Oct. 14, 1952 W. J. MILLER 2,613,665

APPARATUS FOR HEATING AND HANDLING BITUMINOUS MATERIALS

Filed April 15, 1950 2 SHEETS—SHEET 1

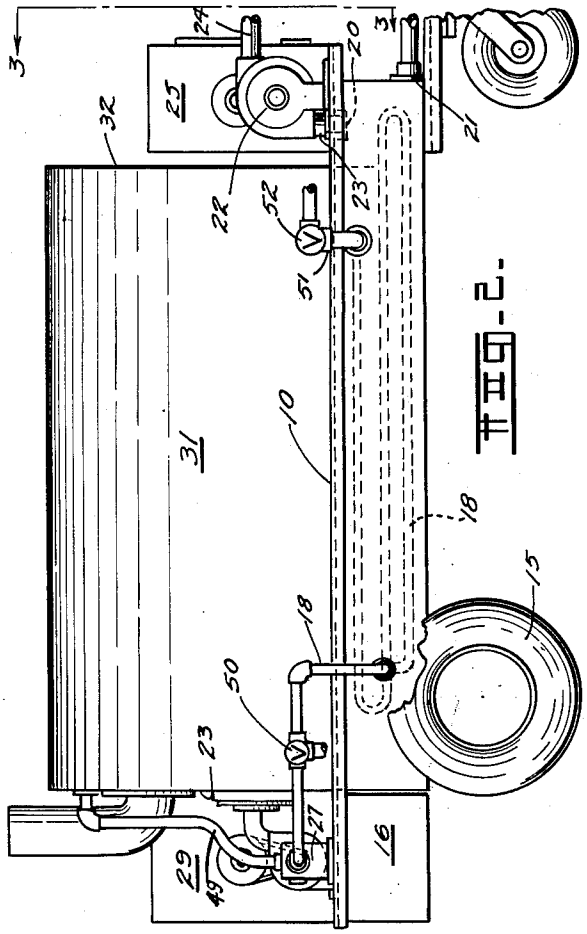


FIG. 2.

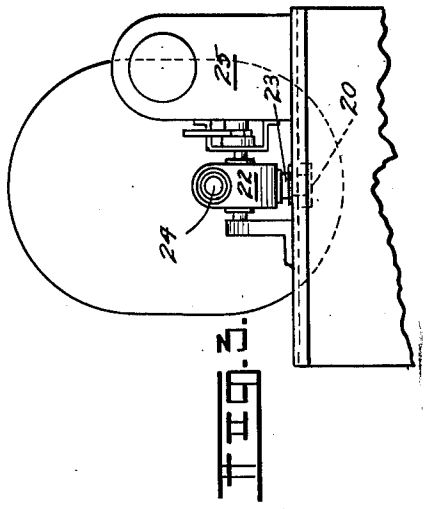


FIG. 3.

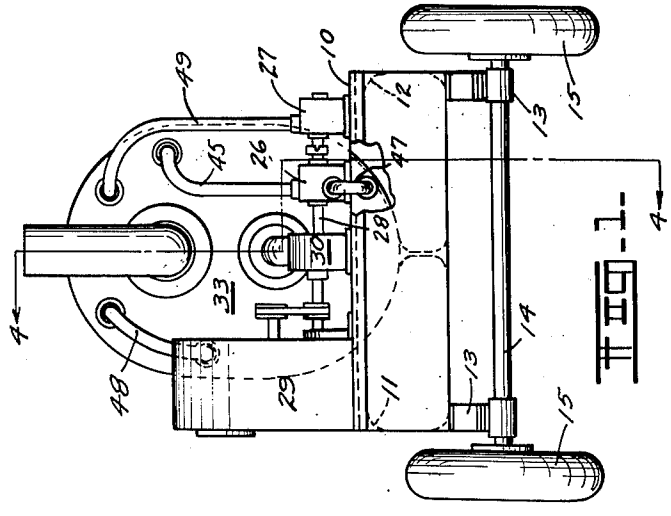


FIG. 1.

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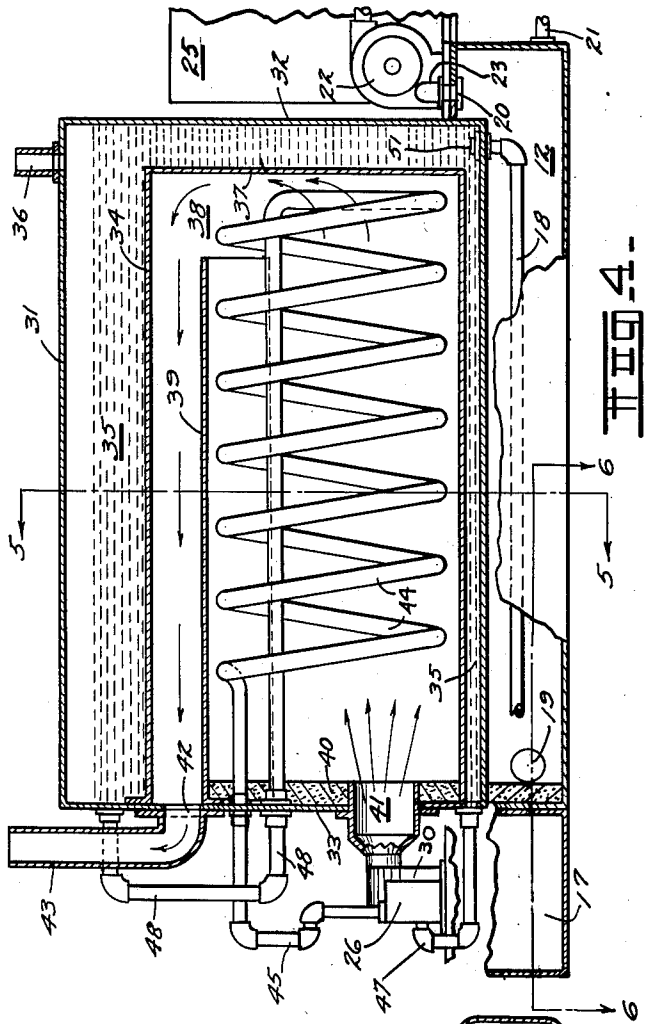


FIG. 4.

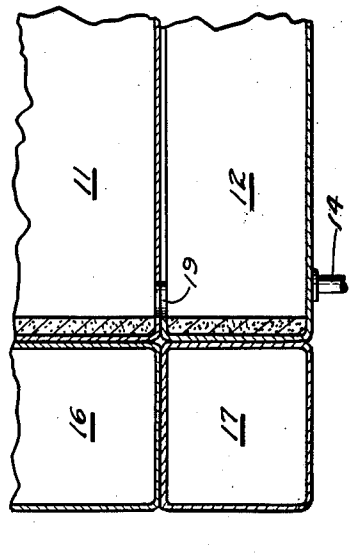


FIG. 6.

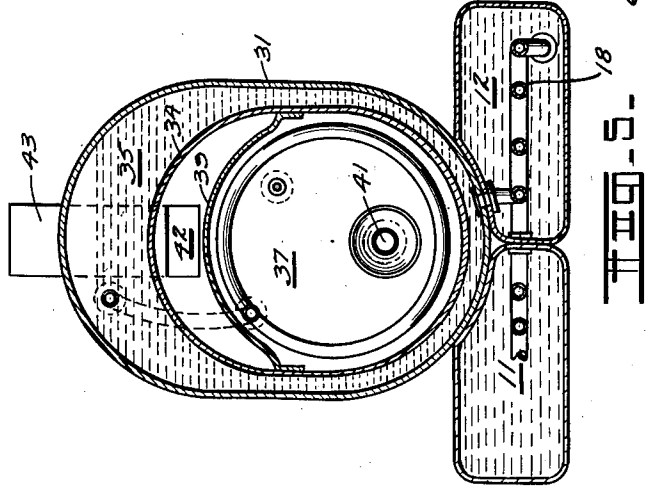


FIG. 5.

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2,613,665

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2,613,665

APPARATUS FOR HEATING AND HANDLING BITUMINOUS MATERIALS

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Application April 15, 1950, Serial No. 156,060

7 Claims. (Cl. 126—343.5)

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This invention relates to apparatus for heating and handling bituminous material such as asphalt and the like and in particular relates to a device for heating a supply of fluid heating medium such as oil in conjunction with means for circulating the fluid heating medium through an asphalt supply such as a tank car.

The principal object of the invention is the provision of apparatus for maintaining a supply of a fluid heating medium at desirable temperatures and incorporating means for circulating the fluid heating medium through a booster tank containing asphalt and through a primary source of supply of asphalt whereby the asphalt may be handled rapidly and efficiently.

A further object of the invention is the provision of means for rapidly and efficiently heating asphalt in a supply tank to enable the same to be withdrawn and incorporating means for secondary heating of the said asphalt in a secondary supply tank to raise the same to desirable temperatures for further handling.

A still further object of the invention is the provision of apparatus for heating and handling bituminous material such as asphalt and the like and taking the form of a portable device capable of being moved to various locations for handling asphalt as from tank cars spotted on job locations.

The apparatus for heating and handling bituminous materials as disclosed herein comprises a simple and efficient portable apparatus which may be used in the asphalt industry for the efficient and rapid handling of asphalt and the like as compared with heretofore known and practiced methods of handling such material. As is known in the art, it has heretofore been the practice to utilize steam generators and the like to heat tank cars of bituminous material such as asphalt to a temperature where the asphalt could be withdrawn from the tank car by pumping the same therefrom and which tank car necessitated bringing the heating apparatus to the tank car location well in advance of the need of the asphalt from the tank car to enable sufficient time to elapse for the heating device to sufficiently warm the entire contents of the tank car to make such withdrawal possible. The asphalt in the tank car could not under such circumstances be withdrawn before a suitable temperature had been reached to maintain working temperatures in the tank car.

In the present invention, the apparatus disclosed enables temperatures to be maintained in a tank car in relatively shorter time than a

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steam boiler such as heretofore used and to thereby raise the temperature of the contents of the tank car to working temperatures at a much faster rate than heretofore believed possible. Additionally, and more importantly, the asphalt in the tank car, after having been raised to temperatures where it may be pumped therefrom, may then be transferred to a booster tank in the apparatus where higher operating temperatures may be imparted to the asphalt to enable it to be subsequently handled by distributors and the like.

The invention therefore contemplates the provision of a portable apparatus including a supply of a fluid heating medium, novel means for maintaining desirable working temperatures in said fluid heating medium and for circulating the said fluid heating medium through a booster tank in the apparatus and through a primary supply source of bituminous materials.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is an end view of the apparatus for heating and handling bituminous material.

Figure 2 is a side view of the apparatus for heating and handling bituminous material.

Figure 3 is an end view taken on line 3—3 of Figure 2.

Figure 4 is a cross sectional side elevation of the apparatus shown in Figures 1 and 2.

Figure 5 is a vertical section taken on line 5—5 of Figure 4.

Figure 6 is a horizontal section taken on line 6—6 of Figure 4.

By referring to the drawings and Figures 1 and 2 in particular it will be seen that the apparatus for heating and handling bituminous materials comprises a trailer structure including a platform 10 formed of a pair of tanks 11 and 12 positioned longitudinally thereof and having spring supporting brackets and shackles 13—13 positioned therebelow for positioning an axle 14 and a pair of ground engaging wheels 15 therebeneath. The platform 10 of the device is formed primarily of the two longitudinally extending tanks 11 and 12 and has two smaller

auxiliary tanks 16 and 17 positioned at one end thereof, as best shown in Figures 4 and 6 of the drawings. The plurality of tanks 11, 12, 16 and 17 therefore comprises the supporting framework of the apparatus and the tanks 11 and 12 in particular comprise pressure vessels as the same form the booster tank heretofore mentioned for final heating of asphalt and the like and by means of heating coils 18 located therein.

The tanks 11 and 12 have a communicating opening 19 near their rearmost ends so that material introduced into the opposite end of one of the tanks 11 and 12 will flow lengthwise thereof through the opening 19 and thence lengthwise of the other tank to a point of discharge. The inlet and outlet openings are shown in Figures 2 and 4 of the drawings wherein the inlet opening is indicated by the numeral 20 and the outlet opening by the numeral 21. A liquid pump 22 is positioned on the platform 10 adjacent the inlet opening 20 and in communication therewith by means of a pipe 23. An inlet 24 on the pump 22 provides means for connection with piping communicating with a source of asphalt such as a tank car (not shown).

It will thus be seen that asphalt can be moved from a source of supply by the pump 22 into the booster formed of the tanks 11 and 12 circulated therethrough and discharged through the opening 21 to any desired point such as, for example, an asphalt distributor. An engine 25 is positioned adjacent the pump 22 for driving the same.

A fuel oil burner and blower 30 therefor are also positioned on the platform 10 and operatively connected with the shaft 28. A major portion of the platform 10 is occupied by a semi-cylindrical casing 31 forming a tank or receptacle and including ends 32 and 33 and enclosing a secondary semi-cylindrical casing 34 of smaller size, as best shown in Figures 4 and 5 of the drawings. The secondary semi-cylindrical casing 34 is positioned within the semi-cylindrical casing 31 in spaced relationship to the same with the exception of the end wall 33 whereby an annular chamber 35 is formed about the exterior of the semi-cylindrical casing 34 and within the semi-cylindrical casing 31. The annular chamber 35 is adapted to be substantially filled with liquid heating medium such as oil to the level shown therein in Figure 4 of the drawings, it being observed that an atmospheric vent 36 is provided so that the annular chamber 35 operates at atmospheric pressure only.

The annular chamber 35 is separated from the interior of the secondary semi-cylindrical casing 34 by a secondary end wall 37 and the space within the secondary semi-cylindrical casing 34 comprises a combustion chamber 38 divided into upper and lower portions by a longitudinally extending, transverse baffle 39 which terminates short of the secondary end wall 37. The end wall 33 heretofore referred to is provided with a refractory lining 40 and an opening 41 into which products of combustion are introduced, as shown by arrows in Figure 4 of the drawings, as by the oil burner 30 heretofore referred to.

The end wall 33 is also provided with a secondary opening 42 above the transverse baffle 39 and which opening or outlet 42 communicates with a stack 43. It will thus be seen that an ignitable combustible material introduced into the combustion chamber 38 will pass longitudinally through the lower part of the chamber 38 around the foremost end of the baffle 39 and longitudinally of the upper portion of the chamber 38 to the stack 43 and thence to atmosphere.

A heating coil 44 comprising a plurality of convolutions of suitable tubular material is disposed within the chamber 38 and located in the lower larger portion thereof under the baffle 39, as best shown in Figures 4 and 5 of the drawings. One end of the heating coil 44 is indicated by the numeral 45 and is placed in communication with the outlet of the oil pump 26 heretofore referred to. The inlet of the pump 26 is in communication with the lower portion of the annular chamber 35 by way of a tubular member or pipe 47. The other end of the heating coil 44 is indicated by the numeral 48 and communicates with the uppermost part of the annular chamber 35. Thus the coil 44 is filled with oil along with the chamber 35 as heretofore described and it will be observed by those skilled in the art that products of combustion introduced into the combustion chamber 38 will heat the oil in the heating coil 44, which oil is continuously circulated through the annular chamber 35 by the pump 26 which is in operation when the burner 30 is operated as both the pump 26 and the burner 30 are dependent for operation upon the engine 29.

The upper portion of the annular chamber 35 is in communication with the inlet of the oil pump 27 by way of a tubular member or pipe 49 and the outlet of the oil pump 27 is in communication by way of a three-way valve 50 with the coils 18 in the tanks 11 and 12 heretofore referred to. Hot oil from the annular chamber 35 may thus be pumped by the oil pump 27 through the coils 18 as the coils 18 are also in communication with the annular chamber 35 by way of an opening 51 therein, as best shown in Figure 4 of the drawings. Thus, operating temperatures may be maintained in the coils 18 comparable with that in the oil heating portions of the apparatus and specifically the annular chamber 35 and heating coils 44. Asphalt introduced into the booster tank formed of the tanks 11 and 12 may thus be rapidly heated to desirable temperatures as heretofore explained.

The three-way valve 50 provides a connection so that hot oil from the outlet of the pump 27 may be pumped directly to coils as, for example, those in a tank car comprising the source of asphalt, the return from such coils being introduced into the opening 51 by way of a secondary three-way valve and connection 52.

It will thus be seen that the device is operative to meet the objects of the invention as hereinbefore set forth in that oil in the heating coils 44 and annular chamber 35 is maintained at desired temperatures such as, for example, 600° F. by the operation of the burner 30 which in turn takes its fuel oil supply from the tank 16. It will be observed that at such times as the burner 30 is operating, the pumps 26 and 27 will also operate as they are both driven by the engine 29 which operates the burner 30. The hot oil in the heater portion of the device is constantly circulated through the coils 18 in the tanks 11 and 12 forming the platform of the device and by way of the three-way valves and connections 50 and 51 through a source of asphalt such as a tank car to the end that the temperature in the tank car is rapidly built up to a point where the asphalt pump 22 may be operated to move asphalt from the tank car into the tanks 11 and 12 where the temperature thereof is rapidly elevated and from whence the properly heated asphalt is discharged through the opening 21

and a pipe connected therewith to an asphalt distributor or the like. It will thus be seen that in normal operation the tanks 11 and 12 (which form in effect a baffled booster tank) are filled with asphalt and that when the apparatus is first moved into position adjacent a tank car, the initial heating operation brings the asphalt in the tanks 11 and 12 to operating temperatures in a very short time. Simultaneously with such operation, connections to the tank car enable the contents thereof to be subsequently heated sufficiently to be moved by the pump 22 into the tanks 11 and 12 where the additional heat necessary is imparted, the material thus speeding up the heating and pumping operation and fulfilling one of the principal objects of the invention.

It will be obvious to those skilled in the art that the apparatus may be formed in various sizes and capacities and that it will operate to meet the several objects of the invention as hereinbefore set forth.

Having thus described my invention, what I claim is:

1. Apparatus for heating and handling asphaltic material comprising a first container for said material, a secondary container for a liquid heating medium, means for heating the said liquid heating medium in the said secondary container comprising a combustion chamber having a heating coil located therein, the said heating coil communicating with the said secondary container at spaced locations, means for heating said asphaltic material in the said first container, said means comprising a secondary heating coil in the first named container in communication with the secondary container, pump means for circulating the said liquid heating medium through said coils, and secondary pump means for moving said asphaltic material to and from said secondary container.

2. Apparatus for heating and handling asphaltic material comprising a container for said material, pump means for moving said asphaltic material therethrough, heat exchanger coils in said container, means for supplying a heating medium to said heat exchanger coils, said means comprising a secondary container having a combustion chamber therein and a secondary heat exchanger coil located therein, the said secondary heat exchanger coil communicating with the said secondary container, and means for circulating a heating medium through said secondary heat exchanger coil and the secondary container.

3. Means for heating and handling asphaltic material comprising a portable mechanism having an asphalt tank forming a supporting frame, and pump means for moving asphalt into and out of said tank, heat exchange coils in said tank, means on said supporting frame for supplying a liquid medium to said heat exchange coils, said means comprising a hot oil heater including a tank having a combustion chamber located therein, a heat exchanger coil in said combustion chamber and in communication with the said tank enclosing the combustion chamber, and pump means for circulating a liquid heating medium through said tank and said heat exchanger coil.

4. Apparatus for heating and handling asphaltic material comprising a portable structure including a pair of tanks positioned in side-by-side relation to each other and in communication with one another adjacent one of their ends, means adjacent their opposite ends for introducing asphalt thereinto and removing asphalt therefrom, heating coils in said tanks, said tanks forming a supporting platform, a double walled tank supported upon said platform and forming a combustion chamber, secondary heat exchanger coils in said combustion chamber communicating with space between the double walls of the said tank, said double walled tank and the last mentioned heat exchanger coils being adapted to receive a liquid heating medium, and means for circulating the said heating medium therethrough and circulating means establishing communication between space between the walls of said double walled tank and the heating coils in the said pair of tanks whereby asphaltic material introduced into the said pair of tanks may be rapidly heated.

5. The apparatus set forth in claim 4 and further characterized by the circulating means comprising a pair of pumps interconnected for simultaneous operation.

6. The structure of claim 2 wherein the coil in the combustion chamber extends longitudinally therein between front and rear end walls thereof and is spaced downwardly from the top of the said combustion chamber, one end wall being formed with an outlet for products of combustion, and a horizontal baffle plate over said coil extending longitudinally in said combustion chamber the full width thereof from the said end wall and terminating in spaced relation to the other end wall, said baffle plate defining an outlet passage leading to the outlet and serving to confine products of combustion in the combustion chamber around the coil.

7. An apparatus for heating and handling asphaltic material comprising a receptacle for the said material, a container for a liquid heating medium, a casing in said container spaced from walls thereof and constituting a combustion chamber surrounded by liquid-receiving space in said container, pump means for circulating liquid heating medium through the space in said container, a heater communicating with said combustion chamber and serving to discharge hot products of combustion into the combustion chamber, said combustion chamber having an outlet for the products of combustion, and a hollow heat-absorbing member in said combustion chamber defining a tortuous path for the said liquid heating medium, the said tortuous path having one end communicating with said pump and the other end of the tortuous path communicating with a portion of the medium-receiving space within the container.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,602,476	Ballard	Oct. 12, 1926
1,790,555	Plumb	Jan. 27, 1931
2,091,801	Amick et al.	Aug. 31, 1937
2,136,738	Giordano	Nov. 15, 1938
2,317,441	Chausse	Apr. 27, 1943
2,439,367	Middlestadt	Apr. 6, 1948
2,506,412	Chausse	May 2, 1950