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J. F. HIGGINS.

HYDROCARBON BURNER.

APPLICATION FILED APR. 28, 1904. RENEWED MAY 5, 1905.

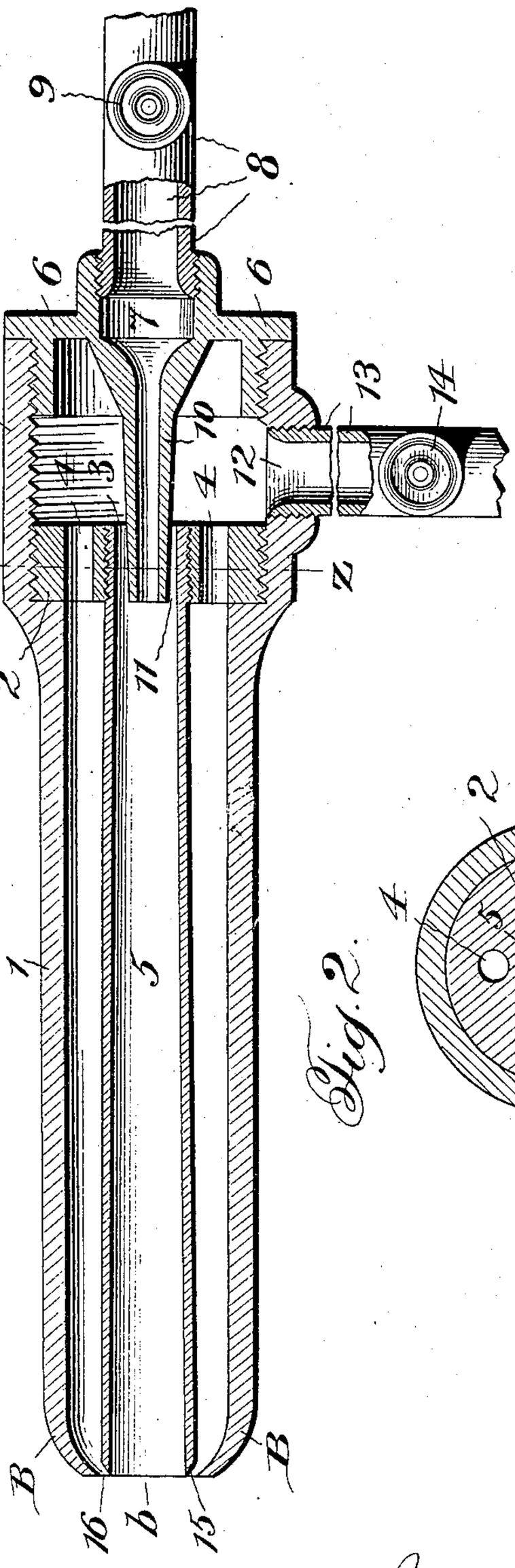

Fig. 1.

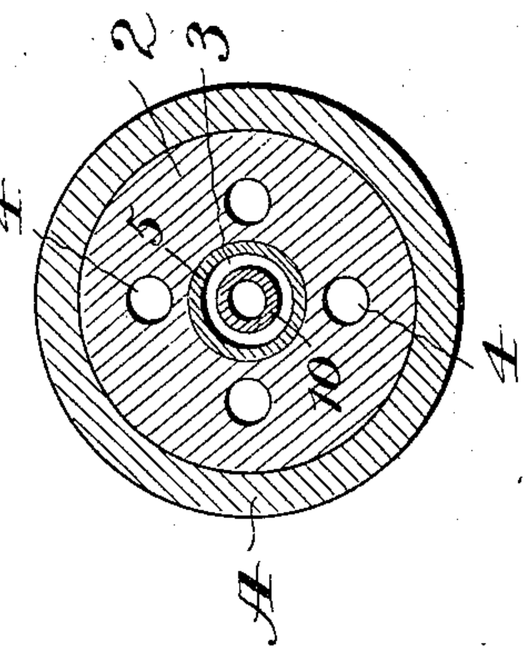

Fig. 2.

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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 792,265, dated June 13, 1905.

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To all whom it may concern:

Be it known that I, JAMES F. HIGGINS, a citizen of the United States, residing at Corsicana, in the county of Navarro and State of Texas, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to hydrocarbon-burners, and especially to those for use with furnaces and whereby oil is mixed with steam under pressure, to the end that an adequate flow of fuel is induced to discharge the same into the furnace, where combustion takes place, the oil being heated in the burner to the proper temperature before combustion and the necessary elements being supplied to facilitate combustion.

My invention is so designed that it is well adapted for successful use with either light or heavy oil.

It is an object of the invention to provide a burner of the utmost simplicity, the construction requiring but few parts, none of which necessitate adjustment while the burner is in use, and at the same time to provide a device which will be most efficient in operation. The flow of oil and steam is regulated and controlled by but a single valve in each of two supply-pipes. As these valves can be located at any suitable distance from the burner, it is not necessary for the operator to come sufficiently near the furnace for manipulation of the valves to regulate the flame as to be inconvenienced by heat, as in the case of many other burners.

It is requisite to the successful operation of oil-burners that the steam be admitted thereto at the proper temperature and that means be provided whereby the oil is caused to flow freely to the discharge end, and back pressure in the oil-pipes is avoided. This invention is designed to use steam at about boiler temperature, which has been found to be the most satisfactory medium of atomization of oil, as the baking of the oil and consequent clogging of the burner resulting from the use of superheated steam or air is obviated and the deterrent effect of cold air upon combustion avoided. Means are provided at a point removed from the discharge end of the burner whereby the proper flow of oil is maintained, the construction being such as to avoid back pressure in the oil-pipe.

The invention further contemplates the provision of means for preventing the subjection of the oil to the heat of the furnace before discharge from the burner.

A preferable embodiment of the invention is delineated for purposes of illustration in the accompanying drawings, forming part hereof, and reference to which is made hereinafter. It is to be understood, however, that the invention is susceptible of other adaptations and that it is not restricted to the precise forms shown in the drawings, as many changes can be made in the construction and arrangement of the several parts disclosed herein without altering the character of the invention or departing from its nature and spirit.

In the drawings like reference characters refer to corresponding parts in both views, of which—

Figure 1 is a central longitudinal sectional view of the burner; and Fig. 2 is a sectional view on the line *z z*, Fig. 1.

Referring more particularly to the drawings, 1 designates the elongated outer casing of the burner, the receiving end A thereof being somewhat enlarged and interiorly screw-threaded and the discharge end B being somewhat contracted to form a nozzle. A plate 2 is held by screw-threads in the enlarged portion of the receiving end A of casing 1, and in this plate are a centrally-located aperture 3 and relatively smaller apertures 4, radially located between aperture 3 and the edge of the plate. An elongated inner casing 5, centrally disposed with respect to the outer casing 1, extends from plate 2 to the discharge end B of the burner, said inner casing being screwed into aperture 3 and held in place by plate 2. A cap 6 is screwed into the enlarged end A of casing 1, forming a closure therefor except for an inlet 7, to which is connected an oil-supply pipe 8, having a valve 9 therein. A tube 10 is formed integral with cap 6 and extends from inlet 7 through the

enlarged portion A of casing 1 and projects a short distance into casing 5. The exterior circumference of tube 10 is less than the interior circumference of casing 5, an inlet-space 11 between said tube and casing thus being formed.

Steam is admitted into the enlarged portion A of casing 1 at inlet 12, to which is connected a pipe 13, having therein a valve 14.

Casing 5 extends exactly to the contracted discharge end B of casing 1, and the end *b* of casing 5 is exteriorly beveled at 15, so as to form with the contracted end B an opening 16 between said casings, which will contract the current of steam emerging from the space between the two casings and throw it into the discharge from casing 5.

Oil enters the burner through inlet 7 and steam under pressure through inlet 12. The greater part of the steam passes through apertures of plate 2, and thus through the space between casings 1 and 5 and out of the discharge end B of the burner; but a quantity of the steam passes through the space 11 between casing 5 and tube 10, and this discharge of steam into casing 5 at the end of tube 10 induces the free flow of oil from tube 10 into casing 5, where they mix and atomization occurs. The current of steam entering casing 5 will maintain a free flow of fuel therethrough to the discharge end of the burner, and thereby prevent the lodgment within said casing of any foreign matter in the oil or any residuum resulting from the oil being baked by overheated steam and the clogging of casing 5 and back pressure into oil-tube 10.

The contents of casing 5 as it is discharged therefrom comes in contact with and is further atomized by the current of steam flowing from the space exterior of said casing. This latter current of steam is equal all around, whereby an even flame is secured and dripping of oil from the nozzle prevented.

To further obviate back pressure against the oil-supply, the size of casing 5 is gradually increased from its reciving end to its discharge end *b*.

The contact of the steam with the tube 10 will cause an initial rise of the temperature of the oil therein. A further rise of temperature will occur at the point of atomization at the inner or discharge end of tube 10, and the steam in casing 1 and exterior of casing 5 will raise the temperature of the oil passing through the latter casing to the discharge end of the burner, where the proper temperature is reached and further atomization is effected.

The steam around casing 5 will serve to deter the communication of too great a heat from the furnace to the oil in casing 5, and thus obviate the disadvantageous effects incident to excessive heat.

The discharge end of tube 10, where the initial mixture of oil and steam occurs, is a sufficient distance from the furnace to obviate the baking and clogging of the oil before the first mixture, and the mixed oil and steam in casing 5 is less apt than oil alone to be baked as it approaches the discharge end of the burner and comes under the influence of the heat of the furnace.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hydrocarbon-burner having suitable inlets for fuel and steam, an outer casing, a transverse plate therein having apertures for passage of fuel and steam, an inner casing connected with said plate and gradually increasing in size from said plate to its discharge end, a steam-passage being formed between said outer and inner casings, and an oil-supply tube projecting into said inner casing, a space being provided between the outside of said oil-supply tube and the inside of said inner casing, whereby steam is admitted into said inner casing, flow of oil induced from said oil-supply tube, and said oil atomized.

2. In a hydrocarbon-burner having suitable inlets for fuel and steam, an outer casing having a steam-discharge end and an enlarged interiorly-screw-threaded receiving end, a transverse plate screwed into said enlarged receiving end and having apertures for passage of fuel and steam, an inner casing extending from said plate to the discharge end of said outer casing, and an oil-supply tube projecting into said inner casing, a space being provided between the outside of said oil-supply tube and the inside of said inner casing, whereby steam is admitted into said inner casing, flow of oil induced from said oil-supply tube, and said oil atomized.

3. In a hydrocarbon-burner having suitable inlets for fuel and steam, an outer casing having a steam-discharge end and an enlarged receiving end, a transverse plate in said enlarged receiving end and having apertures for passage of fuel and steam, an inner casing extending from one of said apertures to the discharge end of said outer casing and gradually increasing in size from said plate to said discharge end, an oil-supply tube in said enlarged receiving end and projecting into said inner casing, and means whereby oil is atomized at the end of said oil-supply tube.

4. In a hydrocarbon-burner having suitable inlets for fuel and steam, an outer casing having a steam-discharge end and an enlarged receiving end, a transverse plate in said enlarged receiving end said plate having apertures therein for passage of fuel and steam and one of which is centrally disposed, an inner casing connected with said centrally-disposed aperture and supported by said plate and extending therefrom to said discharge end, an oil-supply tube in said enlarged receiving end

and projecting into said inner casing, and means whereby oil is atomized at the end of said oil-supply tube.

5. In a hydrocarbon-burner having suitable inlets for fuel and steam, an outer casing having a steam-discharge end and an enlarged receiving end, an inner casing, a cap over said enlarged receiving end, and an oil-supply tube made integral with said cap and projecting into said inner casing, a space being provided between the outside of said oil-supply tube and the inside of said inner casing, whereby steam is admitted into said inner casing, flow of oil induced from said oil-supply tube, and said oil atomized.

6. In a hydrocarbon-burner having suitable inlets for fuel and steam, an elongated outer casing having a steam-discharge nozzle and enlarged receiving end, a transverse plate in said enlarged receiving end and having apertures for passage of fuel and steam, an elongated inner casing extending from one of said apertures and gradually increasing in size to the discharge-nozzle of said outer casing, an oil-supply tube in said enlarged receiving end and projecting into said inner casing, and means whereby oil is atomized at the end of said oil-supply tube.

7. In a hydrocarbon-burner having suitable inlets for fuel and steam, an elongated outer casing having a contracted discharge end and an enlarged receiving end; a transverse plate in said enlarged receiving end, said plate having therein a plurality of radially-disposed apertures and a centrally-disposed aperture, whereby steam and fuel can pass to the discharge end of the burner; an inner casing connected with said centrally-disposed aperture, supported by said plate, and extending therefrom to said discharge end, said inner casing gradually increasing in size from said plate to said discharge end; a cap on said enlarged end; and an oil-supply tube made integral with said cap and projecting into said inner casing, a space being provided between the outside of said oil-supply tube and the inside of said inner casing, whereby steam is admitted into said inner casing, flow of oil induced from said oil-supply tube, and said oil atomized.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES F. HIGGINS.

Witnesses:
WM. T. SPRANLEY,
A. O. HARANG.