July 10, 1934. W. R. HARTUNG 1,965,835

OIL BURNER FOR TANK HEATERS

Filed Feb. 9, 1931

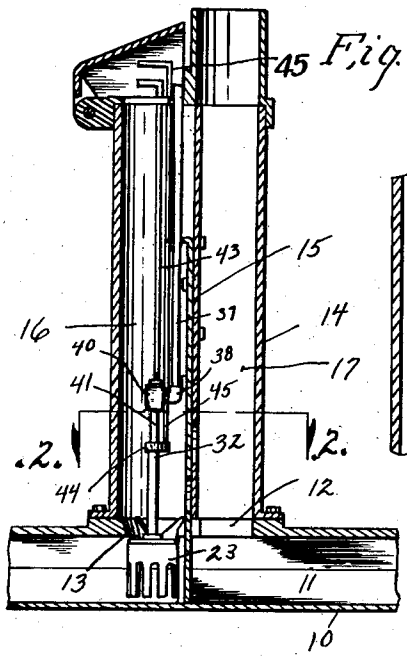


Fig. 1.

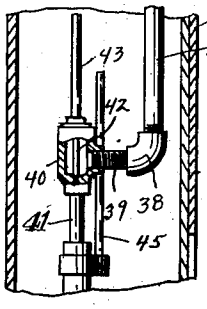


Fig. 7.

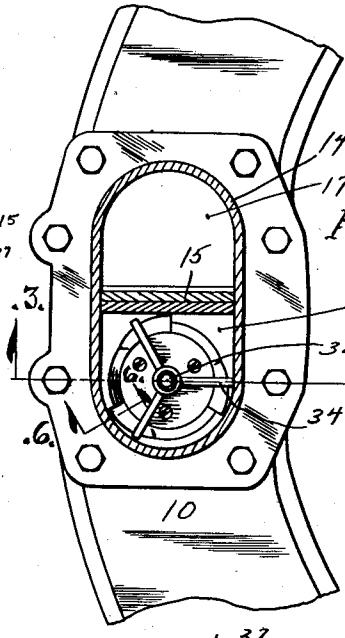


Fig. 2.

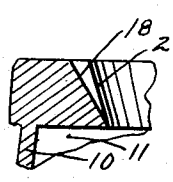


Fig. 6.

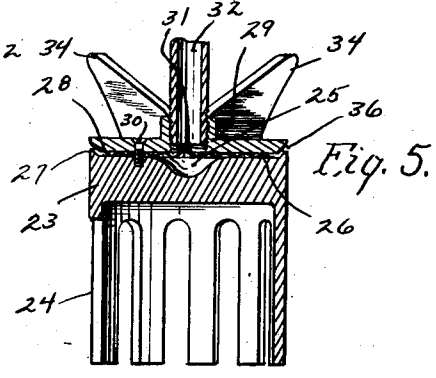


Fig. 5.

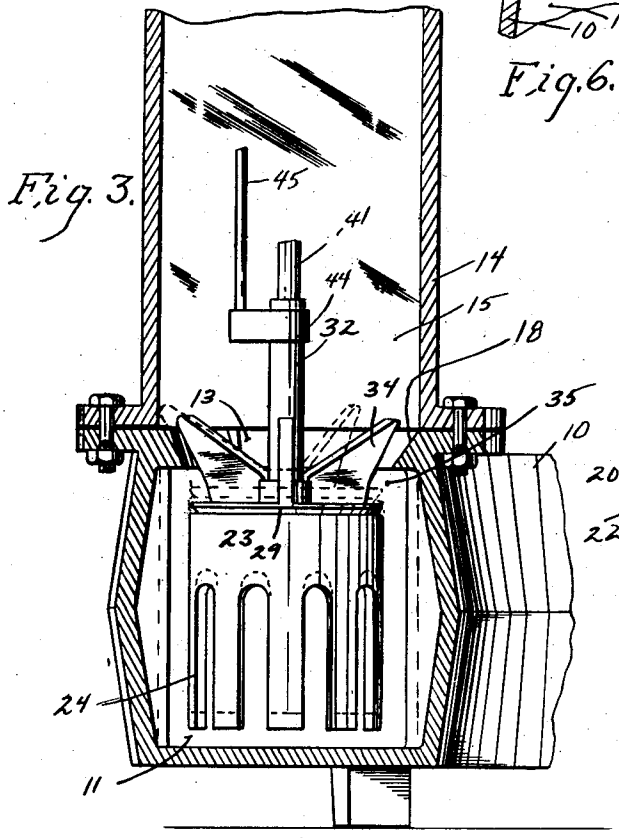


Fig. 3.

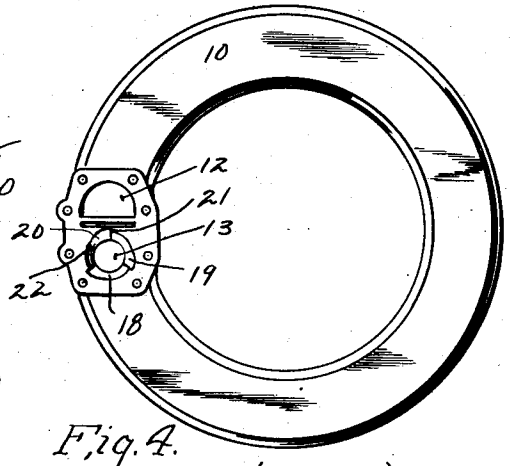


Fig. 4.

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OIL BURNER FOR TANK HEATERS

William R. Hartung, Des Moines, Iowa

Application February 9, 1931, Serial No. 514,527

8 Claims. (Cl. 126—360)

The object of my invention is to provide an oil burner of simple, durable and inexpensive construction, which is particularly adapted to be used in that type of tank heaters having the combustion chamber of the heater submerged below the water surface, and in which the burner is mounted in one end of the combustion chamber.

More specifically it is the object of my invention to provide a simple and inexpensive burner for tank heaters which is formed mainly of cast metal and which requires a minimum amount of machine work, and which will not clog up with soot and other carbonaceous material, and which may be easily and quickly assembled or taken apart for cleaning or repairs, which may be easily generated and which, when generated and ignited, will burn continuously even though the draft varies considerably.

A further object is to provide in a burner for tank heaters means whereby the proportion of air and combustible gas may be quickly and easily varied at the will of the operator, so that a complete combustion may be constantly maintained under various atmospheric conditions.

This invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawing, in which:

Figure 1 is a vertical sectional view of the combustion chamber of the tank, showing the manner in which our improved burner is applied therein.

Figure 2 is an enlarged, detail, sectional view taken on the line 2—2 of Figure 1.

Figure 3 is an enlarged, detail, sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a plan view of the combustion chamber, showing the tube supporting the inlet and outlet passages removed.

Figure 5 is a vertical sectional view of the burner.

Figure 6 is a detail sectional view on the line 6—6 of Figure 2; and

Figure 7 is a detail view of the fuel supply pipe and the valve mechanism controlling the fuel supply.

Referring to the accompanying drawing, the reference numeral 10 indicates an annular shaped radiating member having an annular combustion chamber 11 therein, the member 10 being designed to be supported in a horizontal position and to be entirely submerged when used as a tank heater, the top surface of the member 10 being provided with an outlet opening 12 and an inlet opening 13.

A vertical tube 14 is provided, surrounding both of said openings, said tube having a vertical partition 15 to divide the tube 14 into an inlet passage 16 and an outlet passage 17, thus providing means whereby air may be drawn downwardly through the tube 16 and caused to pass through the combustion chamber 11 and outwardly through the passage 17.

The opening 13 is provided with a bevel edge 18, said edge having a series of notches 19, said notches being so arranged that helically shaped surfaces 20 are developed, starting with the shoulder 21 and terminating in the beveled surfaces 22, for the purposes hereinafter made clear.

My improved burner comprises a body portion 23 which is preferably of cylindrical formation, having one end provided with a series of downwardly projecting fins 24, said fins being arranged in a cylindrical surface. The central portion of the upper surface of the body 23 is provided with a cavity 25, the edge of said cavity terminating in a shallow and annular recessed portion 26, so constructed that an annular flange 27 is formed on the upper periphery of the upper end of the body 23, having its inner face beveled upwardly and outwardly, in the manner clearly illustrated in Figure 5. The capacity of the air passage 35 is increased as the burner is moved downwardly and restricted as it is moved upwardly.

Supported in the recess 26 is a wire netting 28, or similar portion of non-inflammable material. Mounted on top of the netting 28 is a cover member 29 secured in position by means of screw-threaded bolts 30.

The central portion of the cover 29 is provided with a screw threaded opening for receiving the lower end of a pipe 32.

Supported adjacent to the front side of the wall 15 is a supply pipe 37, for receiving liquid fuel, such as crude oil or petroleum, from a suitable supply tank not shown. The said head 33 terminates in the upper end of the intake passage 16. The lower end of the pipe 37 is provided with an elbow 38 supported on the rear end of a nipple 39 which is supported in a valve casing 40, which has a downwardly projecting pipe 41. The lower end of said pipe 41 extends into the upper end of the pipe 32 in the manner clearly illustrated in Figure 7.

The casing 40 is provided with a needle valve 42 having a stem 43 projecting upwardly into the upper end of the pipe 16. The pipe 32 is provided with a laterally projecting lug 44 hav-

ing an upwardly extending stem 45 terminating in the upper end of the passage 16.

By mounting the pipe 37 adjacent to the partition wall 15, and by supporting the casing 40 in the lower end of the passage 16, and slightly above the burner 23, we have provided means whereby heat will be radiated upwardly from said burner, causing the valve casing to be warmed and the fuel to be warmed as it is fed to the burner. The pipe 37 will receive some heat from the partition 15. Thus means is provided whereby comparatively heavy fuel may be utilized in the burner, even in extremely cold weather.

The cover 29 is also provided with a series of upwardly and outwardly projecting wings 34, the under edges of which are slightly curved and designed to engage and rest on the beveled edge 18, in the manner illustrated in Figure 3, with the cover 29 a slight distance below the lower edge of the beveled portion 18. The entire weight of the burner is carried by said beveled edge.

It will readily be seen that the pipe 32 and the burner are free to rotate about the pipe 41 with the wings 34 either resting on the notched portions 19, or on the beveled portions 18. It will readily be seen that if the wings are supported in the notched portions 19 of the lower end of the surfaces 20, then the burner will be supported at a lower elevation than when the wing portions are supported on the beveled portions 18. The burner is moved from one position to the other by simply rotating the same in a counter-clockwise direction by means of the rod 45, to elevate it, as illustrated in Figures 2 and 4, and in the opposite direction to lower it.

This provides means whereby the top edge of the cover may be adjusted toward and from the lower edge of the beveled portion 18, whereby the size of the air passage 25 may be increased or decreased.

The operation of this burner is as follows:

Assuming that fuel has been admitted to the pipe 37 and has collected in the cavity 25, and that the cover 29 has been preheated by inserting a small piece of cotton or waste saturated with kerosene or gasoline which is ignited before being inserted, said waste being allowed to rest on top of the cover, causing the same to become heated and the fuel within the cavity 25 to be vaporized or converted into gases, then said vapors and gases escape through the mesh of the netting 28 and are finally discharged through the annular slot 36 between the lower edge of the cover 28 and the flange 27. The downwardly moving air through the inlet passage passes downwardly over the beveled surfaces 18 and through the restricting passage 35, at which time it is mixed with the vapor and gases from the burner, combustion taking place as the gases are moving downwardly over and between the downwardly extending fins 24, and the said fins becoming heated causing the head 23 to be maintained at a high temperature so that the fuel as it is dripped into the cavity 25 becomes instantaneously vaporized.

It will readily be seen by referring to Figure 3, that by restricting passage 35 an increased velocity of the incoming air passes over the outer edge of the cover 28, creating a partial vacuum in the slot 36 and within the cavity 25 and the recess 26, so that the gases are drawn outwardly through the slot 36.

It will further be seen that any air entering the upper end of the tube 32 is comparatively cold and the weight of the same will assist in forcing the gases outwardly through the slot 36, or at least assist in preventing gases from escaping upwardly through said tube due to pressure created by gasified fuel.

It often happens that the tank heater is so located that the outlet passage 17, which is usually provided with a comparatively tall stack or flue, is so located that the draft in the flue is affected by currents of air around buildings and trees in such a manner that sometimes the draft through the heater is greater than at other times, in which case the velocity of the air passing over the top edge of the burner and through the passage 35 will be varied to such an extent that sufficient air would not be provided to complete combustion, or on the other hand the draft might be such as to pull the flame out. By grasping the member 45 and rotating the pipe 32 the size of the passage 35 may easily and quickly be varied in the manner before described, so that the proper mixture of gas and air may be maintained, which results in a blue flame being projected from the burner when it is properly adjusted, which burns without soot in such a manner that the interior of the combustion chamber will not become clogged. This has been one of the chief objections to burners which have been heretofore provided for this purpose.

The netting 28 provides means whereby the fuel will be broken up and disassociated as it enters the cavity 25, and provides additional heating surface for vaporizing any of the less volatile fuel as it moves outwardly between the cover and the upper end of the body.

A further advantage is gained by mounting the valve casing 40 on the lower end of the pipe 37 and near the lower end of the passage 16 and connecting the upper end of the pipe 37 with a suitable fuel supply tank. By this arrangement it will be seen that a considerable pressure head will be established in the valve casing, due to the weight of the fuel in the pipe 37. This provides means whereby the flow of fuel may be more easily adjusted than would otherwise result if the valve casing were supported at an elevation near the bottom side of the fuel tank, which has heretofore been customary.

It will therefore be seen that I have provided a simple, durable and inexpensive burner which may be easily and quickly assembled or taken apart simply by removing the screws 20 and permitting the cover to be removed, after which the netting 28 and the recess 26 may be cleaned, if necessary, or the netting may be renewed, and in which is provided means whereby the burner may be quickly and easily adjusted to meet the variation of atmospheric conditions.

I claim as my invention:

1. In a device of the class described, the combination of a body having a combustion chamber and inlet and outlet openings, said inlet opening having a downwardly and inwardly extending beveled edge, a burner beneath said inlet opening and within said passage, said burner comprising a body having in its upper surface a central cavity, the edges of which terminate in a shallow annular recess, a screen in said recess, a cover plate on said screen, means for feeding fuel through the center of said cover and screen to said cavity, and means for moving said burner toward and from said beveled edge.

2. In a device of the class described, the combination of a body having a combustion chamber and inlet and outlet openings, a vertically ar-

ranged pipe communicating with said openings, said pipe having a partition to divide the first pipe into inlet and outlet passages, a supply pipe arranged vertically in said inlet passage and adjacent to said partition, the lower end of said supply pipe terminating in a horizontally extending portion and having a valve casing, said valve casing having a downwardly extending pipe, a valve in said casing for controlling the flow of fuel into the last said downwardly extending pipe, a burner supply pipe slidably and rotatively mounted in the lower end of the last said pipe, and means for raising, lowering and rotating said burner pipe.

3. In a device of the class described, the combination of a body having a combustion chamber and inlet and outlet openings, the edge of said inlet opening being beveled downwardly and inwardly, said beveled edge having cam shaped portions, a burner beneath said inlet opening and within said passage, said burner comprising a body having a fuel cavity and a gas discharge orifice in the top edge of its sides, the top end of said body having upwardly and outwardly projecting wings to rest on cam shaped portions of said beveled edge, whereby rotation of said burner about its longitudinal axis will cause the upper end of said body to be moved toward and from said beveled edge.

4. An oil burner for tank heaters comprising a body portion having a combustion chamber provided with vertically arranged inlet and outlet pipes, a burner in said combustion chamber below the lower end of said inlet pipe arranged to form a restricted air passage between the burner and the lower end of said inlet pipe, means for feeding liquid fuel to said burner, means for adjusting said burner toward and from said pipe to vary the size of said air passage whereby the proportion of vapor and air may be varied, and means for moving said burner to its adjusted position.

5. An oil burner for tank heaters comprising a body portion having a combustion chamber provided with vertically arranged inlet and outlet pipes, a burner in said combustion chamber below the lower end of said inlet pipe arranged to form a restricted air passage between the burner and the lower end of said inlet pipe, means for feeding liquid fuel to said burner, means projecting longitudinally through said inlet pipe for moving said burner toward and from said pipe to adjusted positions to vary the size of said air passage whereby the proportion of vapor and air may be varied, and means for retaining the burner in its adjusted positions.

6. An oil burner for tank heaters comprising a body portion having a combustion chamber provided with vertically arranged inlet and outlet pipes, a burner in said combustion chamber below the lower end of said inlet pipe arranged to form a restricted air passage between the burner and the lower end of said inlet pipe, means for feeding liquid fuel to said burner, and manually operated means for varying the amount of air fed to said burner whereby the proportion of vapor and air may be varied to meet the varying draft conditions whereby complete combustion of the fuel may be maintained.

7. In a device of the class described, the combination of a body having a combustion chamber and an inlet passage for said chamber, a burner near the lower end of said inlet passage and having an upwardly extending supply pipe, a second pipe extending downwardly to position for discharging into the upper end of the first pipe, a valve casing on the upper end of said second pipe, a valve in said valve casing, and means for imparting sliding and rotary movement to said burner and its supply pipe relative to the second pipe, whereby the burner will be moved toward and from the inlet end of said passage.

8. In a device of the class described, the combination of a heater body having a combustion chamber, an inlet passageway and an outlet passageway, a flange having an opening therein for restricting the passageway from said inlet passageway to said combustion chamber, a burner below said flange, means for feeding fuel to said burner, and means for moving said burner toward and from said flange.

WILLIAM R. HARTUNG.