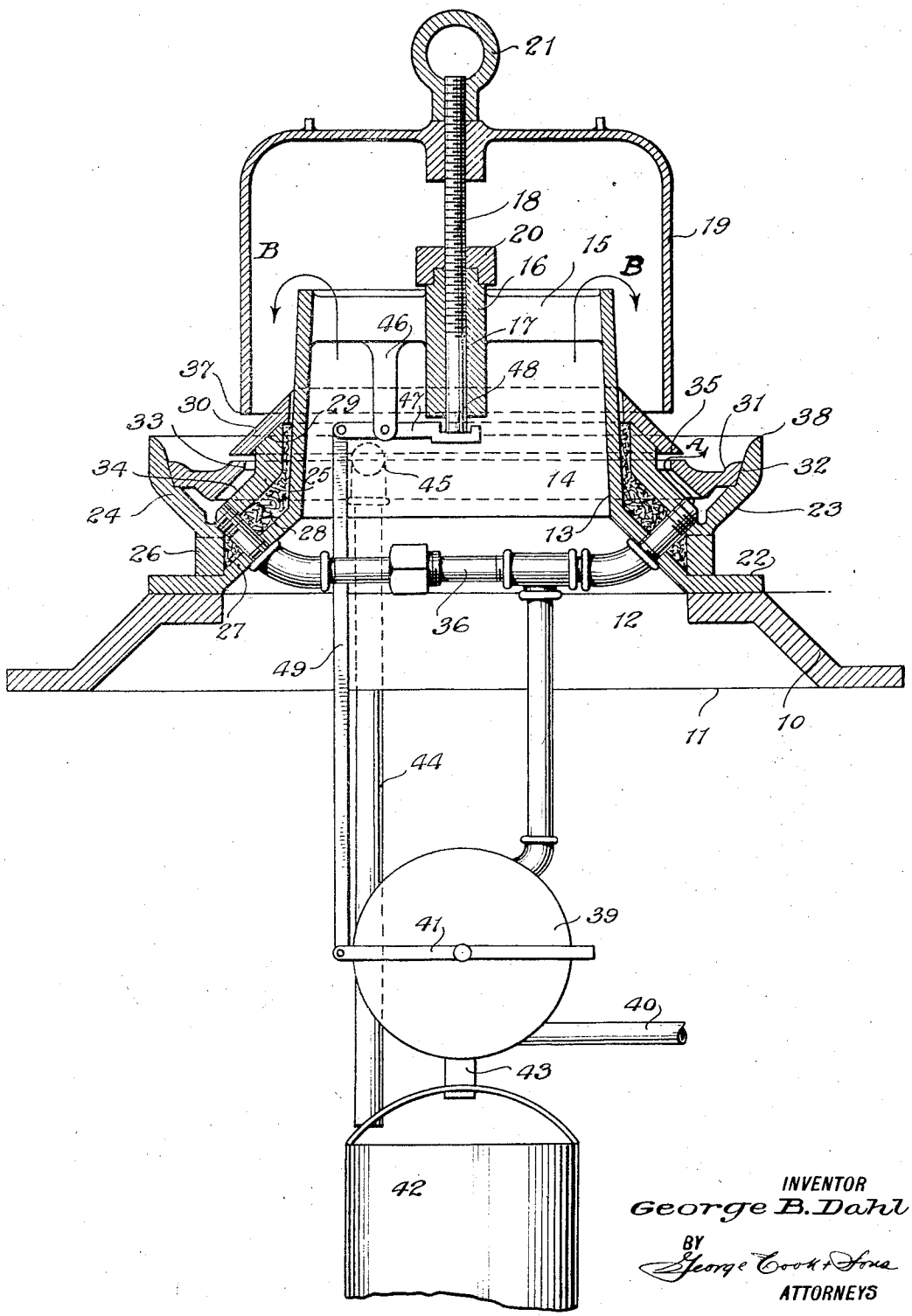
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OIL BURNER

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UNITED STATES PATENT OFFICE.

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OIL BURNER.

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To all whom it may concern:

Be it known that I, GEORGE B. DAHL, a citizen of the United States, and a resident of Woodhaven, in the county of Queens and State of New York, have made and invented certain new and useful Improvements in Oil Burners, of which the following is a specification.

My invention relates to an oil burner and particularly to that type or class known as gravity feed burners.

An object of my invention is to provide an oil burner which will efficiently burn various kinds of oils.

A further object is to provide a burner which will pre-heat the air to a high degree as it passes through the burner and thus materially aid and insure the complete combustion of the fuel.

A further object is to provide a burner wherein the oil trough to which the oil is fed will be heated to the desired temperature for properly vaporizing the fuel but prevented from becoming too hot, which might result in the cracking or breaking down of the oil or fuel, which would result in a deposit of sediment or solid matter in the trough and would not provide for the efficient and complete combustion of the fuel.

A further object is to provide a burner having an oil trough for properly and efficiently vaporizing the fuel and so designed that the gases resulting from the vaporization of the fuel will be superheated, so that when the superheated gases and heated air are mixed and joined together the complete and efficient combustion will result and thereby providing for the economical operation of the burner and the maximum efficiency of the same.

A further object is to provide a burner with improved means for vaporizing the fuel and superheating the gases resulting from such vaporization and to cause the superheated gases to be ejected from the burner in such manner that they will have passed completely beyond the restricted opening of the burner before meeting the preheated air which flows from the burner, thereby preventing any smoke or deposit of carbon resulting from the operation of the burner.

A further object is to provide a burner so designed and arranged that as the quantity of fuel fed to the burner is increased or decreased the quantity of air flowing through the burner will be correspondingly proportioned, thus providing for the operation of the burner at its maximum efficiency throughout its entire range.

A further object is to provide a burner made up of separate and removable units so that all parts of the burner are readily accessible and may be easily removed and cleaned and with little or no trouble or skill returned to their proper place for the correct functioning of the burner.

With the foregoing and other objects in view, my invention consists in the improved oil burner illustrated in the accompanying drawing and hereinafter described and claimed, and in such variations and modifications thereof as will be obvious to those skilled in the art to which my invention relates, it being understood that changes may be made within the scope of what is claimed without departing from the spirit thereof.

The drawing is a view in vertical section of my novel oil burner and diagrammatically illustrating the accompanying oil supply pipes and valves which are associated therewith and form a part thereof.

My novel oil burner is composed of a base 10, which is flared at its lower edge 11 so as to provide for the ample supply of air through the grate bars upon which the base rests. The space between the outer edge of the base 10 and the side walls of the furnace in which the burner is installed may be closed by a suitable steel plate and fire clay (not shown).

Mounted upon the open base 10 is an air supply drum 13 having the opening 14 extending completely therethrough and communicating and aligning with the opening of the base 10. The open and upper extremity of the drum is provided with a spider 15 which is characterized by the central and vertically extending hub 16. Extending through the hub is the longitudinal opening 17 which slidably receives the stem 18, upon the upper extremity of which latter is mounted an air dome 19. The air dome is of inverted cup shape, with the lower side walls extending down over and embracing, although spaced from, the upper extremity of the drum 13. The stem 18 is provided with a suitable nut 20 which rests upon the top of the hub 16 and limits the downward travel or lowermost position of the air dome. The stem 18 which is threaded into the air

dome extends entirely therethrough and receives the eye 21 upon its upper extremity so that the air dome may be easily raised and detached from the drum 13 for cleaning or other purposes and may be as easily assembled in place.

The open ended air supply drum 13 is provided at its lower extremity with the outstanding flange 22 and upon which outstanding flange is assembled and mounted the oil-receiving trough 23. This oil-receiving trough is preferably of V-shape, cross section, and is in the nature of a ring entirely surrounding and assembled upon the air supply drum. This oil trough includes the two upwardly extending and outwardly flared side walls 24 and 25 and the downwardly extending supporting lugs or legs 26. In this connection, it is to be noted that the legs 26 are spaced equally around the trough, there being as few a number as consistent with the proper support of the oil trough so as to prevent undue transfer or loss of heat from the oil trough to the air supply drum.

Attention is called to the adjacent and inwardly flared side wall 27 of the air supply drum, which is opposite the oil trough, as this inward tapering corresponds to the inward extent or tapering of the side wall 25 of the trough and thus provides a spacing between the inner wall of the oil trough and the adjacent wall of the air supply drum, and which space is preferably filled by a suitable heat-insulating material 28. The upper edges of the walls of the oil trough project practically upward in a vertical manner, the inner wall 25 being spaced from the adjacent wall of the air supply drum, as illustrated. The upper edge of the inner wall 25 is downwardly bevelled as at 29 and receives thereon the air deflector 30, the same being in the nature of a ring and this is also slightly spaced from the wall of the drum so as to prevent undue loss or transfer of heat. The air deflecting ring 30 projects outwardly and downwardly and into the space defined by the side walls of the oil trough.

Mounted within the oil trough is the vaporizing ring 31, the outer periphery 32 of which vaporizing ring or member contacts and makes a fairly tight joint with the inner surface of the outer wall of the oil trough, while the inner periphery 33 of this vaporizing ring extends parallel to but is spaced a slight distance from the inner surface 34 of the inner wall of the trough. The inner surfaces of the oil trough are approximately V-shaped and the lower surfaces of the vaporizing ring are approximately the same, although spaced thereabove. The vaporizing ring extends close to but spaced a slight distance below the outer and lower extremity of the air deflecting ring 30 so as to define a restricted opening 35 through which the gases from the oil trough must flow.

An oil inlet pipe 36 communicates at two or more points (only two being shown) with the lowermost level of the oil trough, so that as the liquid fuel flows by gravity through the pipe 36 into the oil trough it will immediately flow entirely therearound and presupposing that the entire apparatus has been initially heated the oil in the trough will be immediately vaporized and the gases will flow up behind the vaporizing ring and thence outwardly through the restricted opening 35, as indicated by the arrow A. Air entering through the base 10 flows upwardly through the open-ended air supply drum 13 and meeting the inner wall of the air dome 19 causes a high degree of pre-heating of the air, which air then flows downwardly, as indicated by the arrow B and escapes through the opening between the lower edge 37 of the air dome and the adjacent surface of the air deflector 30. The air hitting against the top of the downwardly diverging air deflector is caused to flow outwardly and downwardly and in so doing meets with the gaseous fuel flowing in the direction as indicated by the arrow A, causing the two to commingle and burn. The burning takes place in such manner as to play directly upon the top of the vaporizing ring 31 and the outer edge 38 of the oil trough and thereby highly heating the two. The heating of the outer edge 38 of the oil trough causes the entire trough to assume a fairly high temperature but due to the space between the upper edge 38 of the oil trough and the lowermost level at which the oil enters the trough, the liquid fuel will be efficiently vaporized but will not be cracked or broken down into its various constituencies. The vaporizing ring on the other hand will become and remain highly heated, so that as the oil vapors arise from the oil ring they will impinge and strike against the inner surface of the vaporizing ring and become highly or superheated and in such condition will flow upwardly and rearwardly behind the vaporizing ring to escape through the restricted opening below the air deflector, as previously described. The entire burning of the gases will therefore take place externally of the burner and the proper vaporization of the fuel and the superheating of the fuel gases provide that a complete combustion will always take place and that the maximum efficiency and economy will be obtained. Further, the presence of the highly heated vaporizing ring directly above the fuel allows a comparatively low Baumé test oil to be efficiently burned.

Connected to the oil supply pipe 36 is what is known as an over-flow cut-off valve

39 and to which is connected the fuel supply pipe 40. The cut-off valve is provided with the usual type of regulating or controlling handle 41, the movements of which control the quantity of oil which will be fed to the burner. In accordance with the usual construction of this type of valve, a pail 42 is mounted upon the trigger 43 and an overflow pipe 44 is so positioned that oil or fuel which passes therefrom will pass into the pail 42 and when the latter becomes filled to a predetermined height the weight will be sufficient to operate the trigger 43 and automatically close the valve and thus entirely shut off the oil. The overflow pipe 44 communicates at its upper extremity with the oil trough 23 at about the level indicated by the dotted lines 45, so that should for any reason the burner go out or should the oil supplied to the burner become excessive and greater than the burner could properly vaporize and burn the oil upon reaching the level 45 will flow into the overflow pipe and automatically shut off the burner.

In the burning of some grades of oil I find it desirable to regulate the air supplied to the burner in accordance with the quantity of oil supplied and to this end I have provided the spider 15 with the downwardly extending lug 46 and upon which is mounted the horizontally extending lever 47, the one end of which impinges against the lower protruding end 48 of the stem 18, upon which latter is mounted the air dome 19. The opposite end of the lever 47 is connected by a linkage 49 to the control handle 41 of the regulating valve 39, so that as the handle 41 is moved to increase the quantity of oil supplied to the burner the air dome 19 through the linkage and leverage mentioned will be raised a proper and proportional amount, thus increasing the space between the lower edge of the air dome 37 and the adjacent surface of the air deflector 30 and thereby providing for more air to pass through the burner. In some instances I may find it desirable to disconnect the linkage 49 from the regulating handle 41 of the admission valve and to manually raise and lower the air dome, the linkage 49 being assumed to be of sufficient weight to counterbalance the weight of the air dome and hold it in adjusted position. It might be mentioned in this connection also that during the operation of the burner the air supply drum becomes heated and the air dome becomes quite hot so as to efficiently heat the air supply to the zone at which the combustion takes place.

In the practical operation of the burner, should any sediment or foreign matter collect in the trough or upon the various parts they may be readily removed and the burner cleaned by first removing the air dome and then removing the air deflector and the vaporizing ring. With these removed the oil trough is readily accessible and may be easily and readily cleaned and freed of any foreign matter which may be therein. The vaporizing ring and air deflector may also be readily cleaned and replaced, as well as the air dome. Thus the burner may be maintained in efficient condition, although I have found that even after weeks of continuous service, due to the construction and operation of the burner, there was no sediment or collection of carbon whatever upon any of the burner parts and that tests upon the flue gases resulting from the burner showed a very high percentage of CO_2, indicating that the burner was operating at its maximum efficiency.

Having thus fully described my invention, I claim and desire to secure by Letters Patent:

1. An oil burner comprising an open-ended air inlet member, a ring-like oil trough associated with said air inlet member, a vaporizing ring mounted within and extending across said oil trough and terminating short of one side wall thereof, an air deflector extending above and stopping adjacent to the one edge of said vaporizing ring and forming a restricted opening therewith for the passage of gases from below said vaporizing ring to the atmosphere, and means for causing the air flowing through said air inlet member to join and commingle with the gases flowing through said restricted opening.

2. An oil burner comprising an open-ended air supply drum, an oil trough associated therewith and heat-insulated therefrom, a vaporizing member mounted within said oil trough and positioned above the bottom wall thereof and stopping short of one side wall thereof, means associated with said oil trough for causing the vaporized fuel which flows up from behind the vaporizing ring to flow through the restricted opening out and across the vaporizing ring, and means for supplying air to the gaseous fuel as it passes from said restricted opening.

3. An oil burner comprising an open-ended air supply member, an oil-receiving trough associated therewith, a vaporizing ring associated with said oil trough and spaced above the bottom wall thereof and terminating short of one side wall of said oil trough, a member associated with said oil trough and forming with said vaporizing ring, a restricted opening, an inverted cup-shaped air dome associated with said air supply member and adapted to meet and direct the incoming air down and across the restricted opening of the vaporizing ring.

4. An oil burner comprising an open-ended air supply member, an oil-receiving

trough associated therewith, a vaporizing ring associated with said oil trough and spaced above the bottom wall thereof and terminating short of the side walls of said oil trough, a member associated with said oil trough and forming with said vaporizing ring, a restricted opening, an inverted cup-shaped air dome associated with said air supply member and adapted to heat and direct the incoming air down and across the restricted opening of the vaporizing ring, and means for raising and lowering said air dome to increase and decrease the air passing through said burner.

5. An oil burner comprising an open-ended air supply member, an oil-receiving trough associated therewith, a vaporizing ring associated with said oil trough and spaced above the bottom wall thereof and terminating short of the inner side wall of said oil trough, an air deflector associated with said oil trough and forming with said vaporizing ring a restricted opening for the passage of the gaseous fuel therefrom, an air dome associated with said air supply member and adapted to direct the incoming air down and across the said restricted opening.

6. An oil burner comprising an open-ended air supply member, an oil receiving trough associated therewith, a vaporizing ring associated with said oil trough and spaced above the bottom wall thereof and terminating short of the inner side wall of said oil trough, an air deflector associated with said oil trough and forming with said vaporizing ring a restricted opening for the passage of the gaseous fuel therefrom, an air dome associated with said air supply member and adapted to direct the incoming air down and across the said restricted opening, means for raising and lowering said air dome to regulate the quantity of air passing through said burner.

7. An oil burner comprising an open-ended air supply member, an oil receiving trough associated therewith, a vaporizing ring associated with said oil trough and spaced above the bottom wall thereof and terminating short of the inner side wall of said oil trough, an air deflector associated with said oil trough and forming with said vaporizing ring a restricted opening for the passage of the gaseous fuel therefrom, an air dome associated with said air supply member and adapted to direct the incoming air down and across the said restricted opening, means for raising and lowering said air dome to regulate the quantity of air passing through said burner, and means connected to said air dome adapted to regulate the quantity of fuel supply to said burner proportional to the quantity of air passing through the said burner.

8. An oil burner comprising an open-ended drum, an oil trough associated therewith and external thereof, a vaporizing member carried by said oil trough spaced above the bottom walls thereof and stopping short of the inner side wall of the trough, an air deflector mounted upon the top of the inner side wall of the oil trough and extending down close to the top of the vaporizing ring and forming a fuel delivery orifice therewith, an air supply and controlling member extending down close to the upper surface of said air deflector.

Signed at New York, borough of Manhattan, in the county of New York and State of New York, this 2nd day of July, A. D. 1924.

GEORGE B. DAHL.