June 14, 1938. C. P. O'HAGAN 2,120,372

FUEL BURNER

Filed Aug. 31, 1932 2 Sheets-Sheet 1

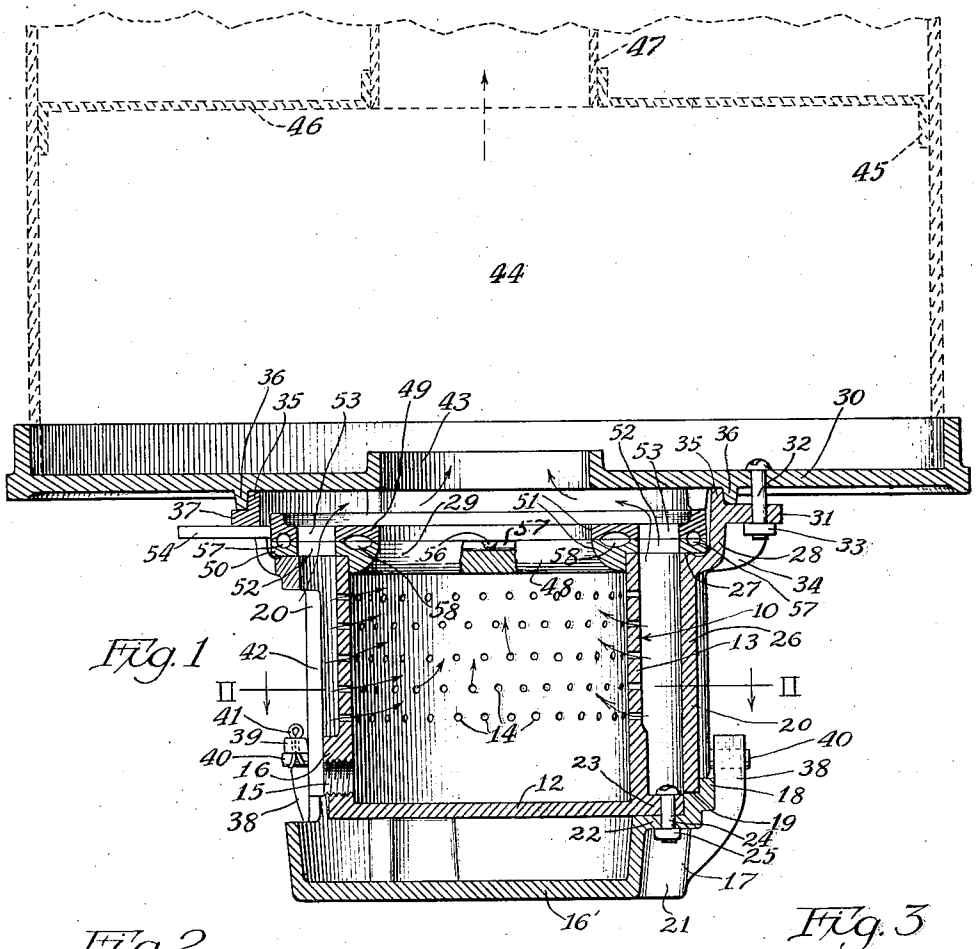


Fig. 1

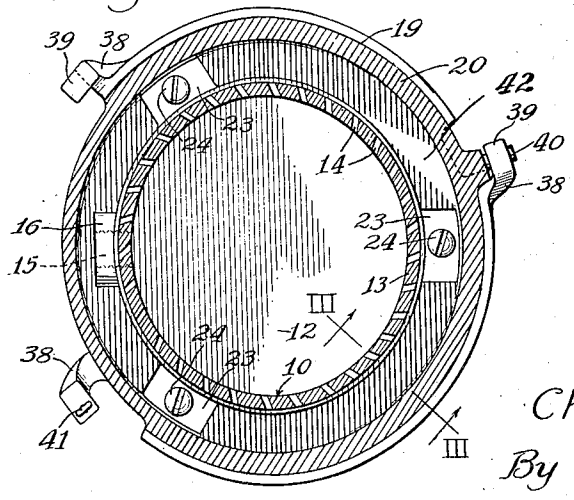


Fig. 2

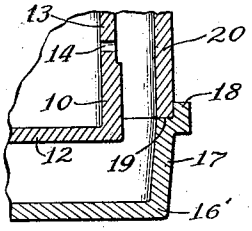


Fig. 3

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FUEL BURNER

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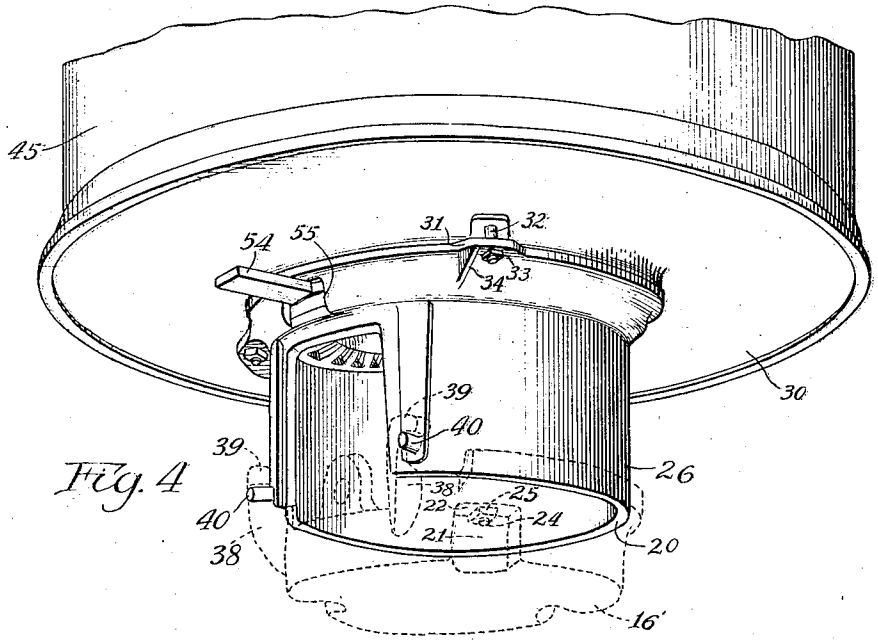


Fig. 4

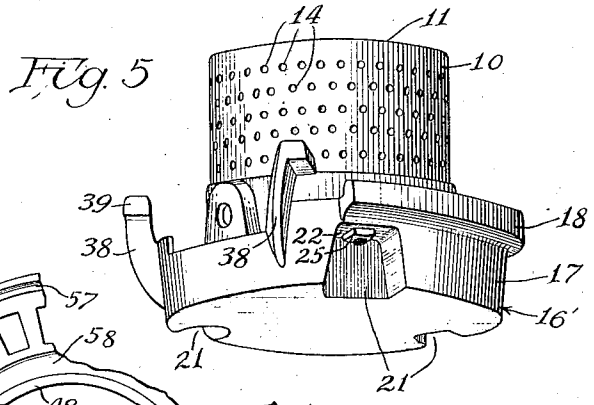


Fig. 5

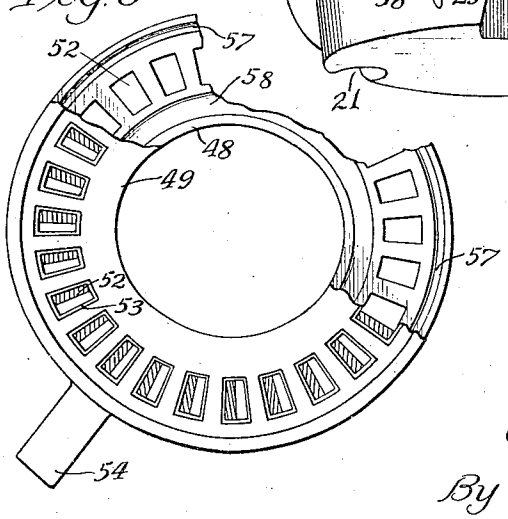


Fig. 6

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UNITED STATES PATENT OFFICE

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FUEL BURNER

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Application August 31, 1932, Serial No. 631,238

9 Claims. (Cl. 158—92)

This invention relates to fuel burners and more particularly to oil burners adapted for domestic appliances, although it may be employed for other purposes and utilize different fuels such as gas with equal advantage.

It contemplates more especially a fuel burner designed for natural draft operation, thereby avoiding the neca sity of supplying air and/or fuel by resort to mechanical expedients.

Numerous types of fuel burners have heretofore been proposed for natural draft operation, but these have not proven entirely satisfactory owing to the inability to produce thorough fuel combustion and failure to afford accessibility for cleansing purposes. Complete combustion is of utmost consequence, and this is accomplished by providing a secondary supply of air capable of regulation to supplement initial combustion which preferably though not essentially serves as a preheating medium for the auxiliary or supplemental supply of air.

The quantity of secondary air is capable of regulation, and the burner is so constructed as to enable instantaneous assembly and dismantling relative to the secondary air register without influencing the adjustment thereof; however, the specific features of construction and assembly are capable of variation depending upon the particular use and requirements of commercial practice. It must be remembered, however, that cleansing of the parts and the ample supply of secondary air to insure complete combustion, are important features which, for the most part, have not been successfully incorporated in oil or other fuel burners of the natural draft design.

One object of the present invention is to simplify the construction and improve the operation of devices of the character mentioned.

Another object is the provision of a natural draft oil burner having means for supplying secondary air to insure complete combustion.

Still another object is to provide an oil burner having secondary air supply and regulation conducive to maximum thermal efficiency.

A further object is to provide an oil burner having an ample source of air supply to initiate fuel burning and insure complete combustion responsive to the regulation thereof.

A still further object is to provide a fuel burner having an air register for effecting the regulation of the secondary air supply insuring complete combustion.

Still a further object is to provide a fuel burner which supplies air for initial combustion with means for effecting a regulated supply of secondary air commingling therewith to insure complete combustion.

Other objects and advantages will appear from the following description of an illustrated embodiment of the present invention.

In the drawings:

Figure 1 is a vertical sectional view through a burner embodying features of the present invention.

Figure 2 is a sectional view of the burner taken substantially along line II—II of Figure 1.

Figure 3 is a fragmentary sectional view taken substantially along line III—III of Figure 2.

Figure 4 is a perspective view of the burner shell with the combustion casing attached thereto.

Figure 5 is a perspective view of a burner or burner receptacle designed for detachable engagement with the burner shell as shown in dotted outline in Figure 4.

Figure 6 is a top plan view of the shutter control for the secondary air supply.

The structure selected for illustration comprises a fire pot or burner 10, preferably cast or otherwise shaped to define a cylindrical member open at one end 11 with the bottom 12 having the upstanding wall 13 thereof provided with inlet holes or apertures 14 for the passage of primary air therethrough. It is worthy of note that the apertures 14 are obliquely inclined relative to the radii of the cylindric wall 13 so as to direct the primary air in a substantially circular path to impart twirling movement thereto (see Figure 2), thereby effecting complete commingling between the air and fuel such as oil or gas which issues through an inlet orifice 15 provided through a boss 16 formed in the burner 10 proximate to the bottom 12 thereof. A source of fuel supply such as a pipe line is detachably connected with the inlet orifice 15 through the medium of the threaded bore thereof, thereby effecting ready attachment and detachment by resort to a coupler or other expedient customarily employed for that purpose.

In the present embodiment, the burner 10 has a base member 16' cast or otherwise shaped to present a circumferential wall 17 terminating in an outwardly off-set peripheral flange 18 defining a circular seat 19 for registry with a shell 20 as will appear more fully hereinafter. The base member 16' is provided with radially arranged depressions 21, in this instance three, formed inwardly from the exterior wall 17 to define ledges 22 for the reception of correspondingly spaced

flanges 23 constituting radial integral extensions of the burner bottom 12. Suitable fastening bolts 24 extend through the aligned edges 21 and flanges 23 so that the free threaded extremity thereof projects within the depressions 21 to permit the detachable engagement of nuts 25 thereto, thereby securing the burner 10 and its base 16' in assembled relation.

The burner shell comprises a cylindrical member 26 which terminates in a peripheral ridge 27, there being an outwardly curved peripheral extension 28 formed integral therewith to project therebeyond or an appreciable distance to accommodate an air register 29, the burner shell extension 28 contacts with the bottom plate 30 constituting a part of the combustion shell. As shown, the burner shell extension 28 terminates in radially extending flanges 31 which receive bolts 32 from the bottom plate 30 to effect the attachment therewith, there being nuts 33 provided on the threaded extremity of the bolts 32 to preclude accidental detachment between the burner shell 20 and the bottom plate 30. Reinforcing ribs 34 may be formed between the flanges 31 and the burner shell extension 28 so as to strengthen the suspended support of the burner shell 20. Oppositely directed peripheral ridges 35 and 36 are formed on the burner extension 28 and bottom plate 30, respectively, so as to contact each other and effect a sealed association between the shell 20 and bottom plate 30. It is to be noted that the base member extension 28 has a peripheral flange 37 which extends laterally to receive the bottom plate ridge 36 thereon, thereby limiting the extent of association between the burner shell 20 and the bottom plate 30 of the combustion chamber. In order to enable the ready association and disassociation of the burner 10 with its base 16' relative to the shell 20 in order to afford relative cleansing and/or replacement, the burner base 16' has upwardly extending lugs 38, in this instance three, formed integral therewith to project beyond the bottom region of the burner shell 20. Lugs 38 are formed with laterally directed ears 39 which are adapted to engage studs 40 projecting radially from the shell 20 to serve as a support for the base member 16'. It is to be noted that the ears 39 are disposed in the same direction relative to the lugs 38, and these may be caused to engage the studs 40 by introducing the burner 10 in the shell 20 with the complemental ears 39 and pins 40 out of registry. With the base member 16' elevated in the shell 20 for a distance sufficient to have its peripheral ridge 19 contact with the bottom edge thereof, the base may be rotated so as to cause the ears 39 to slip over the studs 40, thereby effecting support of the burner base 16' by its shell 20. In order to preclude accidental removal of the burner 10 with the base member 16' relative to the shell 20, one or more of the ears 39 may be provided with an aperture aligning with a corresponding aperture in a stud 40 to receive a retaining member such as a cotter pin 41, thereby precluding relative rotation between the base member 16' and the shell 20 until such a time as the cotter pin 41 is removed.

It is to be noted that the portion of the burner shell 20 is removed to define an opening 42, in this instance of substantially rectangular configuration to extend vertically in communication with the bottom peripheral edge of the burner shell 20. The opening 42 serves to admit primary and secondary air to the burner 10 for assisting in the combustion of the fuel supplied thereto through the orifice 15. The primary air from the surrounding atmosphere enters through the burner shell opening 42 and passes around the fire pot or fuel receptacle 10 for entry to its interior through the holes or apertures 14 provided in the walls thereof. This effects primary combustion of fuel for the purpose of producing vaporization thereof. Thereupon the vaporized fuel together with the primary charge of air rises in the burner 10 for passage through the circular opening defined by the air register 29 which is in alignment with a correspondingly sized opening 43 provided, in this instance, in the bottom plate 30 of the combustion chamber. To this end, the bottom plate 30 has a peripheral upturned flange formed axially therein to define the opening 43 which admits the primary charge of the fuel therethrough for consequent introduction in the combustion space 44 defined by a shell 45 preferably though not essentially constituting the interior of an air, water or other type of heater as commercial practice may dictate.

The combustion shell 45 may be provided with a baffle plate 46 which centrally sustains a tube 47 for directing the passage of the hot gases of combustion into that portion of the heater or shell above the baffles 46 in direct contact with the air, water or other medium of transmitting heat. In order to insure complete combustion of the initial charge as it passes from the burner 10, more air is introduced for commingling therewith. The additional or secondary charge of air is admitted through the register 29 comprising, in this instance, a pair of circular plates 48 and 49. The plates 48 and 49 are disposed above each other in direct contact for confinement within the burner shell extension 28, the lower plate 48 having an axial cylindric projection 50 which registers with the interior of the burner 10 for support thereon and the top ridge 27 of the burner shell 20. Thence the register plate 48 telescopically projects within the burner 10 to maintain its fixed position relative thereto. The top register plate 49 is similarly shaped in size to the plate 48, and these have axial bores 51 in vertical alignment for direct communication with the opening 43 in the bottom plate 30. As a result, the products of combustion rise in the burner 10 through the openings 43 and 51 for introduction in the combustion chamber 44.

Co-incident with the passage of the products of combustion vertically upward in the burner 10 and through the openings 43 and 51, the secondary charge of air passes around the burner 10 for travel through substantially rectangular slots 52 and 53 circumferentially spaced in the plates 48 and 49, respectively. The slots 52 and 53 are of corresponding size and shape, preferably rectangular in configuration for radial positioning and uniform circumferential spacing so that the plates 48 and 49 constituting the register 29 may be rotated relative to each other to bring the slots or openings 52 and 53 in full or partial alignment as well as complete misalignments to vary the size of openings entirely therethrough for the passage or control of secondary air flowing therethrough. In order to facilitate the rotation of the top shutter plate 49, a radially extending lug 54 is formed thereon for projection through an opening 55 provided in the burner shell extension 28. Consequently, the handle projection 54 is freely accessible for rotation of the top shutter plate 49 within the limits of the slot or opening 55 so as to vary the openings 52—53 between the complete open

and closed positions thereof. It is to be noted that the upper shutter plate 49 is provided with depending projections 56 which are adapted to register with circumferential grooves 57 and 58 provided in the confronting surface of the lower shutter plate 48. In consequence thereof, the depending projections 56 will seat in the circumferential grooves 57 and 58 so that one is complemental to the other, and the aligned position definitely established and maintained for rotation relative to each other.

It is to be noted that the contacting surface of the shutter plates 48 and 49 are preferably ground or finished so as to constitute accurate counterparts in complemental association. The upper plate 49 may be oscillated relative to the plate 48 so as to bring the apertures or slots 52 and 53, respectively, of the shutter or air register into or out of registry to control the amount of air that will pass therethrough. The secondary air enters through the opening 42 together with the primary air, and passes upwardly around the burner 10 through the slots 52 and 53 in the air register 29, and thereupon this secondary supply of air is duplicated inwardly by the bottom plate 30 for passage toward the combustion zone or chamber 44 to mix with the hot products of combustion emerging from the confines of the burner 10, thereby completing the combustion to exactly the maximum thermal energy thereof. The secondary air in its traverse around the burner 10, is preheated by the time that it reaches the combustion chamber 44, thereby more than compensating for the cooling effect imparted thereto by the secondary air supply. The fact that the burner may be used for such fuels as oil or gas and its uses varied or adapted to different devices or appliances, renders it necessary or at least highly desirable that the supply of secondary air be capable of variation to meet varying atmospheric and other conditions of operation.

As shown, the burner shell 20 is suspended from the heater or bottom plate 30 by means of the bolts 32 which engage the flanges 31 of the burner shell extension or casing 28. Consequently, the point of attachment between the burner shell 20 and the heated plate 30 is effected along the top region of the former to avoid unnecessary fastener bolt lengths and to avoid undue confinement of the burner shell 20 most usually precluded from immediate accessibility with other known fastening expedients. With the particular complemental attaching expedients provided on the burner base 16' and burner shell 20, the burner 10 may be readily removed and replaced by the exercise of a slight twist to disengage or engage the ears 39 and the pins 40. This is accomplished without disturbing or influencing the adjustment of the air register 29. This affords immediate and ready access to the interior of the burner 10 for cleansing as well as replacement purposes. The burner 10 is initially ignited by allowing the fuel to collect along the bottom 12 thereof, and thereupon ignited by inserting a flame such as occasioned by a lighted piece of paper or similar expedients. This initiates burning of the fuel such as oil or gas, and combustion will be accelerated as the burner 10 is elevated in temperature. A substantial flame is thus produced with only the natural draft available under ordinary and varied atmospheric conditions. With the arrangement of parts above described, a simple, compact and very efficient fuel burner is provided for adaptation to numerous domestic and other appliances where oil or gas is available as a fuel. The fuel, in the case of oil, may be supplied through the register 15 under the influence of gravity without resort to any power feeding devices.

Various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages of the invention as defined in the appended claims.

I claim:

1. In an oil burner, the combination with a receptacle serving as a burner, of a base member secured to said burner receptacle, a burner shell to substantially enclose the burner receptacle, and cooperating means on said burner shell and base member for effecting detachable engagement responsive to a fractional relative turn therebetween so as to afford ready removal of said burner receptacle and enable complete accessibility to the interior of said burner shell.

2. In an oil burner, the combination with a receptacle serving as a burner, of a base member secured to said burner receptacle, a burner shell to substantially enclose the burner receptacle, cooperating means on said burner shell and base member for effecting detachable engagement responsive to a fractional relative turn therebetween so as to afford ready removal of said burner receptacle and enable complete accessibility to the interior of said burner shell, and means bridging said burner receptacle and shell to control the amount of secondary air directed thereabove into the path of the combustible mixture issuing from said burner receptacle.

3. The combination with a burner shell, of a fuel burner comprising an open topped receptacle with apertured walls, a bottom member positioned below and spaced from the bottom of said burner receptacle for attachment thereto, upstanding arms on said bottom member, and means on said burner shell comprising complements of said upstanding arms for interengagement therewith to detachably secure said receptacle thereto responsive to a partial relative turn between said burner receptacle and said shell.

4. A fuel burner comprising a receptacle, a casing around said receptacle and spaced therefrom, and interengaging means carried by said casing and receptacle respectively for effecting engagement and disengagement therebetween responsive to a slight twist of the receptacle relative to said casing about a vertical axis.

5. An oil burner comprising a burner member, a casing member substantially surrounding the walls of said burner member and spaced therefrom to define an air chamber therebetween, pins carried by one of said members, and cooperating instrumentalities on the other of said members to effect engagement and disengagement between said pins and cooperating instrumentalities responsive to a slight twist of one of said members relative to the other of said members.

6. A burner unit comprising an open topped receptacle, a bottom plate below said receptacle and spaced therefrom, said bottom plate having a plurality of upstanding arms terminating in laterally extending lugs, a casing member substantially enclosing said receptacle and spaced therefrom, and supporting instrumentalities near the lower part of said casing to engage and disengage said laterally extending bottom plate lugs responsive to relative rotary movement therebetween to render said receptacle readily attach-

able and detachable relative to said casing member.

7. A burner unit comprising an open topped burner receptacle, a bottom plate below said receptacle and spaced therefrom, said bottom plate having a plurality of upstanding arms around the periphery thereof to terminate in laterally extending lugs, a casing member substantially enclosing said receptacle and spaced therefrom, supporting instrumentalities near the lower part of said casing to engage and disengage said laterally extending bottom plate lugs, and means cooperating with one of said lugs for securely connecting the lugs and supporting instrumentalities to prevent accidental removal of said receptacle from said casing.

8. An oil burner comprising a fuel burner receptacle, a casing substantially enclosing said receptacle and spaced therefrom, means carried by the casing for controlling the amount of air passing from said casing and around said fuel burner receptacle and thereabove for commingling with the fuel mixture issuing therefrom, and interengaging means carried by said casing and receptacle respectively, said interengaging means being engaged and disengaged responsive to a twist of said fuel burner receptacle relative to said casing for quickly removing and replacing said fuel receptacle independent of said air control means.

9. An oil burner comprising a fuel burner receptacle having apertured walls for the passage of air therethrough, a casing substantially enclosing said receptacle and spaced therefrom, there being an opening in said casing for admitting air to the burner receptacle for passage through the apertures therein, means carried by the casing and disposed above said fuel burner receptacle for controlling the amount of air passing from said casing and around said burner receptacle and thereabove into the path of the combustible mixture issuing therefrom for commingling therewith, and complemental interengaging means carried by said casing and receptacle respectively, said interengaging means being engaged and disengaged responsive to a twist of said fuel burner receptacle relative to said casing for quickly removing and replacing said receptacle independent of said air control means.

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