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F. J. EVANS ET AL

AUTOMATIC OIL BURNER

Original Filed June 23, 1924

Fig. 1.

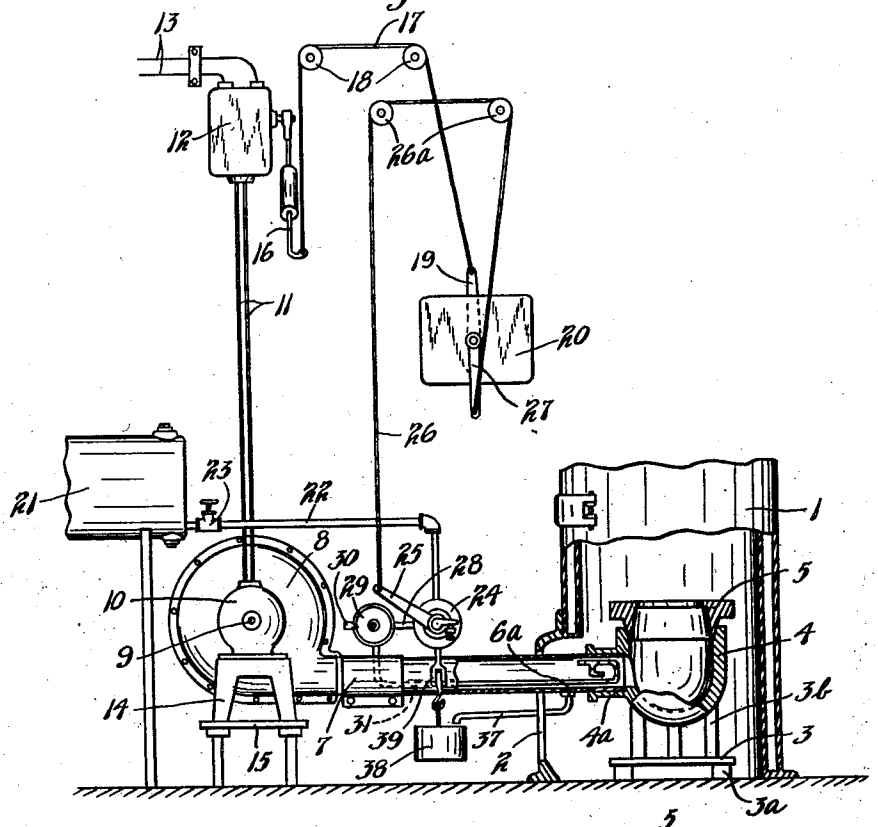


Fig. 2.

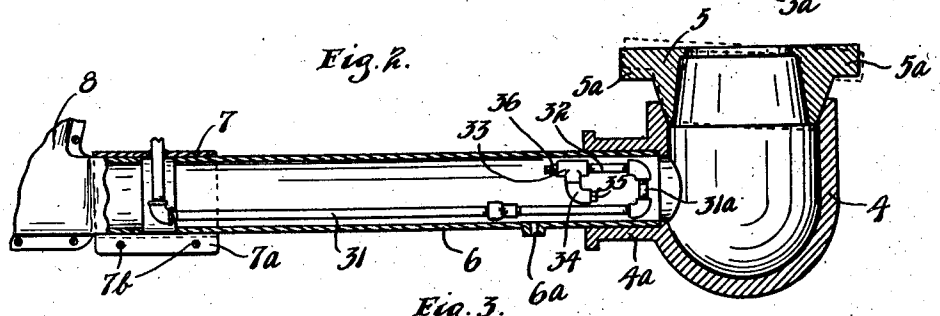
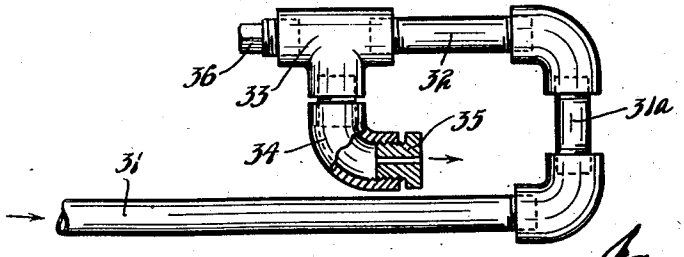


Fig. 3.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC OIL BURNER.

Application filed June 23, 1924, Serial No. 721,687. Renewed May 12, 1926.

This invention relates to a liquid fuel burner such as an oil burner now commonly used in stoves and furnaces.

It is an object of this invention to provide a simple and efficient form of oil burner and one which can very readily and quickly be installed in the furnace and removed therefrom when desired.

It is a further object of the invention to provide such a burner having a novel form of fuel supply pipe adapted to form a pilot.

It is also an object of the invention to provide a bowl-like burner receptacle having an adjustable ring-like cap at the top thereof.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to the same parts throughout the different views, and in which

Fig. 1 is a view in side elevation of the device, certain parts being broken away and others shown in vertical section;

Fig. 2 is a view in vertical section through the burner and supply conduit thereof, the same being shown on an enlarged scale, a portion of the device being shown in different position in dotted lines; and

Fig. 3 is a view in side elevation of one end of the supply pipe, a portion thereof being shown in vertical section, this figure being shown on a still more enlarged scale.

Referring to the drawings, a portion of a furnace of modern standard construction is illustrated having a cylindrical casing 1 and a front charging and ash door opening 2. In accordance with the present invention a supporting means in the form of a cradle-like bracket or plate 3 is illustrated having legs 3^a and upwardly projecting arms 3^b it may be of different heights arranged to support a bowl member 4 forming a fire pot. The arms 3^b in fact are usually of the same height. In Fig. 1 the center arm extends in the rear of the bowl and appears shorter. This bowl will be made of metal or some fire resisting material and is illustrated as of general cylindical shape at its top portion and having a substantially semi-spherical or curved bottom portion with a laterally projecting tubular connecting portion 4^a. The inner top edge of said bowl is outwardly beveled and a flame directing cap 5 has an inwardly beveled circular portion fitting in the beveled portion of said bowl. The cap 5 has a downwardly flaring opening therethrough and is shown as having a surrounding flange portion 5^a, cap 5 thus forming a separate ring-like extension on the upper edge of the fire pot. A pipe or conduit 6 has one end inserted in the portion 4^a and is connected at its other end to a joint or union member 7 illustrated as in the form of a split sleeve with clamping flanges 7^a drawn together by bolts 7^b. The member 7 connects the pipe 6 to the discharge spout of a fan casing 8 enclosing a fan, not shown, which is mounted on and driven by a shaft 9 of an electric motor 10. The motor 10 is equipped with the usual electric conductors 11 which are connected to a switch member 12 adapted to be moved to stop and start said motor. A pair of conductors 13 connect the switch 12 to any suitable source of power. The motor 10 and fan casing 8 are supported on a base member 14 mounted on a suitable support 15. The switch 12 is operated through an arm 16 connected thereto by a flexible member or cord 17 suitably disposed over a pair of pulleys 18 and connected to the arms 19 of a half revolution motor 20.

A supply tank for liquid fuel is shown at 21 and a pipe 22 controlled by a suitable valve 23 leads from the bottom of said tank to another controlling valve 24 adapted to be moved to closed and open position by an arm 25. The arm 25 is connected to and operated by a flexible member or cord 26 arranged to move over suitably disposed pulleys 26^a and be connected to the arm 27 of a half revolution motor 20, said arm 27 being disposed oppositely to the arms 19. A pipe 28 connects valve 24 to another regulating valve 29 having an adjusting or regulating arm 30 adapted to be moved to various positions. An oil supply pipe or conduit 31 extends from the valve 29 downwardly through the central part of the coupling sleeve 7 and then extends longitudinally of pipe 6 adjacent the bottom thereof to a point adjacent the bowl 4. The pipe 31 passes into the sleeve 7 between the ends of pipe 6 and casing 8 and may thus form a stop for the ends of said pipe and casing when placed in said sleeve. The pipe 31 is here turned upwardly or vertically by means of an elbow and thus provided with the vertically ex-

tending portion 31ª. Said portion 31ª is in turn connected to another elbow to which is also connected a portion 32 extending horizontally adjacent the top of pipe 6 and projecting rearwardly. A T member 33 is connected to the rear end of portion 32 and the downwardly projecting cross arm of the T connected to a suitable nipple and another elbow 34 having a horizontal portion projecting horizontally toward bowl 4. An apertured plug 35 extends into said horizontal portion of elbow 34 and forms a discharge nozzle. The outer end of T member 33 is closed by a plug 36. The pipe 6 has an opening 6ª in its lower side and a pipe 37 is connected thereto in communication with said opening, said pipe 37 extending rearwardly and slightly downwardly and having a discharge end disposed over a pail 38, said pail being hung upon the lower hooked end of an arm 39 arranged upon a certain pressure to operate and close the valve 24.

In operation, the fan in the casing 8 will be driven by motor 10, valve 23 will be opened and the motor 20 will be in position to open valve 25. Liquid fuel will be fed by pressure or gravity into the pipe 22 and will pass through pipes 28 and 31 and be discharged through the nozzle 35. The portions 31ª and 32 will preliminarily be heated in any suitable manner so that as the liquid fuel passes therethrough it will be vaporized. This vaporized fuel issuing from nozzle 35 will be ignited, the same being mixed with air supplied from the fan through pipe 6. The flame formed will play against the portion 31ª and adjacent portions so that these portions will constantly be heated. The flame is also projected into bowl 4 and deflected upwardly through cap 5. As indicated in dotted lines in Fig. 2, the cap 5 can be tilted to different positions which will move its upper edges laterally so that the flame can be directed laterally at different points in the furnace if desired thus making it better adapted to different kinds of furnaces. The portion 31ª of the pipe with its adjacent portions will always be kept hot and the liquid fuel passing therethrough will constantly be vaporized. The half revolution motor 20 is controlled by a thermostat disposed in the room to be heated and when the temperature rises sufficiently said motor will be operated and arms 27 swung upwardly and arms 19 swung to its downward position. This motion through the cord or cable 26 will substantially close the valve 24 and through the cord or cable 17 will turn off the motor 10 at the switch 12. Valve 24 is arranged to permit a small portion of the liquid fuel to pass therethrough. This will maintain a small flame at the nozzle 35 sufficiently to heat portion 31ª and adjacent portions to vaporize the fuel. This small flame thus maintained at the nozzle 35 will constitute a pilot light. As soon as the temperature in the rooms to be heated drops below the desired point, the motor 20 will again be operated and arms 25 and 16 operated through their cords, respectively to open valve 24 and close switch 12. A large supply of fuel will then be turned on and the furnace again will be started. The pilot flame will be increased to a flame of normal size and the furnace again operated. If for any reason the flame should be entirely extinguished so that oil will accumulate in the bottom of bowl 4, the same will run out through pipe 37 and into the pail 38. The portion 4ª and the end of pipe 6 are disposed some distance above the curved bottom of the bowl 4 so that there is a recess below said ends. If oil should accumulate in the bottom of the bowl, any sediment or foreign particles would be retained in this recess and only the clean oil would run back through the pipe 6 and through the drain pipe 37. The aperture in the pipe and the drain pipe, therefore, will not be clogged by the sediment or foreign particles. When sufficient weight has accumulated in this pail it will, through arms 39, act to tightly close the valve 24 so that the flow of oil will be shut off and any danger and inconvenience avoided.

The pipe 6 is merely slid into the portion 4ª. When it is desired to remove or inspect the burner for any reason, the pipe 6 can be readily withdrawn from the portion 4ª by a longitudinal motion the connecting sleeve or joint 7 being loosened and the support for the fan and motor 10 being moved rearwardly. Ready access may then be had to the oil pipe 31 and conduit 6. The member 5 and bowl 4 can also be readily removed from the furnace. It is not necessary that the bowl 4 and support 3 be moved in order to separate pipe 6 and casing 8 at the connecting sleeve 7. The sleeve 7 can often be moved enough to make the separation. It is desirable at times to separate the pipe 6 and casing 8 to withdraw the pipe 31 from the pipe 6 or to make some adjustment of the nozzle portion 35. The sleeve 7, therefore, greatly facilitates these necessary operations on the burner. All parts of the burner are thus quickly and easily accessible. It can be very quickly placed in position or removed. Bracket 3 has its plate portion disposed some distance below the bowl 4 and this plate portion will absorb some of the heat radiated from the bowl. The arms 3ᵇ permit circulation of air above the plate and a comparatively uniform temperature is thus maintained all around the plate which prevents cracking or warping. The plate 3 is also spaced from the floor by legs 3ª and the circulation of the cool air can take place beneath the plate.

One important feature of applicants' burner is that a pilot light is maintained without a blast and with the same fuel used with the burner. This pilot furnishes sufficient heat to maintain a constant vaporization of the fuel and to keep the bowl 4 fairly hot, so that when the oil is again turned on full it will readily ignite. The pipe 31 and a portion of section 31ª are kept full of oil so that the full flow of oil is quickly re-established and there is no danger of blowing out the pilot light. With applicants' structure an oil of quite low specific gravity and high flash point can be used and no trouble with the same igniting is experienced when the full supply of oil and the blast are turned on.

Another important feature is the ring-like cap 5 which is made separate and placed on the upper edge of the fire pot where it will be subject to the most intense heat. Being separately constructed, it will be free to expand and contract to a greater extent than the main portion of the fire pot and the pot will therefore not be as liable to crack or become warped as it would if the portions 4 and 5 were made integral. From the above description it is seen that applicants have provided a very simple and efficient oil burner. The same is very simple and simply arranged and made, in the most part, of standard fittings. The burner with the thermostat is entirely automatic in operation and when once installed, requires practically no attention for maintenance. The device has been amply demonstrated in actual practice and found to be very successful and efficient and the same is being commercially produced.

It will, of course, be understood, that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of applicants' invention which, generally stated, consists in a device such as shown and described and defined in the appended claims.

What is claimed is:

1. An oil burner comprising a burner bowl, a conduit communicating therewith, a feed pipe extending longitudinally of said conduit to a point closely adjacent said bowl, then extending transversely of said conduit, then longitudinally of said conduit away from said bowl and then being reversely bent to project toward said bowl and provided with a small discharge orifice alined with and directed toward said transversely extending portion, said pipe forming both a fuel supply and a pilot burner.

2. The structure set forth in claim 1, a blast means connected to said conduit, an oil supply means connected to said feed pipe, a motor for said blast device, a switch for starting and stopping said motor, a valve controlling said feed pipe, and a control device connected to said valve and said switch.

3. An oil burner having a fire pot constructed as a bowl having a curved bottom portion and a cylindrical portion extending above said bottom portion, a blast pipe through which air and flame are projected communicating with the side of said bowl above said bottom portion, the inner edge of said cylindrical portion being beveled outwardly at its top and a cylindrical member having a tapered cylindrical passage therethrough of substantially the same diameter at its bottom as the opening through said bowl and having a height substantially equal to the diameter of the opening at its top, said cylindrical member having its bottom exterior tapered downwardly and constructed and arranged to set down a short distance into the beveled top of said bowl, said cylindrical member being adapted to be tilted to direct the flame coming from said bowl laterally.

4. An oil burner comprising a tube having an upwardly bent portion and an oppositely and reversely bent portion provided with a small discharge aperture directed toward said upwardly bent portion, means for passing a full supply of oil through said tube to produce a full flame and for passing a small quantity of oil therethrough to maintain a pilot flame, a conduit surrounding said tube and a bowl into which said tube and conduit are directed, and means for discharging a blast through said conduit when said full supply of oil is passed through said tube and for discontinuing said blast when said small quantity of oil is passed through said tube to form a pilot light.

5. An oil burner having a fire pot constructed as a bowl having a curved bottom portion and a substantially cylindrical portion extending above said bottom portion, a blast pipe through which air and flame are projected, communicating with the side of said bowl above said bottom portion, the inner edge of said cylindrical portion being beveled outwardly at its top and a cylindrical member having a tapered cylindrical passage therethrough of substantially the same diameter at its bottom as the adjoining inside of the bowl, the outer edge of the downwardly extending portion of the member being beveled to fit the beveled inner upper edge of said bowl, the upper side of said member being disposed an appreciable distance above the upper edge of the bowl whereby the tilting of said member on the bowl will be permitted, to thereby direct the flame coming from the bowl in one direction or the other as said member is tilted.

6. An oil burner having a fire pot constructed as a bowl having a curved bottom exterior, in combination with a plate hav-

ing a plurality of downwardly extending legs adapted to stand on a suitable foundation and to hold the plate at a distance above the foundation, and also having a plurality of upwardly extending arms adapted to contact with the curved bottom exterior of the bowl, and to thereby support it in a position above the plate, said legs and arms being constructed integrally with the plate; whereby a free circulation of air may be permitted all around the plate, which will tend to secure a uniform temperature of all its parts and thus prevent breakage by an unequal expansion and contraction of the parts.

7. An oil burner having in combination, a fire pot constructed as a bowl having a curved bottom portion and a cylindrical portion extending above said bottom portion, a blast pipe through which air and flame are projected communicating with the side of said bowl above said bottom portion whereby there is a recess in said bowl below the end of said pipe, a drain means for excess accumulation of oil extending through the bottom of said pipe and spaced from said bowl whereby any sediment and foreign matter will collect in said recess and clean oil only will run out of said pipe and drain means.

8. An oil burner having in combination, a fire pot provided with a laterally projected tubular connecting portion, a horizontally disposed blast conduit having its inner end inserted in said tubular connecting portion, a fan member having a discharge spout set a distance from the outer end of the conduit and in line therewith, a split sleeve having its end adapted to fit over said spout and over the adjacent end of the conduit, and to be detachably connected thereto, and an oil supply pipe extended into the central part of the sleeve between the spout and conduit and into the conduit to a point near the fire pot to promote combustion of the oil, whereby when the fan member is removed from the adjacent end of the sleeve, the oil supply pipe and the sleeve may be removed from the conduit as a unit.

In testimony whereof we affix our signatures.

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HERMAN C. HANSEN.