July 6, 1937. G. A. BRYAN 2,086,377

OIL BURNER

Filed Sept. 23, 1931 2 Sheets-Sheet 1

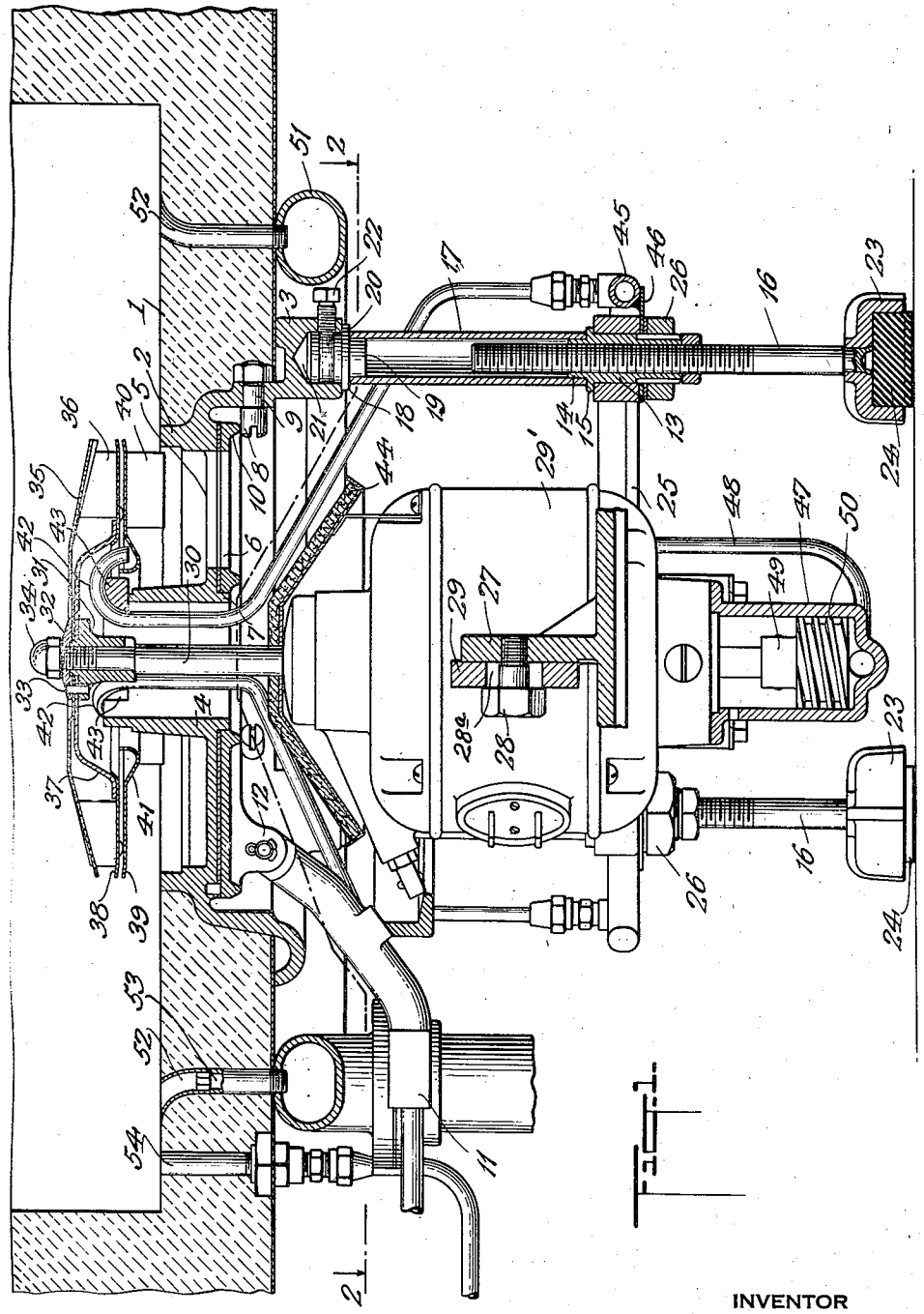


FIG. 1.

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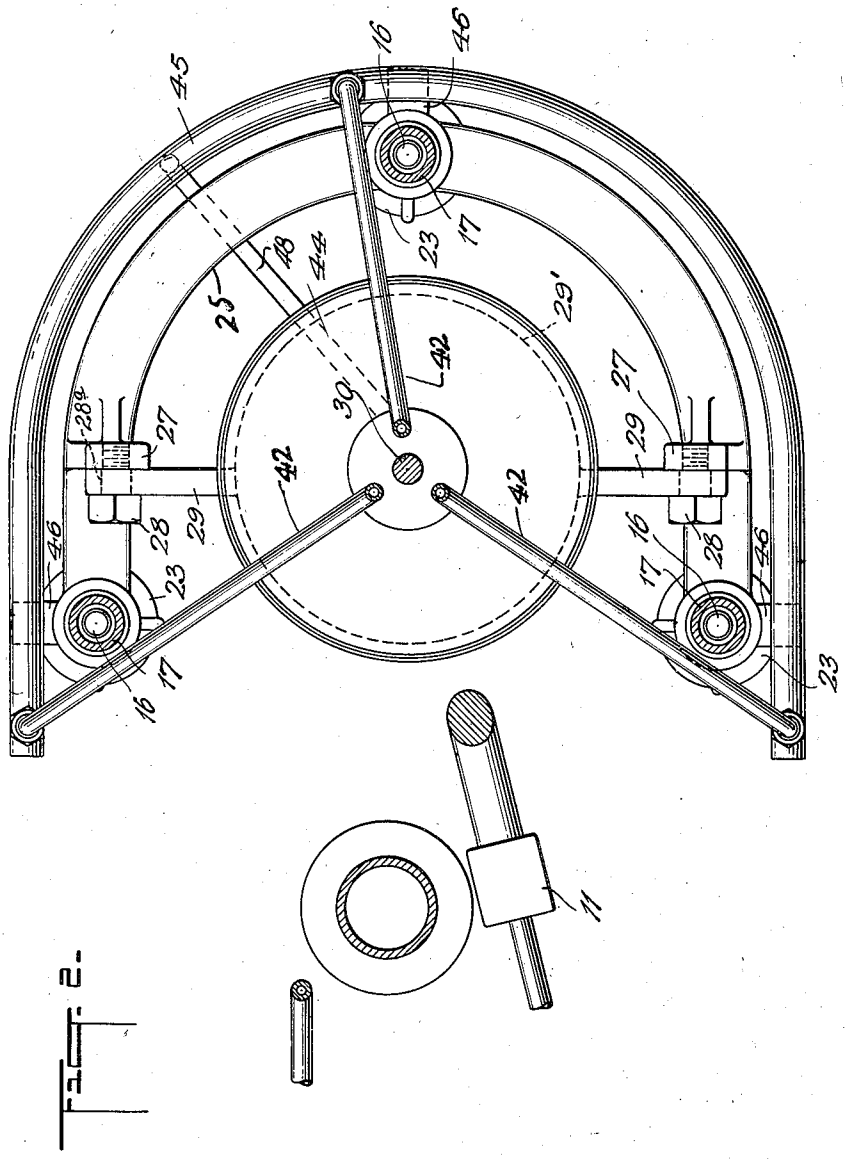


FIG. 2.

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UNITED STATES PATENT OFFICE

2,086,377

OIL BURNER

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Application September 23, 1931, Serial No. 564,486

1 Claim. (Cl. 158—36)

My invention relates to a burner for a heating unit and in particular to a burner of the centrifugal type especially suitable for burning fluid fuels.

In general, the type of burner to which my invention relates includes a distributor mounted upon a vertical shaft. This distributor, which in operation is in the combustion chamber, distributes the fuel about the combustion chamber. Where oil is used as a fuel, it is delivered on a rotating plate which forms a part of the distributor and is discharged from the distributor, together with a current of air in a thin continuous film. Where gas is used as a fuel, the gas is also driven into a jet. The distributor may be driven by any suitable means and commonly an electric motor is used for this purpose, mounted with its shaft vertical. The fuel is delivered to the distributor in the combustion chamber in various ways and where oil is used as a fuel with such burners it is commonly delivered to a rotating plate in the distributor through a plurality of delivery tubes.

By my invention, I am enabled to produce a burner of this type which is more sturdy in construction, and smoother and more economical in operation than those heretofore in use and which is readily and easily convertible from a liquid fuel burner to a gas burner. The burner of my invention includes, in general, a readily and easily removable and replaceable distributor head which includes means for supplying a draft of cool air for cooling the distributor plates; a system for draining the oil from the oil delivery tubes when the burner is shut down to prevent the carbonization of the oil remaining in the delivery tubes; and an improved adjustable support for the burner.

Specifically, the burner comprises a hearth ring which is adapted to extend into an opening in the hearth of a combustion chamber. This hearth ring which includes an annular outer ring and an inner hollow hub joined to the outer ring by a spider is held in position in the hearth by an adjustable support. The support has several adjustable legs connected to the hearth ring and upon which the hearth ring rests. Also supported by these legs, about midway between their ends, there is a U-shaped member to which an electric motor is secured with its shaft, which extends through both ends of the motor casing, vertical, and the upper end thereof extending through the hollow hub of the hearth ring. On the upper end of the motor shaft, the distributor is secured and consists of a hub which fits over the shaft and a set of three plates joined to the hub and supported thereby. The intermediate and lower plates are annular and are secured together in spaced relation to form a nozzle through which oil, delivered on to the lower plate through oil delivery tubes, is forced into the combustion chamber in a fine, continuous film. The upper and lower plates carry, extending from their lower surface, fan blades which cause drafts of air, one under the lower plate to combine with the oil, and another through a spider joining the intermediate plate to the hub and over the intermediate plate to cool the plate.

The oil delivery tubes are connected at their lower end to an oil supply pipe which extends around the U-shaped motor support and the tubes extend up through and around the upper edge of the central hub of the hearth ring, the discharge end of the tubes being directly over the lower annular plate of the distributor which is concaved at its inner edge. To the oil supply pipe, there is also connected a tube leading to the base of an oil sump directly below the motor and into which the lower end of the motor shaft extends. Into this oil sump, when the oil supply is cut off, and the motor stopped, oil remaining in the oil delivery tubes is drained, thus taking the oil out of the heated area and preventing the oil from carbonizing in the tubes. In the sump secured to the motor shaft there is a rotor which when rotated drives the oil out of the sump.

In conjunction with this arrangement a gas supply pipe may be used from which stand-pipes or gas delivery tubes extend into the hearth. The discharge ends of these tubes are flush with the hearth and are bent to discharge radially of the distributor. This construction is conducive to a quiet operation of the burner when gas is used. For burning gas, the oil distributor may be replaced with a distributor without the oil nozzle.

The advantages of the burner of my invention will be more apparent from the following detailed description of the features of the invention as shown in an embodiment thereof that is illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation, partly in section, of a burner constructed in accordance with my invention; and

Fig. 2 is a sectional plan of the same taken on the line 2—2 of Fig. 1.

In the burner shown in the drawings, which is illustrated mounted in the hearth 1 of a combustion chamber, there is a hearth ring 2 which fits in an opening in the center of the hearth

and has formed thereon a flange 3 that extends underneath the hearth and limits the inward movement of the ring, and a central, hollow hub 4, the ring and the hub being joined together by an integral disk 5 having a series of openings therethrough. Below the hearth ring in contact with the disk 5 there is an annular plate 6 in contact with the lower surface of the disk and which is journaled for rotation on an extension 7 of the lower end of the hub 4. This plate, which has a series of openings therethrough corresponding to the openings in the disk and which is adapted to be shifted to cover and uncover the openings through the disk, is supported by the elongated heads 8 of a series of bolts 9 extending through the hearth ring, the plate 6 having a depending circumferential flange 10 at its outer edge which rests upon the bolt heads. For the purpose of shifting this plate about the hub to vary the quantity of air passing through the disk, there is provided a handle 11 which is pivotally secured at one end to a bracket 12 extending from the lower surface of the plate.

The hearth ring is supported by three adjustable legs. Each of these legs includes a central hollow boss 13. This boss has an upper extension 14 which is reduced in diameter and a circumferential limiting flange 15 adjacent its upper end. The interior of the boss is threaded as is also the lower end of the boss. The internal threads of the boss engage threads on a solid rod 16 which extends downwardly from the boss. Over the reduced extension on the upper end of the central boss, there is fitted a sleeve-like section or member 17 which extends upwardly and receives in its upper end a connecting member. This connecting member has a circumferential abutment flange 18 formed intermediate its ends in effect forming two extensions, one on either side of the flange, one extension 19 which fits into the sleeve-like member of the leg, and another extension 20 which fits into a recess 21 formed in the lower surface of the hearth ring. The connecting member is held in the recess in the hearth ring by a set screw 22 which extends through an internally threaded hole through the side of the hearth ring and into the recess. The lower solid member of the leg has a reduced end which extends into a hollow foot member 23 through an opening in the upper side of the foot member. The end of this section which extends into the foot is hollowed and the sides thereof are flared outwardly, thus securing the end of the rod in the foot member. A rubber insert 24 fitted in the foot member rests upon the base of the heating unit. The height of the legs may be adjusted by screwing the solid portion into or out of the boss and may be locked in the adjusted position by a lock-nut.

A substantially U-shaped member 25 having a series of openings therethrough, one for each leg of the support, is fitted on the central bosses of the supporting legs, the bosses extending through the openings in the U-shaped member. The upper edge of the U-shaped member abuts against the limiting flanges on the bosses and is clamped against these flanges by nuts 26 which are threaded onto the lower portion of the bosses. Extending from this U-shaped member there are two opposed brackets 27. These brackets are secured by means of bolts 28 to lugs 29 extending from the opposite sides of the casing of an electric motor 29' which is held by the brackets with its shaft 30, which extends through both ends of the casing, vertical. The bolts 28 pass through slots 28a in the lugs and are threaded into the brackets. The slots in the lugs permit a vertical adjustment of the motor with respect to its U-shaped support. The upper end of the shaft of the motor passes through the hub of the hearth ring and has secured on the end thereof a distributor head.

The distributor head comprises a hub and a set of three plates. The hub, which fits over a reduced portion of the motor shaft, has a body portion 31 and a separable cap portion 32 which are aligned when together by a pin 33 which fits into openings formed in the two sections. The upper end of the motor shaft is threaded to receive a nut 34 which secures the hub against the shoulder formed by reducing the diameter of the shaft and clamps the cap and body portion of the hub together. The upper plate 35 of the distributor head extends between the cap and body section of the hub. This plate has fan blades 36 extending from its lower surface. Also extending between the sections of the hub, there is the inner end of an inverted dish-shaped spider 37. On the outer end of this spider there is secured an annular plate 38 which abuts against the lower edges of the fan blades on the upper plate. To this second or intermediate plate, there is secured, in spaced relation thereto as by spot welding for example, a lower annular plate 39. This lower plate also has fan blades 40 extending from the lower surface thereof and has an inner concaved or dish-shaped section 41 which is adjacent to the hub of the hearth ring. The inner dish-shaped section is adapted to receive oil which is forced, by rotation of the distributor, between the upper surface of the lower plate and the lower surface of the intermediate plate, the two plates together forming a nozzle. The oil is of course driven between these plates and forms a fine thin film by virtue of the centrifugal force exerted by the rotation of the distributor. The fan blades on the under surface of the lower plate supplies a strong current of air beneath the film of oil formed by the distributor which current of air serves to break up the film into fine particles and commingles with the particles to supply oxygen for their combustion. The fan blades depending from the upper plate cause air to flow up through the spider and across the upper surface of the intermediate plate to cool the same and furnish an additional supply of oxygen for combustion.

Oil is supplied to the concaved section of the lower plate through three oil delivery tubes 42 which are spaced from each other through an angle of 120°. These delivery tubes extend up through the hub and at their upper ends are bent over the edge of the hub in the form of a gooseneck, the discharge ends of the tubes being directly over the concaved section of the lower plate of the distributor head. At the points where the tubes bend around the edge of the hub, the hub has cut-out portions into which blocks 43 having rounded faces complementary to the curvature of the tubes, are fitted. The delivery tubes on emerging from the lower end of the hub are bent outwardly parallel to a substantially frusto-conical motor shield 44. The tubes are connected to an oil supply pipe 45 which is bent in the form of a U outside of the U-shaped member supporting the driving motor and which extends approximately three-quarters of the way around the motor. This oil supply pipe is supported through supporting strips 46 which are welded to the supply pipe and which extend between

the nuts on the central bosses of the legs and the lower surface of the U-shaped motor support. The supply pipe is of course connected to a source of fuel oil through the usual automatic valves.

On the lower end of the motor casing, there is secured a cup-shaped container **47** which forms an oil sump. The lower end of this oil sump is connected through a tube **48** to the oil supply pipe. The lower end of the shaft of the motor extends into this oil sump and on the end of the shaft there is secured a rotor **49**. This rotor, which fits snugly in the casing, has a spiral groove **50** in the side thereof substantially in the form of a square thread. When the shaft of the motor is stationary, oil flows down through the tube **48** from the oil supply pipe, and to the oil supply pipe from the delivery tubes, into the oil sump, passing through the grooves in the rotor and filling the oil sump, thereby draining the oil delivery tubes. By draining the oil from the delivery tubes in this manner the oil which otherwise, on shutting down the burner, would be stationary in the tubes and liable to be carbonized in the ends of the tubes, is removed from the tubes, and particularly the ends of the tubes within the combustion chamber. As the motor is started and the rotor is rotated in the oil sump, the oil in the oil sump, by virtue of the spiral grooves in the rotor, is forced out of the sump and into the oil supply pipe, thus clearing the oil sump until the motor is again stopped. In this way, the oil is withdrawn from the oil delivery tubes whenever the rotary distributor ceases to function.

In conjunction with the burner just described, gas may be used as a fuel. For this purpose, a gas supply pipe **51** bent in the form of a ring is provided and fits snugly against the under surface of the hearth of the heating unit. To this gas supply pipe there is connected a series of standpipes or gas delivery tubes **52** which extend through the hearth and have their discharge end flush with the surface of the hearth. The discharge end of each of these tubes is bent radially outwardly with respect to the rotary head. By forming the tubes so that the gas is discharged in this manner, the burner is more efficient and more quiet in operation. When gas is used as a fuel, the distributor illustrated, together with the oil connections, may be removed, and a distributor without the film forming nozzle may be used. To replace the distributor, it is only necessary to remove the nut **34** on the end of the motor shaft.

For different kinds of gas, such as producer gas, and natural gas for example, different size gas orifices are necessary for the proper operation of a gas burner. To make the burner universal in this respect, fittings **53** are removably secured in each of the stand-pipes or tubes **52**, which fittings have orifices therethrough through which the gas passes. Depending upon the type of gas used, these fittings will have a certain size orifice and if the burner is to be used with another or different type of gas than that with which it has been used, the fittings may be changed for fittings having suitable orifices for the gas to be used.

When the burner is used, there is a pilot light **54** which extends into the combustion chamber for starting the combustion of the fuel. This pilot is connected to a source of gas whether the burner is used as an oil burner or a gas burner.

From the above description of an embodiment of my invention, it will be obvious that I have produced a burner which is universal in its application, quiet and efficient in operation and sturdy and reliable in its construction.

It is obvious that various changes may be made in the details of the embodiment shown in the drawings and above described by those skilled in the art within the principle and scope of my invention as expressed in the appended claim.

I claim:

In an oil burner in combination, an oil supply pipe, a rotary distributor, a plurality of delivery tubes connected to the oil supply pipe for delivering oil to the distributor, an oil sump below the point of the connection of the delivery tubes to the oil supply pipe, means connecting the oil supply pipe and sump whereby the sump receives the oil in the tubes and oil supply pipe when the supply of oil thereto has been cut off, and means for discharging and keeping the oil out of the sump during operation of the distributor.

GEORGE A. BRYAN.