

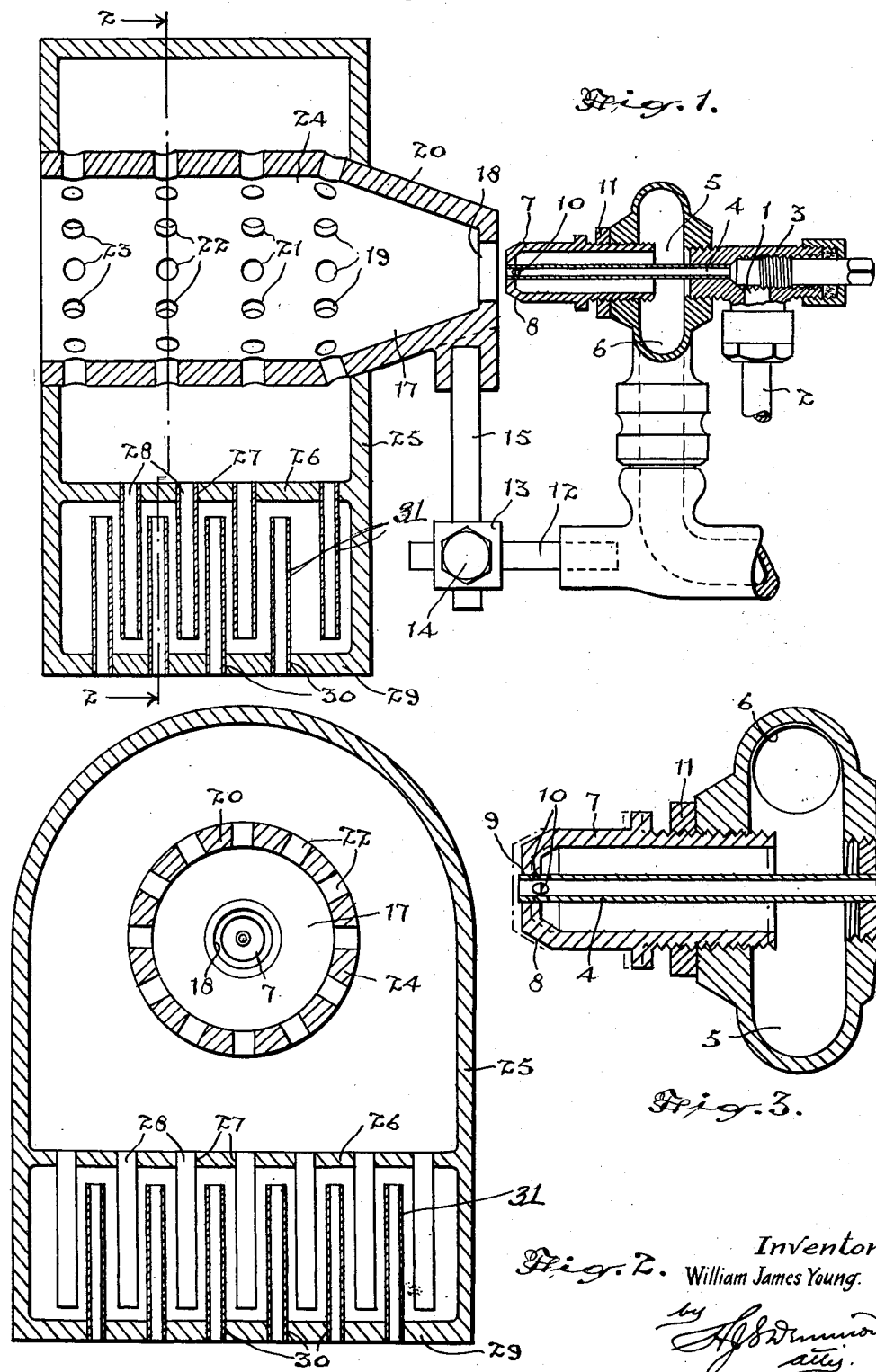
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OIL BURNER

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OIL BURNER

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The principal object of this invention is to provide a device which will effect the atomization of oil and an admixture of air therewith to accomplish the complete combustion of the hydrocarbons so that there will be no free carbon or soot produced and the products of combustion will be free of carbon monoxide or other noxious or poisonous fumes.

A further and important object is to provide a burner which will produce a flame of extremely high thermal value which will be projected from the burner in such a manner as to distribute the heat uniformly over an extensive area thereby enabling the use of the burner in the operation of such equipment as bake ovens or other heat chambers which require an even distribution of heat.

The principal features of the invention consist in the novel construction of burner whereby the oil is atomized with air and projected from a nozzle under pressure into a mixing chamber separated from the atomizing nozzle, said mixing chamber having openings arranged therein to direct jets of air radially inwardly to meet and mix with the air and oil mixture to progressively promote combustion and effect the complete consumption of the hydrocarbons as the flame is projected from the open end of said expansion chamber.

A further and important feature of the invention consists in the novel means of ensuring a uniform flow of air into the combustion chamber through the radial jet openings arranged circumferentially thereof by the provision of an enclosing chamber having a multiplicity of baffle passages leading thereinto.

In the accompanying drawing

Figure 1 is a vertical longitudinal mid-sectional view of a burner constructed in accordance with this invention.

Figure 2 is a vertical sectional view through the line 2—2 of Figure 1.

Figure 3 is an enlarged longitudinal sectional view of the oil atomizing nozzle.

In the burning of hydrocarbons it has been commonly found impractical to produce a flame free from the liberation of free carbon in the form of soot and free from the production of noxious and poisonous gases and the present invention has accomplished these highly desirable results in a very simple and effective manner.

In the structure herein shown, the oil, which may be of the ordinary fuel oil type, is fed to a valve chamber 1 by a pipe 2 and the oil flows past the valve 3, which is here shown as a threaded

plug type, to a small tube 4. The tube 4 extends axially through a circular air chamber 5 to which air under pressure is fed through a tangentially arranged inlet 6.

A nozzle 7 is threaded axially into the air chamber 5 and is provided with a tapering end 8 which has an axial orifice 9 into which the open end of the oil tube 4 extends. The oil tube 4 is provided with a plurality of small radial holes 10 adjacent to its open end and the opening of these holes is regulated by the adjustment of the threaded nozzle 7 in the air chamber wall, it being held in an adjusted position by the lock nut 11.

The air entering the air chamber has a swirling movement imparted thereto through its tangential entrance and it flows into the nozzle 7 around the oil tube and enters said tube through the small radial holes and blows the oil out the end of the said oil tube in a finely atomized state.

A stud 12 rigid with the air conduit has adjustably and rotatably mounted thereon a block 13, said block being secured by a set screw 14.

A stud 15 adjustably secured by a set screw in the block 13 has mounted on its free end a tubular twyer or mixing chamber 17. This chamber is preferably formed of cast iron and is preferably cylindrical for a portion of its length and tapers in frusto-conical form to one end which has a circular opening 18 through which the stream of atomized oil is projected from the nozzle 7.

The twyer member 17 is spaced from the nozzle end so that there will be no physical conduction of heat therefrom to the nozzle, and the nozzle 7 is further insulated from the temperatures of combustion by the flow of air around said nozzle into said twyer chamber through the opening 18.

A circular row of holes 19 is arranged in the flaring wall 20 of the chamber 17 and these holes direct an annulus of jets of air angularly inwardly into the chamber and toward the larger open end thereof. The air thus directed inwardly mixes intimately with the oil and air mixture projected from the nozzle and a mixture is provided which readily ignites with spark ignition.

A plurality of circular rows of holes 21, 22 and 23 are arranged in the cylindrical wall 24 of the member 17 and these direct air to the interior in spaced annular arrangement so that the initial ignition and burning oil mixture is fed with air in such volume and complete mixture that complete combustion takes place and the flame emanating from the large open end of the chamber 17 is entirely free from free carbon and noxious gases. The flame produced by this burner with

ordinary fuel oil has been burned in open room areas for sustained periods without production of soot or noxious gases and it is being used extensively in the heating of bake ovens where it effects a considerable economy in the baking of bread and cakes free from contamination with obnoxious impurities heretofore associated with oil burners.

It is found that the flame produced is extremely hot, but when liberated in an enclosed space such as a bake oven, the entire oven space may be maintained at a uniform temperature throughout, and the articles baked are baked uniformly and without scorching.

The regulation of the amount of air and oil through the atomizer nozzle may be accomplished in a very simple manner by adjusting the nozzle 7.

In order that the air flow through the circular rows of orifices in the member 17 may be uniform, it is preferred to enclose the said member within a casing 25 which surrounds its perimeter and is spaced therefrom. The casing 25 is formed with a depending skirting, and arranged intermediate of its height and spaced from the member 17 is a plate 26 which is perforated with a plurality of holes 27 in which are secured short lengths of tubing 28.

A plate 29 closing the bottom of the casing 25 is also perforated with a plurality of holes 30 which are in staggered relation to the holes 27 in the plate 26 and short tubes 31 are secured in the holes in the bottom plate and extend upwardly.

Air is drawn through the multiplicity of holes provided in the casing 25 on the operation of the burner 17 and the flow of air taken from this enclosing casing through the holes in the combustion chamber 17 will be uniform, further the enclosing casing acts as a baffle and eliminates the hiss and roar of the air inflow.

What I claim as my invention is:

1. An oil burner for producing a high-temperature luminous flame having in combination a tubular mixing chamber cylindrical for its major length and converging rearwardly to an axial atmospheric air inlet opening, said chamber having at least three circumferential rows of openings

in the wall confined mainly to the cylindrical portion and admitting air under atmospheric pressure, the openings of each row being spaced apart circumferentially a distance not appreciably greater than the diameter of the openings and said chamber presenting an unrestricted forward discharge end whereby to avoid choking and the wall of said chamber being of substantial thickness to impart definite directional effect to the air streams passing through said rows of openings, and an air and oil directing nozzle spaced from direct contact with the mixing chamber wall and directing atomized oil and air under forced pressure through said axial atmospheric air-inlet opening.

2. An oil burner having in combination a tubular mixing chamber having a divergent air and fuel inlet end, an outer casing through which said mixing chamber extends, said casing having walls defining an air chamber including spaced walls provided with offset atmospheric air-inlet openings therethrough and said tubular mixing chamber having secondary atmospheric air-inlet openings leading therinto from the interior of said casing, and air and fuel-directing means spaced from the divergent end of said mixing chamber and directing a mixture of air and fuel therinto at a temperature substantially independent of the temperature of the mixing chamber.

3. An oil burner as claimed in claim 2 in which air-directing tubes are inserted in the offset openings of the spaced walls with the tubes of one wall extending toward and terminating short of the opposite wall and with a substantial portion of the respective tubes overlapping to provide an effective baffling of the incoming air streams.

4. An oil burner as claimed in claim 2 in which said outer casing has one imperforate side portion substantially concentrically embracing the tubular mixing chamber, the said spaced walls being disposed on the opposite side of the casing forming an air inlet chamber, and air-directing tubes extending inwardly from said spaced wall openings into said air inlet chamber a distance less than the width thereof.

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