

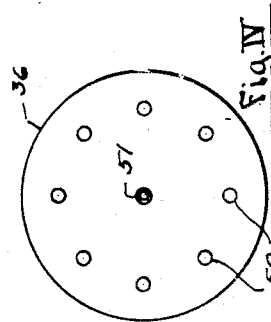
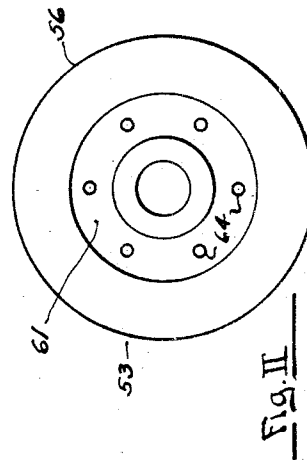
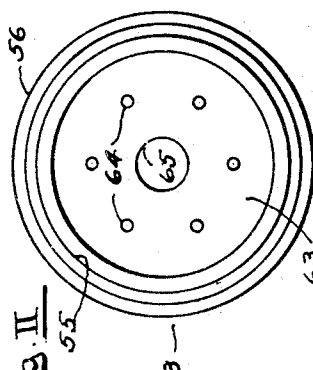
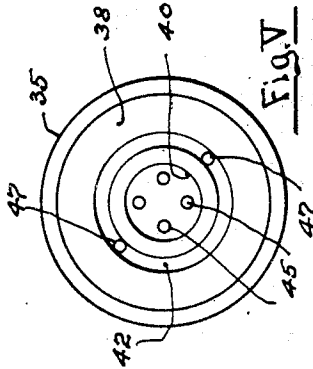
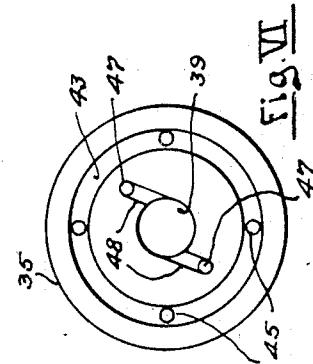
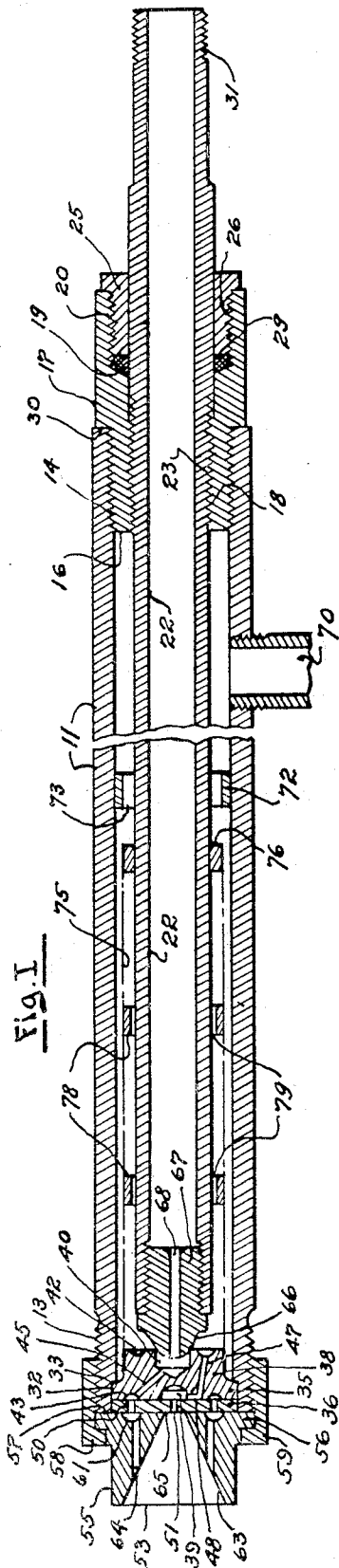
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OIL BURNER

Filed May 8, 1929



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UNITED STATES PATENT OFFICE

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OIL BURNER

Application filed May 8, 1929. Serial No. 361,402.

This invention has reference to fuel oil burners and appertains more especially to the type thereof capable of burning waste and refuse oils.

5 One object of the invention is to produce an improved burner wherein a heat conveying and atomizing fluid is so intimately associated with a combustible fluid in their passage thru the burner as to effect perfect vaporiza-
10 tion of the last named fluid still without the same commingling with the first mentioned fluid except to a limited extent at the place where both of these fluids issue jointly.

Another object is the production of a
15 burner so arranged that the course or direction followed by the fuel oil and the atomizing steam is interchanged to cause intense pre-heating and vaporization of the former in advance of the issuance thereof.

20 A further object consists in producing a burner having inter-changeable elements orificed to suit different grades of fuels and pressures.

Still another object is to provide a burner
25 so constructed that an inner column of whirling oil vapor issuing in rear of subdivided jets of steam communicates a like activity to the latter which in turn impart the same motion to the air immediately in front of the
30 junction of the steam and vapor streams, to render complete and noiseless combustion of the fuel.

A still further object resides in providing
35 a burner with nozzle and vaporizing parts designed to retain one another in operative position, and capable besides of being quickly detached or replaced without disturbing the oil and steam supply connections.

An additional object is the provision of a
40 lengthwise extending oil-strainer carried by one of the fuel comminuting and vaporizing parts of the burner.

A general object is to furnish a quiet and economically operating burner, composed of
45 few, simple and strong parts; not liable to get out of working order; capable of being readily assembled or taken apart for inspection, cleaning or repairs; and amenable besides to low cost of manufacture.

50 Other objects and advantages of the inven-

tion will in part be obvious and in part be more fully brought out in the detailed description hereinafter contained.

The invention consists in the various combinations and subcombinations of elements,
55 arrangements and interrelative disposition of parts and peculiar features of construction pertaining to the improved device herein described and defined in the appended claims.

A practical embodiment of the invention is
60 illustrated on the drawing hereto annexed wherein—

Figure I is a longitudinal section of this improved burner;

Fig. II is a face view of a nozzle member
65 appearing in Fig. I, looking from left towards the right thereof;

Fig. III is a view, similar to the preceeding, of the same member, but looking from
70 right towards the left thereof;

Fig. IV is a face view of an orificed element shown in Fig. I;

Fig. V is a face view of a flow interchanging member, also seen in Fig. I, looking from
75 right towards the left thereof;

Fig. VI is a view similar to Fig. V of the same interchanger, but looking from left towards the right thereof; and

Fig. VII is a face view of a spacer also
80 appearing in Fig. I.

Briefly described the invention as it exists in the embodiment thereof herein exemplified comprises concentrically disposed elongated chambers thru which are conveyed liquid
85 fuel, and steam employed to heat and atomize the same. From the walls of the outer chamber adjacent one of its ends is carried an external member wherethru issues the steam and atomized fuel in a plurality of separated jets so arranged that the steam flows
90 out in advance of and around the fuel oil spray. With the inner chamber or steam conductor is associated another but internal member serving to change the central course initially followed by the steam into
95 several paths further out or away from the single one, while in parallelism therewith. The oil on the other hand is deflected counterwise i. e. from an outer divided flow to an inner unitary and whirling stream. The co-
100

operation of the external and internal members is such that the different streams of oil and steam received from the last named member, maintain their respective directions of flow in issuing by way of the external member until these streams commingle with the air necessary for the combustion of the atomized or vaporized liquid hydro-carbon.

Obviously the greatest benefit will be derived from the invention by using it in its entirety after the manner hereinabove explained, altho it may be noted that an operative device of acceptable design may be produced by employing a less number of parts, with correspondingly diminished advantages. Further, it will be observed by experts familiar with inventions of analogous import, that the coacting members and elements herein disclosed are susceptible of various modifications having the same end in view. Therefore, let it be understood that the accompanying drawings are offered by way of example only and are not put forth as representing the sole means of reducing the invention to practice.

Referring now to the views of the annexed drawings for a detailed description of the invention thereby exemplified, the reference numeral "11" denotes a barrel or extending hollow casing. The latter is externally and internally threaded at its opposite terminals as shown at 13 and 14 respectively. Into the last named end is screwed the correspondingly threaded shank 16 of a shouldered sleeve 17 provided interiorly thereof with screw threads 18. The outer end, in this instance, the right hand end of sleeve 17 has formed therein an enlarged recess 19 also threaded on the inside thereof as indicated at 20 (Fig. I).

A tube 22 for conducting steam or other atomizing agent, has incorporated in the exterior surface thereof, for a portion of its length, screw threads 23 adapted to engage those on the interior of the combined shank and sleeve (16, 17) so as to be guided and held rigidly thereby. At 25 is represented a glandular nut provided exteriorly thereof with screw-threads 26 capable of entering threads 20 in the recess 19. The inner extremity of gland-nut 25 serves to force a packing washer 29 against the bottom of said recess 19 as well as to cause this washer to expand and fill up interstices occurring in and between threads 20—26, thus sealing against leakage around the place last mentioned. Forcible screwing up of the shouldered part of said sleeve 17 against the squared end face 30 of casing 11, makes a joint of sufficient tightness therebetween. Tube 22 extends outwardly beyond nut 25 and has its extremity 31, which is reduced in size, screw-threaded for a suitable coupling to connect the tube referred to with a primary steam supply or generator (not shown).

In the other end of the casing 11 there is provided interiorly thereof, for a certain depth, a smooth cylindrical bore 32 which terminates in an abutment 33. Within the seat thus produced is lodged by their circumferential portions, a flange 35 and in close adjacency thereto, a disc element 36, in the order named from abutment 33. The flange mentioned constitutes an annular enlargement to the reduced body portion of what may be termed a direction flow interchanger 38, the purpose whereof will hereinafter be more fully explained. Member 38 is provided with co-axial non-communicating pockets, of which the front or left hand one 39 is of slightly smaller proportions than pocket 40 which is turned towards the interior of the said casing. The opposite inner and outer faces of flanges 35 and plug member 38 are formed with annular grooves 42 and 43, respectively, of which the latter is somewhat larger than the one first named. From the bottom of pocket 40 lead in an outwardly divergent manner to the front groove 43, a plurality of conduits 45, while from the inner groove 42 run passages 47 that terminate at the outer face of flange 35, in channels 48 which partake of an inwardly tangential course relatively to and issue into the smaller and frontwise facing pocket 39. In close juxtaposition to the left-hand or forwardly facing surface of said interchanger (35—38) is placed the aforementioned element 36. This disc has incorporated therewith a multiplicity of circularly disposed, spaced apart orifices 50 arranged so as to register with the groove 43 in the face of flange 35. Centrally thereof the said disc is provided with an aperture 51 aligning and in communication with the smaller pocket 39.

Both the orificed disc 36 and the flanged member (35—38) are retained within the cylindrical seat (32—33) by a nozzle member 53 the rear-face whereof overlies and abuts the front side of the disc-element 36. Embodied with the nozzle in question are body and rim portions 55, 56 respectively. The portion last referred to, is positioned closely adjacent to the casing's squared front end 57, being held thereagainst by a circumferential lip 58 forming part of a sleeve or union nut 59 that threadingly engages threads 13 on the said casing. Lip 58 in impinging upon rim 56 forces the nozzle member hard against and clamps the disc and the therewith coacting plug member (35—38) in their assigned positions. The pressure of the member 53 on the disc-element 36 makes the latter snugly hug the face of the flange 35 so as to close the frontwise open channels 48. A groove 61 of a size corresponding to and aligned with the groove 43 and the orifices 50 is formed on the rear or inner face of the nozzle member 53. Body portion 55 of the last named member is interiorly provided with an outwardly

flaring or conically shaped throat 63. Communicating with groove 61 and extending substantially in parallelism with the central axis of throat 63 are plural ducts 64 the outermost limits whereof make oblique intersections with the tapering or bevelled interior surface of the said throat. The central aperture 51 in the disc 36 is disposed substantially in the middle of the inner or bottom end 65 of the throat 63.

The edge at the mouth of the inwardly facing pocket 40 is contacted all the way around by a semi-ball shaped head 66 forming the forward end of a mouth-piece 67, which head produces a crush joint against the said edge. Element 67 has its inner or rear portion threaded so as to screw inside of the left hand extremity of the steam tube 22, and running thru the head and threaded part of said element is a straight opening 68 which is of a contracted dimension with respect to the internal diameter of the said tube. The liquid fuel is conducted under pressure into the casing 11 by means of a nipple 70 secured in an appropriate manner in the casing's side wall or shell.

With the object of preventing the tube 22 from sagging that is, to keep its steam delivering mouth piece in operative alignment with the axis of the pocket 40, a collar 72 is supplied, fitting within the casing and supporting in the bore thereof the middle part of the tube 22, there being grooves 73 cut into the collar from its bore so as to enable the oil to uninterruptedly pass to the forward end of the said casing.

In order to preclude impurities or sediment carried in suspension by the oil from clogging up the minutely fine conduits, channels and ducts, a strainer 75 is furnished. The forward end of this foraminous shell is preferably made of close-mesh wire gauze, and is affixed to the reduced plug or rear portion of the member 38 so as to be sustained therefrom. The inner end of the aforesaid gauze mantle is closed by a ring 76 the central opening whereof takes snugly over the exterior smooth surface of the tube 22 to block gritty oil from entering the strainer around the place of contact last referred to. Other rings 78 spaced along the interior of the before mentioned strainer mouth, serve to steady and hold the walls thereof from collapsing or becoming dented. These last named rings altho smaller than the tube centralizing collar 72, are provided with similar internal grooves 79 as the latter to admit of the strained oil flowing past them. The relatively large area of the mantle 75 affords the same prolonged duration of service before the meshes thereof require cleaning to remove obstructing dirt adhering thereto.

In operation of this burner, the atomizing medium, such as steam, for viscous and

medium heavy hydro-carbon oil, on its way thru the tube 22, gives up part of its heat to the liquid fuel surrounding the said tube within the casing 11, thus pre-heating the oil fuel to a certain extent. The velocity of the steam is accelerated somewhat in passing the contracted opening 68 in the mouth-piece 67. Subsequent to having entered the rear pocket 40, this steam flows thru the conduits 45 into the annular groove 43 in the direction interchanging member 38. The steam becomes slightly wire-drawn and therefore superheated in going thru the last mentioned groove and the orifices 50 in the disc 36. No matter how the latter is positioned relatively to either the said groove 43 or the companion groove 61 in the nozzle member 53, the steam will always find its way thru the said orifices 50. Finally, the steam collected in the said grooves 61 will issue by way of the straight ducts 64 into the flaring throat 63.

The oil as before stated, enters the casing 11 under pressure, being conducted thereinto by the branch nipple 70. It then passes the gauze strainer 75 leaving impurities in the oil on the outside of the latter. The passages 47 communicating with the receiving groove 42 conveys the oil thru the tangential channels 48 into the front pocket 39 imparting to the oil which has become highly heated, a whirling or rotative motion. By reason of the fact that the oil in the passages flows in a finely sub-divided state and in close proximity to the hot steam but without mixing therewith, this oil, if of the lighter and medium volatile varieties, issues as a vapor or nearly so thru the disc-element's central aperture 51. The rotary motion of the vaporous oil continues after the same has flowed out into the throat 63, and this motion is communicated to the steam rushing out of the ducts 64. When the jets of steam strike the stream, the latter is atomized thereby, no matter if the liquid fuel has not become entirely vaporized as in the case of viscid oils, but that the same passes out as a hot mist or fine spray, the rotation thereof is kept up and the particles are atomized by the steam. The whirling or gyratory vortex of oil and steam in the said throat 63 draws the surrounding air into the swirl, such action persisting at a considerable distance away from the burner nozzle 53. By virtue of the reason that the steam, which in the first place flowed in a central direction with regard to the enveloping oil, has been made to change positions with the latter, the steam surrounds the conical jet of the atomized or gasified oil and is effectively entrained therewith. The steam within the pipe 22 cannot radiate its heat to the surrounding atmosphere, but this heat will be transferred to the oil, until the steam is shifted to issuing position. After the burner

has been in operation for a short while, the reaction of the flame raises the temperature of the said nozzle 53, so that any entrained moisture in the steam will be re-evaporated. The burning stream of vapor produced by this device is of intense white heat and reaches out at a considerable length from its nozzle, making practically no noise even when operating under full pressure.

10 The means for regulating each of the aforementioned mediums, has not been specifically illustrated, but it will be understood that cocks or valves are to be included in the pipe lines conveying the respective fluids to the burner in question.

15 It is only a matter of a few minutes of time, when it becomes necessary to clean the burner, to unscrew the sleeve-nut 59 and remove the therewith associated throat member 53. The orificed disc and the flow interchanger 38 may then be pulled out of their seat 32 and a fine wire rammed thru the various conduits therein. Rinsing the strainer in a bath of light grade hydro-carbon liquid, such as benzine, will generally loosen the deposits of dirt lodged in the interstices of its meshes. While it is conceivable that the disc 36 can be dispensed with, i. e. the grooves 45 and 61 may be placed in direct apposition, without the intermediary of the said disc, it is more economical to discard a comparatively low priced disc than to substitute both the members 38—53 when worn out by the oil and steam flowing therethru. Moreover, certain fuel oils require orifices of different calibre than others, and it is of considerable convenience for the user of the burner to have on hand such discs having the most advantageous number and sizes of orifices and apertures, in order to obtain the highest efficiency of combustion.

In its broader aspects, the invention herein disclosed is not limited to the precise features of construction and arrangement of parts shown and described, nor to any particular structural make-up or design by which it can be reduced to practise, as numerous changes may be made in the details without departing from the principles of the invention, or even sacrificing any of its chief advantages.

Having now described my invention, what I claim as novel therein, and desire particularly to protect by Letters Patents of the United States, is:—

1. A burner comprising a casing thru which passes a combustible fluid, a conductor for an atomizing fluid axially disposed within said casing, a nozzle, and means for conveying the atomizing fluid from an inner to an outer and the combustible fluid from an outer to an inner path, thereby interchanging the initial positions of both of said fluids in advance of their issuance.

2. A burner comprising annularly ar-

70 ranged exterior and interior chambers for oil and steam respectively, a member adapted to receive said fluids and provided with ducts serving to change the direction of flow of the oil from an outer to an inner path and that of the steam reversely thereto, and a nozzle formed with means to discharge the steam outwardly beyond the discharge point of the oil.

3. A burner comprising extended annular, exterior and interior chambers for oil and steam respectively, a member adapted to receive said fluids and provided with ducts serving to change the direction of flow thereof from an outer to an inner course for the oil and reversely for that of the steam, and a nozzle whereinto the steam issues obliquely with respect to its internal surface and the oil passes out in an inwardly offset relation therinto from said member.

4. A burner comprising exterior and interior annularly arranged chambers for oil and steam respectively, a member lodged in the outer end of said exterior chamber and adapted to receive said fluids, said member being provided with ducts serving to change the direction of flow of the latter from an outer to an inner course for the oil and reversely for that of the steam, a nozzle member having a flaring throat said nozzle being formed to discharge the steam obliquely in advance of the oil from said member.

5. A burner comprising a casing, a steam pipe therein, an inlet for oil into said casing around said pipe, a nozzle at the outer end of the casing affording segregated outlets for the oil and steam in advance one of the other, a member provided with ducts communicating with the respective steam and oil pipes and the respective outlets for interchanging the axial path of flow of the aforementioned fluids, and an apertured disc between the nozzle and the member, the apertures of the disc communicating with the passages in the nozzle and member.

Signed at the borough of Manhattan in the county of New York and State of New York this 7th day of May A. D. 1929.

CHARLES J. OHLSSON.