

D. M. DUNLAP.
TANK HEATER.
APPLICATION FILED JAN. 17, 1911.

1,004,391.

Patented Sept. 26, 1911.

2 SHEETS-SHEET 1.

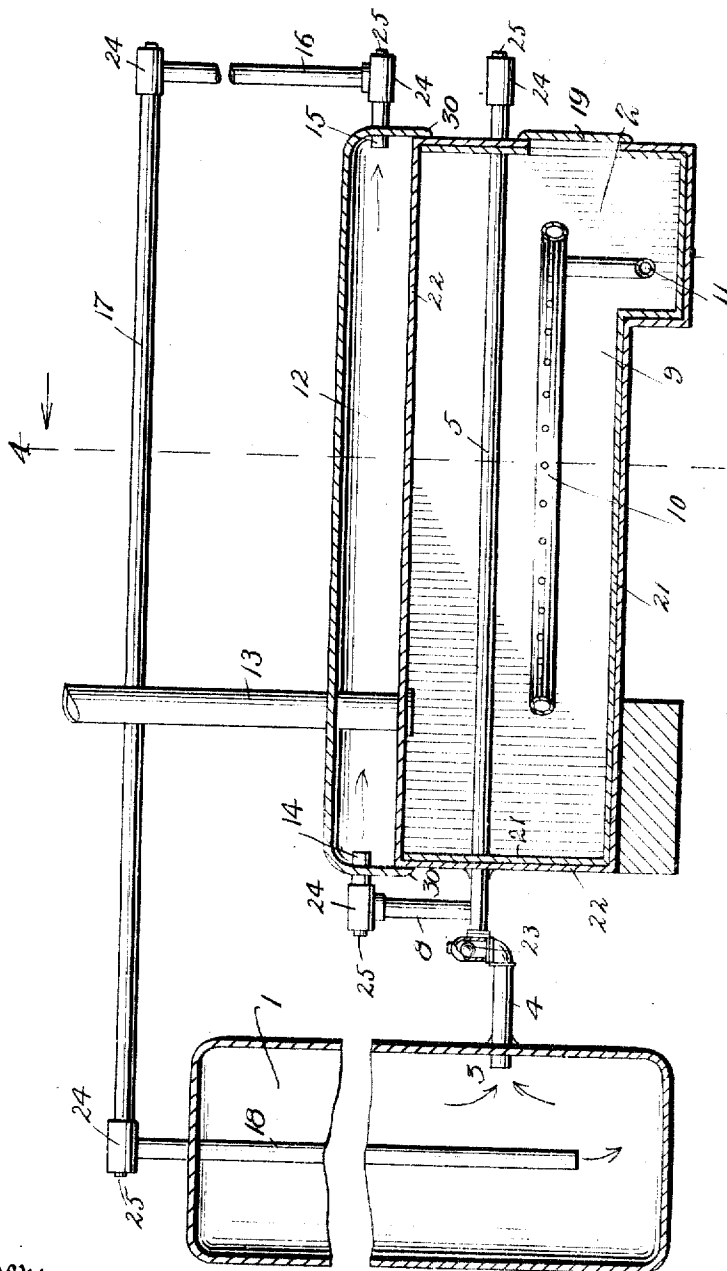


Fig. 1.

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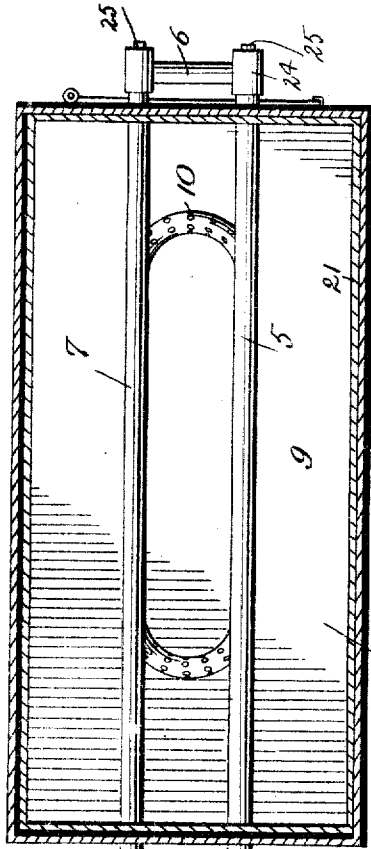


Fig. 2.

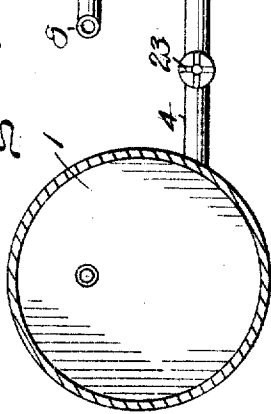


Fig. 3.

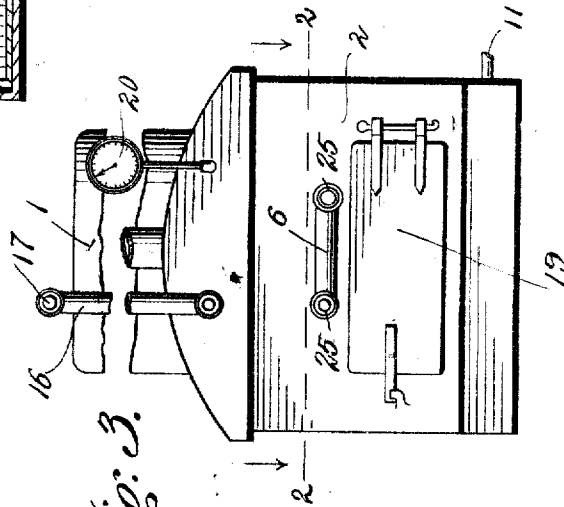


Fig. 4.

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UNITED STATES PATENT OFFICE.

DAVID M. DUNLAP, OF CHICORA, PENNSYLVANIA.

TANK-HEATER.

1,004,391.

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Application filed January 17, 1911. Serial No. 803,053.

To all whom it may concern:

Be it known that I, DAVID M. DUNLAP, citizen of the United States, residing at Chicora, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Tank-Heaters, of which the following is a specification.

This invention relates to tank heaters, and has for its object to provide a simple, inexpensive and at the same time very effective device for heating crude oil or other liquids contained in tanks for the purpose of promoting its fluidity and mobility or particles in transmission, and for other purposes.

Another object of the invention is to provide a furnace for heating oil fluids in a tank and causing a continuous circulation of the fluid between the tank and the furnace.

With the above and other objects in view, I have invented the device illustrated in the accompanying drawings in which,

Figure 1 is a longitudinal vertical sectional view of a tank and heater therefor. Fig. 2 is a longitudinal horizontal sectional view taken on the line 2-2 of Fig. 3. Fig. 3 is an end elevation of the device, and Fig. 4 is a transverse vertical sectional view taken on the line 4-4 of Fig. 1.

Referring to the accompanying drawings 1 indicates a tank and 2 a furnace.

3 is an outlet for oil or other fluid contained in the tank, by means of which the fluid is conveyed through a series of pipes 4, 5, 6, 7, and 8; the pipes 5 and 7 passing through a firebox 9 of the furnace and directly over the oil or gas burner 10, which is fed with fuel through the feed pipe 11.

A reservoir 12 is located directly above and entirely over the fire box 9, and a stack 13 is provided to carry off the gases from the fire box. The fluid passes from the pipe 8 through the inlet 14 and enters the reservoir 12, and when it is heated sufficiently, the expansion forces it to pass through the outlet 15, and through the pipes 16, 17 and 18 into the bottom of the tank 1. A door 19 is provided by means of which access may be had to the burner 10 by which it may be lighted. A temperature gauge 20 is connected with the reservoir 12, so that the temperature of the fluid therein may be ascertained at any time.

The furnace 2 has all its walls except the top wall thereof lined with asbestos or other non-conducting material, 21, so that all the

heat possible may be retained within the furnace.

The top wall 22 of the firebox 9 is the bottom wall of the reservoir. A check valve 23 is located between the pipes 4 and 5 and prevents the fluid under expansion from being forced back through the same pipes into the tank 1. All the various pipes are connected with T-joints 24, and have their outer ends closed with plugs 25, which may be removed at any time for the purpose of cleaning the pipes.

It will be seen from the foregoing description that the pressure of the fluid contained in the tank 1 will force the fluid to fill the pipes 5 and 7 and the reservoir 12. The check valve will prevent a return of the fluid through the same channels when the fluid becomes heated and thereby expanded, consequently the fluid is forced back into the bottom of the tank through the pipes 16, 17, and 18 and the heated fluid naturally rises to the top of the tank and raises the temperature of all the fluid contained in the tank, thus increasing the pressure in the tank and thereby assisting in forcing the cooler portion of the fluid back through the furnace or heater. It will thus be seen that a continuous circulation is maintained between the tank and heater.

In pointing out more clearly the distinctive features of my invention, I would state that I am aware that in hot water heaters and various other liquid heaters it has been common for many years to employ the principle of circulating the body of liquid between a reservoir or tank at one point, and a furnace or heater at another point, by means of pipes which provide a continuous circulation from the reservoir through the heater by expansion and the well known laws of convection, and I make no broad claim to this principle. While my invention belongs to this class of liquid heaters, it is more especially designed for circulating heavy petroleum oil and it possesses important and distinctive features of novelty, among which may be mentioned the following: The reservoir 12, which is placed above the furnace fire box, is co-extensive with the fire box, or of the same ground plan, with the outer edges of the reservoir coinciding and fitting snugly to those of the heating chamber below, and as the top wall 22 of the fire box is the bottom wall of the reservoir, there is a direct

transmission of heat by conduction there-through giving a high and economical heating efficiency, and as said reservoir is formed with downwardly projecting flanges 30, 30, which correspond in dimensions to and fit over the edges of the fire box it renders it easy of construction and application, and also detachable when necessary to take it off. It will also be seen that the heating chamber is of rectangular elongated shape disposed horizontally and that the heating pipe 5 has a long extension horizontally through the heating chamber and through both ends of the same and back again, which gives an extensive heating surface with perfectly straight pipes and brings the T-couplings 24 and clean-out plugs 25 outside of the front end of the heating chamber, where they are easily accessible. The relatively shallow liquid reservoir 12 above the heating chamber also gives extensive heating surface along its bottom over which the liquid has to pass from end to end.

I claim and desire to secure by Letters Patent:—

1. An apparatus for heating liquids by continuous circulation from convection, comprising a tank, a horizontal rectangular heating chamber, a relatively shallow horizontal liquid reservoir placed immediately above the heating chamber and being coextensive in ground plan dimensions with the heating chamber, with the outer edges of the reservoir coinciding with those of the heating chamber, a circulating pipe extending from the lower portion of the tank horizontally through the length of the heating chamber and through the front end of the same and thence back through the heating chamber and its other end and up into one end of the reservoir above the heating chamber, and another circulating pipe extending from the other end of the said reservoir to the tank for return circulation.

2. An apparatus for heating liquids by continuous circulation from convection, comprising a tank, a horizontal rectangular heating chamber, a relatively shallow hori-

zontal liquid reservoir placed immediately above the heating chamber and being coextensive in ground plan dimensions with the heating chamber, with the outer edges of the reservoir coinciding with those of the heating chamber, a circulating pipe extending from the lower portion of the tank horizontally through the length of the heating chamber and through the front end of the same and thence back through the heating chamber and its other end and up into one end of the reservoir above the heating chamber, another circulating pipe extending from the other end of the said reservoir to the tank for return circulation, and an escape flue from the heating chamber opening at its lower end into the heating chamber and passing through the reservoir above.

3. An apparatus for heating liquids by continuous circulation from convection, comprising a tank, a horizontal rectangular heating chamber, a relatively shallow horizontal liquid reservoir placed immediately above the heating chamber and being coextensive in ground plan dimensions with the heating chamber, with the outer edges of the reservoir coinciding with those of the heating chamber, a circulating pipe extending from the lower portion of the tank horizontally through the length of the heating chamber and through the front end of the same and thence back through the heating chamber and its other end and up into one end of the reservoir above the heating chamber, and another circulating pipe extending from the other end of the said reservoir to the tank for return circulation, the reservoir above the heating chamber being formed with downwardly projecting flanges along its edges conforming in ground plan to the adjacent heating chamber and lapping past the upper edges of the heating chamber.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID M. DUNLAP.

Witnesses:

JOHN E. AURUCKER,
GEORGE M. GLASS.