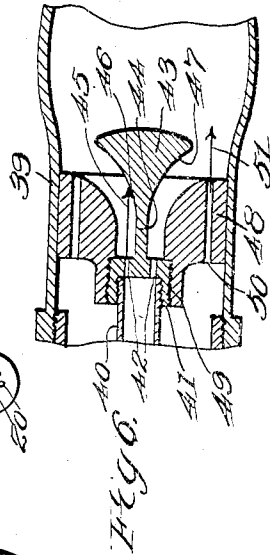
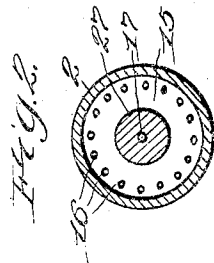
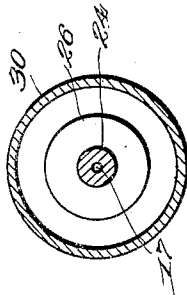
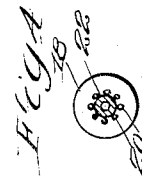
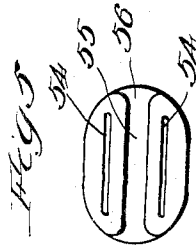
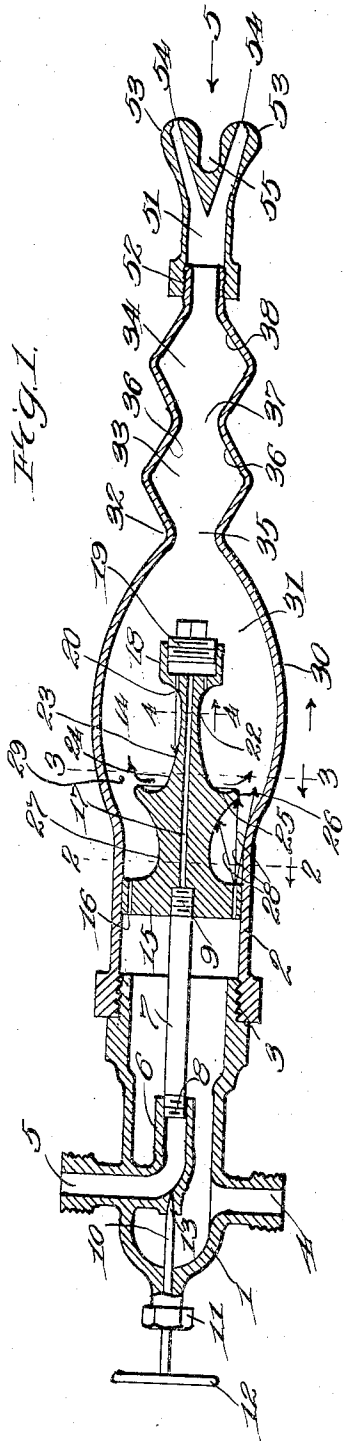


W. R. QUINN.
OIL BURNER.

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UNITED STATES PATENT OFFICE.

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OIL-BURNER.

1,331,376.

Specification of Letters Patent.

Patented Feb. 17, 1920.

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To all whom it may concern:

Be it known that I, WILLIAM R. QUINN, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented new and useful Improvements in Oil-Burners, of which the following is a specification.

This invention relates to improvements in oil burners, and has to do more particularly with that type of burners in which both the steam and the oil, or fuel, are fed under pressure, in contradistinction to that type of burners wherein the oil is fed by gravity.

Heretofore, one of the greatest difficulties to overcome in this class of burners has been that of fully breaking up the oil so as to more completely utilize the atomizing and expansion of both the steam and the oil. It has been proposed to direct the oil against the onrushing steam but the momentary colliding contact is not sufficient to break up the oil so that the atomizing action of the steam is fully effective.

Now it is the primary object of my invention, both as a method and as a mechanism, to break up, disintegrate and disperse the oil just prior to the atomizing action of the steam thereon so that when the steam begins to act, the oil will be sufficiently broken up so that the steam will be initially acting with the greatest efficiency in atomizing the oil. Therefore my invention includes an abutment against which the oil is initially directed prior to engagement of the oil with the steam. My improved abutment not only functions to break up the oil but it is so shaped, in the preferred construction, as to spread the oil after the latter has been broken up, and in this connection, it is also a feature of my invention in at least one embodiment, to change the direction of flow of the oil after the latter has been broken up and spread.

Thus in one form of my invention the oil and the steam are directed toward each other and the abutment is interposed in a manner to intersect and change the direction of flow of the oil from a direction, reverse to the direction of flow of the steam, into a direction substantially coincident with the direction of flow of the steam.

A further feature of my invention consists in providing a casing for the burner with a suitable enlargement arranged and disposed to provide an initial expansion chamber having a very sudden and sharply increasing

area beginning, substantially, at that zone where the steam and oil commingle, and extending for a sufficient length to provide for the necessary expansion.

A further feature consists in contracting the first or initial expansion chamber after allowance has been made for sufficient initial expansion, and then providing one or a series of supplemental combination expansion abutment chambers through which the fuel is directed toward the burner tip.

In another form of my invention, which is a species of the broad genus, the oil and the steam travel in the same general direction but the oil is intercepted by an abutment and subsequently deflected into the path of the steam after the oil has been thoroughly broken up.

A further feature of my invention consists in an improved burner tip which is forked or bifurcated, the bight of the fork or bifurcation forming an air chamber into which air is constantly drawn by the heated surfaces of the tip in order effectively to support combustion.

My invention has other features and objects which will be more fully described in connection with the accompanying drawing and which will be more particularly pointed out in and by the appended claims.

In the drawing:

Figure 1, is a longitudinal sectional view of a burner embodying the preferred form of my invention.

Fig. 2, is a sectional view on line 2—2 of Fig. 1.

Fig. 3, is a sectional view on line 3—3 of Fig. 1.

Fig. 4, is a sectional view on line 4—4 of Fig. 1.

Fig. 5, is an end view of the burner tip looking in the direction of arrow 5.

Fig. 6, is a longitudinal fragmentary sectional view of a modified form of my invention.

Like characters of reference designate similar parts throughout the different figures of the drawing.

First referring to the intake end or head of the burner, 1 designates the head housing which is threaded into a burner casing 2, as indicated at 3. A steam inlet for the head is designated at 4 and an oil inlet is shown at 5. The oil inlet 5 extends radially into the housing and has an elbow 6. An oil containing pipe 7 connects with said elbow by a

threaded connection 8 and has a threaded connection 9 with my improved jet, abutment structure which will be presently described. A needle valve 10 has threaded connection in a suitable packing gland 11 and is provided with a hand wheel 12, on its outer end. Said needle valve 10 is suitably tapered at 13 and seats in a complementally tapered bore in the elbow of oil inlet 5. When cold oil is being fed, or when the burner is being started, the needle valve will be opened to permit steam to enter and not only propel but quickly heat the oil. Inasmuch as my invention does not relate to this part of the burner structure, a further detailed description is unnecessary.

My improved mixer and oil breaker combination jet and abutment structure is indicated as a whole at 14 and is provided with an annular steam head 15 which fits tightly in the casing 2 and which is held in position by its threaded connection at 9 with the oil pipe 7. The head 15 is provided with a circular set of apertures or passages 16 which are so small in size that steam passing there-through at boiler pressure will take the form of wire drawn jets having a very great velocity. The mixer and breaker abutment structure is provided with an axial oil passage 17 extending toward the burner tip and which is of very greatly reduced diameter with respect to the bore of the oil containing pipe 7. This reduction, very greatly increases the velocity of flow of the oil, which is fed under pressure, and which at this point, flows in the general direction of the steam. The structure 14 terminates in a hollow oil jet head 18 which may be closed by a plug 19, for various practical reasons relative to drilling and cleaning. In this head 18 there is provided a circular set of oil jet passages 20 which open for discharge of the oil to the left of Fig. 1 in the direction indicated by the arrow 21. It will be noted that the direction of the oil has now been reversed and that it flows toward the on-rushing jets of steam discharging through passages 16. However the diametrical dimension of the circular series of oil jet passages 20, from center to center, is very much reduced with respect to a diametrical dimension of the passages 16. Therefore, while the oil flows toward the steam, it is out of line with the steam, or in other words, it is radially inwardly thereof.

Even with the present structure, as now described, and in the absence of an abutment, the oil would not collide with the steam as would be the case if the oil passages were in line with the steam passages. I will next describe my improved mixer and breaker abutment structure.

This abutment structure has a cross section at 22 which is so reduced with respect to the diameter of the set of oil passages 20,

that the oil will not engage the abutment until it has traversed a considerable length thereof as indicated by the arrow 21. The diameter increases gradually so that when the oil reaches a position corresponding to the head of arrow 21 it will engage the abutment structure. Thus it will be seen that enough flow of the oil free from engagement with the abutment is afforded to permit the oil to acquire a considerable velocity before it engages the abutment. From point 23, the gradually flaring diameter functions to spread the oil in a much more attenuated tubular sheet than at points in advance, or to the right of 23. This enlarging flare, as indicated at 24, terminates in a somewhat abrupt abutment 25, against which the oil impacts and is broken up. This impact and breaking up operation serves to completely shatter the oil into small particles thereby greatly facilitating atomization by the steam.

Now it will be seen that up to point 25 the oil will not only be shattered and broken up but it will also be deflected outwardly radially as a result of this sudden interception of its flow. While this outward deflection is of the greatest possible advantage by reason of the fact that it throws the oil directly into the path of the steam, as will be presently described, I still further perfect the abutment by curving it to the right of Fig. 1, as indicated at 26, thereby not only causing the abutment to deflect the oil radially outwardly, but to additionally change its course of travel to the extent of practically reversing its flow into substantially the path of travel of the steam.

It will thus be seen that my improved abutment, in this form of the invention, is interposed between the oil and steam flowing toward each other and that it functions both to deflect and substantially reverse the path of the oil.

The jet structure is very appreciably restricted in diameter at 27, between the abutment and the steam jets, so as to permit of a most effective expansion of the steam as indicated by arrows 28. Furthermore, from the annular area 29, the casing 2 enlarges as indicated at 30 and the abutment structure is so restricted in size that from the point 27 at which the oil and steam commingle, there is a very effective expansion chamber provided, as indicated at 31, for the initial expansion of the atomized fuel.

This initial chamber 31 is constricted at 32 and it is a feature of my invention to provide one or more or a series of supplemental and combined abutment and expansion chambers. In the present form, two such chambers are shown at 33 and 34. Chamber 33 has its constricted intake at 35 and the expansion resulting upon the fuel and steam entering chamber 33 causes the fuel to be

thrown against walls 36, the resulting impact, together with the high temperature, serving to further break up the oil particles. Chamber 33 has a constricted outlet 37, which practically forms a constricted inlet to expansion chamber 34, having abutment walls 38. Thus throughout the passage of the fuel the latter will have three stages of expansion and contraction, the importance of which is well understood.

Next referring to the modified form shown in Fig. 6, 39 designates the casing, 40 the conveying oil pipe and 41, my improved oil head. In this form of the invention, the threaded oil head is turned directly onto pipe 40, and is provided with a series of oil jet passages 42. An abutment 43 is provided with a constricted neck 44 which is formed integral with the head and which permits of a considerable length of expansion and flow of the oil, as indicated by arrow 45, before the oil strikes the abutment 43, at 46. After the oil strikes the abutment it is spread and broken up and deflected by the suddenly increasing curve 47 before the steam has an opportunity to engage the oil to atomize the same. A threaded steam head 48 is turned onto the oil head at 49 and is provided with a series of steam passages 50. The steam egresses, as indicated by arrow 51, so as to engage the oil as the latter is thrown outwardly by the curvature of the abutment.

Now it will be seen that in this form of the invention, the oil travels in the same direction as the steam, and is not reversed in its flow, as in the form shown in Fig. 1. However, like the preferred construction this form of my invention serves to break up the oil before the latter is engaged by the steam and likewise this form may be provided with suitable expansion and abutment chambers.

It will now be seen that the method invention herein disclosed is not dependent upon any one specific construction and I consider my improved method to consist in intercepting a pressure jet of oil to break up the same, prior to engagement of the oil by the steam, irrespective of the means by which this is accomplished.

I also consider that my invention resides in the combination oil and steam jet abutment structure, as an article of manufacture, and as indicated in Fig. 1, by the general numeral 14, and as shown in Fig. 6.

My invention also includes a burner tip which comprises a tubular body 51 adapted to be attached to the casing 2, at 52. The tip is bifurcated and the bifurcated portions 53 are each provided with an elongated slit or slot 54 through which the fuel is expressed. A chamber 55, of considerable area, is formed at the bight of the fork and

is open at the ends 56. The heated surfaces serve to induce a continuous inflow of air into said chamber, and between said slots 54 so as to effectively support combustion.

It is believed that the novelty and utility of my invention will be fully understood from the foregoing description and while I have herein shown and described specific forms for carrying out my invention, I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:

1. In a jet structure for pressure fed oil burners, a body adapted to be inserted into the casing of a burner and having an axial oil passage extending from the rear toward the front of said burner or body, said oil passage terminating in a plurality of oil jet apertures opening toward the rear of said body, said body having an abutment extending radially outwardly from said apertures to intercept the oil and break it up, and said abutment being flared and curved to spread the oil outwardly and then substantially reverse the direction of travel of the oil, and said body having steam jet openings rearwardly of said abutment and disposed in position to direct the steam toward and into the oil as the direction of the latter is changed by said abutment.

2. In a pressure fed oil burner, means for directing jets of oil rearwardly in said burner, an abutment for contact with the oil to break it up and substantially reverse its direction from a rearward to a forward direction, means for directing steam jets forwardly and into the path of the oil after its direction has been changed, and a casing for said burner having an enlargement forming an expansion chamber substantially at the area at which the steam engages the oil.

3. In a jet structure for oil burners, a body adapted to be inserted into the casing of a burner and having an axial oil passage extending from the rear toward the front of said body, said passage terminating in a plurality of jet apertures opening toward the rear of said body, said body having an abutment rearwardly of said jet apertures and disposed in a position to intercept the oil discharging from said apertures, and said body having steam jet apertures on that side of the abutment rearwardly of said oil apertures.

4. In a pressure fed oil burner, a casing, a mixer adapted to be inserted into the casing and having an axial oil passage extending from the rear toward the front of said body, said oil passage terminating in a plurality of oil jet apertures opening toward the rear of said body, an abutment on the mixer to intercept the oil and break it up, said mixer having steam jet openings rearwardly of said abutment disposed in position

to direct the steam toward and into the oil, the abutment on the mixture located so as to break up the oil prior to its contact with the steam.

5 5. In a pressure fed oil burner, a mixer having an oil passage extending there-through, and an abutment thereon, jet aper-
tures for directing oil rearwardly against
the abutment, steam passages in the mixer
10 rearwardly of the abutment and an expan-
sion chamber between said steam passages
and the abutment.

6. In a pressure fed oil burner, means for
directing a jet of steam to atomize the oil,
15 means for directing a jet of oil under pres-
sure, and an abutment located between the
jet of steam and the jet of oil and located
in the path of the jet of oil for initial en-
gagement therewith and shaped to prevent
20 contact with the steam until after the oil has

engaged and been broken up by engagement
with said abutment.

7. In a pressure fed oil burner, a casing,
means within the casing for directing a jet
of steam to atomize the oil, means for direct- 25
ing a jet of oil under pressure, and an abut-
ment located between the jet of steam and
the jet of oil and located in the path of the
jet of oil for initial engagement thereby and
shaped to prevent contact with the steam un- 30
til after the oil has engaged and been broken
up by engagement with said abutment, a
pipe extending forwardly of the casing,
baffles in said pipe for further mixing the
steam and oil, and a burner tip on the end 35
of said pipe.

In testimony that I claim the foregoing
as my own I hereby affix my signature.

WILLIAM RAYMOND QUINN.