Oct. 6, 1936. G. H. BORK 2,056,561

OIL BURNER

Filed Oct. 10, 1932

Fig. 1.

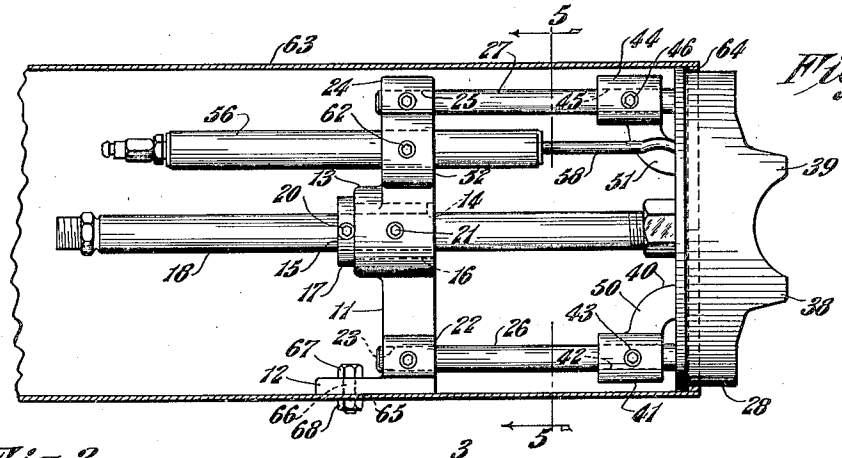


Fig. 3.

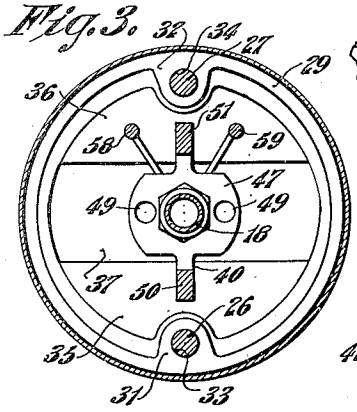


Fig. 2.

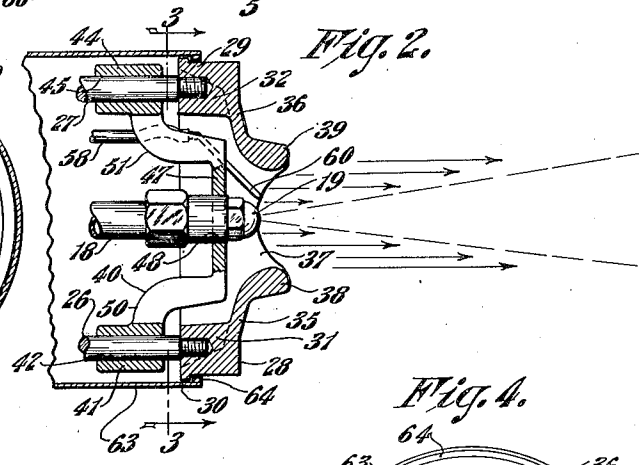


Fig. 4.

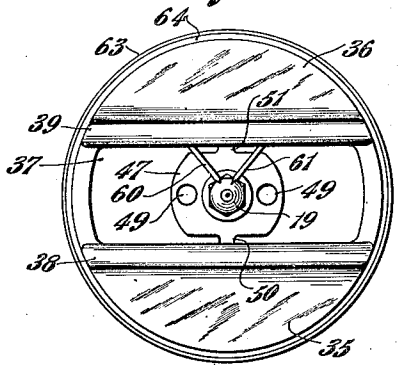
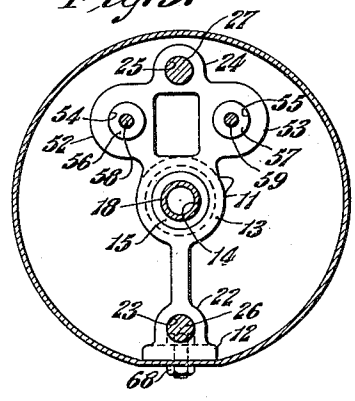


Fig. 5.



INVENTOR,
George H. Bork,

BY
Frank E. Haskell
ATTORNEY.

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OIL BURNER

George H. Bork, Holyoke, Mass., assignor to Harvey-Whipple Co., Inc., Springfield, Mass., a corporation of Massachusetts

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15 Claims. (Cl. 158—76)

This invention relates to oil burners and particularly to the form, arrangement, and adjustability of the oil nozzle, burner head, electrodes, draft tube, and parts associated therewith.

It is one of the objects of the invention to provide a burner head which will produce a flame of a hot and bushy character and which shall be quiet in operation.

It is a further object of the invention to supply air to the discharging oil in a direction substantially parallel to the direction of flow of the discharging oil as distinguished from the large majority of oil burners now on the market which endeavor to obtain a more intimate intermingling of the oil and air by either giving the air a whirling or rotary motion or by directing it into the oil spray by means of converging air streams.

It is a still further object of the invention to prevent destructive distillation and the consequent fouling of the oil nozzle by the residual products of distillation when the oil burner is not operating.

It is also an object of the invention to provide an assembly of oil nozzle, burner head, electrodes, and single supporting pedestal which can be removed as a unit for cleaning, adjustment, and repair.

Another object of the invention is to provide an oil nozzle which is adjustable and which may be removed without disturbing the other parts and replaced in exactly the same adjusted position without the necessity of readjusting it.

Still another object of the invention is to provide means for protecting the electrodes from injury when the assembled parts have been removed from the furnace and placed on a bench or elsewhere.

It is also an object of the invention to provide a draft tube which shall have improved stop and sealing means for preventing or at least reducing the air leakage at the outer portion of the burner head.

It is also a still further object of the invention to provide a maximum adjustability for all the parts with respect to each other.

These and other objects of the invention will readily appear to those skilled in the art to which it appertains by a consideration of one embodiment thereof as set forth in the following description taken in connection with the accompanying drawing in which

Fig. 1 is an elevation of an oil burner assembly, the draft tube being shown in section so that the parts within may be seen;

Fig. 2 is an elevation partly in section of the burner head and the parts near the burner head;

Fig. 3 is a vertical section on the line 3—3 of Fig. 2;

Fig. 4 is an end elevation of the burner head and parts within the air discharge opening; and

Fig. 5 is a vertical section on the line 5—5 of Fig. 1.

Referring to the drawing more in detail the reference numeral 11 indicates a supporting pedestal having a base 12. The pedestal extends upwardly substantially vertically from the base and has an enlarged portion or hub 13 through which extends a horizontally disposed cylindrical aperture 14. Positioned within this aperture 14 is a bushing 15 having one end 16 relatively smaller than the other end and corresponding to the diameter of the aperture 14 in which it is positioned. The other end 17 of the bushing 15 is relatively larger to provide a stop collar which rests against the hub 13. The aperture through the bushing is of a suitable diameter to receive an oil pipe or conduit 18 which conduit has an oil nozzle 19 at the end thereof. The collar 17 of the bushing 15 may be drilled and tapped for a set screw 20 whereby the bushing may be secured to the pipe in its adjusted position. The enlarged portion 13 of the pedestal 11 may also be tapped for a set screw 21 whereby the bushing may be firmly secured to the pedestal. Heretofore it has been common to have but one set screw by which the oil pipe is held in position after the best longitudinal position has been obtained. If in such a construction the fastening means were loosened in order to remove the oil pipe and nozzle for cleaning there was the necessity for again adjusting the oil pipe longitudinally as the position of the nozzle must be just right to a small fraction of an inch to obtain the best results. With the construction shown herein the set screw 21 is loosened for purposes of cleaning while the set screw 20 is permitted to remain tight. Upon replacement the oil pipe is inserted until the collar 17 rests against the hub 13 thus permitting a much quicker as well as a more accurate reassembly.

Between the base 12 and the hub 13 of the pedestal and near the lower portion of the pedestal there is provided an enlarged portion 22 having a preferably cylindrical aperture 23 therethrough, the axis of the aperture being parallel to the axis of the aperture 14. Similarly at the uppermost portion of the pedestal there is provided another enlarged portion 24 having an aperture 25 therein similar to, and parallel to the aperture 23. A pair of rods 26 and 27 each have one of their

ends respectively positioned in the apertures 23 and 25 and carry at the other ends thereof a burner head 28. This head may be a unitary structure such as a casting the outer portion of which is preferably in the form of a ring 29. Around this ring and toward the rear thereof there may be provided a collar 30 for a purpose to be hereinafter described. At the bottom and top of the head 28 there may be provided enlarged portions 31 and 32 having apertures 33 and 34 therein for the reception of the ends of the rods 26 and 27. These rods may be attached to the head in any suitable manner such as being threaded into tapped holes and the head and rods thereby become as one structure so that the head is supported by the pedestal where the rods pass through the apertures in the top and bottom of the pedestal. It will be noted that the opening of the head toward the rear is substantially circular but that segmental portions 35 and 36 partially close the opening at the forward end leaving an opening 37 which has a somewhat greater dimension in a horizontal direction than in a vertical direction. The edge of the lower segmental portion 36 which is nearest the opening 37 is preferably in the form of a projecting lip 38 which is of thicker and heavier material than the rest of the head. Similarly the upper segmental portion 36 is provided with a heavy projecting lip 39.

By the construction of head just described there are attained a number of very marked advantages. It will be noted that because of the large opening 37 the discharging air is moving in the same general direction as the discharging oil. This results in a much more quiet flame than in those types of burners which endeavor to obtain a more intimate mixture of air and oil by giving to the discharging air a rotary or whirling motion. In many fire boxes the vertical dimension is much less than the horizontal dimension which makes it desirable to have a flame of similar shape. Such a result has been attempted heretofore by others by using two converging streams of air, one upper and one lower, which tend to flatten out the flame in a vertical direction and to spread it out in a horizontal direction. As distinguished from such prior constructions, the present invention accomplishes the shaping of the flame by the shape of the opening 37 and avoids much of the unsatisfactory operation inherent in methods heretofore employed.

The large discharge opening 37 also contributes to another very desirable result, the prevention of destructive distillation. Furnaces of this type usually operate intermittently and during periods of shut-down the refractory walls of the furnace radiate the accumulated heat toward the nozzle with the result that it becomes overheated and any oil thereon is apt to be broken down chemically leaving a sticky and gummy residue which clogs up the very fine orifice of the nozzle, necessitating frequent cleaning. Of course the blower employed for the forced draft is not operating but by having a large opening 37 the natural draft is so good that the air flows steadily by the nozzle and tends to keep it cool sufficiently to prevent destructive distillation. The heavy projecting lips 38 and 39 also contribute to the same result by shielding the nozzle from the direct radiation of a considerable portion of the interior of the furnace.

Means are provided for supporting the outer end of the oil pipe or nozzle and maintaining it firmly in its proper position. This comprises a yoke 40 having a lower enlarged portion 41 with an aperture 42 through which the rod 26 extends and to which it may be secured in an adjusted position by means of a set screw 43. The yoke also has a similar upper enlarged portion 44 having an aperture 45 through which the rod 27 extends and to which the yoke is secured by means of a set screw 46. At the middle of the yoke is a collar or diffuser 47 which has an aperture 48 therein for the reception and support of the oil nozzle 19. This diffuser reduces the intensity of the flow of air adjacent to the nozzle and prevents the flame from being blown away from the nozzle. In the diffuser 47 may be provided one or more apertures 49 which permit a small amount of air to discharge close to the nozzle. It has been found that without such apertures there is a tendency for the flame to be drawn back against the nozzle and for the nozzle to become coated with carbon or gummy deposits. It will be noted that the portions 50 and 51 of the yoke which extend between the central diffuser and the lower and upper enlarged portions 41 and 44 respectively are flattened in cross section with the plane of the flattening passing through the rods 26 and 27 and the oil pipe 18. This tends to minimize the obstruction which these parts offer to the air passing toward the opening 37.

The diffuser 47 not only contributes very materially to give the flame its proper characteristics but is used in adjusting the shape of the flame. Heretofore the angle of fire or angle at the apex of a cone which would include the whole flame has been determined almost wholly by the angle of the orifice of the oil nozzle. With the construction shown, it has been found that when the diffuser 47 is moved forward and near the nozzle the angle of flame is greater and when the diffuser 47 is withdrawn away from the nozzle the angle of flame is less. The adjustable diffuser 47 therefore provides a simple means for adjusting the flame angle without the necessity of substituting a new nozzle.

The pedestal 11 has a pair of enlarged portions 52 and 53 symmetrically disposed on opposite sides of the vertical medial plane of the pedestal which enlarged portions have apertures 54 and 55 respectively therethrough. Positioned in these apertures are insulators 56 and 57 carrying electrodes 58 and 59 the ends of which constitute ignition points 60 and 61 positioned just above and close to the discharge orifice of the oil nozzle. Set screws may be provided for holding the electrodes in any longitudinally adjusted position the set screw for the electrode 58 being indicated at 62.

It will be noted that the ignition points project slightly further forward than the oil nozzle 19 but not so far forward as the projecting lips 38 and 39. When the apparatus as a whole is removed for adjustment or repair it may be placed on a bench or other support resting on the lips 38 and 39 and the ignition points are a slight distance above the supporting surface so that they are not injured or disturbed in their adjustment. This it will be noted is still another advantage of the projecting lips besides those advantages already enumerated.

A draft tube 63 is provided for conducting the air from any suitable blower to the discharge opening 37 and has at its end a band 64 secured as by spot welding to the inside thereof. This

constitutes a suitable stop for the burner head, the collar 30 of which strikes against the band 64 when the pedestal and burner assembly is pushed forward into place in the draft tube. This not only provides a convenient adjustment but prevents the burner head assembly from being pushed too far through the tube and the end dropping into the furnace. It also constitutes an efficient air seal and prevents leakage of air near the outside of the head. The tube 63 may be provided with a hole 65 adapted to register with a similar hole 66 in the base 12 of the pedestal 11. A bolt 67 passes through both holes and together with nut 68 hold the pedestal in place in the tube.

It is to be understood that the foregoing embodiment of the invention is for purposes of illustration only and various changes may be made therein without departing from the spirit and scope of the invention as defined in the subjoined claims.

I claim:

1. In an oil burner, a draft tube, a vertical supporting pedestal positioned in said draft tube and having a horizontal opening therein, an oil conduit positioned in said opening and having an oil nozzle at the end thereof, said pedestal having two other horizontal openings one above and one below said oil conduit opening, rods positioned in said last-named openings, a burner head carried by said rods and positioned at the end of said draft tube, said pedestal also having a pair of openings therein for supporting electrodes, and a pair of electrodes positioned in said pair of openings.

2. In an oil burner, a draft tube, a vertical supporting pedestal positioned in said draft tube and comprising a base, an enlarged portion above said base having an aperture therethrough, an oil conduit positioned in said aperture and having an oil nozzle at the end thereof, a smaller enlarged portion between said base and said first-named enlarged portion and a similar smaller enlarged portion above said first-named enlarged portion, each of said smaller enlarged portions having apertures therethrough, members positioned in said last-named apertures, a burner head carried by said members and positioned at the end of said draft tube, a pair of enlarged portions positioned at the same height above the first-named enlarged portion and below the second-named of the smaller enlarged portions and also positioned at equal distances at each side of the vertical medial line of the pedestal, said last-named enlarged portions having apertures therethrough for the support of electrodes, and a pair of electrodes positiond in said last-named apertures.

3. In an oil burner, a draft tube, a supporting pedestal positioned in said draft tube and having a centrally disposed aperture therein, an oil pipe supported in said aperture and having an oil nozzle at the end thereof, an upper and a lower supporting rod carried by said pedestal, a burner head carried by said rods and positioned at the end of said draft tube, a yoke supported by said rods and having an aperture therein through which passes said oil pipe, said oil pipe and oil nozzle being supported by said yoke.

4. In an oil burner, a draft tube, a supporting pedestal positioned in said draft tube and having a centrally disposed aperture therein, an oil pipe supported in said aperture and having an oil nozzle at the end thereof, an upper and lower supporting rod carried by said pedestal, a burner head carried by said rods and positioned at the end of said draft tube, a yoke supported by said rods and having a disc-like portion centrally disposed thereof, said disc-like portion having an aperture therethrough in which the said pipe is positioned and supported, said portion obstructing the flow of air near the pipe.

5. In an oil burner, a draft tube, a supporting pedestal positioned in said draft tube and having a centrally disposed aperture therein, an oil pipe supported in said aperture and having an oil nozzle at the end thereof, an upper and lower supporting rod carried by said pedestal, a burner head carried by said rods and positioned at the end of said draft tube, a yoke supported by said rods and adjustable longitudinally thereof and having a disc-like portion centrally disposed thereof, said disc-like portion having an aperture therethrough in which the said pipe is positioned and supported, said portion obstructing the flow of air near the pipe.

6. In an oil burner, a draft tube, a supporting pedestal positioned in said draft tube, an oil pipe carried by said pedestal and having an oil nozzle at the end thereof, a pair of rods carried by said pedestal positioned on opposite sides of said pipe, a burner head carried by said rods positioned at the end of said draft tube, and a yoke extending between said rods and having an aperture therethrough for the support of said oil pipe, the portions of said yoke between said pipe and the respective rods being flattened in form to reduce air friction, the plane of said flattening passing through said pipe and rods.

7. In an oil burner, a draft tube, a substantially vertical supporting pedestal positioned in said draft tube, said pedestal having a cylindrical aperture at substantially the middle thereof, an oil pipe positioned in said aperture and having an oil nozzle at the end thereof, means for adjustably securing said pipe in said aperture in different longitudinal positions, said pedestal having a pair of cylindrical apertures disposed parallel to said oil pipe aperture, one at the lower portion of said pedestal and one at the upper portion thereof, a pair of rods each rod having one end positioned respectively in said apertures and the other end extending parallel to the direction of said oil pipe, a burner head carried by said forwardly extending ends and positioned at the end of said draft tube, means for adjustably securing said rods in said apertures in different longitudinal positions, a yoke having apertures through which said rods extend, said yoke having a centrally disposed disc having an aperture therethrough for the reception and support of said oil pipe, means for adjustably securing said yoke in different longitudinal positions on said rods, said pedestal having another pair of cylindrical apertures disposed parallel to the other apertures, a pair of electrodes positioned in said last-named apertures, and means for securing said electrodes in different longitudinal positions.

8. In an oil burner, a draft tube, a burner head positioned at the outlet end of said tube and having an outer contour of a size and form to fit the inner contour of said draft tube, a supporting member carried by the draft tube intermediate its inlet and outlet ends, rods extending between said supporting member and said head for rigidly securing them together, an oil pipe supported by said supporting member, a yoke carried by said rods and having an aperture therein for supporting the outer end of said oil pipe, and electrodes

carried by said supporting member, said supporting member being detachably secured to said draft tube whereby said supporting member, head, rods, yoke, oil pipe and electrodes may be removed as a unit.

9. In an oil burner, a draft tube of uniform cross-section, an annular member secured to the inside of said tube at the discharge end thereof, a burner head having two portions of two different diameters, the portion nearest to the discharge end being of a slightly smaller diameter to just fit within said annular member and the portion away from the discharge end being of a diameter to just fit within the draft tube, the two portions providing a shoulder fitting against the annular member and constituting therewith an air seal, and supporting means for said burner head attached to said tube at a position spaced inwardly from the discharge end thereof.

10. In an oil burner, a horizontally disposed cylindrical air tube for receiving air at one end thereof and discharging it at the other end thereof, an oil nozzle positioned approximately in the axis of said tube near the discharge end thereof, and a burner head positioned at the discharge end of said tube, said burner head having an outer circular portion fitting within the end of said tube and having a single discharge opening therethrough of nearly the same horizontal dimension as the diameter of the tube, said head having segmental portions at the top and the bottom thereof to reduce the vertical dimension of said opening.

11. In an oil burner, a horizontally disposed cylindrical air tube for receiving air at one end thereof and discharging it at the other end thereof, a burner head positioned at the discharge end of said tube and having an outer circular portion fitting within the end of said tube, said head having a single discharge opening therethrough of nearly the same horizontal dimension as the diameter of the tube and having segmental portions with outwardly extending lips at the top and the bottom of said head to reduce the vertical dimension of said opening, and an oil nozzle positioned approximately in the axis of said tube and supported independently of said head within the opening thereof at a slight distance back from the outwardly extending lips of the head.

12. In an oil burner, a horizontally disposed cylindrical air tube for receiving air at one end thereof and discharging it at the other end thereof, a burner head positioned at the discharge end of said tube and having an outer circular portion fitting within the end of said tube, said head having a single discharge opening therethrough of nearly the same horizontal dimension as the diameter of the tube and having segmental portions with outwardly extending lips of substantially thicker material at the top and the bottom of said head to reduce the vertical dimension of said opening, and an oil nozzle positioned approximately in the axis of said tube and supported independently of said head within the opening thereof at a slight distance back from the outwardly extending lips of the head whereby the outwardly extending lips of substantially thicker material protect the nozzle from the direct action of the flame.

13. In an oil burner, a horizontally disposed cylindrical air tube for receiving air at one end thereof and discharging it at the other end thereof, an inwardly projecting annular band at the discharge end of said tube, an oil nozzle positioned approximately in the axis of said tube near the discharge end thereof, and a burner head positioned at the discharge end of said tube, said burner head having an outer circular portion of two different diameters, the smaller diameter being toward the discharge end of the tube and fitting within said annular band and the larger diameter being of the same diameter as the tube and positioned close against said band, said head having a single discharge opening therethrough of nearly the same horizontal dimension as the diameter of the tube, and having segmental portions at the top and the bottom thereof to reduce the vertical dimension of said opening.

14. In an oil burner, a horizontally disposed cylindrical draft tube, an inwardly projecting annular band at the discharge end of said tube, means for supporting a burner head positioned within said tube and slidable longitudinally therein, a burner head supported by said means, means for securing said supporting means to said tube in the proper adjusted longitudinal position of said supporting means and burner head, said burner head having an annular collar with a diameter small enough to pass through said tube and too large to pass through said band to provide a combined stop and means for reducing air leakage.

15. In an oil burner, a cylindrical air tube for receiving air at one end thereof and discharging it at the other end thereof, an oil nozzle positioned approximately in the axis of said tube near the discharge end thereof, and a burner head positioned around said nozzle at the discharge end of said tube, said head being in the form of a ring fitting within the end of said tube and having a single opening therethrough, said opening being substantially circular toward the rear thereof and said head having segmental portions to partially close said circular opening on diametrically opposite sides toward the front thereof.

GEORGE H. BORK.