Aug. 22, 1939. U. R. GOODALE 2,170,139

GAS BURNER

Filed Feb. 8, 1937

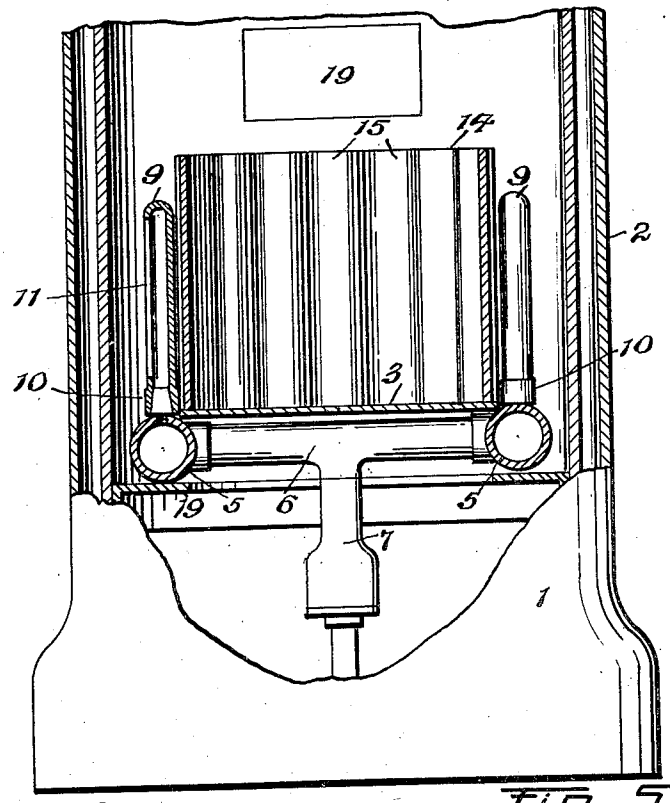


Fig. 1.

Fig. 3.

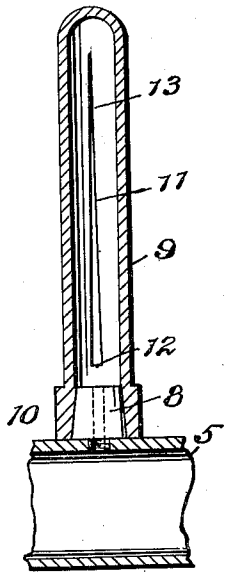


Fig. 4.

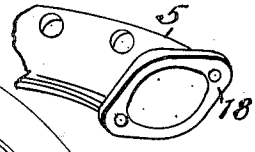


Fig. 5.

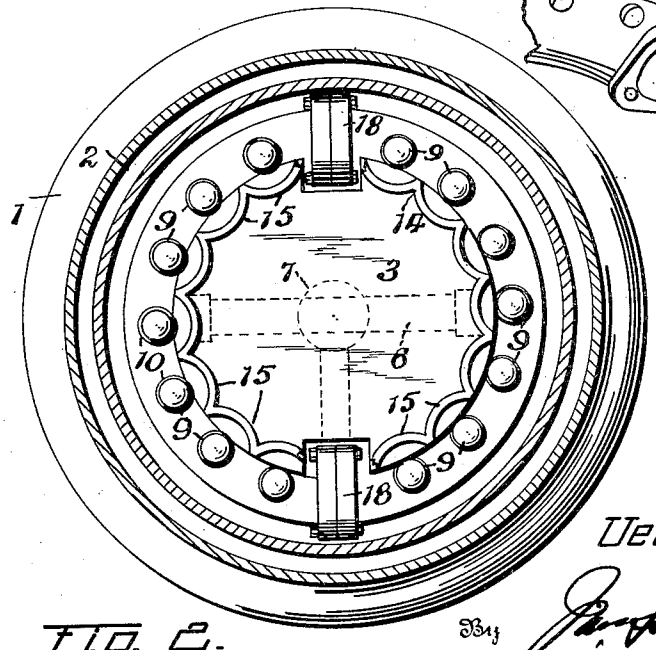
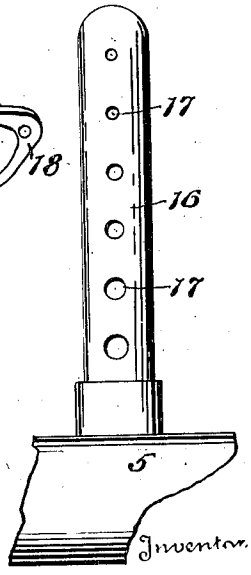


Fig. 2.



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Patented Aug. 22, 1939

2,170,139

UNITED STATES PATENT OFFICE

2,170,139

GAS BURNER

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Application February 8, 1937, Serial No. 124,737

2 Claims. (Cl. 126—350)

This invention is directed to an improvement in gas burners designed particularly for use in connection with water heaters wherein maximum heat efficiency is attained with a materially simplified and comparatively inexpensive construction.

The primary object is the provision of an annular series of burner tubes, each provided with an elongated flame outlet of such formation as to insure substantially equalized flame projection throughout the full length of the flame outlet.

A further object is the provision of a burner tube of elongated form with a flame outlet practically coextensive with the available length of the tube, which flame outlet is formed as a slot having its maximum width at the lower portion of the tube, that is the portion of the tube nearest the gas supply, with such slot of gradually decreased width toward the upper end of the tube.

A further object of the invention is the provision of a reflector for use with the burner tube, with such reflector constituted to provide a substantially independent reflecting area for each tube, in order to provide for maximum heat reflection from the series of tubes.

The invention is illustrated in the accompanying drawing, in which:

Figure 1 is a broken vertical section, partly in elevation, showing the water heater with the improved gas burner in place therein.

Figure 2 is a transverse section of the heater taken above the burner.

Figure 3 is a sectional detail showing the application of a burner tube to a nipple and particularly illustrating the flame outlet of the burner tube.

Figure 4 is a view in elevation showing a slightly modified form of burner tube.

Figure 5 is a broken perspective of one end of a section of the gas ring.

The improved gas burner is shown and will be hereinafter described as for use in a more or less conventional water heater, and while such is designed as its primary use, it is nevertheless to be understood that any and all uses to which the burner as a whole, or any part thereof may be put, is considered to be within the scope of the invention as defined in the claims.

The water heater proper may be conventionally described as including an ordinary casing or shell 1 within which or forming part of which is provided an annular chamber 2 for the reception of the water to be heated and provided with an inlet and an outlet. Within the water chamber 2 and preferably at the lower end thereof is arranged an annular gas ring 5 having a diametrically arranged communicating supply tube 6 from which depends a conventional Bunsen burner construction 7 in communication with a source of gas under pressure and through which Bunsen burner construction a proper air mixture is controlled.

The gas ring 5 has an external diameter slightly less than the internal diameter of the water chamber 2, and the upper surface of the gas ring is provided with upstanding plain nipples 8. These nipples are arranged in the same concentric plane and are, of course, to be in such number as will provide the desired heat effect in the particular use, and are preferably threaded into holes in ring 5.

A burner tube 9 is designed for removable cooperation with each nipple 8, and as these tubes are identical, a detailed disclosure of one will suffice for all. The burner tube constitutes an integral tubular member closed at the upper end and open at the bottom end. At the lower end the burner tube, either integrally or by the use of an additional part, is formed to provide a sleeve section 10, the interior of which more or less snugly conforms to the exterior of the nipple 8 in order to permit the burner tube to be readily and conveniently applied to and withdrawn from the nipple. Aside from the frictional engagement between the sleeve sections 10 and nipples 8, the burner tube is without direct connection with the nipples, and thus the burner tube may be readily slipped over the nipples and moved downwardly to an engaging position, or merely lifted from the nipples when the tubes are to be withdrawn.

In each burner tube, substantially throughout the full length of the tube from the upper end of the sleeve section to immediately adjacent the closed upper end of the tube, there is formed a flame outlet in the form of a slot 11, the construction of which is particular in that the spacing between the walls of the slot at the lower end, as as 12, is of the maximum width, from which lower end the walls of the slot gradually approach each other toward the upper end, as at 13. Thus, the flame outlet is in the form of a slot widest at the lowest end and gradually tapered to the upper end.

The burner tubes are arranged on the nipples 8 so that the flame outlets face toward the inner wall of the water chamber 2, so that the flame from the outlets may directly impinge the wall of the water chamber. Inwardly of the burner

tubes is arranged a heat reflector 14 constituting a sheet of appropriate metal having a height slightly exceeding that of the burner tubes and formed with an annular series of vertically extending corrugations 15, each of a width exceeding the diameter of the burner tube and of a curvature permitting the reflector to be spaced from the burner tube. As contemplated, the reflector 14 is so positioned that a burner tube rests within the area of each corrugation, so that the heat from each burner tube is reflected by the curved surface of the corrugation onto the inner wall of the water chamber.

In Figure 4 there is shown a slightly modified form of burner tube in which the tube, here indicated at 16, is formed with a series of holes 17 aligned longitudinally of the tube and of relatively different diameters, the hole nearest the bottom of the tube being of a maximum diameter and the succeeding holes being of gradually reduced diameter to the upper end. There is no restriction as to the number or diameter of the holes employed in this construction and it will be quite evident as a general proposition that the function of the modified tube is the same as the preferred form.

The particular formation of the flame outlet is important for through its use the flame projected from such flame outlet is substantially equal throughout the full length of the burner tube. Under the pressure of the gas, if the flame outlet were of uniform dimension, there would be a reduction in flame projection toward the upper end of the burner tube, but incident to the particular form here described, the feeding pressure of the gas through the gradually restricted flame outlet compels, as a matter of course, an increase in gas flow at the restricted area of the flame outlet to a degree to compensate for the loss of pressure of the gas in the length of the burner tube. Under the particular construction described, the volume of gas flowing through the upwardly converging flame outlet is substantially equalized throughout the length of the burner tube and thus the actual heat transference at the upper end of the tube is equal to that at the lowest or any intermediate portion of the length of the tube. This construction will obviously provide for more effective heating of the water in the water chamber as the flame area is substantially the same throughout the full length of the burner tube.

If desired, the gas rings may be made in sections connected in any appropriate way or the reflector may be made in sections joined in any desired manner, as, for example, that shown at 18 in Figure 5. Preferably a plate 3 bridges the space within the burner tube, resting on the upper surface thereof, and if desired cut out to afford space for the nipples. The reflector may rest on and be supported by this plate.

A support 19 is preferably arranged within the heater at or adjacent the lower end of the water chamber on which the gas ring is removably positioned, as more particularly illustrated in Figure 1. A door 20 in the casing permits access to the heater.

What is claimed to be new is:

1. A water heater comprising an annular water chamber, a gas burner within and concentric with the chamber, said burner including an annular supply pipe within and at the lower end of the chamber, a series of burner tubes rising from and in open communication with the supply pipe, each of the tubes being formed substantially throughout its length with a flame outlet slot of gradually decreased opening toward the upper end, the burner tubes being arranged with the flame outlet slots toward the water chamber, and a reflector supported on the supply pipe inwardly of the burner tubes and extending above the upper ends of said tubes, the reflector having a vertical dimension exceeding that of the burner tubes and extending above the latter, the space within the reflector being closed at the lower end.

2. A construction as defined in claim 1, wherein the reflector is made up of a series of convolutions one for each burner tube, with each such convolutions concentric with the burner tube, the outer margin of the reflector being substantially on a plane including the inner margins of the burner tubes, whereby the heat reflected from the convolutions of the reflector is directed outwardly between the burner tubes and into contact with the water chamber.

UEL R. GOODALE.