

July 21, 1942.

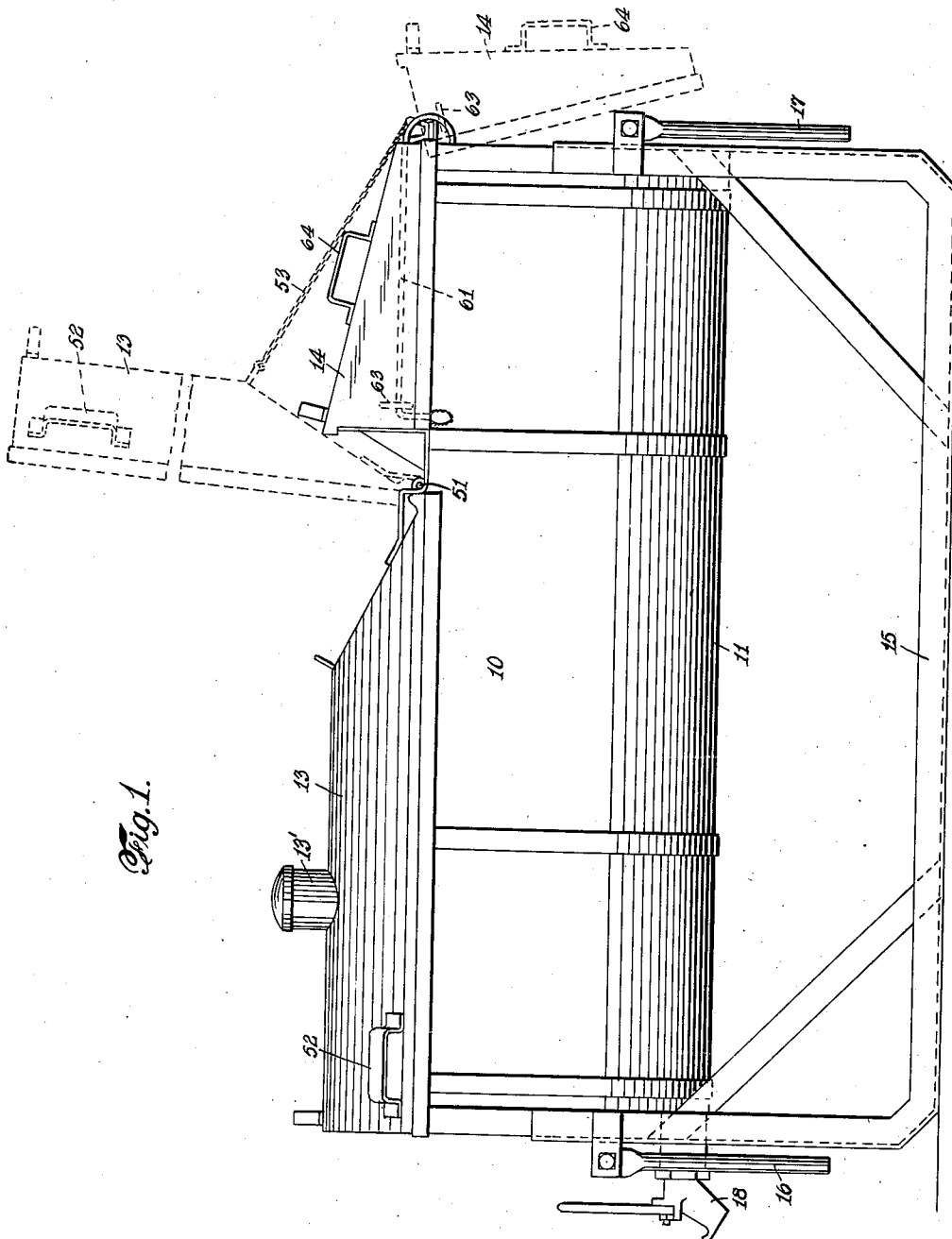
W. C. ELZE

2,290,742

REMOVABLE TANK HEATER

Filed March 25, 1941

5 Sheets-Sheet 1



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Fig. 2.

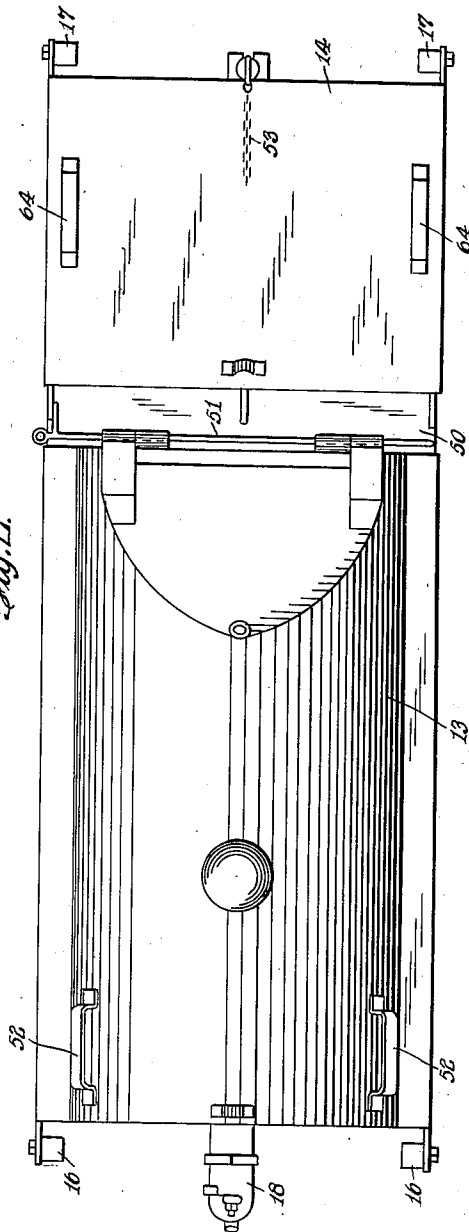
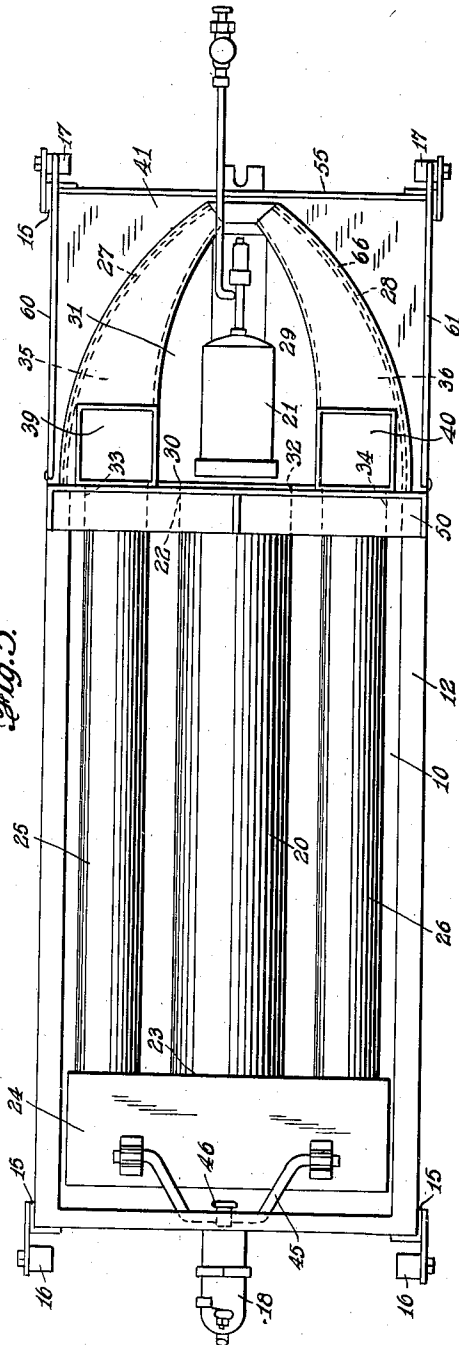


Fig. 3.



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Fig. 1

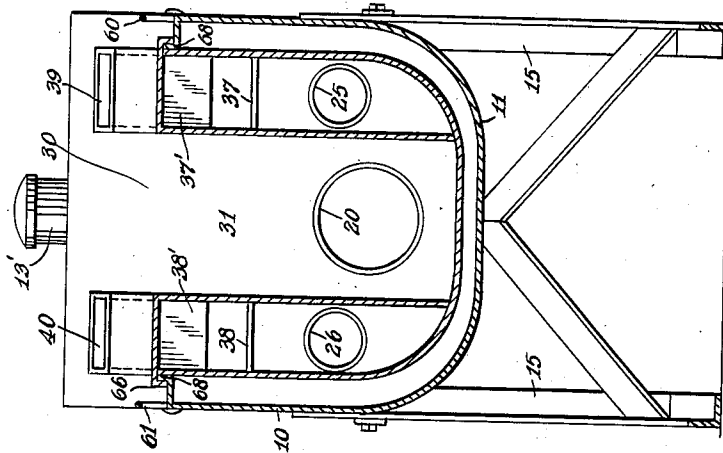


Fig. 6

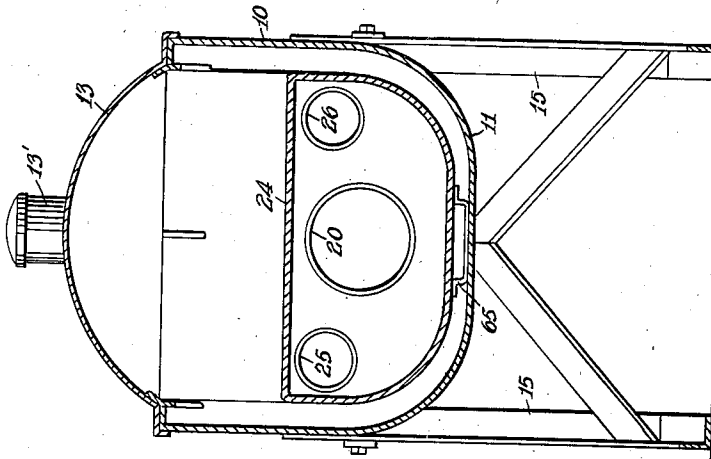
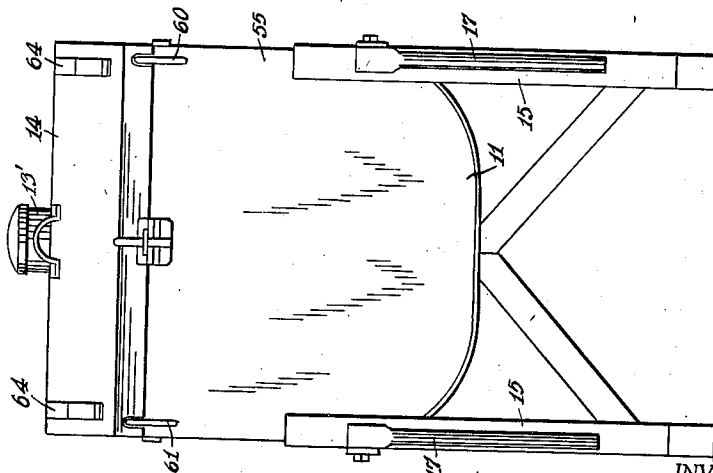


Fig. 4



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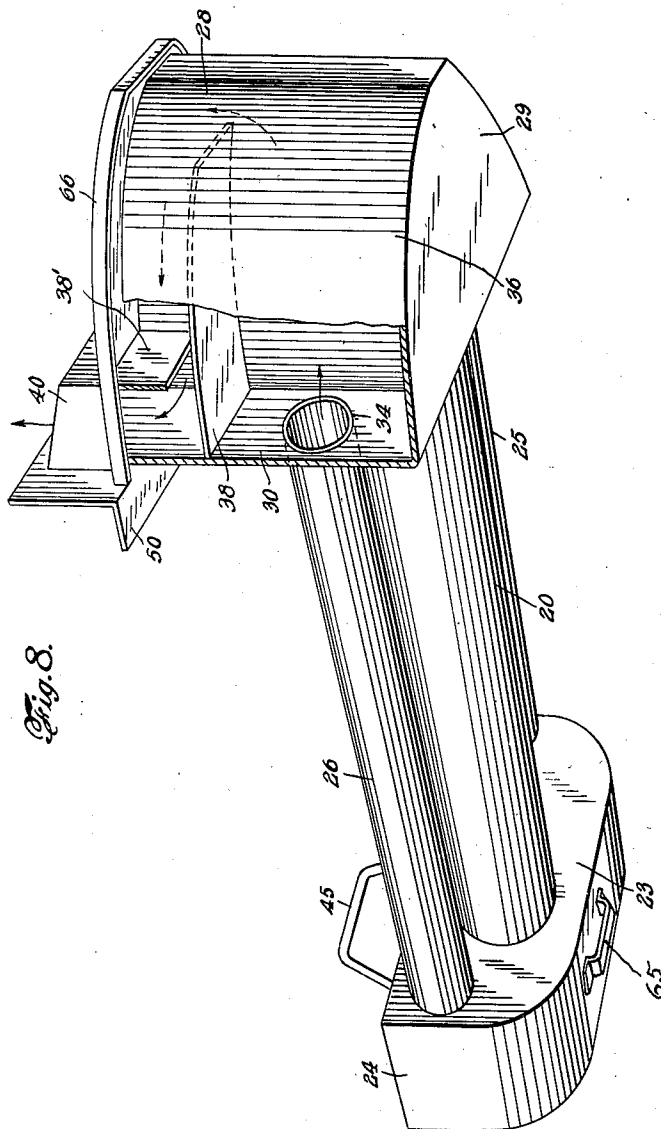


Fig. 8.

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UNITED STATES PATENT OFFICE

2,290,742

REMOVABLE TANK HEATER

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Application March 25, 1941, Serial No. 385,059

5 Claims. (Cl. 126—360)

The invention relates to melting apparatus, more especially to melting kettles for bituminous materials as tar, asphalt, and the like, and designed usually for highway maintenance, paving, roofing, and waterproofing and like operations. The present invention is concerned more especially 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 of the receptacle, together with a separate burner removably carried thereby in an enclosing well and so associated therewith as to introduce a flame 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 exhaust portion of the flue system whereby to increase the thermal efficiency of the kettle.

A further object of the invention is to provide at one end of the heating unit an integral well or like receptacle constructed in part of the exhaust portion of the flue system, said well being adapted to support removably the burner element for directing through said well and into the flue system a flame or heated gases for circulation therethrough.

A still further object of the invention is to utilize the spent gases to preheat the incoming combustion air, thereby not only reducing materially the final or discharge temperature of said gases, but also enhancing the thermal efficiency of the unit.

Another object is to afford a substantially uniform distribution of the heat throughout the kettle.

Still another object of the invention is to mount in a novel manner a pair of cover elements for sealing the top of the kettle.

In carrying out the invention, there is provided in the kettle receptacle a removable heating unit comprising a system of longitudinal flues including, for example, an intermediate flue designed to receive at one end a directed flame or heated gases from a burner element, and return flues, communicating at the opposite end with said intermediate flue, having exhaust portions at the burner end which form the side walls, and, preferably, an end of an open-top well or terminal unit. This well is completed by a suitable bottom element which supports removably the

burner and by an end wall having an opening to which is juxtaposed the burner end of the intermediate flue to receive therein the flame from the burner.

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

Fig. 1 is a side elevation of the novel melting kettle.

Fig. 2 is a plan view thereof with the two kettle covers in position to close the top of the same.

Fig. 3 is a similar view with the covers removed.

Fig. 4 is an end view of the kettle.

Fig. 5 is a longitudinal section therethrough with the burner well cover open.

Figs. 6 and 7 are transverse sectional views taken respectively on the lines 6—6, 7—7, Fig. 5 of the drawings, and looking in the direction of the arrows, the burner being removed in Fig. 7.

Fig. 8 is a perspective view of the removable heating unit which is designed to fit within the receptacle for material to be melted, a portion of an outer wall of the terminal unit thereof being broken away.

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 covers 13 and 14, as will hereinafter be more fully set forth, when the apparatus is not in use and by the one cover 13 only during the melting operation. The kettle is carried by a suitable frame-work 15 which may be provided with pairs of handles 16 and 17 at its opposite ends for manually transporting the kettle from place to place, as required. A spigot 18 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 bodily removable from the kettle for convenient cleaning, particularly of the external surfaces of the heating flues thereof. It comprises essentially a flue portion consisting, in the particular embodiment shown by way of example, of three flues adapted to be disposed longitudinally of the receptacle 10, the intermediate flue 20 being designed to receive a directed flame or hot gases from a burner 21 through its open inner end 22, while its outer end 23 communicates through a T-connection 24 with two adjacent parallel return flues 25 and 26. In ad-

dition, there is a terminal member associated with the flues, the same being located at the end of the receptacle opposite the spigot end.

This member is constructed in part of the return flues which form double-walled sides 27 and 28 thereof, preferably converging to close the terminal member at one end, the respective converging ends of each being sealed. A bottom closing plate 29 is attached over the bottom of the sides and, together with an end plate 30, provides an open-top chamber or well 31 which is designed to receive and support the burner 21 when it is desired to operate the kettle for melting material therein.

Burner 21 rests then on the bottom plate 29 and is aligned with the intermediate flue 20 to direct a flame and/or heated gases into the said flue 20 through the opening 22 thereof and through a registering opening 32 in the plate 30. Further openings 33 and 34, respectively, are provided in plate 30 to register with the juxtaposed outlets of the respective flues 25 and 26. These flues continue then in expanded form as the side wall members 27 and 28 which provide intermediate ducts or chambers 35 and 36, respectively, for the waste gases. These gases are caused to circulate through the respective chambers, being directed by means of horizontally disposed baffles 37 and 38 and vertically disposed baffles 37' and 38' in their respective ducts. The said ducts in turn are closed over at the top and terminate in outlets 39 and 40 for final discharge of the products, extending to this end above the sides and a deck 41 integral with the receptacle at the burner end of the kettle.

By this expedient, the return flues are in effect continued to provide a heating chamber not only for the purpose of assisting in the melting of material in the receptacle and for securing more uniform distribution of the heat throughout the kettle, but for pre-heating the combustion air which enters through the top of chamber 31 to supply the burner 21. Moreover, the flues and terminal member constitute a single unit which is readily removable from the receptacle as by grasping the handle 45 attached to the T-connection 24. This handle may serve also, in connection with latch member 46 pivoted to the juxtaposed end wall of the receptacle, to retain the melting unit within the receptacle against the buoyant action of the molten material when the bail of the handle is locked under the latch 46 as indicated in Fig. 5 of the drawings.

When the kettle is not in use, it is desirable to cover the top of the same, generally first removing the burner by lifting it out of the well 31. To this end, the cover 13 is provided and is hingedly attached at its inner end to a bracket 50 which is secured to the wall 30 of the terminal member, a pin 51 serving to connect the hinge portions. Cover 13 carries also a safety valve 13'.

When it is desired to open the kettle, as for charging the same with material to be melted, cover 13 may be swung upwardly about the hinge pin 51 to the position indicated by the broken lines, Fig. 1 of the drawings, as by grasping the handles 52 provided thereon. In this position it may be further held by means of a chain 53 attached to the burner end wall 55 and removably secured to said cover. When the heating unit is to be removed, hinge pin 51 is knocked out to separate the cover from the bracket 50 and the former is then temporarily laid aside.

Similarly, the cover 14 is removable so that the top of well or chamber 31 and the outlets 39

and 40 of the flues may be exposed. This is effected conveniently by attaching rods 60 and 61 at the sides of the receptacle at its burner end, the rods being secured with their outer ends turned downwardly over the burner end of the kettle and with said rods displaced from the kettle wall. The lower edges of the cover 14 are provided with perforated lugs 62 and 63 at the respective inner ends, the lugs being designed to receive the rods 60 and 61 and to ride over the same. The cover is thereby retained on the kettle but is permitted to be removed from the top of chamber 31 as by sliding it outwardly and then dropping it downwardly over the burner end of the receptacle, in which position it hangs on the rod ends, as indicated in the broken-line position, Fig. 1 of the drawings. Handles 64 are attached to the top of the cover 14 to assist in its removal.

The entire heating unit is arranged to be displaced somewhat from the bottom of the receptacle as by means of a foot or like member 65 attached to the bottom of the T-connection 24 at the end opposite the burner, while at the burner end a further support may be afforded as by the terminal unit. Thus, the outer plates of the side walls may be provided along the top with a turned-over edge 66 which fits over an upturned rim 68 of the receptacle or rather the deck portion 41 thereof. The fit between the same is made sufficiently close to effect also a substantial seal thereat.

I claim:

1. Removable tank heater, comprising a burner, an open-top terminal member, a flue leading from said member and flue elements for the discharge thereof of products of combustion from the burner carried by said terminal member, the latter including a pair of exhaust ducts receiving the products discharged by the flue elements and having respective outlets at the top for final discharge of the products of combustion, said exhaust ducts constituting the side walls of the said terminal member, and a closure at the bottom of the member affording a support for the burner.

2. Removable tank heater, comprising a burner, an open-top terminal member, a flue leading from said member and flue elements for the discharge thereof of products of combustion from the burner carried by said terminal member, the latter including a pair of exhaust ducts converging to the rear of the member to close the same thereat, adapted to receive the products discharged by the flue elements and having respective outlets at the top for final discharge of the products of combustion, said exhaust ducts constituting the side walls of the said terminal member, and a closure for the bottom of the member affording a support for the burner.

3. Removable tank heater, comprising a burner, an open-top terminal member, a flue leading from said member and flue elements for the discharge thereof of products of combustion from the burner carried by said terminal member, the latter including a pair of exhaust ducts converging to the rear of the member to close the same thereat, adapted to receive the products discharged by the flue elements and having respective outlets at the top for final discharge of the products of combustion, said exhaust ducts constituting the side walls of the said terminal member, a plate closing the front of the member having a flue opening at the bottom for said flue leading from the terminal member, and a plate

closing the bottom of the member affording a support for the burner.

4. Removable tank heater, comprising a burner, an open-top terminal member, a flue leading from said member and flue elements for the discharge thereof of products of combustion from the burner carried by said terminal member, the latter including a pair of exhaust ducts provided with horizontally disposed baffle elements therein and receiving the products discharged by the flue elements and having respective outlets at the top for final discharge of the products of combustion, said exhaust ducts constituting the side walls of the said terminal member, and a closure for the bottom of the member affording a support for the burner.

5. Removable tank heater, comprising a

burner, an open-top terminal member, a flue leading from said member and flue elements for the discharge thereof of products of combustion from the burner carried by said terminal member, the latter including a pair of exhaust ducts receiving the products discharged by the flue elements and having respective outlets at the top for final discharge of the products of combustion, said exhaust ducts constituting the side walls of the said terminal member and the upper portion of the said walls being bent outwardly and downwardly to afford a support for the member and a seal thereat with the tank, and a closure for the bottom of the member affording a support for the burner.

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