Jan. 12, 1926. 1,569,605

H. W. ASH

TANK CAR HEATER

Filed June 15, 1923 3 Sheets-Sheet 1

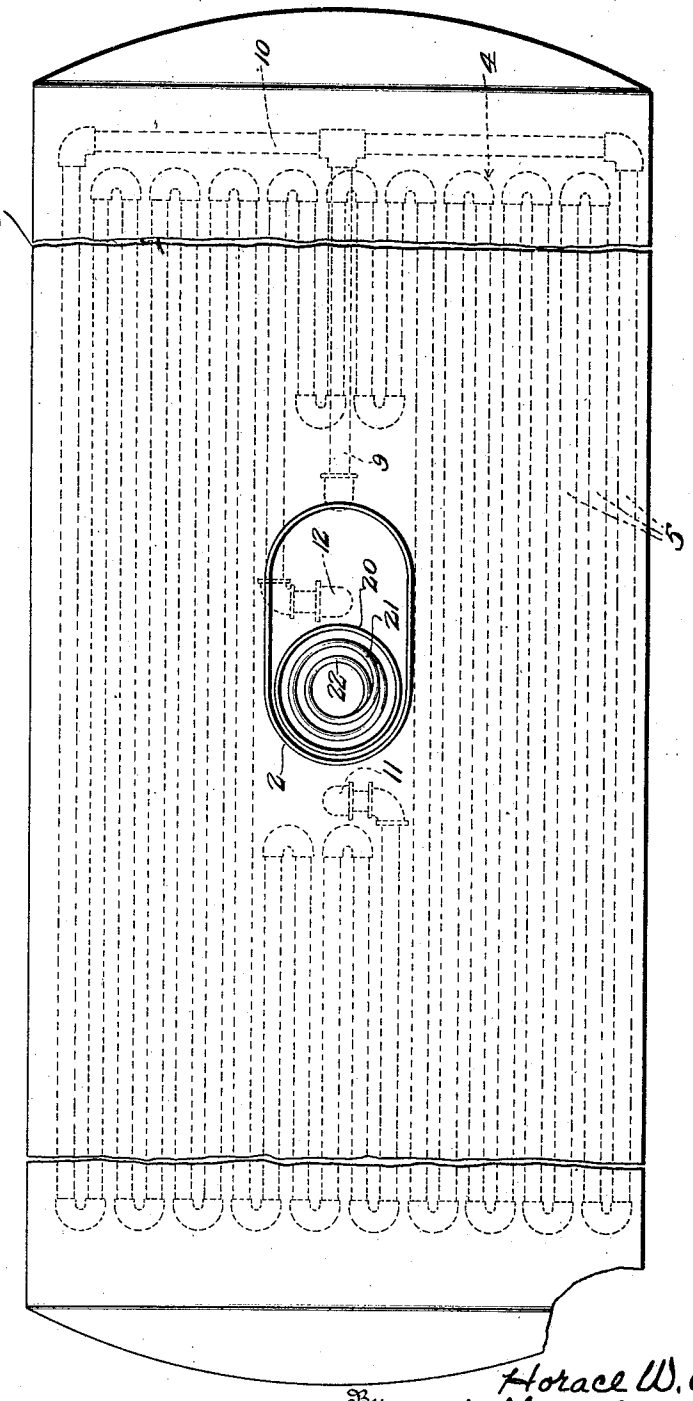


Fig. 1.

Inventor

Horace W. Ash.

By William W. Deane

his Attorney

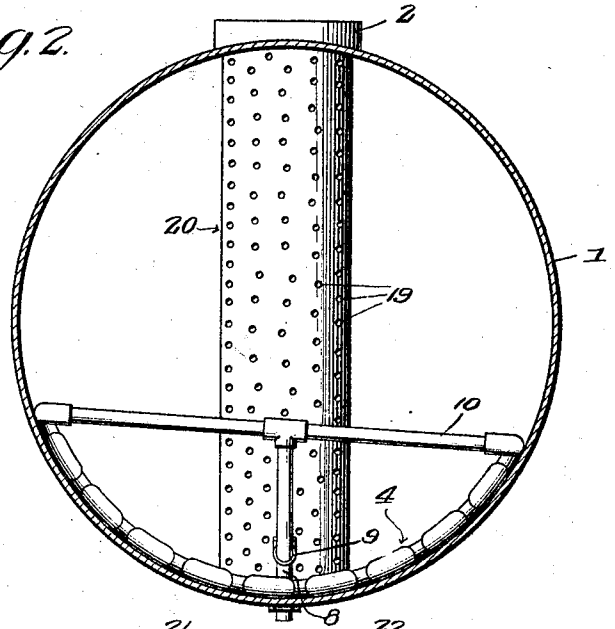
Jan. 12, 1926. **1,569,605**

H. W. ASH

TANK CAR HEATER

Filed June 15, 1923 3 Sheets-Sheet 2

Fig. 2.



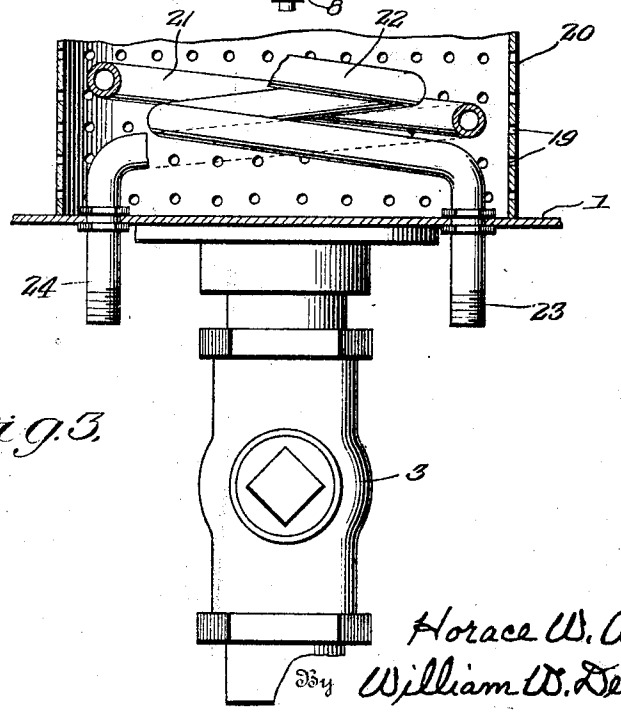


Fig. 3.

Inventor

Horace W. Ash,

By William W. Deane

his Attorney

Jan. 12, 1926. 1,569,605

H. W. ASH

TANK CAR HEATER

Filed June 15, 1923 3 Sheets-Sheet 3

Fig. 4.

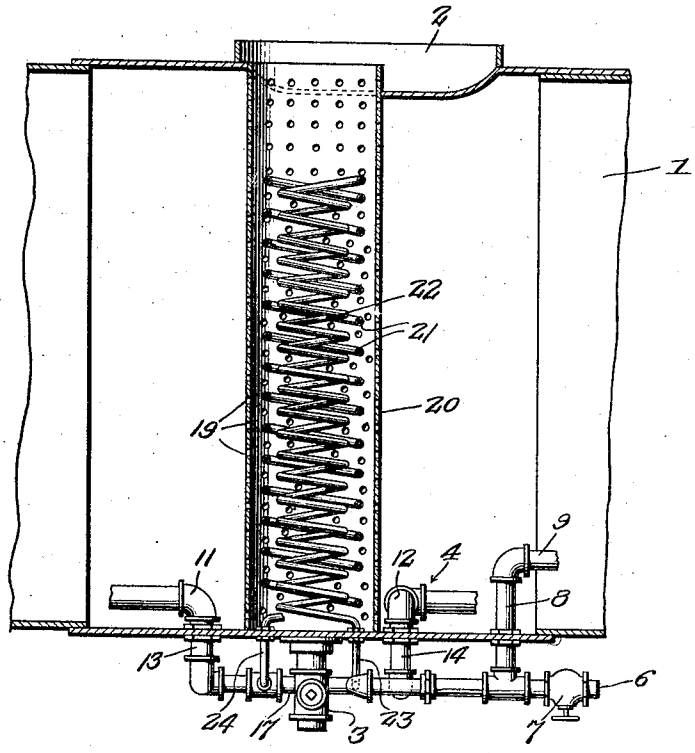
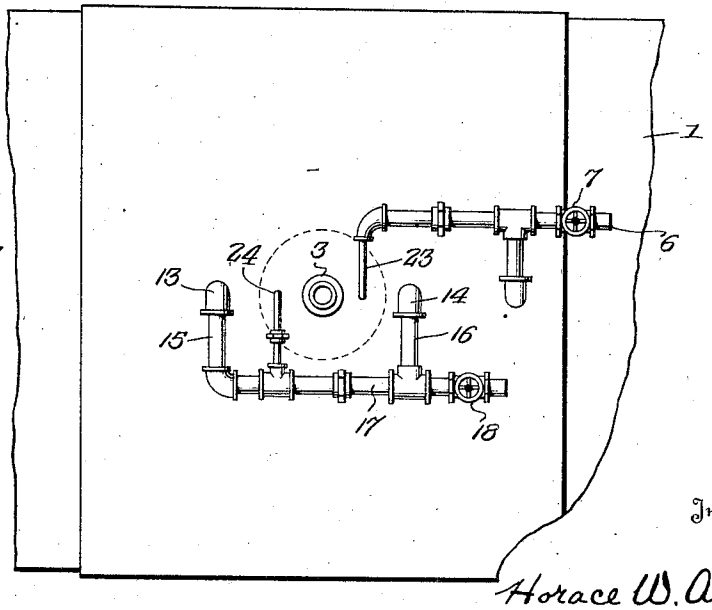


Fig. 5.



Inventor

Horace W. Ash.

By William W. Deane

his Attorney

Patented Jan. 12, 1926. 1,569,605

UNITED STATES PATENT OFFICE.

HORACE W. ASH, OF WINCHESTER, MASSACHUSETTS.

TANK-CAR HEATER.

Application filed June 15, 1923. Serial No. 645,619.

To all whom it may concern:

Be it known that I, HORACE W. ASH, citizen of the United States, residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Tank-Car Heaters, of which the following is a specification.

When shipping asphalt or kindred substances in tank cars, the materials at ordinary temperatures are in a solid state and have to be melted in order to either fill the cars or empty them, so that the present practice in shipping these materials is to fill the cars while the asphalt is in a hot fluid condition, and the asphalt cools and solidifies before the car reaches its destination. These cars are equipped with steam pipe coils by means of which the temperature of the contents of the car is raised to the melting point and the material drawn off or pumped out through an outlet in the bottom of the car.

The specific gravity of asphalt decreases comparatively rapidly with an increase in temperature, which is the result of the expansion due to heating. This represents about one (1) percent increase in volume for each 20° raise in temperature, so that the increase in volume in a car of asphalt of 60°, raised to a temperature of 260, would be approximately ten (10) percent.

The coils in the tank car are placed at the bottom of the car for the reason that the asphalt, when it becomes liquid, immediately leaves the bottom and works its way to the top of the car, the cooler asphalt dropping to take its place. In this way, if there is any cold or unmelted asphalt in the car, it is always at the bottom of the car and it is at the bottom of the car that the outlet for drawing off the asphalt is placed; thus it will be seen that the entire contents of the car must be heated to the proper temperature required to melt the asphalt to the proper fluidity for handling before any of it is drawn off, as it would take only a small slug of unmelted asphalt to close off the overflow.

The main object of the present invention is to provide means to permit drawing off of the asphalt as fast as it melts, and this results in a very great saving in the time of emptying a car and in the fuel required to heat the contents of the car to the point where it can be emptied. The reason why it takes so long a time to empty a car (usually about twenty-four hours) is because as fast as the asphalt becomes melted it works its way around the inside of the tank, and finds its way to the top of the car, and as the entire outside area of the tank is exposed to the cooling effect of the atmosphere, the radiation is quite rapid.

Taking the case of an 8,000 gallon tank car, which is usually about 33'—6" long, and 6'—4" diameter, the outside area of the car is 690 square feet. In a car of this size, I place steam coils having a heating surface of 445 square feet, so that the ratio of heating surface to the radiation surface is as one is to 1.55. It thus will be readily seen that in case the asphalt can be taken away from the car as fast as the heating coils heats it up to the proper temperature, the possible surface exposed to radiation gradually decreases as the level of the asphalt in the car falls. As the level falls the ratio of the heating surface to the radiating surface increases, but tends to accelerate the rate at which the asphalt is brought to the temperature at which it can be drawn off.

The apparatus forming the subject matter of the invention includes a perforated discharge tube or chute provided with means for maintaining the same in heated condition while the material is being discharged from the car, this heating means acting to maintain the material in the chute in fluid condition, so that said material will flow readily from the car.

The method forming part of the invention and the apparatus for carrying out this method will be described in detail in connection with the accompanying drawings, in which:—

Figure 1 is a top plan view of a tank car provided with the apparatus forming part of the invention.

Fig. 2 is a transverse vertical sectional view of the same.

Fig. 3 is an enlarged vertical sectional view illustrating means for connecting the discharge pipe and certain of the steam coils to the tank.

Fig. 4 is a longitudinal vertical sectional view of the central portion of a tank car provided with the improvements forming the subject-matter of the present invention.

Fig. 5 is a bottom plan view of the central portion of said car.

The method forming part of the present

invention consists briefly in the following steps: Heating the material which is normally solid at atmospheric temperature, while said material is in a tank car; permitting the material which has been rendered fluid by the heating to flow into a discharge chute; and maintaining the interior of the discharge chute in heated condition while the material is flowing therethrough, in order to rapidly discharge the material.

The means for carrying out this method includes an ordinary tank car 1 having an inlet 2 and a discharge pipe 3, said inlet and the outlet being preferably arranged intermediate the ends of the car.

Arranged within the tank 1 is a cradle 4 of steam pipes 5. The steam enters these pipes at the point 6 and passes through a manually controlled valve 7. After passing through the valve 7, the steam travels up the pipe 8 and then along the pipe 9 to the header 10 arranged near one end of the tank car. From the header 10 the pipes 5 extend back and forth longitudinally in the form of coils and the two coils thus formed terminate at the points 11 and 12. Pipes 13 and 14 extend downwardly from the terminals of the coils through the bottom of the tank and these pipes are connected to conduits or branches 15 and 16, which are connected to a steam discharge pipe 17 having a manually controlled valve 18.

From the drawings it will be seen that the steam coils cover the lower portion of the tank and they function to heat the material within the tank, and as before stated, as the material is heated, it will tend to rise through the solid material above the same, but on account of the construction hereinafter described, this material as it is heated and rendered fluid will pass through perforations 19 in a central discharge chute or tube 20, and steam coils 21 and 22 are arranged in this chute, so that the material will be maintained in heated and fluid condition while it is traveling through the chute. The chute 20 preferably extends from the bottom of the tank to the top of the same, so that the material which becomes fluid and rises, may enter the upper portion of the chute and flow down the latter. The perforations 19 extend along the chute throughout the extent of the latter, so that the material may readily flow into the chute from any level or height.

The coils 21 and 22 are preferably formed from a single piece of pipe helically twisted to form the double coils, one end of said pipe 23 being connected to the steam inlet pipe and the other terminal 24 of the coil pipe being connected to the exhaust steam pipe 17.

From the foregoing it will be seen that the tank 1 has steam coils 5 in the bottom as is usual in tanks of this sort, and the central heating chamber or chute 20 with perforations 19 and coils 21 and 22 is added thereto, the main difference being that the bottom coils 5 have to be shortened to allow the heating chute 20 to extend down to the bottom of the tank. As in the case of an ordinary tank, the steam connection is made in one place and the steam exhaust in another and the operation of the central heating chamber 20 is thereafter automatic.

In operation, steam is turned on by the valve 18 until the contents of the chute 20 are melted and then the asphalt or the like may be drawn off through the valve 3 at the bottom of the tank. The chute 20 will soon be empty and the asphalt heated by the coils 5 will flow into said chute and out of the valved outlet 3 as fast as the material becomes soft enough to pass through the perforations 19 in the walls of the chute. These holes are preferably of such size that they thus become automatic valves which open when the material is of sufficient fluidity to pump and close when it becomes so stiff that it will not pump.

While the present method and apparatus have been devised specifically for handling asphalt and kindred substances, it is obvious that the same may be used for any substance which is normally solid or substantially solid and which becomes fluid when heated.

It is apparent that the details disclosed in the present application, may be varied without departing from the spirit of the invention as expressed in the claims.

What is claimed and desired to be secured by Letters-Patent is:

1. In combination, a tank adapted to contain a substance which is normally solid and which becomes fluid under heat treatment, means for heating the lower portion of said tank to render the substance in the tank fluid, an upwardly extending discharge tube arranged in said tank and of a height sufficient to directly discharge material from various levels in said tank, means arranged in the tube for permitting the passage of material at various levels from the tank into the tube, and means for maintaining the interior of said tube in heated condition, so that the material may readily pass through the same.

2. In combination, a tank, a heating means arranged in said tank and of substantially the same length as said tank, a discharge chute of substantially the same height as said tank arranged in the latter and perforated throughout substantially its entire height with relatively small holes and means arranged in said chute for heating the interior of the latter.

3. A tank car provided with a tank having an inlet and an outlet, means for heating the lower portion of said tank throughout substantially its entire length, and a substantially vertically disposed discharge tube

arranged in said tank and provided throughout substantially its entire height with holes adapted to permit material in the tank to flow into the tube at various levels and to be discharged from the tank through said outlet.

4. A tank car provided with a tank having an inlet and an outlet, means for heating the lower portion of said tank throughout substantially its entire length, a substantially vertically disposed discharge tube arranged in said tank and provided throughout substantially its entire height with holes adapted to permit material in the tank to flow into the tube at various levels and to be discharged from the tank through said outlet, and a second heating means cooperating with said tube for maintaining the interior of the same in heated condition.

5. The combination with a tank having an inlet and an outlet, of a heating fluid conducting coil arranged in said tank and extending throughout the entire length of the latter, a perforated discharge tube communicating with said outlet and arranged within said tank, a heating fluid conducting coil associated with said tube for maintaining the interior of the latter in heated condition, a common heating fluid conducting pipe for conveying heating fluid to both of said coils, and a second common heating fluid conducting pipe connected to both coils for discharging the heating fluid from the latter.

6. The combination with a tank having an inlet and an outlet, of a heating fluid conducting coil arranged in said tank and extending throughout substantially the entire length of the latter, a perforated discharge tube arranged substantially between the ends of the tank and communicating with said outlet, and a second heating fluid conducting coil arranged within said tube and adapted to maintain the interior of the tube in heated condition.

7. The combination with a substantially horizontally disposed tank having an inlet and an outlet, of a heating fluid conducting coil arranged within the tank extending throughout substantially the entire length of the tank and having an intake and an exhaust, a perforated discharge tube arranged within the tank and communicating with said outlet, a heating fluid conducting coil arranged within the tube and having an intake and an exhaust, a steam supply pipe connected to the intakes of said coils, and a steam discharge pipe connected to the exhausts of said coils.

8. In combination, a tank, a heating means arranged in said tank and of substantially the same length as said tank, a discharge chute of substantially the same height as said tank arranged in the latter and perforated throughout substantially its entire height with relatively small holes, and heating means arranged contiguous to said chute.

In testimony whereof I affix my signature.

HORACE W. ASH.