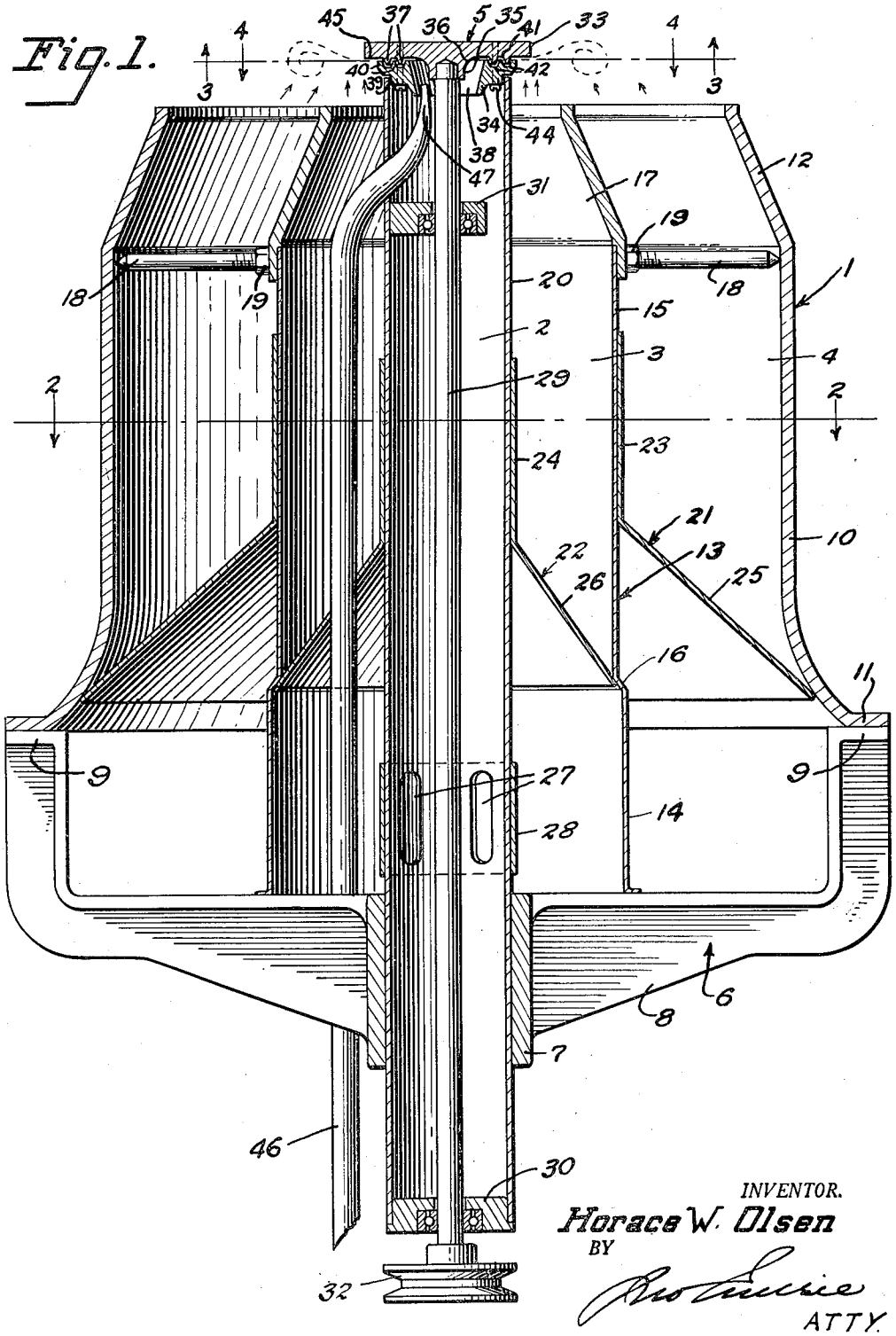
March 28, 1950 H. W. OLSEN 2,501,736

ROTARY DISTRIBUTING HEAD OIL BURNER

Filed April 23, 1947 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

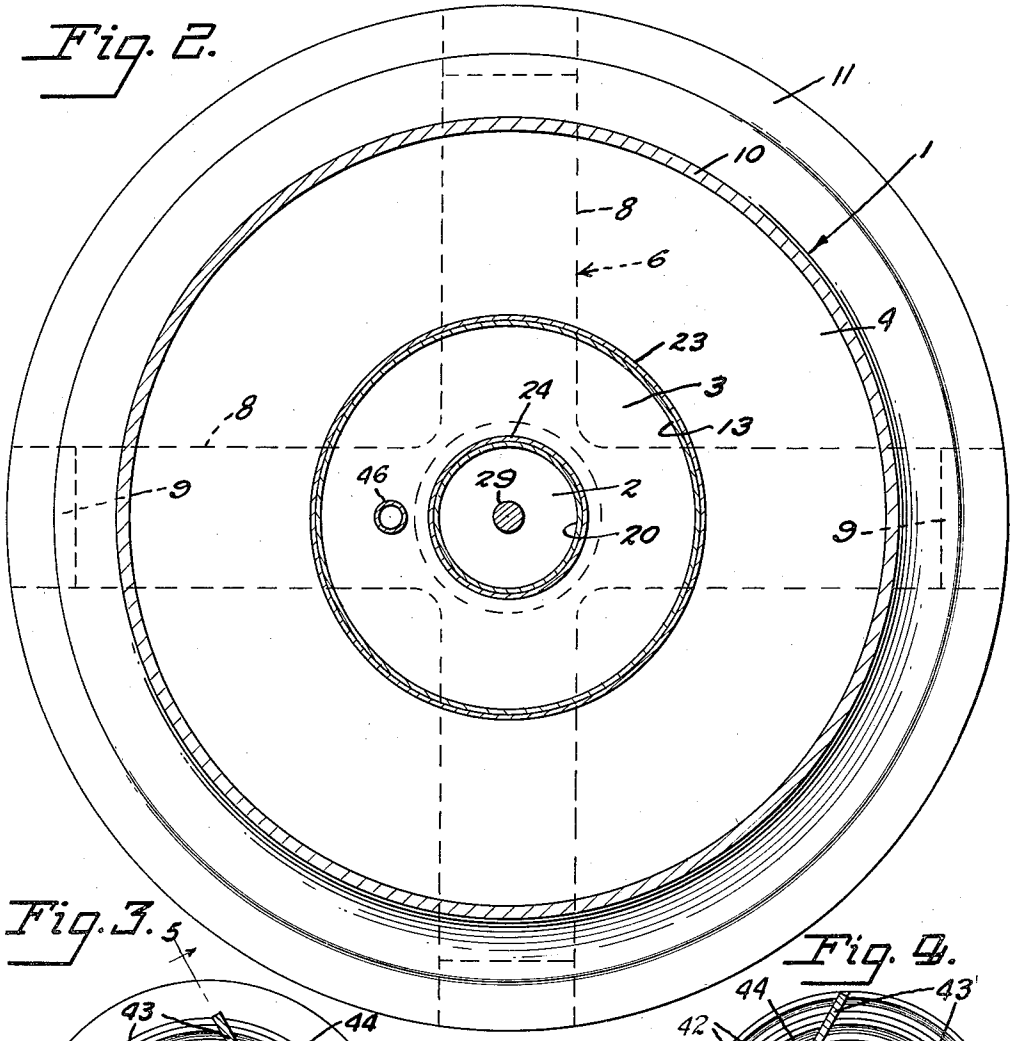


Fig. 3.

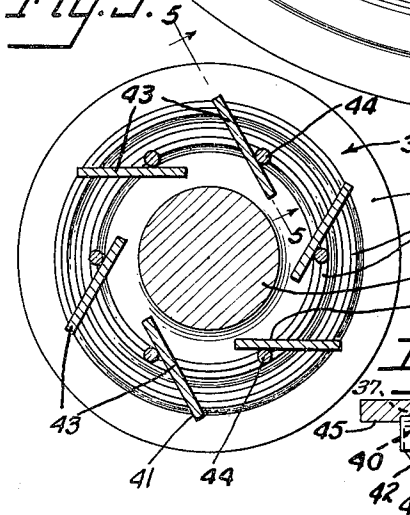


Fig. 4.

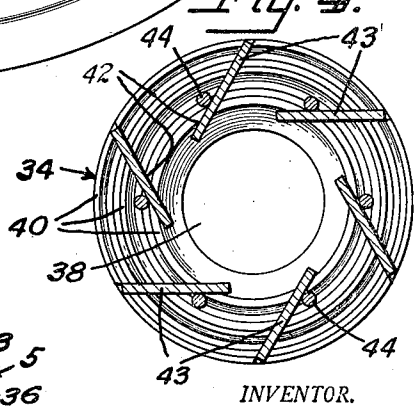
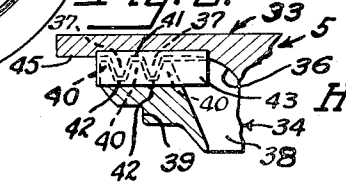


Fig. 5.



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ROTARY DISTRIBUTING HEAD OIL BURNER

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Application April 23, 1947, Serial No. 743,414

2 Claims. (Cl. 158—77)

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This invention relates to hydro-carbon burners, and more particularly to such burners of the non-aspirating type.

It has been the consistent aim of hydro-carbon burner designers to produce burners which approach the ultimate in efficiency from the standpoint of heat produced per unit of fuel consumption. To achieve this, various means have been devised to secure more perfect combustion by a more complete breakdown of the oil particles, coupled with an improved mixing of the oil particles with oxygen to produce a more highly volatile mixture.

The object of this invention is to provide a burner in which means are employed to reduce the size of the droplets, or particles, of oil to a point that nearly complete hydroxylation takes place prior to the time that the fuel is actually burned.

A further object of the invention is to provide a burner of this type, wherein a maximum efficiency is obtained in the mixture of the fuel and air prior to and during its period of combustion, and in the amount of control the operator of the burner has over the flow of air in and from the wind box system.

It is a still further object of the invention to provide a burner, wherein atomized fuel is thrown outward from a central head by centrifugal force, the force being sufficient to throw the fuel across a surrounding concentric secondary air supply into a tertiary air supply, the droplets being sufficiently small to have their direction of flow materially affected by the flow of secondary air thereby acquiring a torus motion accentuated by the tertiary air flow to produce a short and nearly spherical-shaped flame.

Another object of the invention is the provision of a burner, wherein waste materials or impurities are automatically removed from the burner and deposited clear of the burner and beyond the sphere of combustion.

Yet another object of the invention is to provide a burner of extreme flexibility, wherein the efficiency remains substantially constant whether adjusted for large or small fuel consumption.

Other objects will become apparent from the following detailed description of one form of the invention, taken in conjunction with the drawings which accompany and form a part of this specification.

In the drawings:

Figure 1 is a vertical section through a hydro-carbon burner embodying the principles of the present invention;

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Figure 2 is a horizontal section taken on the line 2—2 of Figure 1;

Figure 3 is a section through the spinner head taken on the line 3—3 of Figure 1 looking toward the intake ring;

Figure 4 is a section taken on the same line as Figure 3, but looking in the opposite direction toward the shroud plate; and

Figure 5 is a section taken on the line 5—5 of Figure 3 showing the seating of channel-forming spacers in the spinner head.

Referring to the drawings in detail, the burner of the present invention comprises a wind box system 1, having channels 2, 3 and 4, for the passage of primary, secondary, and tertiary air supplies respectively, and a spinner head 5.

The wind box 1 is supported upon a spider 6 which may be positioned and held in a fire box in any conventional manner. The spider is provided with a central hub 7, from which extends a plurality of radial arms 8. The outer portions of the arms turn upward and carry flat horizontally disposed flanges 9 at their ends, the flanges forming supports for a vertical open-ended cylindrical casing 10. The casing has a peripheral flange 11 skirting its lower end, which seats upon the casing supports 9 on the spider arms. Casing 10, when in position on the arms, is concentric with the hub 7 of the spider. The upper end of the casing 10 is tapered inwardly, as at 12, for a purpose to be described later.

Concentrically positioned within the casing 10 is a second casing 13 having a lower portion 14 seating upon the horizontal portions of the spider arms 8, and an upper portion 15 of less diameter than the lower portion and joined to the lower portion by an inclined section 16. A tapered collar 17 fits over the upper end of the casing 13, and extends upward to a point substantially flush with the upper end of the casing 10. Positioning pins 18 have their inner ends threaded into the collar 17 at spaced points about the periphery of the casing 13 and extend radially outward to contact the inner wall of the casing 10. These pins may be screwed in or out to position and hold the casing 13 concentric to casing 10. When the pins are properly adjusted, they are held in position by lock nuts 19.

A tube 20 has its lower end fitted into and is supported by the hub 7 of the spider 6. The lower end of the tube extends below the hub, and the upper end rises vertically through the casing 13 and terminates above the plane of the upper ends of the casings 10 and 13.

Thus, there are provided three concentric cas-

ings forming the three passageways 2, 3 and 4, mentioned above, passageway 2 being through tube 20, passageway 3 being an annular one formed between tube 20 and casing 13, and passageway 4 also being annular and formed between casings 13 and 10. The inward taper of the upper end 12 of casing 10 and the collar 17 is substantially the same, whereby the air rising in passageway 4 is given a direction change and issues from the mouth of the passageway to form an inwardly directed hollow cone of air. The taper of collar 17 toward tube 20 restricts the mouth of passageway 3 so that the cylinder of air issuing therefrom is reduced in diameter and the air is directed closely adjacent the outer perimeter of the spinner head.

Control of the incoming air in the three passageways is obtained through the use of valves. Two of these valves, 21 and 22, controlling the passageways 4 and 3 respectively, are similar, and comprise sleeves 23 and 24 closely fitting and slidably mounted on the casing 13 and the tube 20 respectively, and outwardly flared conical skirts 25 and 26, which depend from sleeves 23 and 24 and are the valves proper. When sleeve 23 of valve 21 is slid upwardly on casing 13, the outer edge of its skirt 25 comes in contact with the lower surface of flange 11 of casing 10, shutting off the supply of air through the passageway 4. Downward movement of the valve moves the skirt from the flange 11 and permits the entrance of increasing amounts of air. Movement of valve 24 gives similar control over the air supply through passageway 3, the skirt 26 cooperating with the inclined section 16 of casing 13 to cut off the supply of air. Tube 20 is provided with a plurality of elongated openings 27 spaced around its periphery. A sleeve 28 is slidably fitted over the tube and may be moved to cover more or less of the openings 27 to control the primary supply of air.

A shaft 29 is positioned centrally of tube 20 and extends beyond both ends of the tube. The shaft is supported at the lower end of the tube in an anti-friction bearing carried by a bearing plug 30, which also serves to close the lower end of the tube. A spider 31 is fixed in the tube near its upper end and carries an anti-friction bearing which forms the upper journal for shaft 29. At its upper end, the shaft carries the spinner head 5, and upon its lower end, a pulley 32 is mounted. A belt from a suitable source of power will pass around the pulley to rotate the shaft.

Spinner head 5 is composed of two parts, a shroud plate 33 mounted on the shaft 29, and an intake ring 34 beneath the shroud plate. Shroud plate 33 is a disk-like member, smooth on its upper surface and having a centrally disposed hub 35 depending from its lower face to receive and be fixed to the shaft 29. The hub is joined to the disk by a slow curve 36, whereby the vertically rising fuel will be smoothly diverted in a horizontal direction. Annular ribs 37 project from the under side of the disk, the ribs being positioned concentric to the disk. Intake ring 34 is of smaller outside diameter than the shroud plate, and its inner opening 38 is of sufficient size to form with the hub 35 an annular opening for the passage of fuel. The sides of the opening diverge upwardly to aid the smooth flow of the fuel in making its direction change. The periphery of the ring is undercut to provide an annular boss 39, which just fits within the upper end of the tube 20. Intake ring 34 is also provided with a plurality of spaced concentric annular ribs 40, the ribs on the intake ring being of such number and size with respect to those on the shroud plate that when the two members, intake ring, and shroud plate are placed in operative association, the ribs 37 of the shroud plate fit into the recesses between the ribs 40 of the intake ring.

Both shroud plate and intake ring are provided with grooves, the grooves extending across the respective ribs and shown at 41 and 42 in the shroud plate and intake ring respectively. The grooves occupy positions substantially tangential to the intake throat formed between the opening 38 in the intake ring and the hub 35 of the shroud plate. Spacers 43 fit into the grooves, and the shroud plate and intake ring are fastened together by bolts 44. The spacers serve to hold the shroud plate and intake ring at the proper distance from each other, so that the ribs of the two elements interfit without touching, leaving a tortuous passageway between them. The spacers also serve to divide this passageway into a plurality of channels. It will be noted that when the spinner head is assembled, the shroud plate presents a peripheral portion 45 which overhangs the intake ring and forms a guiding surface to give the fuel leaving the spinner head its initial horizontal direction.

Fuel oil is fed to the spinner head by means of a pipe 46. Pipe 46 may conveniently extend upward through passageway 3 and be inserted through the tube 20 at a point above the spider 31. The outlet end of the pipe may be flattened to form a nozzle 47, and the nozzle terminates within the intake throat of the spinner head.

In operation, the head is rotated by means of shaft 29, and fuel is introduced into the rapidly rotating head. In the head, it is picked up and forced outward through the tortuous path between the spacers 43 and the nested annular ribs on the shroud plate and intake ring. In passing through the head, the size of the individual particles or droplets of oil is reduced materially. The overhanging lip 45 on the shroud plate directs the flow of these finely divided droplets into the streams of air from the secondary and tertiary air supplies. The flow of these streams is induced by the difference in temperature in the wind box and that at the mouth where the combustion of the gaseous mixture of fuel oil and air takes place. The size of the particles or droplets of fuel on leaving the head is such that while they have sufficient momentum to penetrate the stream of secondary air completely, their direction of flow will be materially affected thereby, the gases in their passage through the secondary air acquiring a torus motion. This resulting motion, or turbulence, is accentuated by the flow of air from the outer passageway 4. The flow of air from passageways 3 and 4 is so directed that the fuel enters each of these streams approximately at right angles thereto. The flame resulting from the above described action will be short and nearly spherical in shape.

The burner described will operate quite efficiently when adjusted to burn a large amount of fuel and will operate with the same efficiency when turned down to burn a small amount. The temperature in the combustion area will induce the proper flow of air through the wind box for the amount of fuel being burned. The correct proportional ratio of air flowing through the various passageways is controlled by the valves in the individual passageways. The ef-

ficiency is further enhanced by the serpentine passage of the fuel through the head which produces the optimum time lag between the time the fuel flows into the head and the time that it is actually burned. Waste materials or impurities in the fuel consumed will not hamper materially the efficient operation of the burner. These impurities, being normally heavier than the fuel itself, are by reason of their greater momentum thrown outward beyond the sphere in which combustion takes place, thus removing them automatically from the fuel. The design of the burner is such that these impurities will be thrown entirely clear of the burner structure.

While in the above there has been described one practical embodiment of the invention, it will be obvious that the invention may take other forms without departing from the inventive concept as defined by the appended claims.

What I claim is:

1. In hydro-carbon burners, a spinner head comprising axially spaced plates having their diametrically juxtaposed faces shaped to form between them a tortuous path from the center of the plates to the periphery thereof, means between the plates spaced peripherally thereof to divide the tortuous path into a plurality of tortuous channels, a shaft supporting said spinner head, means to supply fuel to the space between the plates, a plurality of cylindrical casings concentric to each other and to said shaft and forming between them passageways for primary, secondary, and tertiary air supplies, the primary air passageway communicating with the space between the plates, the secondary air passageway shaped to discharge a cylinder of air around the perimeter of the spinner head, and the tertiary air passageway shaped to discharge a converging cone of air outside the secondary cylinder of air, and means to control the amount of air permitted to flow through the respective passageways.

2. A spinner head for hydro-carbon burners,

comprising a shroud plate having a diametrical face and a depending hub, an intake ring having a diametrical face with a central opening larger than said hub and adapted to form with said hub an intake throat when said shroud plate and intake ring are juxtaposed, the juxtaposed diametrical faces of the plate and ring being each provided with a plurality of concentric ribs, the ribs on the respective plate and ring being of such diameters that the ribs of one fit closely between the ribs of the other, the diametrical faces of said plate and ring having peripherally spaced matching grooves, spacers fitting in the grooves, and means to hold the ring to the plate, said grooves and spacers extending substantially tangentially of the opening in said ring, and said spacers spacing the diametrical faces of the plate and ring and their interfitting ribs to define a very narrow tortuous path for producing the optimum time lag of oil passage therethrough and materially reducing the size of the oil droplets.

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