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APPARATUS FOR BURNING LIQUID FUEL

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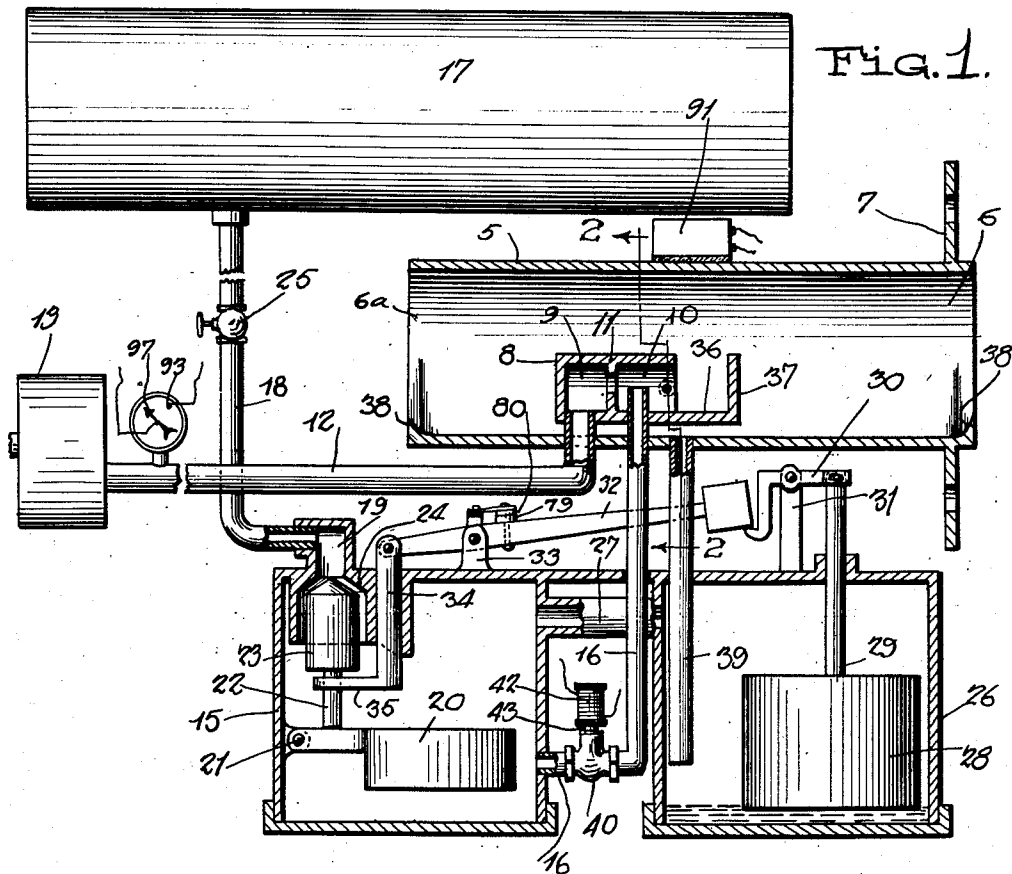
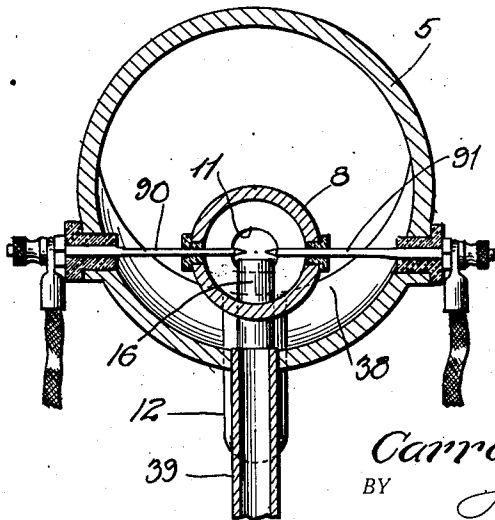


Fig. 2.



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APPARATUS FOR BURNING LIQUID FUEL

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This invention relates to an apparatus for burning liquid fuel, such as oil, and has for its general objects to secure complete combustion of such fuel and to obtain maximum heating efficiency therefrom.

A further object is to provide an apparatus for burning liquid fuel which is extremely simple and practical in construction as well as efficient and reliable in operation.

Another object of the invention is to provide an apparatus of the above kind having such safety features as to meet with all of the requirements for a successful commercial use.

Other and more specific objects will become apparent as the nature of the invention is better understood, and the same consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawings and claimed.

In the drawings, wherein like reference characters indicate corresponding parts throughout the several views,

Figure 1 is a somewhat diagrammatic view, partly in elevation, and partly broken away and in section, of the principal portion of the present apparatus including the burner, carburetor and associated parts;

Figure 2 is an enlarged fragmentary vertical section taken upon line 2—2 of Figure 1.

Referring more in detail to the drawings, the present apparatus includes a burner embodying a relatively large combustion tube 5, open at its ends and adapted to be rigidly mounted in a horizontal position with the end 6 thereof projecting into the fire box of a stove or furnace. For so mounting the combustion tube, the latter may be provided near the end 6 thereof with an annular flange 7 adapted to be bolted to the wall of the furnace in an obvious manner. The burner further includes an atomizer embodying a casing 8 horizontally mounted within the combustion tube 5 intermediate the ends of the latter, the outer end of the casing 8 being open and the inner end thereof being closed as clearly shown. The casing 8 is divided by a partition into

inner and outer chambers 9 and 10 which communicate by the provision of a central opening 11 in said partition, and communicating with the inner chamber 9 is the upturned end of a pipe 12 which passes through the bottom of the combustion tube 5 and extends from an air compressor 13 that is preferably driven by means of an electric motor 14 as shown in Figure 6. A float chamber 15 is suitably mounted beneath the combustion tube 5 and has an outlet pipe 16 that projects upwardly above the float chamber and extends upwardly through the combustion tube 5 and casing 8 so as to terminate directly in front of the opening 11 in the partition of the casing 8 within the outer compartment or chamber 10 of the latter. It is thus apparent that when air under pressure is supplied to the casing 8 through pipe 12 by operation of compressor 13, such compressed air will pass through the opening 11 in small volume but relatively great velocity so as to flow directly across the open upper end of the outlet pipe 16, thereby drawing the oil from the float chamber 15 upwardly through the pipe 16 and causing the forward projection of the comingled air and oil in a finely divided or atomized spray which passes out of the forward open end of the casing 8 for mixture with the additional air admitted into the combustion tube 5 through the open inner end 6a of the latter. Naturally, the draft of air into and through the combustion tube may be obtained either through the reliance upon natural draft, or upon the use of a fan connected to the intake end 6a of the combustion tube, as is well known in the art. Thus, the air supplied by the compressor 13 effects the feeding and atomizing of the oil, and is not supplied in such quantity as to support combustion, the required amount of additional air for the latter purpose being supplied through the open inner end 6a of the combustion tube 5.

The chamber 15 is employed to maintain a supply of oil adjacent the burner, and the oil is fed thereto from a suitable source of supply in any desired or preferred manner. As shown, the oil is preferably supplied

to the chamber 15 from a main reservoir or storage tank 17, by gravity, through a supply pipe 18 communicating with a top inlet 19 of the chamber 15. For the purpose of maintaining a constant level of oil within the chamber 15, a float 20 is pivotally mounted as at 21 within the lower part of the chamber 15 and is engaged by the lower end of a stem 22 provided on and depending from a valve head 23 arranged to seat upwardly against a seat 24 provided upon the inlet 19. Thus, when the level of oil is low in the chamber 15, the float 20 will lower so as to open the valve member 23 and permit the oil to flow from the supply pipe 18 into the chamber 15, and as the level of the oil in the chamber 15 rises, the float 20 will rise until the oil reaches the desired level in the chamber 15, at which time the valve 23 will be engaged with the seat 24 for cutting off the supply of oil to the chamber 15. A shut off valve 25 is preferably provided in the supply pipe 18 for convenience in cutting off the supply of oil to the chamber 15 from the tank 17 when the burner or adjacent parts require repair or the like.

Disposed beside the float chamber 15 is a second float chamber 26, and the upper part of the chamber 15 is placed in communication with the upper part of the chamber 26 by means of a horizontal overflow pipe 27. Arranged within the float chamber 26 is a float 28 having an upstanding stem 29 that slidably extends through the top of the chamber 26 and has its upper end loosely pivoted to the adjacent arm of a catch 30 which is pivoted to the upper end of a post 31 carried by the top of the chamber 26. The hooked end or arm of the catch 30 is arranged to engage the weighted end of a lever 32 that is pivoted upon a post 33 carried by the top of float chamber 15, and the other end of lever 32 is pivoted to the upper end of a rod 34 slidably extending through the top of the float chamber 15 and having a lateral arm 35 upon its lower end arranged beneath the valve head 23 and having the stem 22 freely slidable therethrough. Thus, with the weighted longer arm of the lever 32 held raised by the catch 30 as shown in Figure 1, the arm 35 of rod 34 will be held at a sufficiently low point to freely permit lowering of the valve head 23 away from the seat 24 when the float 20 lowers, and the float 20 is free to raise the valve 23 to its seat 24 when the level of oil in the chamber 15 rises. However, should the oil rise to an excessively high level within the chamber 15 for any reason, such as by reason of failure of the valve 23 to close or entirely cut off the supply of oil to the chamber 15 from pipe 18, the excess oil will overflow through pipe 27 into float chamber 26, causing float 28 to rise so that stem 29 swings catch 30

and causes the latter to disengage its hooked end from the weighted end of lever 32. When this occurs, the weighted end of lever 32 will lower, thereby elevating rod 34 and causing arm 35 to engage valve member 23 to raise the latter to its seat 24, thereby effectively cutting off the supply of oil to chamber 15. In this way, operation of the burner is prevented when dangerous defective operation of the float valve occurs.

Projecting outwardly from the forward open end of the atomizer casing 8 is an arm 36 upon the outer end of which is rigidly mounted a vertical transversely disposed baffle plate 37 arranged in spaced relation to but directly in front of the open end of the casing 8 as shown in Figure 1. In this way, the baffle plate 37 deflects the spray of atomized oil laterally against the sides of the combustion tube 5, and should any excess oil or more oil than will burn be drawn through the pipe 16 it will run down the sides of combustion tube 5 to the bottom of the latter. In order to prevent this excess oil from passing out of the ends of the combustion tube 5, the latter is preferably provided with bottom upturned ledges or lips 38, and a pipe 39 communicates with the bottom of the tube 5 directly beneath the arm 36 for draining the excess oil from the bottom of tube 5 into the float chamber 26. said overflow pipe 39 extending into the latter for this purpose. Should the amount of oil drained from combustion tube 5 through pipe 39 reach a predetermined level in the chamber 26, the float 28 will have been raised sufficiently to release catch from lever 32 so that the latter will operate valve member 23 and thereby cut off the supply of oil to the chamber 15. This renders the burner inoperative until the supply of oil through the pipe 16 is properly regulated or reduced. Further, the spray of oil and air striking against the baffle 37 will be directed laterally to more thoroughly break up the oil and cause a thorough mixture with the air entering the tube 5, thus insuring thorough combustion of the inflammable mixture issuing from the outer end 6 of the combustion tube. As the pipe 39 is shielded beneath the arm 36 and is arranged a considerable distance from the outer end 6 of the tube 5 where the flame is had, ignition of the oil in the pipe 39 and chamber 26 is rendered unlikely.

A valve 40 is provided in the pipe 16 for controlling the flow of oil from the float chamber 15 to the atomizer of the burner, and this valve includes a movable valve member or head not shown adapted to freely reciprocate in a vertical direction and to normally lower by gravity to its seat. The pole piece of an electro-magnet 42 has a projecting end surrounded by a stem 43 of insulating material which is adjustably

threaded into the top of the casing of valve 40, and the valve member not shown is constructed of magnetic material so as to be attracted by the pole piece of magnet 42 for being elevated to open position. The magnet 42 is of a well known type adapted to be applied with alternating current, and which, when energized, will cause rapid reciprocation of valve member, the alternations of current passing through the magnet intermittently attracting the valve member and releasing the same. Thus, when the magnet 42 is de-energized, the valve member 41 will automatically close and remain closed, and when the magnet 42 is energized, the valve member not shown will be reciprocated to permit the flow of fuel from the chamber 15 and at the same time have a churning action upon the oil so as to transform it into a "foamy" state for being more readily broken up and atomized when issuing from the open upper end of pipe 16 in the path of the air supplied by the compressor through pipe 12. Obviously, by threading the stem 43 to different distances within the casing of valve 40, the degree of opening of valve may be adjusted for preventing excessive supply of oil through pipe 16 such as will cause introduction of a greater amount of oil into combustion tube 5 than will burn. However, the regulation of the flow of oil through pipe 16 may be varied in any suitable manner such as by the use of an additional control valve, the principal function of valve 40 being to control the opening and closing of pipe 16 and to effect the churning of the oil supplied to the burner or the atomizer of the latter.

What I claim as new is:—

1. In a liquid fuel burning apparatus the combination with a combustion chamber of a burner located therein and consisting of a hollow integral casting open at one end and closed at the other end, and having a baffle plate located in front of the open end, said casting being formed with a transverse partition having an opening therethrough for the passage of air, and dividing the casting into two chambers, one of which is provided at its base with means for the supply of liquid fuel, the latter means comprising a tube terminating in line with the opening through said partition, and constructed and adapted to cause vaporization of the fuel issuing therefrom by the current of air through the partition.

2. A liquid fuel burner constructed and adapted for insertion in a suitable combustion chamber and consisting of a hollow elongated casting closed at one end and open at the other end, and formed with a transverse partition dividing the casting into two chambers, and formed with a diminished aperture for the passage of an air jet, said

casting having openings into the two chambers, for the admission of air under pressure, and the admission of fuel respectively, said openings being located in the base of the casting and having air and fuel supply pipes leading therethrough, the fuel supply pipe terminating at its upper end in line with the opening through the partition, whereby the fuel will be vaporized by the air jet.

In testimony whereof I affix my signature.
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