Jan. 30, 1945. A. J. TURPIN 2,368,177

REMOVABLE TANK HEATER

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Fig. 1.

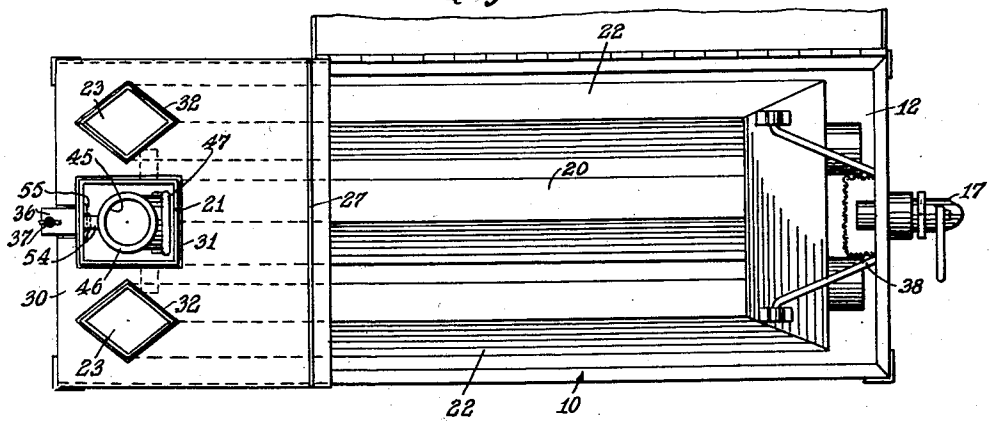


Fig. 2.

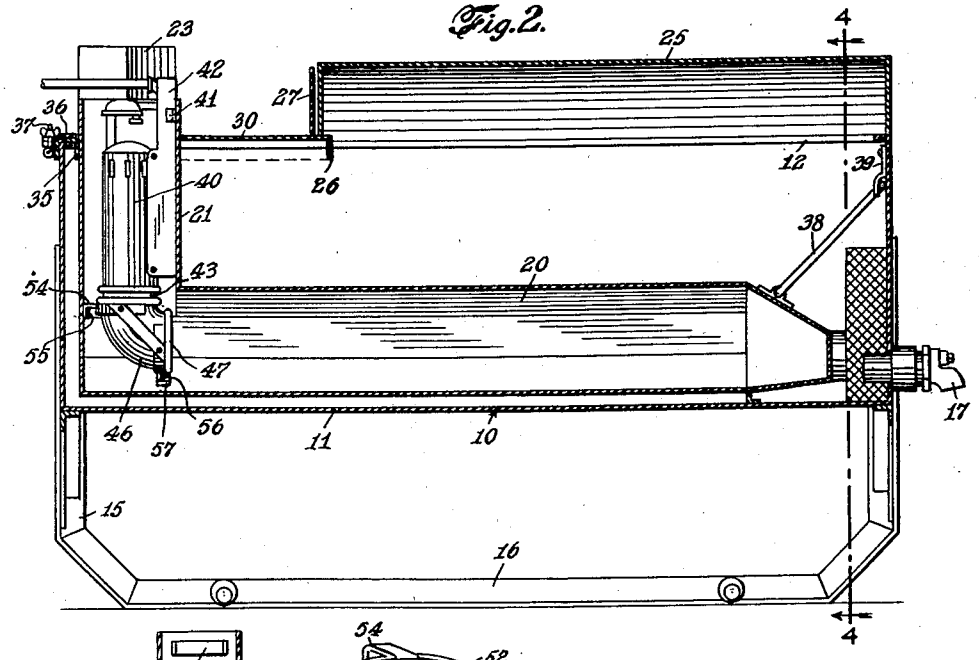


Fig. 6.

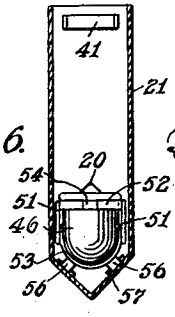
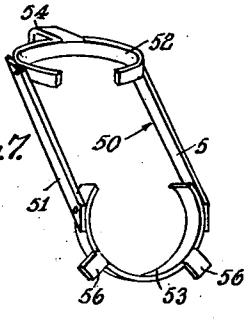


Fig. 7.



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Fig. 3.

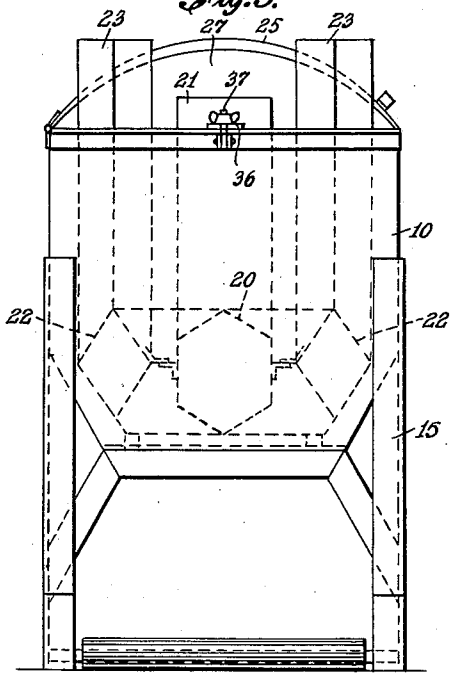


Fig. 4.

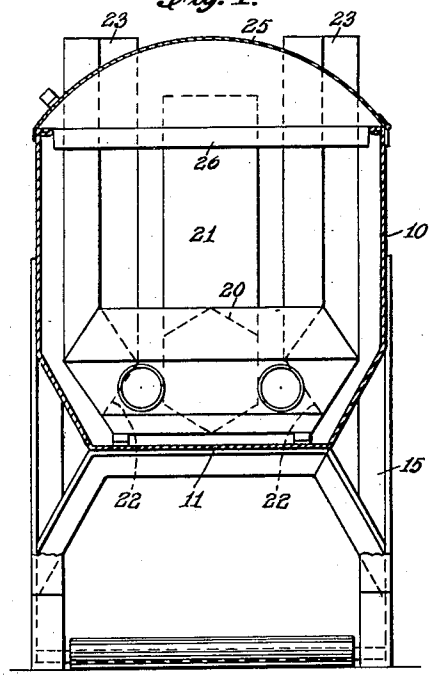
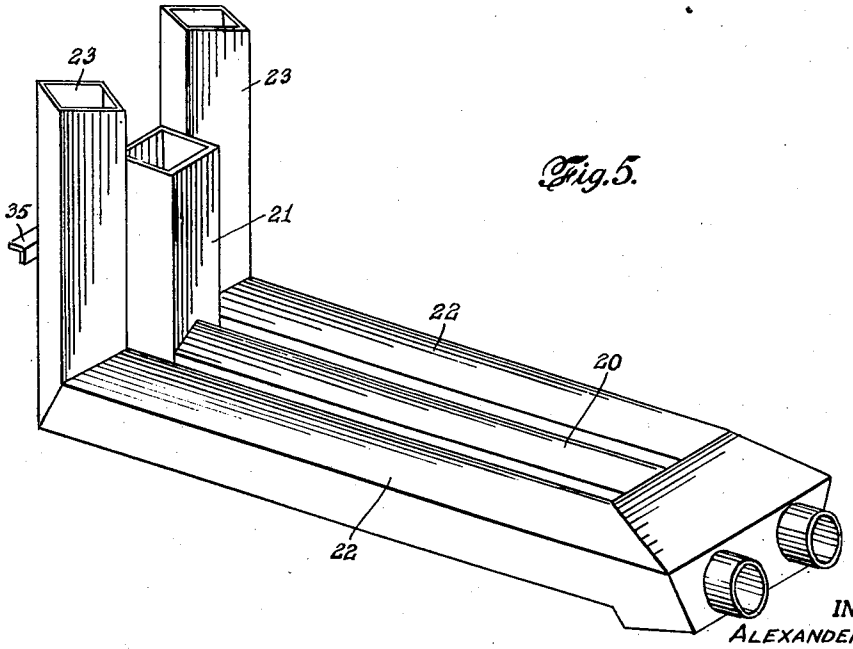


Fig. 5.



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REMOVABLE TANK HEATER

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7 Claims. (Cl. 126—360)

The invention relates to melting apparatus, more especially to melting kettles for bituminous material as tar, asphalt and the like, and designed usually for highway maintenance, paving, roofing, and waterproofing and like operations. The present invention is concerned particularly with kettles of this nature including a removable and submersible type of heating unit adapted to fit within the receptacle of the kettle. Such unit comprises a system of heating flues designed, when in operation, to be totally immersed in molten material in the receptacle, together with a separate burner removably carried thereby and so associated therewith as to introduce a flame and/or heated gases into the flue system at one end thereof, said flues extending substantially longitudinally of the receptacle.

It is an object of the present invention to afford a novel type of heating unit of this nature, more especially with respect to the arrangement of the flues, whereby to increase the thermal efficiency of the kettle.

Another object of the invention is to provide a simplified construction of the flue system which will admit of supporting the burner therein and in a manner to increase the thermal efficiency of the system, as well as to provide for a material increase in effective heating surface; also, through a reduction in the displacement of the heating system to increase correspondingly the kettle capacity for melting.

Still another object of the invention is to associate the burner with the flue system in such a manner that the former is disposed in a vertical or axial position during operation of the kettle; and to provide for the deflection horizontally of the discharge from said burner.

The invention has for a further object to admit of ready introduction and removal of the burner from the flue system.

The invention has for an object, also, to provide a novel support and deflecting member for the burner designed to introduce the flame and/or products of combustion from the burner into the main heating portion of the flue system.

Still another object is to provide for a mounting of the deflecting member which will enable its ready removal and replacement when required.

In carrying out the invention, the flue system comprising a horizontally extending inlet flue is provided with a vertical extension at its inlet end to receive the burner, the discharge of which is arranged to be deflected into the flue, said flue communicating at its other end with one or more horizontally disposed flues having corresponding vertical exhaust stacks adjacent the inlet flue extension.

Provision is made, also, for closing the top of the receptacle when the flue system is in position therein and not in use, as by means of a movable hood hinged to one side wall of the receptacle of the kettle and designed to cover a substantial portion of the flue system. A separate and removable cover member having openings to pass the said extension and stacks is provided thereover to cover the remaining open top of the receptacle.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 is a plan view of a melting kettle with the novel tank heater installed but without the burner, and with the hinged hood swung backwardly to expose the interior of the receptacle of the kettle.

Fig. 2 is a longitudinal section through the kettle with burner in position and shown in elevation.

Fig. 3 is an end elevation of the kettle; and Fig. 4 is a transverse section taken on the line 4—4, Fig. 2 of the drawings, and looking in the direction of the arrows.

Fig. 5 is a view in isometric projection of the novel heater without associated burner.

Fig. 6 is a fragmentary transverse section through the inlet extension of the heater with burner removed but deflecting member in position.

Fig. 7 is a view in isometric projection of a cradle member for positioning the deflecting member in the inlet extension.

Referring to the drawings, 10 designates a metal shell or more or less elongated receptacle with bottom 11 and open at the top 12. The latter is designed to be closed by a pair of cover members, as will hereinafter be more fully set forth, when the apparatus is not in use and by one cover member only during the melting operation. The kettle is carried by a suitable framework 15 having the runners 16 at the bottom. A spigot 17 is provided at the bottom of the kettle at one end thereof for discharging molten material from the receptacle.

The melting kettle herein disclosed is of the type wherein the heating unit is designed to be totally immersed in molten material and to be removable bodily from the kettle for convenient cleaning, particularly of the external surfaces of the heating flues thereof. The heating system comprises essentially a horizontally disposed inlet flue 20 extending longitudinally of the shell

10 when positioned therein and having a vertical extension 21 at the end opposite spigot 17. One or more flues 22 similarly horizontally disposed in the shell are provided and form with the flue 20 a unitary member, said flues, as shown, communicating through a T-connection with the end of flue 20 opposite its vertical extension. The flues 22 are also provided respectively with extensions or stacks 23, the same extending somewhat above the top of extension 21 and being located adjacently thereto, in the embodiment shown one upon either side thereof. When the heater unit is located in the shell 10, the T-connection ends thereof will be in proximity to the spigot 17 while the extensions of the flues constituting the heater extend upwardly at the opposite end of the shell and beyond the top 12 thereof.

As hereinbefore noted, the top is designed to be closed when the kettle is not in use and this is effected in the present instance by a concave hood member 25 hinged along the top edge of one of the sides of the shell, said hood extending to a removable cross-piece 26 which spans the top of the shell, and has an upstanding wall 27 to shield the burner end of the kettle from gases arising from the melt when hood 25 is swung back.

In addition to the hood member 25, a cover plate 30 is provided over the open space at the top between cross-piece 26, with which it is integral, and the burner end of the shell, said plate being provided with corresponding openings 31 and 32 to pass respectively the extension 21 and the adjacently disposed stacks 23 of the flue elements. The heating unit at this end, moreover, carries a securing bar 35 with bifurcated lug 36 into which is adapted to fit a swing-bolt 37 of the shell for attaching the heating unit to said shell at the burner end. At the opposite end, a suitable bail 38 pivotally attached to the heater unit at this end may be locked under a pivoted catch 39 of the shell to prevent elevation of the unit at the spigot end during operation.

A liquid-fuel burner 40 of any suitable type is designed to discharge flame and products of combustion to the heater unit, the gases being directed into the intermediate flue 20 and through the adjacently disposed flues 22 for final discharge through the exhaust stacks 23. The burner arrangement, however, is effected in a novel manner in that the burner is not horizontally disposed, as is the usual practice, with reference to the intermediate flue 20. As indicated, it is disposed vertically or axially in the vertical extension 21 of the said intermediate flue, thereby not only rendering the burner more accessible for removal or replacement, but requiring less horizontal space within the kettle to allow of increase thereby of the length of the heating flues as well as materially increasing the kettle capacity for material to be melted.

In inserting the burner, it is to be lighted before installation in the extension 21, and in this connection it will be noted that there will be no tendency for the flame to be deflected back through the burner through contact with the sides of the extension. To guide the burner and insure its correct position, a cleat or guide member 41 is attached to one of the sides of the extension 21 near the top thereof and is designed to accommodate the base 42 of the burner which is made to have a sliding fit in the cleat.

Moreover, the outlet or nozzle 43 of the burner is designed to cooperate with a deflecting member which may be integral therewith, but is preferably arranged to be supported by and to register with the inlet opening 45 of such member as, for example, the elbow member 46. This member is in the nature of a 90° elbow-fitting whose horizontal outlet 47 registers with the inlet of flue 20 so that the gases from the vertically positioned burner 40 will be deflected horizontally into the flue 20 and from the same through the remaining flues until discharged through the exhaust stacks 23.

The fitting 46, also, is mounted to be removable, being held to this end in a cradle or like member 50 having the two side pieces 51 and a horizontally disposed band or strap 52 with flexible ends and a vertically disposed band or strap 53 similarly having its ends flexible. From the band 52 extends backwardly a finger 54 designed to hook into a cleat or socket element 55 secured to the inner wall of extension 21.

In addition, feet 56 extend downwardly from the band 53 and at the required angle to contact the bottom of the extension for additional support of the cradle, and the said feet are properly located by stops 57 attached to the said bottom of the extension. The cradle itself is thus also removable and the fitting 46 rests therein with side-pieces 51 embracing the sides of the fitting while the bands 52 and 53, after bending over their ends, embrace respectively the vertically disposed and the horizontally disposed portions of the fitting immediately under its respective flanges. It will be necessary, therefore, in removing the fitting merely to pry apart the band ends, whereupon the fitting may be lifted out of the cradle, it being understood, of course, that the burner 40 has first been removed.

In providing a deflecting member, in addition to its function of diverting the flow of the flame and gases, the same affords a further heating surface to increase thereby the effectiveness of the kettle. Furthermore, it prevents overheating of a flue section, particularly at a point where the direction of flow of the gases discharged by the burner is changed; and the intense heat due to impingement at the entrance to the flue system in the constructions heretofore utilized is considerably lessened by the novel arrangement.

I claim:

1. Removable tank heater, comprising a horizontally extending inlet flue with vertical extension at one end, and additional horizontally disposed flues communicating with the inlet flue having respective vertical exhaust extensions adjacent the inlet flue extension, a burner element adapted for axial disposition in said inlet flue extension and provided with a discharge nozzle, means for mounting the same removably therein, and tubular deflecting means within the inlet flue extension having a horizontal outlet juxtaposed to the said inlet flue and a vertical inlet juxtaposed to the nozzle of the burner element to receive the discharge therefrom and deliver it into said inlet flue.

2. Removable tank heater, comprising a horizontally extending inlet flue with vertical extension at one end, and additional horizontally disposed flues communicating with the inlet flue having respective vertical exhaust extensions adjacent the inlet flue extension, a burner element adapted for axial disposition in said inlet flue extension and provided with a discharge nozzle, means for mounting the same removably therein, and an elbow-fitting mounted at the bottom

of said inlet extension having a horizontal outlet juxtaposed to the said inlet flue and a vertical inlet juxtaposed to the nozzle of the burner element to receive the discharge therefrom and deliver it into said inlet flue.

3. Removable tank heater, comprising a horizontally extending inlet flue with vertical extension at one end, and additional horizontally disposed flues communicating with the inlet flue having respective vertical exhaust extensions adjacent the inlet flue extension, a burner element adapted for axial disposition in said inlet flue extension and provided with a discharge nozzle, guide means provided on the inlet flue extension for removably mounting the burner element therein, and deflecting means having a horizontal outlet juxtaposed to the said inlet flue and a vertical inlet juxtaposed to the nozzle of the burner element to receive the discharge therefrom and deliver it into said inlet flue.

4. Removable tank heater, comprising a horizontally extending inlet flue with vertical extension at one end, and additional horizontally disposed flues communicating with the inlet flue having respective vertical exhaust extensions adjacent the inlet flue extension, a burner element adapted for axial disposition in said inlet flue extension and provided with a discharge nozzle, guide means provided on the inlet flue extension for removably mounting the base of the burner element therein, and an elbow-fitting mounted at the bottom of said inlet extension having its horizontal outlet juxtaposed to the said inlet flue and its vertical inlet supporting the nozzle of the burner element to receive the discharge therefrom and deliver it into said inlet flue.

5. Removable tank heater, comprising a horizontally extending inlet flue with vertical extension at one end, and additional horizontally disposed flues communicating with the inlet flue having respective vertical exhaust extensions adjacent the inlet flue extension, a burner element adapted for axial disposition in said inlet flue extension and provided with a discharge nozzle, means for mounting the same removably therein, a cradle removably seated at the bottom of the said inlet flue extension, and a 90° elbow-fitting removably held by said cradle having its horizontal outlet juxtaposed to the horizontally extending flue and its vertical inlet juxtaposed to the nozzle end of the burner element to receive the discharge therefrom and deliver it into said inlet flue.

6. The combination with a flue comprising two tubular arms substantially at right angles to each other; of means for removably mounting a burner element axially in one arm of said flue, the said burner having a nozzle for discharge into the other arm of the flue, the said mounting means comprising a cradle removably seated at the bottom of said one arm, and a 90° elbow-fitting removably held by said cradle, having its outlet juxtaposed to the other arm and its inlet to the nozzle end of the burner element to receive the discharge therefrom.

7. The combination of claim 6, wherein the cradle is provided with flexible ends to embrace the fitting and with an outwardly and downwardly extending attachment finger and downwardly extending feet for respectively locating and supporting the cradle in said one arm.

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