Sept. 10, 1940. H. McCLAMMY, JR 2,214,027

BURNER

Filed June 7, 1938

Fig. 1

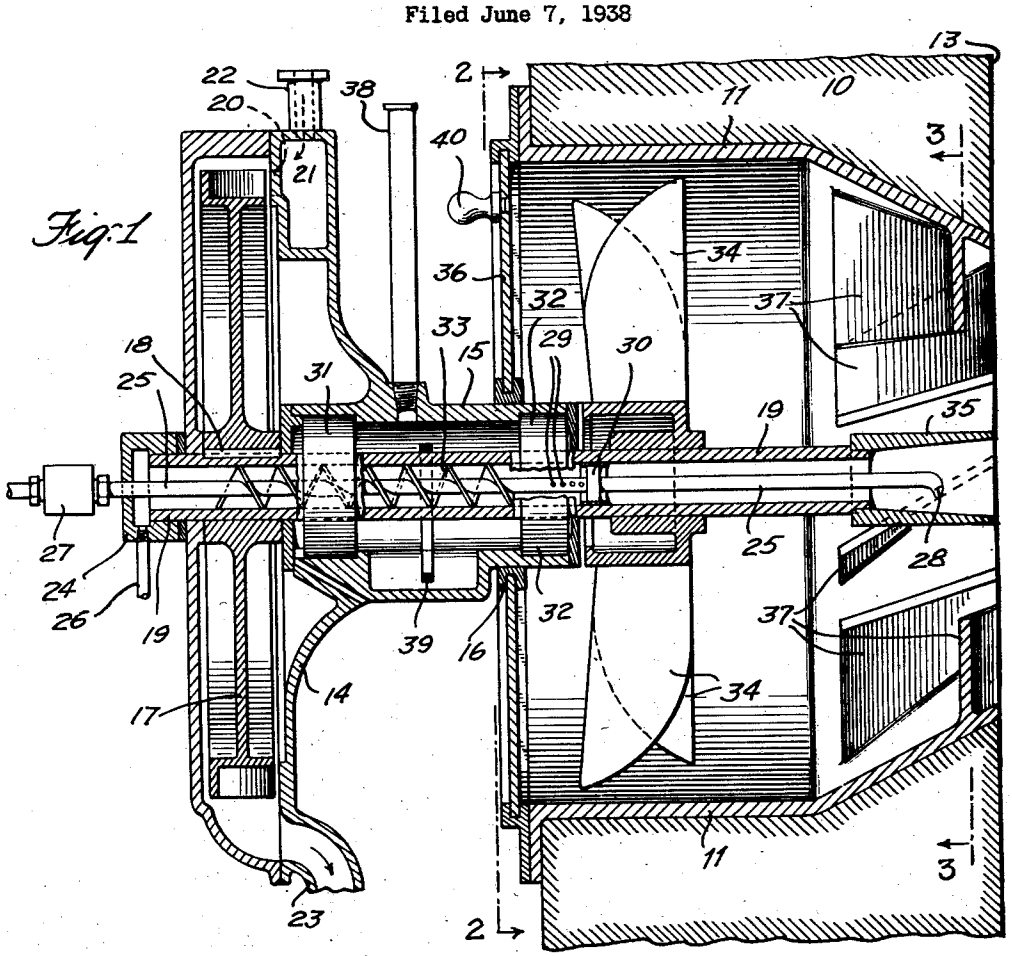
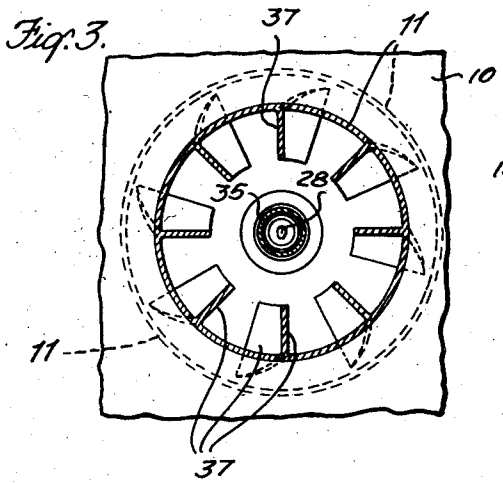


Fig. 3.



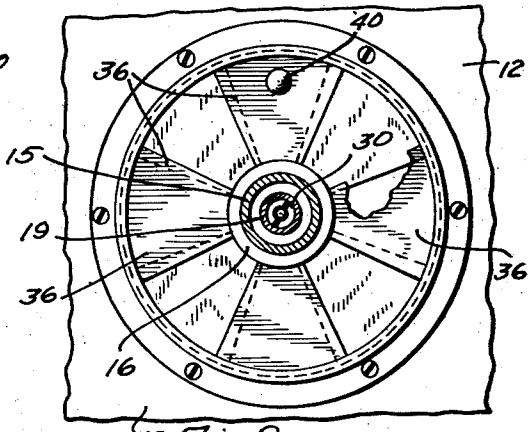


Fig. 2.

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BURNER

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Application June 7, 1938, Serial No. 212,221

5 Claims. (Cl. 158—77)

This invention relates to burners, and more particularly pertains to liquid fuel burners of the rotary type which are applicable to steam power plants and the like.

The invention provides a compact and self-contained steam driven fuel pump, fuel burner and fan which possesses great flexibility of control and high operating efficiency.

The invention will be understood from the following description considered in connection with the accompanying drawing forming a part thereof, and in which:

Fig. 1 is a longitudinal sectional view of a preferred form of apparatus embodying my invention;

Fig. 2 is a transverse sectional view, on a reduced scale, taken on line 2—2 of Fig. 1; and

Fig. 3 is a transverse sectional view, on a reduced scale, taken on line 3—3 of Fig. 1.

Like reference characters refer to the same parts in the several views.

Referring to the drawing, reference character 10 designates a refractory furnace wall in which is imbedded a cylindrical air casing or member 11 having a cone-shaped inner end portion and which extends through the furnace wall from its outer side 12 to the furnace side 13, and comprises the throat and mouth portion of the burner and fan. Adjacent the outer side of the furnace wall is a housing 14 having an axially disposed, cylindrical neck portion 15, the outer end of which is received in a circular opening in the damper device hereinafter described, which is located at the outer end of the member 11. The housing 14 is suitably supported in position on the wall by adequate supporting means, not shown. Within the housing 14 is a turbine rotor 17, which is fixed by a key 18 to a hollow turbine shaft 19, and is supplied with steam through an orifice 20 which connects with a channel 21, which receives a supply of steam from a steam inlet connection 22. Exhaust steam leaves the housing through exhaust connection 23. The hollow turbine shaft is supported for rotation within the housing by the roller bearings 31 and 32. A packing gland 24 which closes and seals the outer end of the hollow turbine shaft, receives a supply of liquid fuel through a pipe 26 which connects with the chamber inside the gland. A stationary feed tube 25 extends throughout the length of the turbine shaft and through the gland 24 by which it is supported at its outer end portion. An overflow relief valve 27 is carried by the outer end of the feed tube 25 and the inner, or furnace end of the tube is provided with a liquid fuel nozzle 28. In the wall of the feed tube, and approximately mid-way between the ends thereof, are a plurality of closely spaced orifices 29. Adjacent the orifices is an oil tight gland 30 through which the feed tube passes, and by means of which liquid flow is prevented between the gland and the feed nozzle 28 on the outside of the feed tube. Within the turbine shaft 19, and rigidly secured to the inner wall thereof is a helix 33 which extends radially inwardly into close proximity to the outer surface of the feed tube 25. A fan 34 is fixedly mounted on the turbine shaft for rotation within the air casing, and an atomizing nozzle 35 is fixed to the burner end of the shaft and encloses the feed nozzle 28. A circular slide type damper 36 the radially inner portions of which are received in an annular groove of annulus 16, is manually operable by a knob 40 and is disposed at the outer end of the member 11 and functions to control the admission of air to the burner fan 34. A series of spiral vanes 37 are fixed within the cone-shaped inner end portion of the member 11 about the atomizing nozzle 35. These vanes 37 may be made adjustable if desired. Lubrication for the roller bearings 31 and 32 is provided by means of the lubricating cup 38 and splash ring 39.

In operation, steam is supplied to the turbine rotor 17 which drives the fan 34 fixed to the turbine shaft 19 and also drives the helix 33. Normally the operation will be such that the turbine shaft and the fan will be rotated at a speed of approximately 3600 R. P. M. to 3900 R. P. M. although other speeds may be satisfactory under certain operating conditions. Under usual conditions, the steam will exert approximately a constant pressure on the turbine rotor so that the exact speed of the turbine shaft at any given time will be determined by the position of the damper 36 since the air load on the fan will vary with the extent to which the damper is opened. More specifically, when the damper is fully open, the maximum air load will be imposed on the fan and the turbine shaft will rotate at minimum speed, whereas when the damper is fully closed, the load on the fan will be at the minimum, and the speed of the fan will be correspondingly increased. Flow of oil or other liquid fuel through the pipe 26 is induced by the rotation of the helix 33 as it rapidly revolves with the turbine shaft about the stationary feed tube. It will be understood that the helix, upon rapid rotation, will act as a pump and will produce a suction on the feed pipe 26 and will also produce

sufficient pressure to force the incoming feed against the oil tight gland **30**, through the orifices **29** to the interior of the feed tube, and thence to burner nozzle **28**. The desired pressure and rate of feed of the fuel at the nozzle **28** is controlled and maintained substantially constant by the relief valve **27** which is normally adjusted to permit an overflow of the fuel when for any reason the pressure at the nozzle becomes excessive, or exceeds a predetermined value.

With this arrangement, the supply of liquid fuel to the burner may be controlled independently of the quantity of air supplied thereto. Flexibility of control of the burner is thus obtained. The fuel pump and fan are integral parts of the burner structure, providing compactness, and all the essential parts requisite for the operation of the burner are contained in a single unit.

Various changes may be made in the form of the invention herein disclosed, and in the form, location, and relative arrangement of the several parts thereof without departing from the principles of the invention. Accordingly, it will be understood that the invention is not to be limited excepting by the scope of the appended claims.

What is claimed is:

1. In a liquid fuel burner, a rotatable hollow shaft, means for rotating the shaft about its axis, a stationary feed tube having a portion at least disposed within said shaft, a helix within the shaft and fixed thereto and disposed between the walls of the shaft and the tube, means for supplying liquid fuel to the space between the shaft and the tube, the tube having an opening through which fuel is forced by the pumping action of the helix into the feed tube from the space between the shaft and the tube, and a fuel nozzle at one end portion of the tube.

2. In a liquid fuel burner, a rotatable hollow shaft, means for rotating the shaft about its axis, a stationary feed tube having a portion at least disposed within said shaft, a helix within the shaft and fixed thereto and disposed between the walls of the tube and the shaft, means for supplying liquid fuel to the space between the shaft and the tube, the tube having an opening intermediate its ends through which fuel is forced by the pumping action of the helix into the feed tube from the space between the shaft and the tube, a fuel nozzle at one end portion of the tube, and a pressure release valve connected to the other end portion of the tube.

3. In a liquid fuel burner, a rotatable hollow shaft, means for rotating the shaft about its axis, a stationary feed tube having a portion at least disposed within said shaft, a helix within the shaft and fixed thereto and disposed between the walls of the shaft and the tube, means for supplying liquid fuel to the space between the shaft and the tube, the tube having an opening through which fuel is forced by the pumping action of the helix into the feed tube from the space between the shaft and the tube, a fuel nozzle at one end portion of the tube, and a fan driven by the shaft.

4. In a liquid fuel burner, a rotatable hollow shaft, means for rotating the shaft about its axis, a stationary feed tube having a portion at least disposed within said shaft, a helix within the shaft and fixed thereto and disposed between the walls of the shaft and the tube, means for supplying liquid fuel to the space between the shaft and the tube, the tube having an opening through which fuel is forced by the pumping action of the helix into the feed tube from the space between the shaft and the tube, a fuel nozzle at one end portion of the tube, a fan driven by the shaft, and means for controlling the supply of air to the fan.

5. In a liquid fuel burner, a rotatable hollow shaft, means comprising a steam driven device for rotating the shaft about its axis, a stationary feed tube having a portion at least disposed within said shaft, a helix within the shaft and fixed thereto and disposed between the walls of the shaft and the tube, means for supplying liquid fuel to the space between the shaft and the tube, the tube having an opening through which fuel is forced by the pumping action of the helix into the feed tube from the space between the shaft and the tube, and a fuel nozzle at one end portion of the tube.

HERBERT McCLAMMY, JR.