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COMBINATION BURNER
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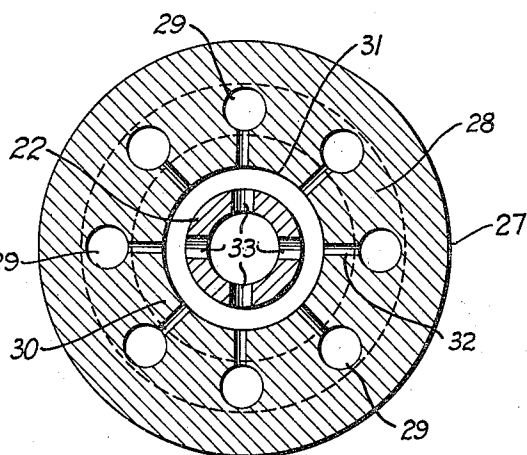
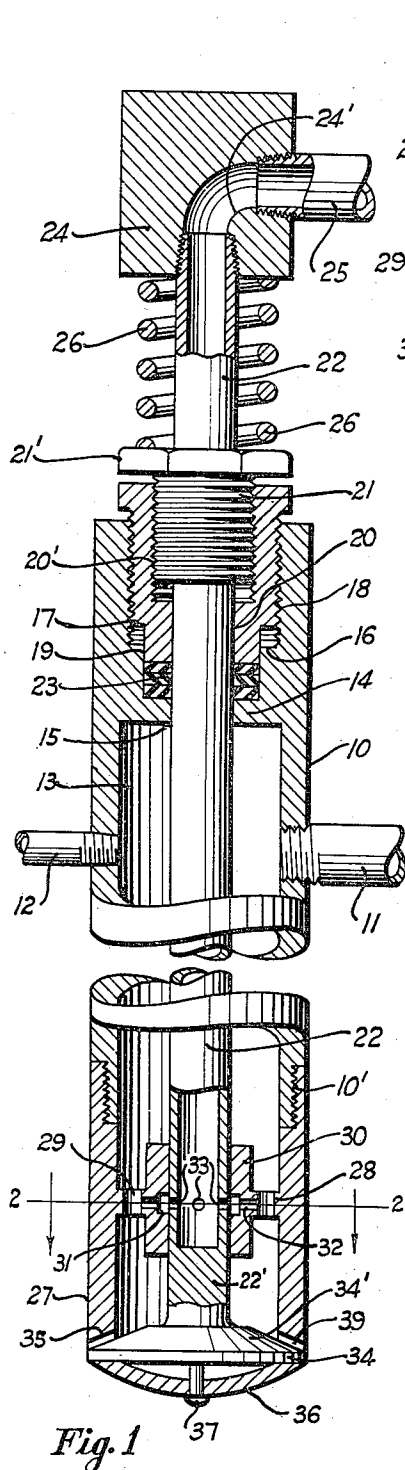


Fig. 2

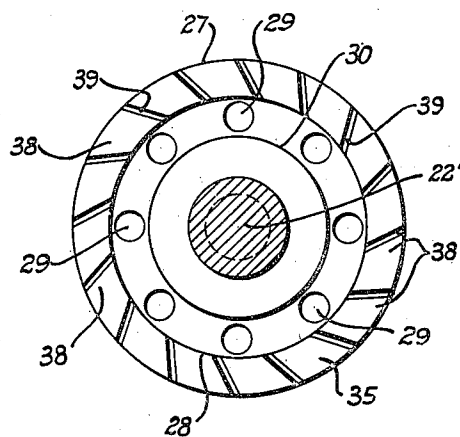


Fig. 3

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COMBINATION BURNER

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5 Claims. (Cl. 299—59)

This invention relates to new and useful improvements in combination burners.

One object of the invention is to provide an improved burner adapted to use one or two fuels or either of said fuels without disconnecting or attaching parts.

Another object of the invention is to provide an improved combination burner having an improved tip arranged to burn fluid fuels of different characteristics, such as oil and gas, from the same discharge orifices.

A particular object of the invention is to provide an improved burner tip for a burner, the tip consisting of a sleeve having its forward end bevelled and provided with ribs, whereby discharge orifices are formed by a bevelled head engaging the ribs of the bevelled end of the sleeve.

An important object of the invention is to provide a combination burner having a tip connected with the conductors of the burner and provided with discharge orifices formed by a head engaging the ribbed end of one of said conductors, the head being yieldingly held in position by resilient means and being rotatable under tension thereof, whereby the orifices and head may be readily cleaned without affecting the flame or the operation of the furnace.

A further object of the invention is to provide a combination burner of the character described having means for varying the tension of the resilient means, whereby expansion and contraction may be compensated.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing, in which an example of the invention is shown, and wherein:

Figure 1 is a longitudinal view, partly in plan and partly in section, of a burner constructed in accordance with the invention,

Figure 2 is a transverse, cross-sectional view, taken on the line 2—2 of Figure 1, and

Figure 3 is an end elevation of the burner, the head being omitted and its stem being illustrated in section.

In the drawing, the numeral 10 designates an elongate cylindrical barrel or casing having a steam pipe 11 and a gas pipe 12 communicating with its bore 13 intermediate its ends. The barrel 10 is arranged to extend through the air box and wall of a furnace (not shown) with the pipes 11 and 12 positioned exteriorly of said fur-

nace. A partition 14, having an axial opening 15, extends transversely across the bore 13 near the outer or rear end of the barrel 10 and is, preferably, made integral therewith. An annular flange 16 is formed within the barrel adjacent the partition 14. The outer or rear end of the barrel is internally screw-threaded at 17 to receive an externally screw-threaded flanged packing gland 18. An annular boss 19 projects axially from the inner end of the gland 18 and has a snug sliding fit in the flange 16 when said gland is screw-threaded into the barrel. An axial bore 20, having the same diameter as the opening 15 of the partition 14, is formed within the gland 18 and its boss 19. The outer end of the bore 20 is enlarged and is provided with internal screw threads 20' so as to be engaged by a screw-threaded annular nut or follower 21 having a hexagonal flange 21' formed on its outer end.

A cylindrical tube 22 is concentrically disposed within the bore 13 of the barrel and projects from both ends thereof, as is clearly shown in Figure 1. The tube 22 extends through the opening 15 of the partition 14, outwardly through the bore 20 of the gland 18 and its boss 19, through the annular follower 21 and beyond the flange 21'. It is pointed out that the tube has a snug sliding fit within the opening 15, the bore 20 and the bore of the follower 21. A plurality of packing rings 23, or other suitable packing means, are confined within the flange 16 between the partition 14 and boss 19 of the packing gland, whereby the rings may be distorted into engagement with the flange 16 and tube 22, so as to pack off therebetween. A connecting block 24 is screw threaded upon the outer end of the tube 22 and has an angular passage 24' for connection with a flexible tubing 25, whereby oil under pressure may be supplied to said tube from a suitable source (not shown). A helical or coiled spring 26 is confined upon the tube between the block 24 and the flange 21' of the follower 21, whereby said spring is under compression and is constantly exerting its force to displace said block from said flange, as will be hereinafter explained.

The forward or inner end of the barrel 10 is provided with a reduced externally screw-threaded flange 10', whereby a cylindrical sleeve 27 may be secured to said barrel. The diameter of the sleeve 27 may be substantially the same as the diameter of the barrel, whereby said sleeve forms a flush continuation of said barrel. An annular spider or web 28, having a plurality of

equally spaced ports 29, extends transversely across the bore of the sleeve near its mid-portion and is, preferably, made integral with said sleeve. The spider carries a cylindrical collar 30 arranged to receive the forward portion of the tube 22 which has a snug sliding fit therein. An annular groove or recess 31 is formed in the inner surface of the collar 30 and communicates with the ports 29 by means of a plurality of spaced radial ducts 32, as is clearly shown in Figure 2. The groove and the tube co-act to form an annular chamber. A plurality of apertures 33 are provided in the wall of the tube so as to discharge into the annular groove 31. Thus, communication is established between the interior of the tube and the interior of the sleeve 27, whereby oil under pressure within said tube may flow through the radial ducts 32 and finally into the ports 29, where said oil will be picked up by the steam flowing through the barrel 10 and said ports, as will be hereinafter explained.

The forward end of the tube 22 is plugged or made solid to form a stem 22', whereby oil within said tube is caused to pass through the apertures 33. A flat head 34, having substantially the same external diameter as the sleeve 27, is secured to the stem 22' and has its rear side 34' bevelled to co-act with a complementary bevelled face 35 formed on the end of said sleeve. The bevelled face 35 is formed with a plurality of spaced ribs 38, disposed more or less tangentially to the collar 30 as shown in Figure 3, so that when the head 34 is pulled toward the face 35 by the spring 26 the bevelled surface 34' will engage said ribs, thus forming burner outlets or orifices 39 which direct the flow of the fluid fuels more or less tangentially. Such a fluid fuel discharge sets up a whirling motion which promotes mixing and enhances combustion. It will be noted that the orifices 39 are restricted and control the discharge of the fluid fuels so as to promote atomization.

A concavo-convex plate 36 of the same diameter as the head 34 is secured on the outer flat side thereof by an axial pin 37, or other suitable means, whereby a dead air pocket is formed therebetween. This construction acts to protect the head from the extreme heat of the flame and minimizes warping and distortion of said head. It is pointed out that the orifices 39 communicate with the interior of the sleeve 27, and therefore, the steam-motivated oil is discharged therefrom under pressure. It is also noted that the forward portion of the sleeve 27 and the head 34 form a tip for the burner, whereby a distinctive type of tip is provided.

While it is possible to use both gas and oil at the same time, more satisfactory results will be had where one or the other is used individually. Where oil is used steam is an advantageous adjunct, but with gas steam will not be necessary. Suitable valves (not shown) are provided on the steam pipe 11, gas pipe 12 and oil tubing 25, whereby a ready selection of fuels is permitted. Should it be desired to employ gas alone the steam and oil valves (not shown) may be closed and the gas valve (not shown) opened. Gas flowing through the bore 13 of the barrel 10 under pressure will pass through the sleeve 27 and ports 29 formed in the plate 28, and may be discharged through the orifices 39 so as to be admixed with air.

By closing the gas valve and opening the steam and oil valves (none of which are shown) oil will flow through the tube 22 while steam will

flow through the bore 13 of the barrel 10. The oil will strike the solid end of the tube and will be diverted through the apertures 33, chamber 31, radial ducts 32 and into the ports 29. Since the oil is under pressure, it will be ejected from the ducts 32 in fine streams or jets and will come in contact with the steam passing through the ports 29, whereby said oil is picked up by the steam and carried into the forward end of the sleeve 27. Here, the oil will be atomized by the steam and thoroughly admixed with the steam and air, so as to form a gaseous mixture which will be discharged from the burner as hereinbefore described.

The helical spring 26, being confined between the flange 21' of the follower 21 and the block 24, holds the head 34 seated against the ribs 38 formed on the bevelled face 35. Manifestly, the compression of the spring may be varied by adjustment of the follower 21, whereby the head may be held against the ribs of the face and expansion and contraction compensated.

The tube 22 may be partially rotated because the tubing 25 is flexible and, thus, the bevelled surface 34' of the head may be readily cleaned by rotating said tube. This rotation tends to loosen any carbon deposited on the inner surface of the head and upon the ribs 38 and to scrape the same therefrom. By striking the block 24 a moderate blow, the head 34 is forced away from the face 35 and its ribs which permits the gas pressure or combined steam and oil pressures to blow the loosened carbon from the orifices 39 and said head. It is pointed out that the only portion of the burner which requires cleaning is in this manner cleaned within a few minutes and as frequently as is necessary or desired.

Various changes, alterations and modifications may be made in the size, shape and arrangement of the herein described elements, within the scope of the appended claims.

What I claim and desire to secure by Letters Patent is:

1. A combination burner including, a pair of fluid conductors one within the other, a burner tip connected with the conductors, one of said conductors having one end exposed and provided with openings, said openings being disposed substantially tangentially with respect to the inner conductor whereby the effluent fuel mixture is given a whirling motion, a head engaging the exposed end of said last named conductor and co-acting with said openings to form orifices, and resilient means yieldingly holding said head in engagement with the end of said conductor, said head being rotatable while under tension of said resilient means for cleaning the orifices.

2. A combination burner including, a pair of fluid conductors, one of said conductors communicating with the other of said conductors so as to admix the fluids of both conductors, a burner tip connected with the conductors, one of said conductors having one end exposed and provided with openings, said openings being disposed substantially tangentially with respect to the inner conductor whereby the effluent fuel mixture is given a whirling motion, a head engaging the exposed end of said last named conductor and co-acting with said openings to form orifices, and resilient means yieldingly holding said head in engagement with the end of said conductor.

3. A combination burner including, a pair of fluid conductors one within the other, said inner conductor communicating with the outer conduc-

tor through a plurality of ports, a burner tip connected with the conductors, one of said conductors having one end exposed and provided with openings, said openings being disposed substantially tangentially with respect to the inner conductor whereby the effluent fuel mixture is given a whirling motion, a head engaging the exposed end of said last named conductor and co-acting with said openings to form orifices, and resilient means yieldingly holding said head in engagement with the end of said conductor.

4. A combination burner including, a pair of fluid conductors one within the other, a burner tip connected with the conductors, one of said conductors having one end exposed and provided with grooves, said grooves being disposed substantially tangentially with respect to the inner conductor whereby the effluent fuel mixture is given a whirling motion, a head engaging the exposed end of said last-named conductor and coacting with said grooves to form orifices, said

inner conductor communicating with the outer conductor at a point above and in back of said head, resilient means yieldingly holding said head in engagement with the end of said conductor, and means for varying the tension of said resilient means.

5. A combination burner including, a pair of concentric fuel conductors, a burner tip connected with the conductors, one of said conductors having its end exposed and provided with grooves, a head secured to the inner conductor and engaging the end of the outer conductor and coacting with said grooves to form orifices, said grooves being disposed substantially tangentially with respect to the inner conductor whereby the effluent fuel mixture is given a whirling motion, and means for rotating said head while it is held in engagement with the end of said conductor so as to clean said orifices.

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