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F. H. JOHNSON

OIL BURNER

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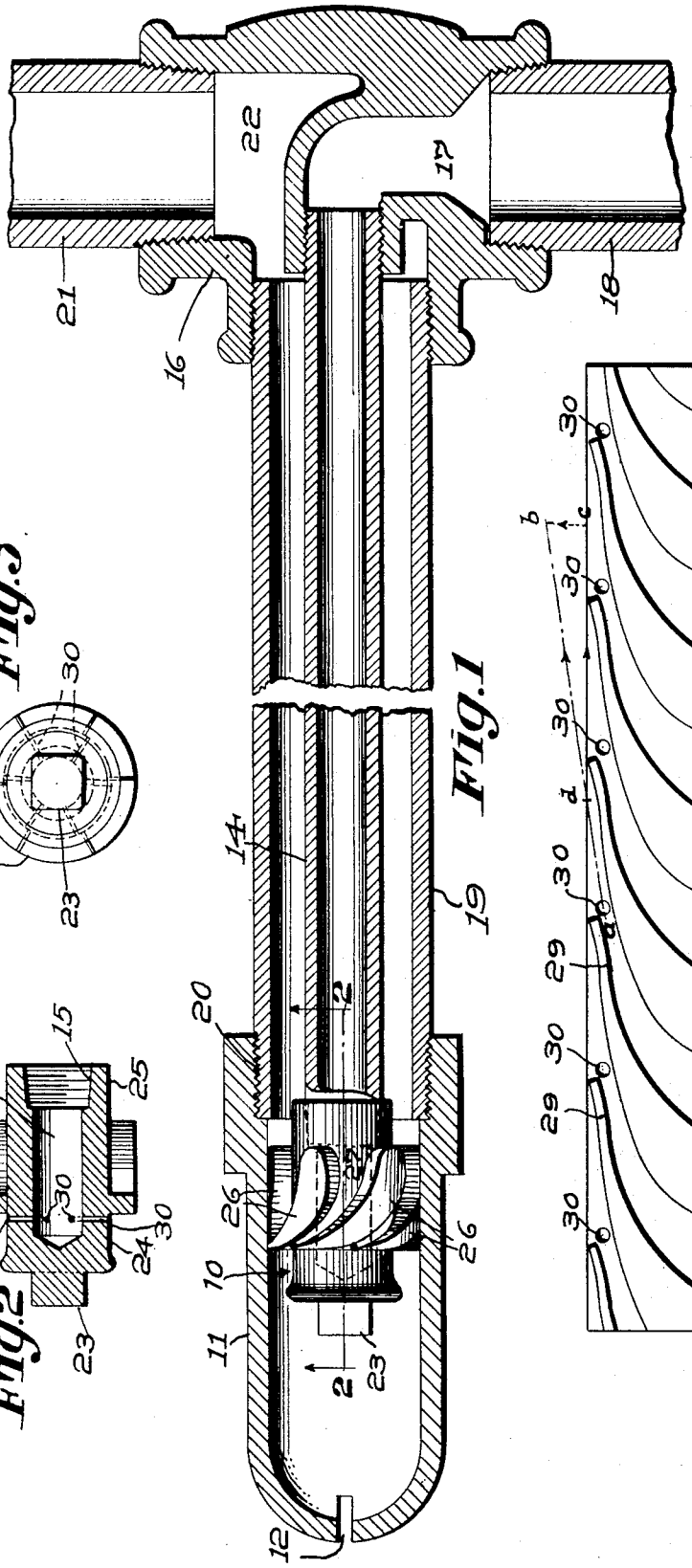


Fig. 1

Fig. 3

Fig. 2

Fig. 4

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OIL BURNER.

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To all whom it may concern:

Be it known that I, FRANK H. JOHNSON, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Oil Burners, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to oil burners, and more particularly to the construction by which atomized oil is caused to issue from the burner tip in an improved type of jet.

In many types of burners employing gaseous fluids for atomizing purposes, the oil is mixed within a casing or enclosure and the mixture then issues from a burner tip through one or more apertures, and the apertures are usually so formed that they promote atomization of the mixture passing therethrough.

It is usual to make the apertures of the burner tip relatively small as compared to the volume of the mixture that escapes through the apertures so that the mixture will issue from the burner tip under a substantial degree of pressure and in the form of one or more jets. The jets are usually relatively small in cross sectional area due to the small size of the apertures from which they issue and the jets do not permit as large a volume of air as desired to reach the burning mixture. Furthermore the type of jet heretofore provided is usually longer than is desired for the ordinary type of furnace and causes too great a portion of the combustion to occur near the rear wall of the furnace.

The present invention contemplates a construction in which the above mentioned objections are overcome by causing the mixture to issue from the burner tip in a jet which tends strongly to spread out in all directions as it advances from the aperture, with the result that the area of the jet exposed to the surrounding air is materially increased and the length of the jet is shortened so that a short bushy flame which is highly desirable is obtained.

This desired form of jet is obtained, in accordance with the present invention by imparting a pronounced rotating movement to the mixed oil and atomizing fluid within the casing so that the mixture will possess a potential centrifugal force, due to its whirling movement, as it escapes from the aperture at the burner tip and as a result the jet will spread out to a substantial degree in all directions as it leaves the aperture, due to the centrifugal force imparted to the particles forming the mixture.

One important feature of the present invention, therefore, resides in novel means for imparting a substantial rotary whirling movement to the oil before it escapes from the burner tip.

Another feature of the invention resides in improved means for directing the atomizing fluid against the oil to be atomized, and in novel means for reducing the frictional losses heretofore experienced in directing the atomizing fluid against the oil.

Other features of the invention and novel combination of parts in addition to the above will be hereinafter described in connection with the accompanying drawings which illustrate one good practical form thereof.

In the drawings:

Fig. 1 is a longitudinal central sectional view through an oil burner constructed in accordance with the present invention.

Fig. 2 is a sectional view of the mixer head, taken on line 2—2 of Fig. 1.

Fig. 3 is an end view of the mixer head of Fig. 2, and

Fig. 4 is an enlarged development of the portion of the mixer head upon which the curved vanes are formed.

The improvement of the present invention is well adapted for use in connection with various different types of oil burners, and in the drawing the mixer head 10 is shown as mounted within a casing 11 forming a burner tip having an aperture 12 through which combustible products are discharged.

In the construction shown the mixer head 10 is provided with a longitudinally extending oil passage 13 to which oil is supplied by a pipe 14 having threaded engagement with the threaded portion 15 of the head. At the opposite end of the pipe 14 is provided a body 16 of any preferred construction and having a central oil passage 17 to which oil is supplied by the pipe 18.

Steam or other atomizing fluid is supplied to the mixer head 10 by a pipe 19 that surrounds the oil pipe 14. One end of the pipe 19 is shown as secured to the casing 11

by threads 20, and the opposite end of the pipe 19 is threaded to the body 16. Steam is delivered by a pipe 21 into the chamber 22 of the body and flows from this chamber into the steam pipe 19. The pipe 14 due to its threaded engagement at one end with the body 16 and its threaded engagement at its opposite end with the mixer head 10, serves to hold the head 10 in the desired position of adjustment within the casing 10, and the forward end of the head 10 may be provided with a squared end 23 adapted to receive a wrench to rotate the head.

As stated an important feature of the present invention resides in the construction by which a substantial rotary movement is imparted to the oil and steam mixture so that it will rotate rapidly within the casing 10, and this is accomplished by providing the mixer head 10 with passages that discharge the steam into the casing in a direction substantially tangential to the head.

The mixer head 10 is shown as having an enlarged central portion that fits the interior of the casing 11 and as having reduced end portions 24 and 25. The central portion just mentioned is provided with curved vanes 26 which are constructed to form between them the steam receiving passages 27. The reduced end portion 25 of the head 10 serves to provide an annular steam passage about said portion, and the steam receiving ends of the vanes 26 are rounded as at 28 to direct the steam into the different passages 27.

The steam passages 27 have the curved construction best shown in Fig. 4, and they are provided with outwardly flaring entrances that extend in substantially an axial direction, and as a result the steam enters the passages with a minimum entrance loss. The passages 27 preferably decrease in size in the direction in which they extend and are curved as shown so that the steam issues from the discharge end of the passages in a direction substantially tangential to the head 10. As a result of this construction practically the entire velocity of the steam issuing from the passages 27 is utilized to impart a whirling movement to the steam. The passages 27 preferably have their smallest cross sectional area at a point 29 that may be called the throat, and from this point the passages flare outwardly somewhat to take advantage of the velocity of the expanding steam.

The direction in which the steam travels as it issues from the passages 27 is indicated by the dotted line *a*, *b* shown in Fig. 4, and it should be noted that this line extends at substantially right angles to the longitudinal axes of the head.

The oil is delivered from the passage 13 through ports 30 into the path of the steam issuing from the passages 27 and these ports preferably are disposed beyond the throats 29 as shown and along the line *a*, *b* which indicates the path of travel of the steam.

The action of the steam issuing from the passages 27 in the direction indicated by the line *a*, *b* may be best understood by regarding the portion *d*, *b* of this line as indicating the velocity and direction of the steam and oil issuing from the passage 27, then the forces represented by this line may be considered as the resultant of the forces represented by the lines *b*, *c* and *c*, *b* in the triangle *d*, *b*, *c*. In this triangle the line *b*, *c*. is the axial component of the line *d*, *b* and represents the force moving the steam and oil mixture longitudinally of the casing 11, and the line *d*, *c*, is the tangential component of the line *d*, *b* and represents the force that imparts a whirling movement to the steam and oil. From this diagram of forces it will be seen that by far the greater portion of the velocity of the steam issuing from the passages 27 is utilized to impart a whirling movement to the steam and oil.

As a result of this whirling movement within the casing 11 the mixture is given a potential centrifugal force which causes the mixture to flare or spread outwardly upon issuing from the aperture 12. This causes the mixture to burn in the form of a short bushy flame which produces better oxidation of the combustible products and because it is short is better adapted for use in the ordinary furnace than the flame of the burners heretofore used.

What is claimed is:

1. A burner comprising, in combination, a casing forming a burner tip having an orifice through which the combustible products are discharged, a mixer head within the casing for delivering oil and steam and having a longitudinally extending oil passage surrounded by a steam passage, vanes provided about the head and constructed to form steam passages between them which passages decrease in size in the direction they extend and are curved to present a substantially axially extending receiving portion and a substantially tangentially extending discharge portion from which the steam issues with a rotative force that greatly exceeds its force axially of the burner tip, and the mixer head having ports extending outwardly from the oil passage to discharge jets of oil into the path of the steam issuing from said steam passages.

2. A burner comprising, in combination, a casing forming a burner tip having an orifice through which the combustible products are discharged, a mixer head for delivering oil and steam into the casing, vanes provided about the head and constructed to form steam passages between them which passages decrease in size in the direction they extend and are curved to present a sub-

stantially axially extending entrance portion and a substantially tangentially extending discharge portion, and means for delivering oil into the path of the steam issuing from said passages.

3. A burner comprising, in combination, a casing forming a burner tip having an orifice through which the combustible products are discharged, a mixer head for delivering oil and steam into the casing with a rotary whirling movement, vanes provided about the head and constructed to form steam passages between them which passages are curved to present a substantially axially extending entrance portion and a substantially tangentially extending discharge portion, and means for delivering oil into the path of the steam issuing from said passages.

4. A burner comprising, in combination, a casing forming a burner tip having an orifice through which the combustible products are discharged, a mixer head for delivering oil and steam into the casing with a rotary whirling movement, vanes provided about the head and constructed to form steam passages between them which passages are curved to present a substantially axially extending entrance portion and a substantially tangentially extending discharge portion, said vanes being rounded at the steam receiving ends to direct the steam into the passages, and means for delivering oil into the path of the steam issuing from said passages.

5. A burner comprising, in combination, a casing forming a burner tip having an orifice through which the combustible products are discharged, a mixer head for delivering oil and steam into the casing with a rotary whirling movement and provided with steam passages, each having an outwardly flaring entrance portion and a reduced discharge portion and the passages being curved to discharge the steam in substantially a tangential direction and with a rotative force that greatly exceeds its force longitudinally of the burner tip, and means for delivering oil into the path of the steam issuing from the passages.

6. A burner comprising, in combination, a casing forming a burner tip having an orifice through which the combustible products are discharged, a mixer head for delivering oil and steam into the casing with a rotary whirling movement and provided with steam passages which decrease in size in the direction they extend, said passages being curved to deliver the steam into the casing with a rotary movement and each having a reduced throat near its delivery end and increasing in size from the throat toward the discharge end to utilize the velocity of the expanding steam, and means for delivering oil into the path of the steam at a point beyond said throats.

7. A burner comprising, in combination, a casing forming a burner tip having an orifice through which the combustible products are discharged, a mixer head for delivering oil and steam into the casing with a rotary whirling movement and provided with steam passages that are curved to present a substantially axially extending receiving portion and a substantially tangentially extending discharge portion from which the steam issues with a rotating force that greatly exceeds its force axially of the burner tip, and means for delivering oil into the path of the steam issuing from said passages.

8. A burner comprising, in combination, a casing forming a burner tip having an orifice at its end through which the combustible products are discharged, a mixer head for delivering oil and steam into the casing with a rotary whirling movement and provided with steam passages that are curved to present a substantially axially extending receiving portion and a substantially tangentially extending discharge portion from which the steam issues with a rotative force that exceeds its force axially of the burner tip, and means for delivering jets of oil into the path of the steam issuing from said passages so that the mixture of oil and steam will be given a strong whirling movement in the casing and will have imparted thereto a potential centrifugal force as it issues from the aperture which will cause the mixture to spread out laterally upon escaping from the aperture.

In testimony whereof, I have signed my name to this specification.

FRANK H. JOHNSON.