To all whom it may concern:

Be it known that I, WILLIAM J. TANGERMANN, a citizen of the United States, and resident of Hammond, Lake county, Indiana, have invented certain new and useful Improvements in Tank-Car-Heating Means, of which the following is a specification.

The general object of my invention is to improve the form, arrangement, construction and operation of the means for heating the contents of tank cars preparatory to and during the unloading thereof.

The principles and main elements of my invention, and also the details of the best embodiment thereof that I have thus far devised, will be readily understood on reference to the drawings that form part of this specification, and are particularly pointed out in the appended claims.

In said drawings Figure 1 is a side elevation of a tank car embodying my invention, one half being in section to disclose the interior;—Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1;—Fig. 3 is a like section on the line 3—3 of Fig. 1, the heating pipes being omitted;—Fig. 4 is a view in elevation on the line 4—4 of Fig. 1;—Fig. 5 is a horizontal section on the line 5—5 of Fig. 1;—Fig. 6 is an enlarged fragmentary cross section of the tank and its heater, on the line 6—6 of Figs. 5 and 9;—Fig. 7 is a sectional detail of the center anchorage of the heating coil, on the line 7—7 of Fig. 6;—Fig. 8 is a detail of one of the expansion-permitting clips for the coils;—Fig. 9 is an enlarged side view of the three-way steam valve on the side of the tank; and Fig. 10 is an enlarged section better showing said valve.

The unloader, D, is described and claimed in detail in my co-pending application, Serial No. 78,900, filed February 17, 1916, and the tank anchorage, C B, is described and claimed in my co-pending application, Serial No. 84,559, filed March 16, 1916.

It will be understood, that the coils, L and M, are steam coils or pipes, and are used for heating the contents of the tank. Each coil comprises several turns of pipe and the ends of each coil are spaced apart, thus making room for the parallel turns of the other coil, as best shown in Figs. 1, 5, and 6. Except for the different spacings and locations of the turns, characteristic of this arrangement, the two coils are essentially the same. The upper ends, m and 2, of the coils are conveniently placed close together in one side of the tank, being secured in flanged couplings, 2 and 3, thereon. The vertical distance between the upper ends of the coils and the bottom, C', of the tank is determined by the number of turns in the coils, and is the measure of the fall or drop between the upper and lower ends of the coils. The lower ends, n, P, of the coils, are secured in the top flange, d, of the unloader, D, which, as shown, is provided with separate outlet-ducts, d', d'', for the two coils. This last is a feature described and claimed in my application, Serial No. 78,905. The projecting upper ends, t and m, of the coils are joined by the casing, n, of the three-way valve, N. The coupling, Q, of a steam hose (through which the tank coils are supplied with steam from a distant source) is shown connected with the inlet, n', of the valve casing. Within the casing, n, is the three-way valve plug, n'', having a squared-end, n', to which a wrench may be applied, to turn the valve, n', and direct steam into either of the coils, or into both of them, as desired. This is of advantage when conditions are such that the heat of only one coil is required, or in event one coil is broken; in both cases it is desirable to pass steam through only one coil. On the other hand, the arrangement makes it possible to hasten the heating of the contents of the tank by using both coils at the same time.

The several turns of the coils find support upon the coil-cradles, O and P. Each of these cradles P comprises a downwardly curved strap, 4, substantially following the curve of the tank, but spaced away therefrom. The upper ends of the straps, 4, are bolted to brackets, 5, extending inwardly from the walls of the tank (see Figs. 5 and 6). The cradle, O, may have an additional supporting strut, 6, as heretofore mentioned. It will be noted that the cradles, O and P, are arranged at substantially the same heights in the tank, there being a difference of only a few inches between heights of the end-cradles, P, and the middle cradle, O.

Considering a single coil, each turn thereof is made of several straight lengths of pipe, 7, and two return-bends, 8; the coil being rectangular rather than circular, and extending from end to end of the tank, as well as from side to side thereof. The end
the coils, 15, between the straight lengths, 7, and the return-bends, 8, are preferably placed at the inner sides of the cradles, P, and do not interfere with the expansion and contraction of the straight portions, 4, of the coils. For convenience, I prefer that each straight length or side of the coil shall be made up of two sections, 7, and these are joined by middle couplings, 10. As best shown in Figs. 6 and 7, each of these couplings, 10, is provided with end-flanges, 11, which straddle the strap, O. U-clips, 12, secured by nuts, 13, hold the couplings, 10, in place on the strap, O. The bracket, or strip, 6, before mentioned, between the strap, O, and the bottom of the tank, prevents the swinging of the cradle, in the tank. As the cradle, O, is thus made rigid, and as the couplings, 10, are rigidly secured to the rigid cradle, it follows that all of the turns of the coils, L and M, are effectively anchored at the middle or center of the tank. In contrast, the end portions of the coils are tied to respective cradles, P, by clips, 14, which have shoulders, 14', that prevent the tightening of the clips, 14, to an extent which would interfere with the movement of the coils longitudinally across the cradles, P. By this arrangement the breaking of the coils by the expansion and contraction thereof is practically eliminated, as both ends of each turn of the coil are supported in a manner which permits them to expand and contract freely upon their cradles or supports, though anchored at the middle. In this connection attention is called to the long return-bends, 8, which allow free movement between the connected straight portions of the coils.

The feature of greatest importance characterizing the heating coils, is that they are self-draining. A further important characteristic of the duplex or double-coil arrangement shown, is that the heat is distributed equally upon both sides of the tank. Taking into consideration the number of turns in the coil, the drop between the inlet and outlet ends thereof is not great, but in my novel arrangement of the coils, each is given ample inclination or pitch to insure the free drainage of the water of condensation and the avoidance of steam traps and water-hammering difficulties. Contrary to the usual arrangement, the two coils are not placed on opposite sides of the tank, nor in opposite ends thereof, but instead, each coil distributes as much of its heat in one side of the tank as in the other. This advantage is secured by extending the coil along the side of the tank toward the end thereof, thence across the tank to the opposite side, thence to the opposite end of the tank, thence back across the tank, and thence back along the side, and so on, according to the number of turns required in the coil. As illustrated, I take advantage of this division of the sides of each coil upon opposite sides of the car to secure the necessary pitch in all parts of each coil. The coil which starts at the three-way valve connection, drops gradually to its support upon the end cradle, P, and extends thence to a somewhat lower point on the opposite side of the same cradle, P, and from thence inclines gradually toward the opposite end of the car, where it finds similar supports of different elevations upon the cradle at that end of the tank. As each coil starts at a high point, it is clear that as the turns pass from side to side of the tank they approach the bottom middle line thereof, and thus finally terminate at the unloader as before described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The herein described improvement comprising the horizontal tank, in combination with a duplex heating apparatus thereon comprising two steam coils entering through the side wall of the tank and discharging through the bottom thereof, each said coil extending substantially from end to end and from side to side of the tank and being inclined throughout, and a three-way valve joining the inlet ends of said coils.

2. The herein described improvement comprising the horizontal tank in combination with a duplex heating apparatus thereon comprising two steam coils entering through the side wall of the tank and discharging through the bottom thereof, each said coil extending substantially from end to end and from side to side of the tank and being inclined throughout, and a three-way valve joining the inlet ends of said coils on the outer wall of the tank.

3. The herein described improvement comprising the horizontal tank in combination with a duplex heating apparatus thereon comprising two steam coils entering through the side wall of the tank and discharging through the bottom thereof, each said coil extending substantially from end to end and from side to side of the tank and being inclined throughout, a three-way valve joining the inlet ends of said coils on the outer wall of the tank, and a hollow-walled unloader forming the terminal for the discharge ends of said coils.

4. The herein described improvement comprising the horizontal tank in combination with a steam coil entering through the side wall of the tank and discharging through the bottom thereof, said coil extending substantially from end to end and from side to side of the tank and being inclined throughout, and curved coil-cradles spaced in said tank and providing supports for the variously elevated turns of said coil, means anchoring said turns to one of said...
cradles, and other means securing the same upon the other cradle, but permitting the free longitudinal expansion and contraction of said turns.

5. The herein described improvement comprising a horizontal tank, in combination with a duplex heating system therein, comprising two steam coils entering through the side wall of the tank and discharging substantially centrally of the bottom of the tank, each said coil extending substantially from end to end and from side to side of the tank, and being inclined throughout, valve means for controlling the inlets of said pipes, and a hollow walled unloader forming the terminal for the discharge ends of said coils.

In testimony whereof, I have hereunto set my hand this 3rd day of April, 1916.

WILLIAM J. TANGERMAN.