July 9, 1940. H. M. REEVES 2,207,553

OIL BURNER

Filed July 19, 1937

Fig. 1

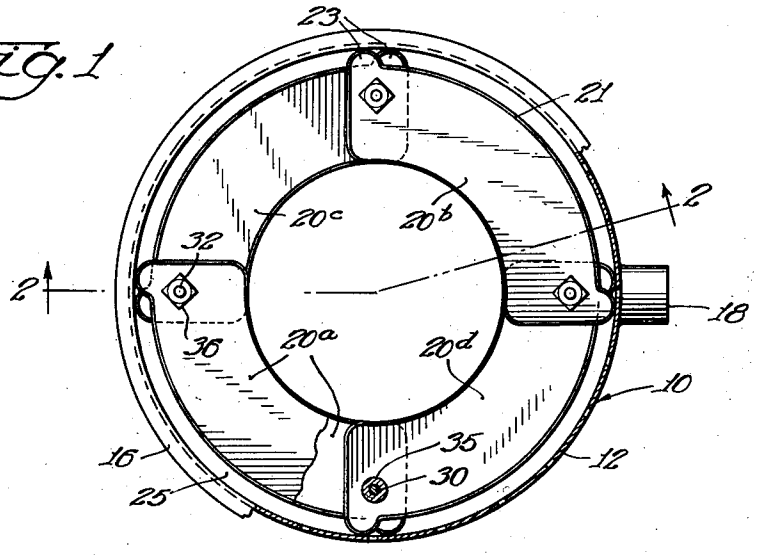


Fig. 2

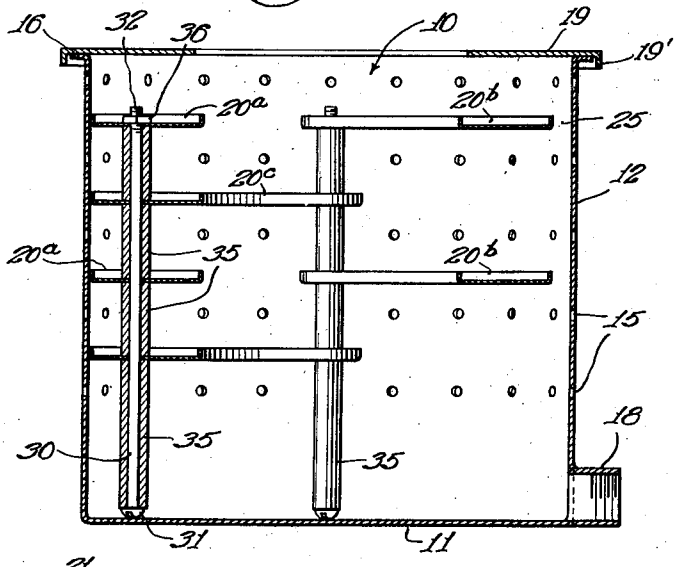
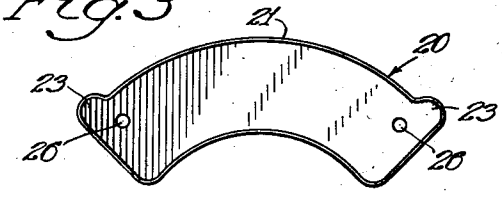


Fig. 3



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OIL BURNER

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Application July 19, 1937, Serial No. 154,410

13 Claims. (Cl. 158—91)

My invention relates to burners for liquid fuel and relates more particularly to burners of the pot type specially adapted for the consumption of oil.

Pot type burners have been known for many years but have been subject to certain disadvantages. An important objection to this type of burner in the forms previously known has been that such devices did not function efficiently at a low rate of fuel feed. Even in the case of devices which operated satisfactorily with high fuel consumption, when the fuel was turned down to a comparatively small ratio to the normal feed, the flame would either go out or else the fuel would burn with a flickering, yellow flame of low thermal efficiency and with a large deposit of carbon.

A special object of my invention is to provide a device of the type referred to which will be capable of effecting efficient combustion of oil fuels with a normal feed as well as with intermediate and low rates of feed. In other words, devices embodying my invention have what is known in the industry as a high "turn-down" ratio.

Another object of my invention is to provide a device of the type referred to which will be simple and inexpensive in construction.

Various other objects and advantages will become apparent as the description proceeds.

Referring now to the drawing forming a part of this specification and illustrating a preferred embodiment of my invention:

Fig. 1 is a top plan view of a pot burner embodying my invention, certain parts being broken away for added simplicity;

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1; and

Fig. 3 is a plan view of a baffle plate comprising an element of my invention.

The numeral 10 indicates a pot or container wherein combustion takes place. Although I have shown this pot in a simple and substantially standard form it will be understood that the same may be modified in various ways and still come within the spirit of my invention. In the embodiment shown, the pot is substantially cylindrical, having a bottom wall 11 and a side wall 12 provided with vertically and horizontally spaced apertures 15, said apertures being arranged in horizontal rows, and said wall 12 terminating at the top in an outwardly extending flange 16. The side wall is provided at or near the bottom with an opening to which is connected a threaded nipple 18 whereby fuel is introduced into the bottom of the pot. At the top of the pot, resting on the flange 16, is an annular plate 19 having a depending positioning flange 19'.

Arranged within the chamber or pot 10 is a plurality of baffles 20 arranged in staggered relation to each other. It will be noted by reference to Fig. 3 that each of the baffles 20 is substantially arcuate in form, defining an annular segment. In the embodiment shown the baffles 20 are stamped out of sheet metal or the like and are preferably formed with a continuous peripheral flange 21 for stiffening against the warping effects of heat. It will be understood, however, that the baffles may be cast or formed in any other suitable manner. Each baffle is preferably provided with an outwardly extending boss 23 at each end, whereby said baffle plates are spaced inwardly from the wall 12 of the pot, as defined by the space 25.

The baffles 20 are supported in the following manner: Each plate 20 is provided with an aperture 26 spaced a like distance from each end and through these apertures extends a stud 30. Each of the studs 30 carries a slotted head 31 on its lower end and is threaded at its upper end as at 32. Sleeves 35 are loosely arranged on the studs 30, said sleeves serving to support the baffle plates 20 and to maintain them in properly spaced relation, nuts 36 being threaded onto the ends of the studs to maintain all of the parts in properly assembled relation.

It will be seen that I have provided the baffle plates 20 in oppositely disposed pairs, the pairs being arranged in staggered horizontal relation at different levels. Thus the baffles 20*a* and 20*b* are disposed opposite each other at a given level, another pair 20*c* and 20*d* being disposed opposite each other on a lower level, but on the same level with each other, said baffles 20*c* and 20*d* being staggered angularly with reference to the baffles 20*a* and 20*b* so as to register vertically with the spaces between said baffles 20*a* and 20*b*. Similarly, baffles 20*e* and 20*f* are arranged opposite each other in vertically spaced relation to the baffles 20*c* and 20*d* and angularly staggered with reference thereto, the baffles 20*e* and 20*f* being disposed substantially in vertical registry with the baffles 20*a* and 20*b*, and so on. Thus I have provided a series of fragmentary staggered annular baffle plates at different levels within the pot, said plates defining a central combustion zone extending vertically from the top of the burner to the lowest point at which combustion can efficiently be maintained.

Although I have provided in the embodiment shown that each of the plates **20** be of such length as to subtend approximately 90° (this approximately being the arc between the holes **26**), it will be understood that this length of arc has been chosen merely for convenience. The plates might be of any desired length, so long as they are interrupted, whereby the flame and gases may easily rise from lower to higher levels.

It will be seen from an inspection of Fig. 2 that apertures **15** are provided below each pair of baffles and that a row of apertures is also preferably provided between the uppermost baffles **20***a* and **20***b* and the top edge of the pot.

The operation of the device will be apparent from what has gone before. Fuel is fed through nipple **18** and vaporizes in the pot. At a high rate of fuel feed the volume of gases sustains combustion in active form in the upper portion of the pot, the various baffles all serving to direct primary and secondary air into admixture with the gases and flame. At various degrees of turn down, the flame burns at certain zones or positions below the top of the device due to the centralizing effect of the baffles on the gases and inrushing air currents. The zone or position in which flame is active depends entirely upon the particular rate of fuel feed. By having baffles arranged in staggered relation I am able to effect efficient combustion at intermediate turn down ratios between the highest and lowest rates of feed, the baffles serving to confine the flame, avoiding all possibility of the flames flickering and going out. At all stages there is obtained a perfect flame indicating complete combustion. In actual practice I have been able to obtain as high a turn down ratio as 10 to 1, with highly efficient combustion.

An important advantage of my invention is that the number of baffles and vertical distances therebetween may be readily changed in an obvious manner to permit different stages of "turn-down." Also, the baffles may be removed and baffles of different shape and size substituted therefor. Such removability also facilitates cleaning.

Various changes coming within the spirit of my invention will become apparent to those skilled in the art, and hence I do not wish to be limited to the specific form shown or uses mentioned, except to the extent indicated in the appended claims, which are to be interpreted as broadly as the state of the art will permit.

I claim:

1. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having means for introducing fuel into the lower portion thereof and a plurality of vertically staggered removable baffle members arranged within said container, said baffle members defining a central passage for the products of combustion, said container also having openings for the admission of air below and between said baffles.

2. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having means for introducing fuel into the lower portion thereof, and a plurality of vertically staggered baffle members arranged within said container, said baffle members defining a central passage for the products of combustion, said container also having openings for the admission of air below and between said baffles, said baffles being removable from the container as a unit.

3. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having a plurality of substantially segmental annular baffle plates arranged in staggered relation therein, said container having perforations in its side walls for admission of air below each of said baffles and having means for the introduction of fuel into the lower portion thereof.

4. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, and a plurality of segmental annular baffle plates arranged in staggered relation therein, said pot having perforations in its side walls for admission of air below each of said baffles and having means for the introduction of fuel into the lower portion thereof, said baffles being mounted for removal from said pot.

5. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having a central opening at the top and having means for introducing fuel into the lower portion thereof, and a plurality of staggered baffles defining a relatively large substantially uninterrupted vertical central passage and a substantially uninterrupted relatively narrow vertical annular passage adjacent the inside of the container wall, said container being provided with means for the introduction of fuel adjacent the bottom thereof and with openings for the admission of air below and between said baffles.

6. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having a central opening at the top and having means for introducing fuel into the lower portion thereof, and a plurality of staggered baffles defining a relatively large substantially uninterrupted central vertical passage and a substantially uninterrupted relatively narrow vertical annular passage adjacent the inside of the container wall, said container being provided with openings for the admission of air below and between said baffles, said baffles being mounted for removal as a unit from said container.

7. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having a central opening at the top and having means for introducing fuel into the lower portion thereof, and a plurality of vertically staggered baffle plates arranged within said container, said baffle members defining a central passage for the products of combustion, said baffles being mounted for removal individually and as a unit from said container, and said container also having openings for the admission of air below and between said baffles.

8. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having a central opening at the top and having a plurality of baffle members arranged within said container, each of said baffle members being a segment of an annular plate defining an arc not substantially greater than about 90°, a plurality of such baffles being arranged at a plurality of levels within said container, the baffles at each level being in substantial registry with the openings between the baffles of the next adjacent level, said container having means for the introduction of fuel into the lower portion thereof and having openings for the admission of air below and between said baffles.

9. In a device of the class described and in combination, a pot like container for the burning of liquid fuel, said container having a central opening at the top and having a plurality of baffle members arranged within said container, each of said baffle members being a segment of an annular plate and defining an arc not substantially greater than about 90°, a plurality of such baffles being arranged at a plurality of levels within said container, the baffles at each level being in substantial registry with the openings between the baffles of the next adjacent level, said containers having means for the introduction of fuel into the lower portion thereof and having openings for the admission of air below and between said baffles, said baffles being mounted for removal individually and as a unit.

10. In a device of the class described, in combination, a pot-like container for burning fluid fuel, the wall of said container being provided with a plurality of air inlet apertures located at various levels, and a baffle unit located within said container, said unit including a plurality of generally upright supports and a plurality of segmental and vertically staggered baffle members mounted on said supports, said baffle members being located at levels above the lowest and below the highest of said air inlet apertures, said baffle members defining a central generally vertical passage.

11. In a device of the class described, in combination, a pot-like container for burning fluid fuel, the wall of said container being provided with a plurality of air inlet apertures located at various levels, and a baffle unit located within said container, said unit including a plurality of generally upright supports and a plurality of segmental and vertically staggered baffle members mounted on said supports, said baffle members being located at levels above the lowest and below the highest of said air inlet apertures, said baffle members defining a central generally vertical passage, said baffle members being arranged with a pair of diametrically opposed baffle units at each of a plurality of levels, the units in each said level being staggered in relation to the units at adjacent levels.

12. In a device of the class described, in combination, a pot-like container for burning fluid oil, said container having air inlet apertures at various levels in the wall thereof, and a unitarily removable baffle unit located within said container, including a plurality of generally upright supports, and a plurality of segmental and vertically staggered baffle members defining a central generally vertical passage, said baffle members each subtending an arc slightly in excess of ninety degrees, said baffle members being arranged in pairs with a pair of diametrically opposed baffle members at each of a plurality of levels, the members in each level being staggered in relation to the corresponding members of adjacent levels, and spacing sleeves, threaded upon said uprights, interposed between the vertically spaced baffle units, said spacing sleeves and baffle members being removable from said upright supports.

13. In a device of the class described, in combination, a pot-like container for burning fluid oil, said container having air inlet apertures at various levels in the wall thereof, and a unitarily removable baffle unit located within said container, including a plurality of generally upright supports, and a plurality of segmental and vertically staggered baffle members defining a central generally vertical passage, said baffle members each subtending an arc slightly in excess of ninety degrees, said baffle members being arranged in pairs with a pair of diametrically opposed baffle members at each of a plurality of levels, the members in each level being staggered in relation to the corresponding members of adjacent levels, and spacing sleeves, threaded upon said uprights, interposed between the vertically spaced baffle units, said spacing sleeves and baffle members being removable from said upright supports, each individual baffle member having spacing means adapted to space it inwardly from the container wall, whereby air is permitted to flow upwardly about the outer edge of each such baffle member.

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