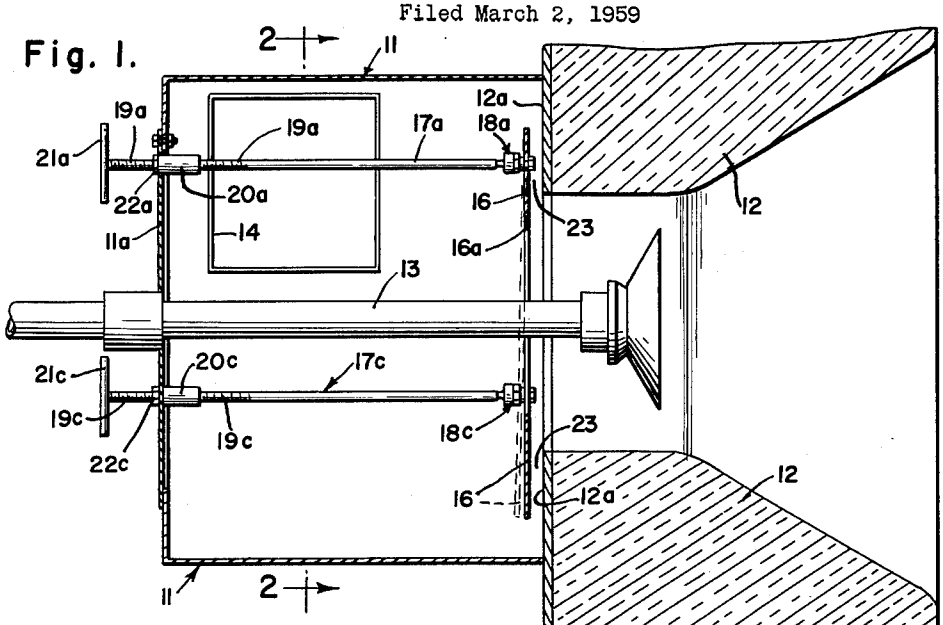
May 16, 1961 J. T. VOORHEIS 2,984,296

ADJUSTABLE AIR REGISTER FOR OIL OR GAS BURNERS

Filed March 2, 1959

Fig. 1.



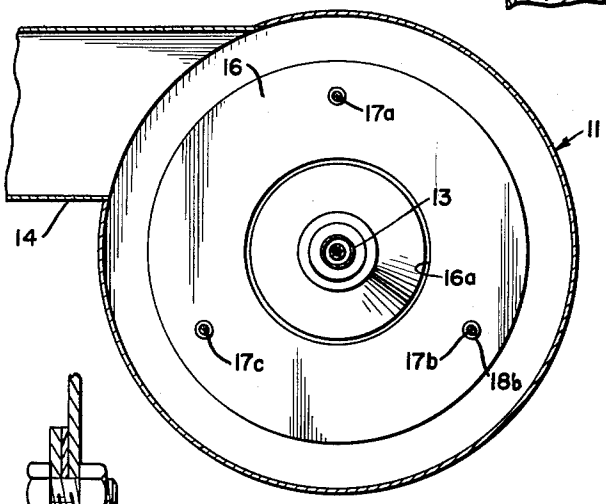


Fig. 2.

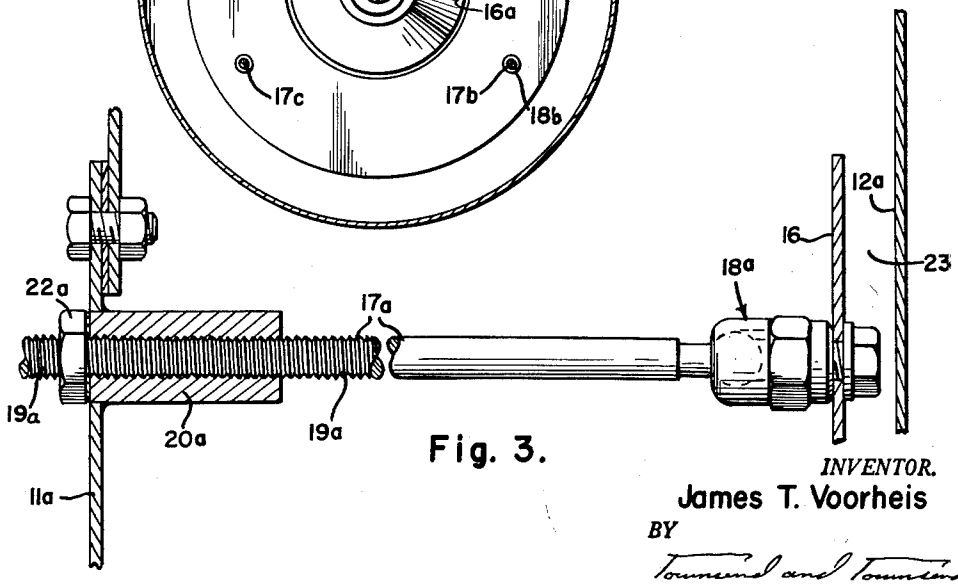


Fig. 3.

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ADJUSTABLE AIR REGISTER FOR OIL OR GAS BURNERS

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4 Claims. (Cl. 158—1.5)

This invention relates to a forced air draft burner construction and more specifically relates to an adjustable control means for balancing the air flow from a burner into the throat entrance of a combustion chamber.

The particular embodiment of the invention which is illustrated in the drawings and which will be described hereinafter in more detail is used in combination with a burner housing of substantially circular cross-section and having a discharge opening positioned coaxially adjacent the entrance opening to a combustion chamber throat and through which said housing a forced draft of air is caused to flow into the throat entrance. The means for adjustably controlling the flow of air in substantially uniform flow through 360° circumference of said entrance opening comprises an annular baffle plate defining a central bore or hole and which is supported within the housing in spaced coaxial alignment relative to the wall surrounding the throat entrance. The outer diameter of the baffle plate is substantially smaller than the interior diameter of both the housing and throat entrance so as to provide an air passage between the baffle plate and the interior face of the wall surrounding the throat entrance through which a portion of the forced air will normally flow. The central bore of the plate is of smaller diameter than the entrance and provides an axial passage through which the majority of the forced air draft of the housing flows into the throat entrance. In the specific embodiment of the invention shown in the drawings, the baffle plate is adjustably supported in the housing so as to permit the same to be canted in a desired plane so as to move any one side of the baffle plate relatively closer to the wall surrounding the throat entrance than an opposite side of the plate. This permits the size of the air passage between the plate and the wall surrounding the throat entrance to be varied from one side relative to the other, and which, in turn, permits the volume of air flow into the throat entrance to be modified and made uniform through 360° circumference of the said entrance.

A principal object of the present invention is to provide an extremely simple and effective means for adjustably uniformly controlling the flow of air into a throat entrance of a combustion chamber through 360° circumference of the throat entrance.

A more specific object of the invention is to provide as a means for controlling the air flow into the throat entrance a novel baffle plate assembly that can be adjustably canted with reference to the axis of the housing and throat entrance.

A further object is to provide novel mounting means for accomplishing the adjustable canting of the baffle plate.

Other objects and advantages of the invention will become apparent upon having reference to the following specification and accompanying drawings in which similar characters of reference designate corresponding parts in each of the several views.

In the drawings:

Fig. 1 is a longitudinal sectional view of a burner unit incorporating an embodiment of the present invention;

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

Fig. 3 is an enlarged fragmentary side elevational view of one of the baffle plate mounting shaft assemblies.

Referring now more specifically to the drawings, there is shown somewhat diagrammatically a circular burner housing as indicated generally at **11**. The discharge side of the housing is positioned adjacent and in coaxial alignment relative to the mouth opening of a refractory tile throat entrance **12** leading into a combustion chamber.

Mounted interiorly and axially of the burner housing is a conventional oil gun assembly **13** which is adapted to spray either steam or mechanically atomized oil into the throat entrance **12** for intermixture and combustion with air supplied thereto through the housing **11**. The air to the housing **11** is supplied via an air inlet duct **14** which communicates from the discharge side of a fan or blower (not shown). For purposes of understanding the nature of the present invention, it may be assumed that all of the components **11–14**, inclusive, and their normal mode of operation, may be considered as typical or conventional in the art of oil burners, and no claim to invention to any of these components per se is made herein.

The forced draft of air entering the housing **11** from air duct **14** at substantially right angles to the axis of the housing will create various types of air currents and eddy flows within the housing, some predictable and some not, although air from duct **14** will arrange itself in a general axial flow pattern through the discharge side of housing **11** into the refractory tile throat entrance **12**. As might be anticipated, however, the various and diverse air currents and eddy flows created within the housing **11** will generally result in more air flowing into the throat entrance **12** at one side of the opening than the other. Stated otherwise, the general pattern of air flow through the discharge side of the housing into the throat entrance **12** will not be perfectly uniform or balanced throughout 360° circumference of the opening. Therefore, and as will also be readily appreciated by those skilled in the art, wherever there is an unbalance of air entering a combustion chamber for admixture with the oil spray, there will also occur an unbalanced or non-uniform condition of burning between the fuel and air.

In order to adjustably regulate and balance the air flow from housing **11** into the throat entrance **12** for uniform air distribution and intermixing with the fuel, I provide an annular baffle plate or ring **16**. Plate **16** is mounted interiorly of housing **11** adjacent, but spaced rearwardly from, the mouth opening of the throat entrance **12** and in coaxial alignment with both the axes of the housing and the throat entrance **12**. The outside diameter of baffle plate **16** is substantially larger than the interior diameter of the throat opening to the entrance; whereas, the interior diameter of the center bore or hole **16***a* in the baffle plate is substantially smaller than the interior diameter of the tile throat entrance opening.

The baffle plate **16** is mounted in a plane generally normal or pendendicular to the axis of the housing and the throat entrance **12**. However, by supporting means now to be described in more detail, the baffle plate may be canted from perpendicular, whereby any one side of the baffle plate may be moved further away or closer toward the face of the wall **12***a* of the furnace than an opposite side of the baffle plate.

The supporting means which mount the baffle plate within the housing comprise three support shafts or rods indicated at **17***a*, **17***b* and **17***c*. The shafts extend lengthwise exteriorly of the housing and are connected adjacent their

inner ends to the baffle plate **16** at equiangularly and equidistantly spaced points thereon. More specifically, the inner end of shaft **17***a* is mounted to the baffle plate by a ball and socket connection of conventional design such as indicated at **18***a*. The ball and socket joint **18***a* provides for universal movement between the inner end of the shaft and the baffle plate. The rearward extremity of shaft **17***a* is threaded as at **19***a*, and projects through a supporting sleeve **19***a* which is rigidly mounted, as by welding, to the interior rear housing wall **11***a*. The threaded portion of shaft **17***a* is threadedly engaged with its associated supporting sleeve **20***a* and the outer end of said shaft projects bevond the rear housing wall **11***a* and is provided with a suitable lever or handle **21***a* by which it is possible to manually rotate said shaft in either a clockwise or counterclockwise direction. A lock nut or jam nut **22***a* is threadedly mounted on the outer extremities of shaft **17***a* which can be loosened or tightened to maintain said shaft **17** in any desired position of rotation.

As indicated in the drawings, each of the other shafts **17***b* and **17***c* are threadedly supported within supporting sleeves and are also provided with lever or handle means and lock nuts operable to permit rotation of the shafts and to lock the same in any desired position of rotation. All the sleeves, handles, and lock nuts are numbered correspondingly, but are suffixed by the letters, *a*, *b* and *c* to distinguish them in the drawings.

In operation, air flowing into the housing **11** from air duct **14** will, as aforesaid, form itself into a general flow pattern into the throat entrance **12**. More specifically, the major part of the air flow will pass through the center hole or opening **16***a* of the baffle plate **16** and flow in an axial direction of travel through the discharge side of the housing **11** into the throat entrance. A portion of the forced draft air in housing **11** will, however, flow around the baffle plate **16** and through the annular passage **23** defined by the spacing between the baffle plate and the wall surrounding the face of the throat entrance. The amount of air that will flow through any specific area or portion of the annular passage **23** will depend in large measure upon the size of the passage at that particular area. Consequently, by restricting or enlarging the passage **23**, it is possible and feasible to adjust the total amount of air flowing into the throat entrance through 360° of circumference of the entrance opening. Variation in the passage size may be accomplished by canting the baffle plate at an oblique angle with reference to the longitudinal axis of the burner housing and throat entrance. The canting of the plate may be accomplished by adjustably lengthening and shortening the supporting shafts **17***a*, *b* and *c*. For example, Fig. 1 discloses how the shafts may be independently rotated within their threaded sleeve supports **19***a*, *b* and *c* in such manner that the upper shaft **17***a* is extended relatively further into the housing than either of the lower shaft supports **17***b* or *c*. As a consequence, the baffle plate **16** is canted (as illustrated in broken lines) so that the upper side (adjacent coupling **18***a*) is spaced relatively closer to the wall surrounding the face of the throat entrance **12** than the opposite or lower side of the baffle plate (adjacent couplings **18***b* and *c*). As a consequence, less air will be permitted to flow through the upper portion of passage **23** into the throat entrance **12** than will be permitted to flow through the lower side of passage **23** into the lower extremities of said throat entrance.

By being able to adjustably control the amount of air that is permitted to flow from the housing into opposite sides of the throat entrance, it is of course possible to regulate the air flow so that it is introduced into the throat entrance in a substantially uniform volume and/or velocity throughout the 360° of opening. The unbalance of air flow in any given burner housing and the adjustment, if any, required to balance the flow may be determined by observation or empirical tests with reference to each burner installation. Generally speaking, therefore, the baffle plate **16** will be initially installed in a plane substantially perpendicular to the axis of the housing **11** and will thereafter be canted (if necessary) to compensate for unbalanced air flow into the throat entrance after the installation is completed.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention as limited only by the scope of the claims appended hereto.

I claim:

1. In combination with a furnace having a combustion chamber and a throat through the wall of said furnace, means forming an entrance opening to said throat, a forced air draft burner housing having a discharge opening positioned coaxially adjacent said entrance opening to and through which a forced draft of air having an axial component of movement through said housing is supplied via said housing into said entrance opening, means for adjustably controlling the flow of air comprising an annular baffle plate defining a central opening; support means mounting said plate interiorly of said housing in spaced coaxial alignment relative to said entrance opening and in a plane generally normal to the axis of said housing; the outer diameter of said baffle plate being substantially smaller than the interior diameter of the housing and larger than the diameter of the said entrance opening to provide an air passage between the outer periphery of the baffle plate and the interior of the housing and extending between the baffle plate and the face of said wall and through which said passage a portion of the forced air draft is adapted to normally flow; the central opening through said plate being of smaller diameter than the diameter of said entrance opening; and means, including said support means, for adjustably canting said plate to move any one side of said plate relatively closer to said wall than an opposite side thereof, whereby the size of the air passage between the plate and the face of said wall may be varied from one side relative to the other.

2. The combination of claim 1, and wherein said support means comprises at least three shafts extending axially lengthwise interiorly of said housing and connected respectively to said baffle plate at equiangularly and equidistantly displaced spaced points thereon; and means for independently adjustably lengthening and shortening said shafts relative to one another to permit adjustable canting of said plate relative to said wall.

3. The combination of claim 2, and wherein each said shaft is connected to said baffle plate by a wall and socket joint.

4. The combination of claim 3, and wherein the outer extremities of said shafts are threadedly mounted in supporting sleeves whereby rotation of said shafts will cause the inner ends to relatively extend or retract within said housing.

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