame of this invention; and

Figure 12 is an elevational view taken at one of the corners of the frame of this invention.

Referring to the drawings more in detail, Figure 1 shows a tank car which is substantially standard as regards the car frame or chassis indicated at 10, the truck assemblies as indicated at 12, and the tank 14 carried by the car.

The purpose of this invention is to provide a heating arrangement for the tank 14 for transporting substances therein which may be maintained at a predetermined temperature and to this end there is provided a heating coil arrangement at 16 which extends along the lower part of the car and which is supplied with steam for maintaining the said predetermined temperature in the tank 14.

The entire tank 14 and the coil 16 are preferably covered by a layer of heat insulation 18 which is retained in position by a sheet metal covering 20 which is suitably secured to a superstructure or frame assembly generally indicated at 22 in Figure 1.

In Figures 2 and 4 it will be seen that the heating coil 16 extends substantially the entire length of the tank and consists of a plurality of runs of conduit which provides for substantially complete coverage of the lower surface of the tank.

In Figure 4 it will be seen that the coil 16 has an inlet valve at 24 and a discharge valve at 26. The steam entering through the valve 24 follows

a serpentine path in passing through the heating coil and efficiently transfers its heat energy to the tank.

It will be understood that both of the valves 24 and 26 could be inlet valves if desired whereby the sections of the coil 16 lying on opposite sides of the vertical center line of the tank would be connected in parallel thereby promoting uniformity of temperature over the entire heated surface.

The coil 16 may be, as shown in Figures 5 and 6, mounted on an arcuate bracket 28 which is spaced from the surface of the tank as by the channel means 30. A plurality of U bolts 32 secure the reaches of the coil 16 to the bracket.

Inasmuch as the coil 16 will expand and contract during the heating and cooling thereof it is rigidly supported on the tank at only one point. This is by the hanger 28 while the hangers indicated at 34 in Figure 2 are constructed as shown in Figure 7, this view indicating that the U bolt hangers 36 and brackets 34 are over-size relative to the coil 16.

As mentioned before, the layer of insulation 18 surrounds the entire tank and at the bottom of the tank said insulation is spaced from the tank to provide a space for receiving the heating coil 16. The insulation prevents any substantial loss of heat from the heating coil while the space between the tank and coil prevents the development of hot spots on the tank. The material may be maintained at a relatively high temperature without any danger of burning the same.

The frame work which supports the insulation and the sheet metal covering 20 thereof will best be seen in Figures 8, 9 and 10. It will be noted that secured to the central I beam 50 of the car frame is a flat plate 52. The connection between the beam and plate is preferably by welding as indicated at 54. Extending laterally outwardly from the plate 52 are spaced T sections 56. The T sections preferably have the web part 58 secured to the plate 52 as by the angle clips 60 and the bolts 62. At the outer ends of the T sections 56 there is the longitudinally extending angle 64 which is secured to the T sections as by the angle clips 66 and bolts 68.

Extending vertically from the angles 64 which extend along each side of the car are the I beams 70 which have their lower ends secured together with the web part 58 of the T sections 56 to the angle 64 by the clips 66. These I sections, of which there are a plurality along the length of the car as indicated in Figure 2, have at their upper ends a longitudinally extending angle 72 which corresponds with the angle 64 at the bottom of the said I beams. Similarly to the arrangement at the bottom of the I beams, the angle 72 is secured thereto by the angle clips 74 and bolts 76.

At the ends of the car, there are the vertically extending angles 78 which are connected with the top and bottom angles 64 and 72 by angle clips and bolts as at 80. A second corner angle 82 is disposed inwardly of the corner angle 78 and is also connected with the top and bottom frame angles 64 and 72 by the angle clips and bolts 84. A transverse angle 86 across each end of the car is connected with the inner corner angle 82 by the angle clips and bolts 88.

For further stiffening the frame assembly, the upper angles 72 are preferably welded along the side of the tank as indicated at 90 in Figure 8.

In joining the T section 56 to the plate 52 and the angle 64, the base of the said T section is

preferably cut off and only the web portion thereof extends over the said plate and angle. This is for the purpose of providing a continuous flat surface commencing at the plate and extending along the top surface of the base of the T section and on to the top surface of the base of the angle. This flat surface is utilized, as will be seen in Figures 1, 5 and 6, for supporting the blocks of insulation 19.

Similarly arranged, with regard to the flanges are the vertical channel members 70 and the angles 64 and 72. This will be seen in Figure 10 and the purpose of this arrangement is to provide space for receiving the blocks of insulation 21, best seen in Figures 1, 5 and 6.

With the insulation around the bottom of the car prepared in blocks and mounted in this manner the removal thereof for inspection of the coil is very simple and any necessary servicing of the coil can readily be carried out.

After the frame has been placed on the car and the heating coils assembled therewith, the insulation, which is preferably in the form of pads or blocks, is placed over the top and bottom of the tank and thereafter the sheet metal covering 20 is placed in position and secured to the farmework described above. The result is a car which is neat in appearance but which at the same time is well insulated against the loss of heat therefrom.

It will be understood that the heating coil 16 could include suitable automatic control means such as thermostatically controlled valves or flow regulators if desired according to practices well known in the art.

The coil 16 is also preferably provided with the drain valves indicated at 92 which communicate with the lowest portions of the coil 16 and thus may be employed for draining the said coil when the car is to remain idle or when there is any danger of the coil freezing.

It will be understood that this invention is susceptible to modification in order to adopt it to different usages and conditions such as attaching the brackets for the heating coil directly to the surface of the tank and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. In a tank car; a layer of heat insulation completely enclosing the tank thereof; said insulation being separated from the tank along substantially the lower half of the surface of said tank; and heating means disposed between the insulation and the tank and along the surface of said tank for transmitting heat into said tank, said heating means comprising steam coils, said steam coils being of serpentine construction and comprising a series of parallel sections extending longitudinally of said tank car and short lengths of pipe forming U-bends joining each pair of parallel sections, and arcuate hangers extending closely adjacent the outside lower surface of said tank and spaced from said tank and said insulation, said hangers supporting in spaced relationship the parallel lengths of said pipe.

2. In a tank car having a tank; a car frame; cradle arms supported from the center beam of the car frame, the vertical portions of which end tangent to the tank at its point of maximum width; interconnecting members extending between both the top and bottom of the vertical portions of said cradle arms to form a frame-

work along the side of the tank; cross members adjacent to the top and bottom of the vertical portions of the end cradle arms of the opposite sides of the tank passing tangent to the dished ends of said tank; spaced arcuate members mounted on the tank and adjacent thereto and in the space between said tank and said framework, said arcuate members paralleling the contour of the bottom half of said tank; heating coils carried by said arcuate members; a layer of heat insulation surrounding the upper part of said tank; and a plurality of blocks of heat insulated material mounted in said framework and being supported completely around their periphery by the aforementioned interconnected framework and defining a box-like enclosure around the lower part of said tank, the block form of said insulation permitting its easy removal for inspecting or repairing said heating coils.

3. In a tank car having a tank; a framework; spaced arcuate members mounted on the tank and adjacent thereto and in the space between said tank and said framework, said arcuate members paralleling the contour of the bottom half of said tank; heating coils carried by said arcuate members; a layer of heat insulation surrounding the upper part of said tank; and a plurality of blocks of heat insulated material mounted in said framework and being supported completely around their periphery by the aforementioned interconnected framework and defining a box-like enclosure around the lower part of said tank, the block form of said insulation permitting its easy removal for inspecting or repairing said heating coils.

4. In a tank car having a tank; a car frame; a framework including interconnecting members extending along the side of the tank; spaced arcuate members mounted on the tank and adjacent thereto and in the space between said tank and said framework, said arcuate members paralleling the contour of the bottom half of said tank; heating coils carried by said arcuate members; a layer of heat insulation surrounding the upper part of said tank; and a plurality of blocks of heat insulated material mounted in said framework and being supported completely around their periphery by the aforementioned interconnected framework and defining a box-like enclosure around the lower part of said tank, the block form of said insulation permitting its easy removal for inspecting or repairing said heating coils.

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