Sept. 20, 1932. T. A. RONSTROM 1,878,427

GAS BURNING HEATER

Original Filed Aug. 31, 1927

Fig. 1.

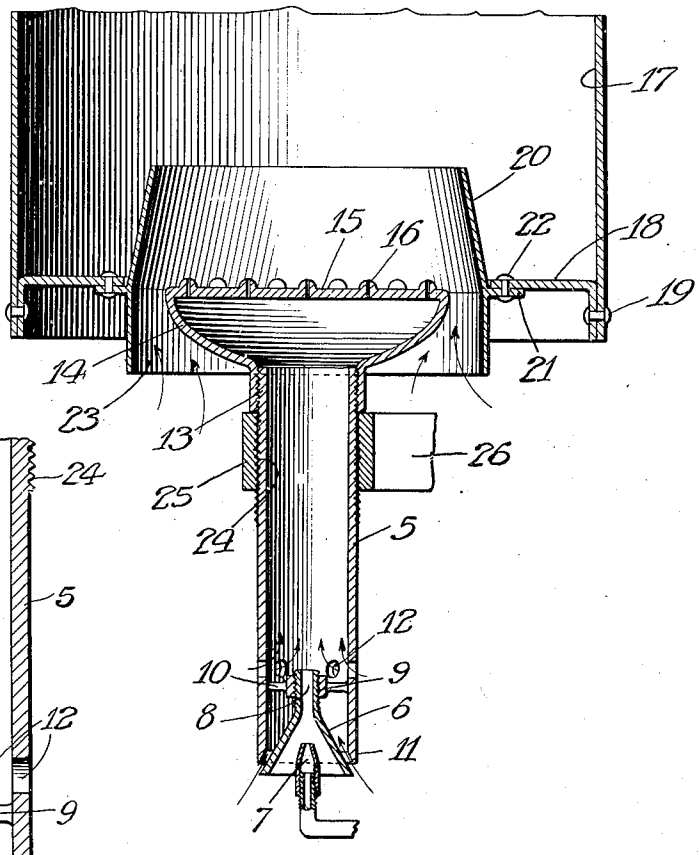
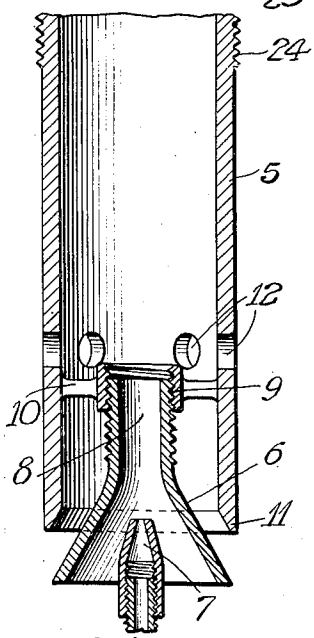


Fig. 2.



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UNITED STATES PATENT OFFICE

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GAS BURNING HEATER

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My invention relates in general to gaseous fuel burners and has particular reference to a burner for use in combination with various types of heaters, such, as for instance, domestic water heaters, or in fact any other heaters in which the heat is confined within a casing.

The primary object of my invention is to provide means for generating heat within a heating chamber through the efficient combustion of a properly proportioned supply of air and gas so as to derive a maximum heating efficiency.

Another object of this invention is to provide means for increasing the proportion of the mixture of gas and air which during operation passes through the mixing chamber of the burner to the point of combustion, and to correspondingly reduce the supply of air admitted into the combustion chamber for the purpose of completing the combustion. The advantage of such an arrangement will result in the development of a higher temperature of the products of combustion, but with a reduced volume.

The invention possesses other objects and features which will be hereinafter referred to as the description proceeds with reference to the illustrative embodiment of the invention shown in the accompanying drawing.

In said drawing—

Figure 1 is a view in vertical section showing my improved burner in combination with a portion of a specially designed combustion chamber.

Figure 2 is a view in vertical section showing a part of the burner on an enlarged scale.

Referring now to the drawing in detail, I will first describe the construction of the burner, the same preferably comprising a relatively long, cylindrical tube cylinder or the like 5, the respective ends of which being open and having an unobstructed passage through the same. This tube or cylinder 5 serves as an elongated mixing chamber, the same being elongated for the purpose of assuring a complete mixing of the air and gas passing therethrough.

Positioned in the lower end of the mixing chamber 5 is a funnel-shaped primary mixing chamber 6 comprising a flared skirted portion which surrounds the gas nozzle 7 and terminates in an upstanding throat 8 which is disposed centrally of the mixing chamber 5. The throat 8 is externally threaded so that the same may be screwed into a sleeve 9 which is carried by the spider 10 and co-axially disposed within the mixing chamber 5. The lower open end of the mixing chamber 5 is flared as at 11 with the flare corresponding to the flare of the skirt of the primary mixing chamber, so that by turning the primary mixing chamber in its threaded engagement with the sleeve 9 the annular opening between the skirt of the primary mixing chamber and the end of the mixing chamber 5 may be adjusted for increasing or decreasing the amount of air introduced therethrough. By threading the primary mixing chamber all the way up into the mixing chamber 5 this opening may be entirely closed. The reason for closing the intake will be presently described. Normally, of course, the same will be opened to adjusted degree.

With this construction and arrangement of parts the tubular cylinder 5 becomes, in reality, a secondary mixing chamber in that the gas introduced through the nozzle 7 into the primary chamber 6, will be liberated through the restricted throat 8 into the mixing chamber 5 where an additional quantity of air will be mixed with the gas, the same entering through the adjustable opening in the bottom of the adjustable chamber 5.

Arranged around the chamber 5 adjacent the termination of the restricted throat 8, is a series of openings 12 which also serve to introduce a secondary air supply into the secondary mixing chamber 5.

Threaded as at 13 on the upper end of the secondary mixing chamber 5 is a burner head 14, the same having a very much larger diameter than the secondary mixing chamber 5 and preferably having flared side walls so as to act as a spreader for the mixture introduced therein. The top 15 of the burner head is preferably flat or it may be made in any other suitable design, and the burner tips 16 are distributed in spaced relation over the face thereof.

The combustion chamber which I have elected to illustrate the application of my improved burner is also of especially designed construction and it also involves several novel features in itself both in combination with the particular kind of burner described or in combination with any other type of burner.

The point I wish to make clear is that the salient features of the combustion chamber are not necessarily limited to my improved form of burner, nor is my improved form of burner necessarily limited to the combustion chamber shown.

The heating chamber 17 will be disposed below the coils or other part of the heater to be heated by the products of combustion of the burner. Disposed at the bottom of the heating chamber 17 is an annual internal flange 18 which may be secured by the rivets 19 to the side of the heating chamber so as to provide a supporting ledge for the cylindrical combustion chamber 20. The combustion chamber being supported by the flange 18 intermediate the ends of the skirt or wall thereof and an annular flange 21 on the outside of the skirt may be used for this purpose. The flange 21 may be secured to the flange 18 by rivets or the like 22. The skirt 20 surrounds the burner head 14 to leave an unobstructed air intake 24 from atmosphere around the burner head and into the heating chamber 17. For a portion of its height the skirt 20 has perpendicular walls or substantially perpendicular walls, the remaining height of the same being slanted inwardly as illustrated. The purpose of this is to direct the incoming air over the jets of the burner head and also to adjust the opening around the burner head for increasing or decreasing the introduction of air through the opening 23. This adjustment is effected by raising or lowering the burner head 14 relatively of the inwardly slanting part of the skirt 20. In order to provide for this adjustment the exterior of the tube or cylinder which makes up the secondary mixing chamber 5 may be screw-threaded as at 24 so that it may be threaded into a collar 25 which is supported on the end of a bracket arm 26. With this construction it will readily be seen that by turning the secondary mixing chamber 5 in the collar 25, the burner head, or in fact the entire burner structure, may be elevated or lowered, which will develop the required adjustment of the head 14 relatively to the skirt 20 and thus increase or decrease the area of the secondary air supply developed by the opening 23 around the burner head.

Referring now particularly to the advantages of the burner apart from any combination features with the particular kind of combustion chamber described attention is directed to the fact that I have found in practice that I am able to provide a gas burner by which a comparatively rare mixture of gas and air may be burned with perfect combustion and without danger of backfiring.

Another feature of the invention, so far as concerns the burner, is the possibility of using the burner in a heating device with the burner enclosed in the casing without carbonization or formation of soot in any part of the heating chamber.

The formation of soot in gas heating devices is generally caused by incomplete combustion due to an insufficient supply of primary air and consequently too rich a mixture of gas and air supplied to the points of combustion.

With my improved burner I am able to supply the required volume of air so as to develop complete combustion without backfiring, consequently all of the gas will be completely consumed and no carbon can possibly be deposited on any parts of the combustion chamber. A comparative rich mixture of air and gas will pass from the primary mixing chamber 6 into the secondary mixing chamber 5 with sufficient force and rapidity to draw an additional supply of air into the secondary mixing chamber through the air intake openings 12 as well as through the adjustable air intake in the bottom of the secondary mixing chamber, the mixture being then introduced into the burner head 12 where it may be ignited at the jets 16 in the top 15. The air introduced through the secondary air intake opening 23 at the top of the burner will be sufficient to assure a completion of the combustion of all combustible mixture discharged from the burner head.

The combination of the burner with the particular kind of combustion chamber illustrated will develop advantageous results because the burner is supermounted in the lower part of the heater with the burner top within the combustion chamber and the gas connections and all intake openings on the outside of the combustion chamber so as to permit a free and unobstructed communication between the interior of the burner and atmosphere which surrounds it. In order to admit sufficient supply of secondary air directly to the point of combustion and at the same time adjust the volume of the secondary air supply, the burner head, as previously stated, may be elevated and lowered in the opening of the skirt 20.

In order to further advance the theory involved in my invention I will call particular attention to the fact that while the sole function of the primary air chamber is to support combustion, the function of the secondary air particularly in a heating device which is enclosed within a casing is twofold, namely to complete combustion if the primary air supply is insufficient therefor and to provide for an unobstructed passage for the products of combustion from the top of the burner. It will be readily seen that by increasing the primary air supply sufficiently the secondary air intake openings on the heater casing may be reduced to a minimum.

Obviously those skilled in the art may make changes of the detailed construction and combination of parts illustrated in the drawing without departing from the spirit of the invention as defined by the subjoined claims and I therefore do not care to be limited to the exact construction shown and described.

I claim:

1. A gas burner comprising a heating chamber; a combustion chamber extending through a wall of said heating chamber and open at both ends; a burner head mounted in said combustion chamber, there being an air space around the periphery of said head; an elongated cylindrical secondary mixing chamber threaded at one end into said burner head; a support for said secondary mixing chamber having threaded connection therewith permitting of adjustments of said head; a threaded spider at the other end of said secondary mixing chamber; a primary mixing chamber in inverted funnel form, the throat of said funnel being threaded in said spider and the flaring portion of said funnel protruding from the end of said secondary mixing chamber, the edges of the latter being flared to correspond with said funnel and there being air openings in the walls of said secondary mixing chamber adjacent the throat of said primary mixing chamber; and a gas nozzle discharging into said primary mixing chamber.

2. A gas burner comprising a heating chamber; a combustion chamber extending through the bottom of said heating chamber and open at both ends, the upper end being inwardly converging in form; a burner head adjustably mounted in said combustion chamber, there being an air space around the periphery of said head; an elongated cylindrical secondary mixing chamber threaded at one end into said burner head; a support for said secondary mixing chamber having threaded connection therewith permitting of adjustments of said head; a threaded spider in the other end of said secondary mixing chamber; a primary mixing chamber in inverted funnel form, the throat of said funnel being threaded in said spider and the flaring portion of said funnel protruding from the end of said secondary mixing chamber, the edges of the latter being flared to correspond with said funnel and there being air openings in the walls of said secondary mixing chamber adjacent the throat of said primary mixing chamber; and a gas nozzle discharging into said primary mixing chamber.

3. A gas burner comprising an elongated cylindrical secondary mixing chamber having a burner head at one end; a threaded spider on the other end of said secondary mixing chamber; a primary mixing chamber in inverted funnel form, the throat of said funnel being threaded in said spider and the flaring portion of said funnel protruding from the end of said secondary mixing chamber, the edges of the latter being flared to correspond with said funnel and there being air openings in the walls of said secondary mixing chamber adjacent the throat of said primary mixing chamber; and a gas nozzle discharging into said primary mixing chamber.

4. A gas burning heater comprising a heating chamber having side walls and a bottom, there being an opening in the bottom; a vertically arranged combustion chamber communicating with said heating chamber through said opening, the upper portion of the walls of said combustion chamber converging inwardly; a burner located in said combustion chamber and of a size to leave a relatively narrow space between it and the sides of said combustion chamber; and means for adjusting said burner and combustion chamber relatively to each other to regulate the flow of air through said combustion chamber.

5. A gas burning heater comprising a heating chamber having side walls and a bottom, there being an opening in the bottom; a vertically arranged combustion chamber communicating with said heating chamber through said opening, the side walls of said combustion chamber being imperforate and the upper portions of said side walls converging inwardly, the top and bottom of said combustion chamber being freely open; a burner located in said combustion chamber and of a size to leave a relatively narrow space between it and the sides of said combustion chamber; and means for adjusting said burner vertically in said combustion chamber to regulate the flow of air therethrough.

6. A gas burning heater comprising a heating chamber having side walls and a bottom, there being a central circular opening in the bottom; a vertically arranged combustion chamber fitting through said opening and having an external securing flange secured to said bottom, the side walls of said combustion chamber being imperforate and

tapering inwardly at their upper ends, said combustion chamber being freely open at top and bottom; a circular burner located in said combustion chamber and of a size to leave a relatively narrow space between it and the sides thereof; and means for vertically adjusting said burner in said combustion chamber to regulate the flow of air therethrough.

In witness that I claim the foregoing as my invention, I affix my signature this 29th day of August A. D. 1927.

THOMAS A. RONSTROM.