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BURNER

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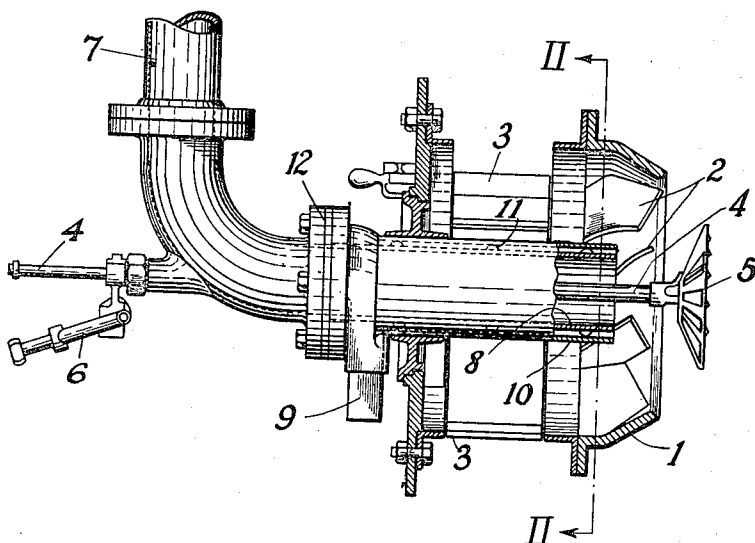
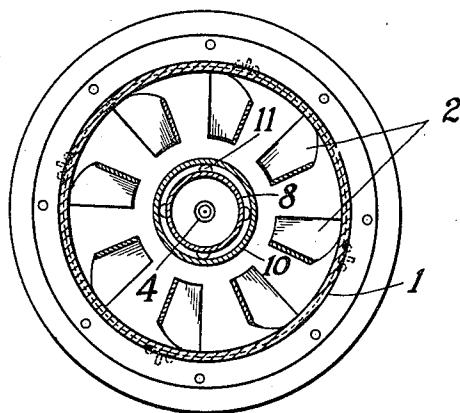


Fig 2



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BURNER

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Continuation of application Serial No. 310,450,
October 5, 1928. This application May 10, 1932,
Serial No. 610,383

12 Claims. (Cl. 110—22)

My invention relates to a burner which is suitable for burning one or more different kinds of fuel, and is a continuation of my copending application Serial No. 310,450, filed October 5, 1928.

One object of the invention is the provision of a burner which may be operated to burn oil or pulverized fuel or gas separately, or to burn two or all of these fuels simultaneously. A further object is the provision of such a burner in which the supply of one kind of fuel may be shut off at any time without interfering with the burning of the others. Another object is the provision of such a burner wherein a high degree of mixing of any fuel employed or all three fuels with air, or of all three fuels with air and with each other is realized. Still another object is the construction of such a burner in a form wherein a high degree of mixing is realized for the gas and pulverized fuels, and at the same time make possible the delivery of oil at a point where it will not form a film over any of the furnace parts. Other objects will be apparent upon consideration of the present specification.

The invention is shown by way of illustration in the accompanying drawing in which—

Figure 1 is a longitudinal section through an illustrative embodiment of the invention, and

Fig. 2 is a section on the line 2—2 of Figure 1.

In the drawing there is shown a combination fuel burner comprising a discharge ring member 1 which is constructed in the form of a truncated cone and adapted to be mounted in a burner opening in a furnace wall and constituting the discharge outlet of the burner. Inwardly extending vanes 2 are provided on the inside surface of the ring 1, these vanes being set at an angle to the axis of the ring in a manner to produce a whirling motion to any gaseous or finely comminuted material passing through the ring.

An air register 3 of cylindrical shape surrounds the space in front of the ring 1, and is provided with spaced longitudinal openings around its periphery. The air inlet 3 is provided in well known manner with dampers in the openings around its periphery in order to regulate the admission of air to the burner. Air passing through the air register and entering the burner is given a vigorous swirling motion by the vanes 2.

A pulverized fuel delivery pipe 7 leads from a source of supply of the fuel to a pulverized fuel pipe 8 which terminates within the ring 1. It will be noted that the ring extends beyond the end of the fuel pipe 8, and further that the vanes

2 in the ring project beyond the end of the pulverized fuel pipe 8.

A feed pipe 9 for gas leads from a source of gas supply to a gas pipe 10 which surrounds the fuel pipe 8 and is spaced therefrom sufficiently to leave an annular opening between the two pipes. Spacers 11 are provided between the pulverized fuel pipe 8 and the gas pipe 10. A flange 12 on the gas pipe 10 may be bolted to a corresponding flange on the pulverized fuel delivery pipe 7 to keep the gas pipe 10 in place.

An oil pipe 4 extends through the center of the pulverized fuel pipe 8 and projects inwardly of the furnace beyond the ring 1. This oil pipe may be adjusted longitudinally so that it will project any desired distance into the furnace in the burner opening. The oil pipe 4 is provided at its end with an atomizing or spraying tip of any desired or known design. A conically shaped deflector 5 is attached to the pipe 4 near the nozzle at the end of the pipe. This deflector 5 is of a well known type and is provided with slots and inclined blades or vanes, as will be apparent from inspection of Figure 1. An oil feed pipe 6 leads from a supply of oil to the oil pipe 4.

When operating the burner, oil may be introduced through the oil pipe 4, pulverized fuel and primary air through the pulverized fuel pipe 8, and gas through the gas feed pipe 9, while secondary air is admitted through the air register 3. The pipes 8 and 10 terminate in a plane which intersects the vanes 2 on the inside of the ring 1. As a result the air entering between these vanes and being whirled around while being passed through a restricted opening, becomes thoroughly mixed with the fuel projected by the pipes 8 and 10. The whirling mixture of fuel and secondary air strikes the deflector 5 which produces further turbulence, thorough mixture of the fuel and air, and as a result a short flame. Where oil is burned it is projected into the furnace beyond the vanes 2 and the deflector 5, and therefore, can deposit no film on any of the burner parts. The secondary air, however, is given a whirling motion, as previously described, and mixes with the oil spray quite readily.

If either one or any two of the fuels is shut off, the burner continues to operate with the remaining fuel or fuels, and when the fuel which has been shut off, is again projected into the furnace it will, of course, ignite and burn with the other burning fuel.

The particular description here given and the form of burner illustrated in the drawing are presented merely as an example of how the in-

vention may be applied. Other forms coming within the scope of the appended claims will readily suggest themselves to those skilled in the burner art.

5 I claim:

1. A burner for pulverized solid fuel, oil and gas comprising a ring forming the burner discharge outlet, a gas tube inside of and substantially co-axial with said ring, a pulverized fuel
10 pipe inside of and substantially co-axial with said gas tube, and an oil feed pipe inside of and substantially co-axial with said pulverized fuel pipe, in combination with vanes on the inside of said ring extending beyond the ends of said pulverized fuel pipe and said gas tube, but behind
15 the end of said oil feed pipe.

2. A burner for pulverized solid fuel, oil and gas comprising a ring forming the burner discharge outlet, a gas tube inside of and substantially co-axial with said ring, a pulverized fuel pipe inside
20 of and substantially co-axial with said gas tube, and an oil feed pipe inside of and substantially co-axial with said pulverized fuel pipe, in combination with vanes on the inside of said ring extending beyond the ends of said pulverized fuel pipe and said gas tube, but behind the end of
25 said oil feed pipe, and a deflector on said oil feed pipe beyond said ring but behind the end of said oil feed pipe.

3. A multi-fuel circular burner comprising casing means forming an air chamber having a discharge opening at one end, a pulverized fuel conduit having a discharge portion substantially
30 symmetrically arranged in said air chamber, a fuel oil conduit having its discharge end adjustable to a normal operating position forwardly of and co-axial with the discharge end of said pulverized fuel conduit, an impeller having a circular series of deflecting blades with fuel and air
35 passages therebetween positioned forwardly of the discharge end of said pulverized fuel conduit in the path of the discharge therefrom and adjacent to the discharge end of and out of the path of the discharge from said oil conduit, and
40 a gaseous fuel conduit positioned in said air chamber at the rear of the normal operating position of the discharge end of said oil conduit and arranged co-axially of the discharge ends of said pulverized fuel and oil conduits and discharging adjacent the discharge end of said pulverized fuel
45 conduit.

4. A multi-fuel circular burner comprising casing means forming an air chamber having a discharge opening at one end, a pulverized fuel
50 conduit having a discharge portion arranged substantially symmetrically with and terminating short of the discharge end of said air chamber, a fuel oil conduit positioned within and arranged co-axially of said pulverized fuel conduit and
55 having its discharge end adjustable to a normal operating position forwardly of the discharge end of said pulverized fuel conduit, a spray nozzle mounted on the discharge end of said oil conduit, an impeller having a circular series of deflecting blades with fuel and air passages therebetween positioned forwardly of the discharge
60 end of said pulverized fuel conduit in the path of the discharge therefrom and adjacent to and out of the path of the discharge from said spray nozzle, and a gaseous fuel conduit positioned in said air chamber and arranged co-axially of the
65 discharge ends of said pulverized fuel and oil conduits and discharging adjacent the discharge end of said pulverized fuel conduit and rearwardly of the forward position of said spray nozzle.
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5. A multi-fuel circular burner comprising casing means forming an air chamber having a constricted discharge opening at one end, a pulverized fuel conduit in said casing and having
5 a straight discharge portion of substantially uniform cross-section and terminating short of the discharge end of said air chamber, a fuel oil conduit positioned within and arranged co-axially of said pulverized fuel conduit and having its discharge end adjustable to a normal operating
10 position forwardly of the discharge end of said pulverized fuel conduit, a spray nozzle mounted on the discharge end of said oil conduit, an impeller having a circular series of deflecting blades with fuel and air passages therebetween surrounding said oil conduit forwardly of the discharge
15 end of said pulverized fuel conduit in the path of the discharge therefrom and adjacent to and out of the path of the discharge from said spray nozzle, and a second fuel conduit positioned in said air chamber and arranged co-axially of the discharge ends of said pulverized fuel and oil conduits and discharging adjacent the discharge end of said pulverized fuel conduit and rearwardly of the forward position of said
20 spray nozzle and impeller.

6. A multi-fuel circular burner comprising casing means forming a circular air chamber having a constricted discharge opening at one end, a
25 pulverized fuel conduit mounted on said casing and having a straight discharge portion of substantially uniform cross-section arranged substantially co-axially of and terminating short of the discharge end of said air chamber, a fuel oil conduit positioned within and arranged co-axially
30 of said pulverized fuel conduit and having its discharge end adjustable to a normal operating position forwardly of the discharge end of said pulverized fuel conduit, a spray nozzle mounted on the discharge end of said oil conduit, an impeller having a circular series of deflecting blades with fuel and air passages therebetween surrounding said oil conduit forwardly of the discharge
35 end of said pulverized fuel conduit in the path of the discharge therefrom and adjacent to and out of the path of the discharge from said spray nozzle, and a gaseous fuel conduit mounted in said casing and arranged to surround and extend co-axially of said pulverized fuel and oil
40 conduits and to discharge adjacent the discharge end of said pulverized fuel conduit and rearwardly of the forward position of said spray nozzle and impeller.

7. A multi-fuel burner comprising casing means forming an air chamber having a discharge opening at one end, a fuel conduit in said casing
45 having a discharge portion terminating short of the discharge end of said air chamber, a fuel oil conduit positioned within said fuel conduit and having its discharge end adjustable to a normal operating position forwardly of the discharge end of said fuel conduit, a spray nozzle mounted on the discharge end of said oil conduit, an impeller having a circular series of deflecting blades with passages therebetween surrounding said oil
50 conduit forwardly of the discharge end of said fuel conduit and in the path of the discharge therefrom and rearwardly adjacent to and out of the path of the discharge from said spray nozzle, and a second fuel conduit having a discharge portion in said casing surrounding said
55 first fuel conduit to form therebetween a fuel passage terminating adjacent to the discharge end of said first fuel conduit and rearwardly of
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the normal operating position of said spray nozzle and impeller.

8. A multi-fuel circular burner comprising casing means forming a circular air chamber having a constricted discharge opening at one end, a pulverized fuel conduit having a straight discharge portion of substantially uniform cross-section extending through the opposite end wall of said air chamber and arranged substantially coaxially of and terminating short of the discharge end of said air chamber, an impeller having a circular series of deflecting blades with fuel and air passages therebetween positioned forwardly of the discharge end of said pulverized fuel conduit and in the path of the discharge therefrom, and a second fuel conduit extending through said opposite end wall and having a straight discharge portion surrounding and extending coaxially of said pulverized fuel conduit to form therebetween a fuel passage terminating adjacent to the discharge end of said pulverized fuel conduit and rearwardly of said impeller.

9. A fuel burner comprising casing means forming a circular air chamber having a discharge opening at one end, a pulverized fuel conduit having a straight discharge section arranged substantially coaxially of and terminating short of the discharge end of said air chamber, an impeller having a circular series of deflecting blades with passages therebetween positioned forwardly of the discharge end of said pulverized fuel conduit and in the path of the discharge therefrom, and a second fuel conduit having a substantially circular inlet chamber externally of said casing means and a straight discharge section surrounding and extending coaxially of said pulverized fuel conduit discharge section to form therebetween a second fuel passage terminating adjacent to and rearwardly of said impeller.

10. A fuel burner comprising a casing having a discharge opening at its forward end, means for supplying combustion air to said casing, a fuel conduit having a substantially circular inlet chamber externally of said casing and a straight discharge portion extending from said inlet chamber through the outer end wall of said casing to a point adjacent the discharge opening in said casing, a second fuel conduit having an external elbow inlet section and a straight discharge portion extending from said inlet section

through said circular inlet chamber and into the discharge portion of said first fuel conduit in spaced relation to the walls thereof, and an impeller having a circular series of deflecting blades with passages therebetween normally positioned forwardly of the discharge ends of said first and second fuel conduits and in the path of the fuel discharge from both of said conduits.

11. A fuel burner comprising a substantially circular casing having a circular discharge opening at its forward end, means for supplying combustion air to said casing, a fuel conduit having a substantially circular inlet chamber externally of said casing and a straight discharge portion extending from said inlet chamber through the outer end wall and coaxially of said casing to a point adjacent the discharge opening in said casing, a second fuel conduit having an external elbow inlet section and a straight discharge portion extending from said inlet section through said circular inlet chamber and into and extending coaxially of the discharge portion of said first fuel conduit in spaced relation to the walls thereof, and an impeller having a circular series of deflecting blades with passages therebetween normally positioned forwardly of and symmetrical with the discharge ends of said first and second fuel conduits and in the path of the fuel discharge from both of said conduits.

12. A fuel burner comprising a casing having a discharge opening at its forward end, means for supplying combustion air to said casing, a fuel conduit having a substantially circular inlet chamber externally of said casing and a straight discharge portion extending from said inlet chamber through the outer end wall of said casing to a point adjacent the discharge opening in said casing, a second fuel conduit having an external elbow inlet section and a straight discharge portion extending from said inlet section through said circular inlet chamber and into the discharge portion of said first fuel conduit in spaced relation to the walls thereof, an impeller having a circular series of deflecting blades with passages therebetween normally positioned forwardly of the discharge ends of said first and second fuel conduits and in the path of the fuel discharge from both of said conduits, and a series of air deflector vanes in said casing surrounding the end of said first fuel conduit.

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