April 27, 1926.

1,582,552

I. E. SMITH

OIL BURNER

Filed April 18, 1925

2 Sheets-Sheet 1

Fig. 1

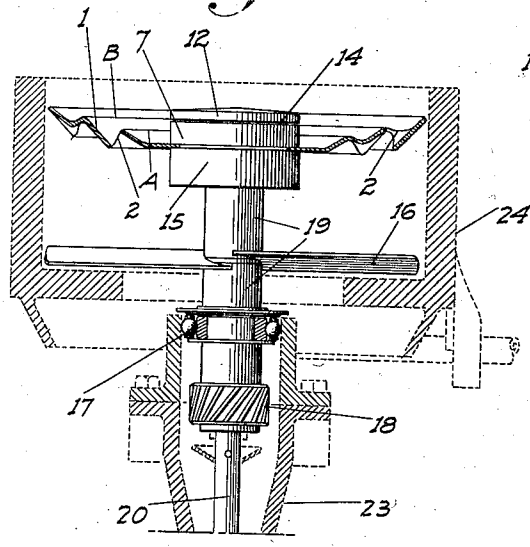


Fig. 2

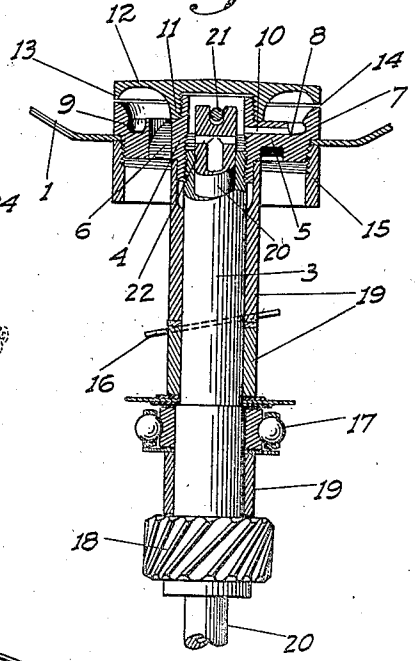
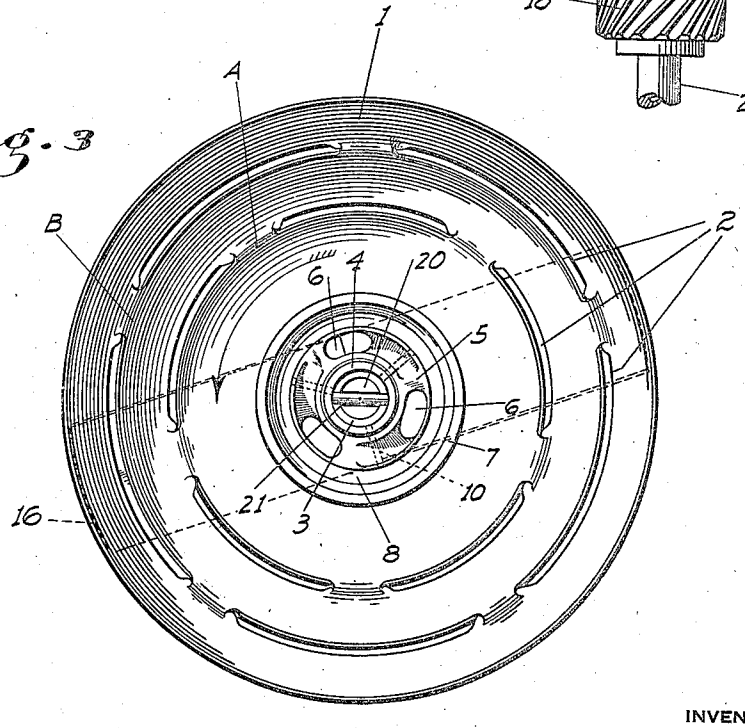


Fig. 3



INVENTOR

Ira E. Smith

BY Percy S. Webster

ATTORNEY

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Fig. 4

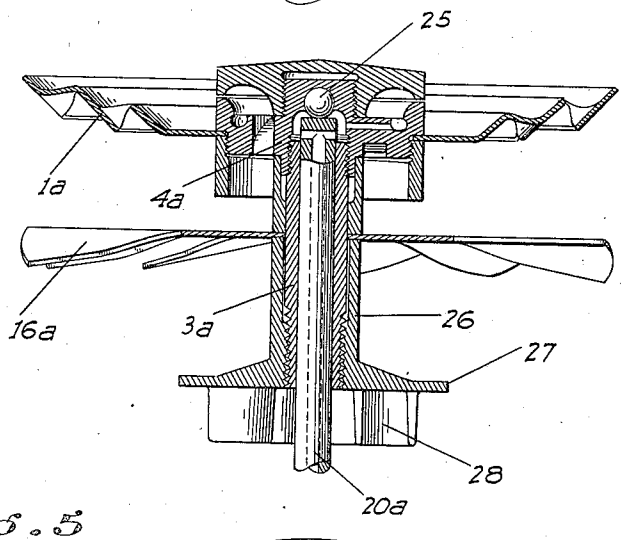
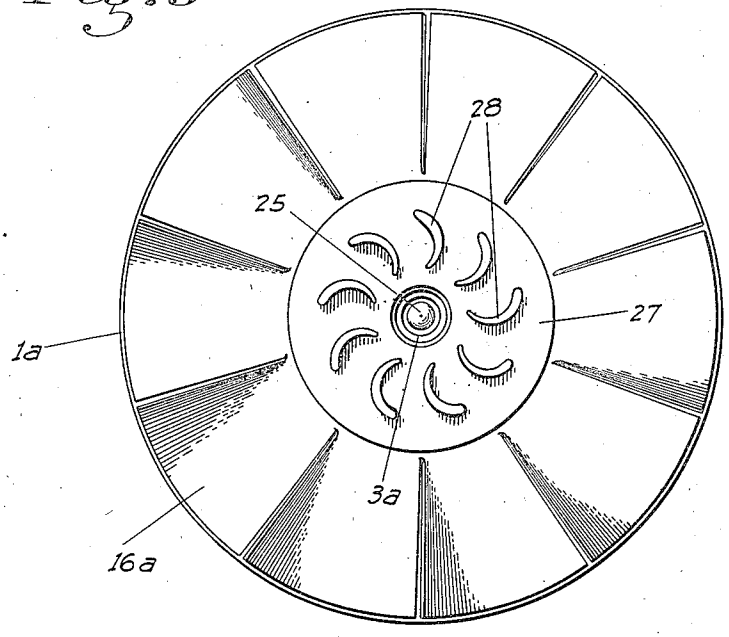


Fig. 5



INVENTOR

Ira E. Smith

BY Percy L. Webster

ATTORNEY

Patented Apr. 27, 1926. 1,582,552

UNITED STATES PATENT OFFICE.

IRA E. SMITH, OF STOCKTON, CALIFORNIA.

OIL BURNER.

Application filed April 18, 1925. Serial No. 24,147.

To all whom it may concern:

Be it known that I, IRA E. SMITH, a citizen of the United States, residing at Stockton, county of San Joaquin, State of California, have invented certain new and useful Improvements in Oil Burners; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this application.

This invention relates to improvements in oil burners of the rotating burner plate type, in which oil is fed onto the plate from the center thereof and then drawn centrifugally onto the plate by reason of the rotation thereof and at the same time upwardly by means of an air fan disposed under the plate.

The present invention particularly forms an improvement over that type of burner shown in my Patent No. 1,512,247 dated October 22nd, 1924, and over my copending application, Serial No. 750,248, filed November 17th, 1924, especially with regard to the burner plate unit itself.

In the previous devices pure oil was fed onto the plate from the top of the tubular hub thereof and air was not mixed with the oil until the latter was thrown out from the center of the plate or hub. The result was that in due time with the operation of the burner, the burning of this pure oil adjacent the hub unmixed with air caused the formation of carbon on the hub. This had a tendency to choke up the outlet passage of the oil from the hub, necessitating frequent removal of the unit in order to scrape off the accumulation of carbon and permit of the proper and unobstructed flow of fuel to the burner.

The principal object of my present invention therefore is to eliminate any tendency for carbon to form on any part of the burner plate unit by constructing the same in such a manner that air is mixed with the oil before it is thrown out and distributed onto the plate. At the same time the oil is maintained enclosed until it is thus distributed so that it cannot burn prior to this operation.

A further object is to construct the hub of the burner plate, from which the oil is thrown onto said plate, in such a manner that a distribution of the oil spray will be had evenly from all around said hub.

I attain these ends without increasing the number of parts over what was originally employed, without interfering with the desired arrangement of the burner plate structure as a removable unit, and without having to redesign the remainder of the apparatus or alter the same in any way in order to apply the new burner unit thereto.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of my improved burner plate unit, the plate proper being in section, showing the outline of the structure in which the unit is mounted.

Fig. 2 is an enlarged fragmentary section of the burner plate unit.

Fig. 3 is a top plan view of the same with the central cap removed.

Fig. 4 is a sectional elevation of a burner plate unit, showing a modified form of supporting and driving means.

Fig. 5 is a bottom plan view of the same.

Referring now more particularly to the characters of reference on the drawings and particularly to those on Figs. 1 to 3, the numeral 1 denotes the burner plate, a circular dished element having intermediate its center and rim concentric and spaced ridges A and B all around the inner ridge A, being lower than the outer ridge B, and the latter being lower than the rim of the plate. This feature is clearly shown in Fig. 1. Circumferentially spaced slots 2 are cut through the plate along the outer slope of the ridges, to allow air to pass up through the plate from below.

The plate is mounted on a built up hub structure, constructed as follows:

Disposed axially of the plate is a tubular member 3 whose upper end is threaded to fit into the tapped end of a sleeve 4. This sleeve is formed intermediate its end with an outwardly projecting disc-like member 5 which is provided with a plurality of openings or slots 6 concentric with the axis of said member, and as close to the sleeve as possible. The end walls of these slots are cut on a

slope so that a fan is formed integral with said disc which, with the rotation of the latter, will cause air to be drawn up through the slots. A circular flange 7 projects upwardly from the rim of the disc for a certain distance, a continuous groove 8 being formed in the upper surface of the disc at the base of the flange, said groove being undercut into the inner wall of the flange as shown at 9. A plurality of radially disposed holes 10 lead from the interior of the sleeve 4 to the adjacent side of the groove 8.

The upper end of the sleeve 4 above the disc is threaded to removably fit into the hub 11 of a cap 12. The rim of the cap, which is the same size as the flange 7, is turned down toward said flange in the form of a lip 13. This lip however does not engage said flange, the hub 11 being arranged to abut against the disc to limit the downward movement of the cap and thus leave a narrow slit 14 all around between the cap and the flange. The vertical level of this slit is so arranged as to be above the top of ridge A, but below the top of ridge B of the plate. The cap being removable the width of the slit which forms the passage for the oil to pass to the plate, may be varied to suit different conditions by replacing one cap with another having a different depth of hub relative to the depth of the lip 13. A ring or short cylinder 15 open on the bottom is screwed onto the lower end of the member 5 below the plate. This ring not only serves in connection with the member 5 to clamp the plate 1 therebetween, but provides a definitely outlined air intake passage to the fan slots 6. This insures that air drawn into the chamber formed between the disc and cap will be drawn from below the plate a certain distance and not from immediately under the plate, which would open the way for the possibility, however remote, of flame being drawn through the slots 2 and up into the disc chamber.

A horizontal fan 16 of suitable type is mounted on the sleeve 3 a certain distance below the plate. A ball-bearing 17 and a driving gear 18 are also mounted on said sleeve in suitably spaced relation. These parts and the fan, as in the previous devices hereinbefore mentioned, are maintained in definite alinement with each other by spacers 19, which are clamped against said parts when the sleeve 4 is screwed onto the member 3.

All the parts above described therefore form a single unit independent of any other part of the burner structure. The parts last above described however, and their arrangement, are fully covered in the patent above mentioned and need not be enlarged upon here.

This burner plate unit is mounted, also as in the previous devices, in driving relation with a shaft 20 which projects up through the sleeve 3 and has a transverse slot on its upper end which engages a cross pin 21 in the upper end of the sleeve 4. This shaft is hollow and oil is pumped up through the same with the rotation of the shaft and distributed therefrom through radial holes 22 which lead to the interior of the sleeve 4 above the member 3 so that oil will be then thrown by centrifugal action through the passages 10 and into the groove 8.

The structure is mounted in a vertical position in a base or casing, the upper part of which is outlined at 23, said base being surmounted by a cylindrical casing 24 which surrounds the fan and burner plate. These features however form no part of the present invention.

In operation with the rotation of the burner plate unit oil from the shaft 20 will pass through the holes 22 into the sleeve 4 and thence through the passages 10 into the groove 8 by reason of centrifugal force as above set forth. This force will also cause the oil to leave the bottom of the groove and bank up in the undercut or vertically disposed portion 9 of the groove, filling the same evenly all around.

An upward current or draft of air, induced by the fan slots 6, will then travel at considerable speed through the slit 14—its only possible exit—and will act on and take with it a certain amount of this banked up oil.

This is on account of the arrangement of parts of the burner. The air intake slots 6 being near the center of rotation, and the outlet slit 14 being a considerable distance therefrom, a centrifugal fan or blower structure is formed, which causes the air current to pass with considerable force and speed through the outlet, due to the centrifugal action set up with the rotation of the burner and the relatively great rim-speed at the outlet compared with that in the plane of the intake opening 6.

The oil, being carried in the blower enclosure outwardly of the air intake, is also whirled around at considerable speed, and the air necessarily blowing past the oil from the intake 6 to outlet 14, will force a certain amount of this oil through the outlet.

The oil is thus distributed through the slit and onto the plate in the form of a fine film somewhat mixed with air, the mixture being then further mingled with the greater volume of air forced up by the fan 16, and ignited by suitable means (not shown). The operation of the fan 16 also causes an initial current of air to be passed upwardly into the ring 15, where it is then caught and boosted by the fan slots 6.

It will be noted that the innermost row of slots 2 in the plate is a considerable distance from the member 7, said plate being solid

therebetween. This arrangement is of great assistance in enabling a low fire to be maintained. A low fire with this burner is obtained by slowing down the speed of rotation of the structure. This reduces the amount of oil fed to the enclosed groove, and also of course decreases the velocity of the air and oil flow from the outlet 14. By sufficiently reducing the speed therefore, the film of oil discharged may be controlled as to its velocity so that it is very small and is only thrown outwardly for a short distance. The burner plate adjacent the member 7 being solid, the upward draft of air from the lower fan 16 cannot act on this film to unduly scatter it, which would result in the fire being extinguished.

This would otherwise take place, owing to the amount of oil being discharged being inadequate to offset this scattering or dissemination above referred to.

This small film however, even though not directly acted on by the air draft from the fan, still is brought into contact with sufficient air for proper consumption. This is because owing to the level of the slit 14 through which the horizontal oil film passes relative to the level of ridge A of the plate, an amount of air from the adjacent slots 2 can pass over said ridge under the oil film, toward the center of the plate.

The upward moving tendency of this air however is counteracted by a layer of air above the oil film issuing horizontally from the slit 14 above said film. The latter is therefore interposed and held between the two air layers, which allow of an efficient mixture and proper combustion being had.

When the burner is speeded up and the velocity and size of the oil film increased, said film is then acted on directly by the air passing up through the slots 2, and a fire of increased volume is of course had.

By reason of the undercut groove 9, a small supply of oil is constantly maintained all around the flange 7 below the outlet slit 14, so that oil is distributed with the air evenly all around said slit. Without this undercut feature, oil would be present in any appreciable quantity in the disc chamber only immediately adjacent the openings 10, and distribution through the outlet slit would therefore be correspondingly uneven.

The slots 6 being inwardly of and terminating above the level of the groove 8, the oil in said groove will not run into and drip down through said slots when the burner stops.

The above described unit is designed to be driven by an electric motor.

The unit however, with but few changes, may be arranged to be driven by water or other fluid power directly acting on the unit.

Such a structure is shown in Figs. 5 and 6. In this type of apparatus, the burner plate 1^a, the hollow hub structure, and the fan 16^a are substantially the same in form and arrangement relative to each other as in the type first described.

The central sleeve 4^a of the hub structure is closed at its upper end however to form a seat for a centrally located ball 25, which is press-fitted into place. This ball forms an anti-friction bearing against which the upper end of the supporting shaft 20^a rests, said shaft having oil passages therethrough as before. The shaft in this case is stationary and supports the unit, the latter turning thereon.

The sleeve 3^a is threaded on its lower end and screws into the hub 26 of an annular flange member 27 which carries vanes 28 depending from its under faces. The parts 27 and 28 constitute a water wheel by means of which the entire structure may be rotated about the stationary shaft 20^a as an axis, said wheel in operation being of course enclosed in a suitable casing.

The hub 26 extends to the fan 16^a and takes the place of the lower sleeve 19 in the first described type, the fan being clamped between this hub and a sleeve 19^a on the member 3^a above the fan as before.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. An oil burner comprising a rotatable burner plate, a hollow hub structure for the plate arranged to rotate therewith, means for feeding oil into the hub, the latter having passage means to the plate whereby with the rotation of the hub oil will be thrown onto the plate from the hub, and fan means incorporated with the hub for causing the oil to be automatically mixed with a certain amount of air while said oil is in the hub and the latter is rotating.

2. An oil burner comprising a horizontally disposed and rotatable burner plate, and a hollow hub structure mounted in unitary connection with the plate; said hub structure including a member having a tubular axial sleeve into which oil is initially fed, said member being formed with a continuous groove in its upper face between the sleeve and outer periphery of the member, there being passage means from the sleeve to said groove, means covering the member to form an interior chamber of which the groove is a part and providing an outlet passage from

said member above the groove, and means for causing a current of air to be induced in said chamber above the groove to draw oil from the groove upwardly toward the outlet and force said oil through the outlet, the oil being then mixed with the air.

3. An oil burner comprising a horizontally disposed and rotatable burner plate, and a hollow hub structure mounted in unitary connection with the plate; said hub structure including a member having a tubular axial sleeve into which oil is initially fed, said member being formed with a continuous groove in its upper face between the sleeve and the outer periphery of the member, there being passage means from the sleeve to said groove, means covering the member to form an interior chamber of which the groove is a part and providing an outlet passage from said member above the groove, there being openings in said member leading down from said chamber inwardly of the groove to the atmosphere, and means whereby with the rotation of the plate an upward current of air will be induced through said openings and in the chamber.

4. An oil burner comprising a horizontally disposed and rotatable burner plate, and a hollow hub structure mounted in unitary connection with the plate; said hub structure including a member having a tubular axial sleeve into which oil is initially fed, said member being formed with a continuous groove in its upper face between the sleeve and the outer periphery of the member there being passage means from the sleeve to said groove, means covering the member to form an interior chamber of which the groove is a part and providing an outlet passage from said member above the groove, there being openings in said member leading down from said chamber inwardly of the groove to the atmosphere, said openings extending around said member in concentric relation therewith and the ends thereof being cut on a slant whereby to form fan like elements acting to create an upward current of air into the chamber with the rotation of the plate.

5. An oil burner comprising a horizontally disposed and rotatable burner plate, and a hollow hub structure mounted in unitary connection with the plate; said hub structure including a member having a tubular axial sleeve into which oil is initially fed, said member being formed with a continuous groove in its upper face between the sleeve and the outer periphery of the member, there being passage means from the sleeve to said groove, means covering the member to form an interior chamber of which the groove is a part and providing an outlet passage from said member above the groove, there being openings in said member leading down from said chamber inwardly of the groove to the atmosphere, and fan means mounted in connection with the plate to induce an upward current of air through said openings with the rotation of the plate.

6. A structure as in claim 4, in which additional fan means is provided below the plate to set up an initial flow of air to the openings.

7. A structure as in claim 4, in which a ring, open on the bottom, projects downwardly from said member outwardly of the plane of the openings.

8. An oil burner comprising a horizontally disposed burner plate, and a hollow hub structure mounted in connection with the plate; said hub structure including a disc like member formed at its outer periphery with an upwardly projecting flange and having a central and upwardly projecting axial sleeve spaced from the flange and into which the oil is initially fed, said sleeve and flange forming a circular chamber with the disc, a cap over the disc and overhanging the top of the flange in spaced relation thereto to substantially enclose the chamber while providing an outlet therefrom in a horizontal plane, the upper face of the disc having a groove at the base of the flange and undercut vertically into the same and there being spaced passages from the sleeve to said groove whereby with the rotation of the plate the oil will be thrown centrifugally from the sleeve through the passage means to the undercut portion of the groove, and means for causing an upward current of air to be maintained in the chamber which will act on and mix with the banked up oil and force the same through the outlet.

9. An oil burner comprising a burner plate adapted to be rotated, a hollow hub structure for the plate having a horizontal outlet slit around the same, the hub having interior groove means below the slit to receive and hold oil, and having openings leading downwardly therethrough and located inwardly of the groove means, whereby with the rotation of the structure a draft of air will be induced through the openings to and outwardly through the slit which will act on and carry some of the oil in the groove means therewith.

10. An oil burner comprising a rotatable burner plate, a hollow hub structure for the plate arranged to rotate therewith, means for feeding oil into the hub, the latter having passage means to the plate whereby with the rotation of the hub oil will be thrown onto the plate from the hub, and additional passage means to the atmosphere, and means in the hub for causing a current of air to be positively induced into the hub through said additional passage means with the rotation of the hub.

In testimony whereof I affix my signature.

IRA E. SMITH.