Oct. 16, 1956 H. C. LITTLE 2,766,819

FLAME SPREADER

Filed March 5, 1951 2 Sheets-Sheet 1

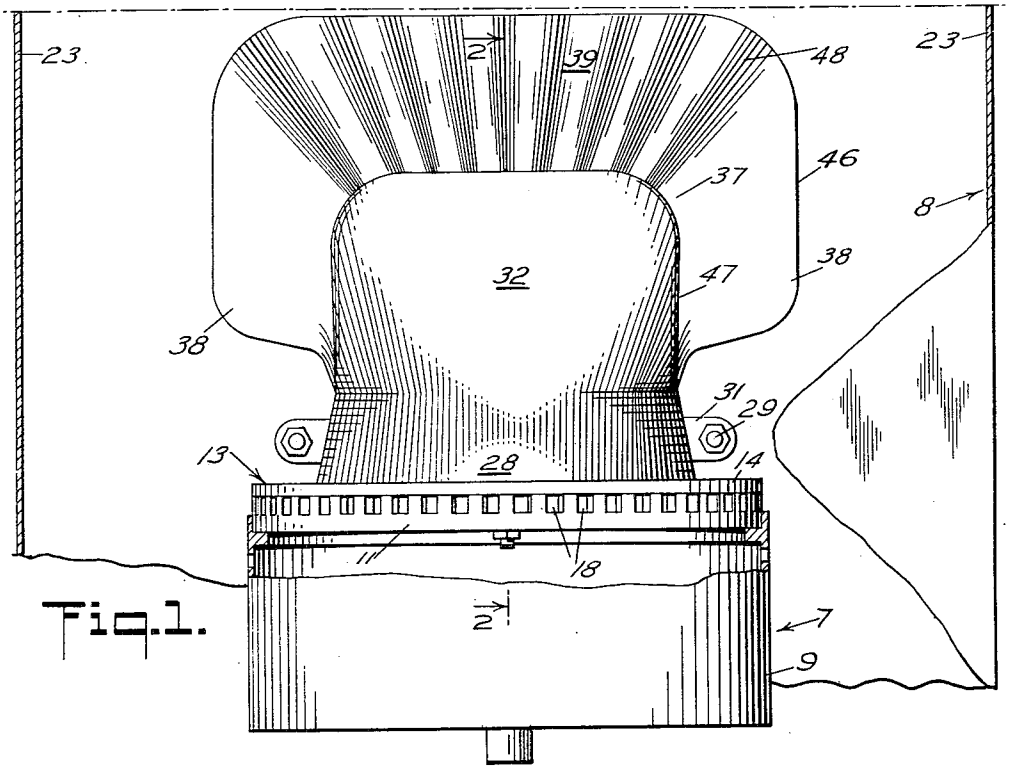


Fig. 1.

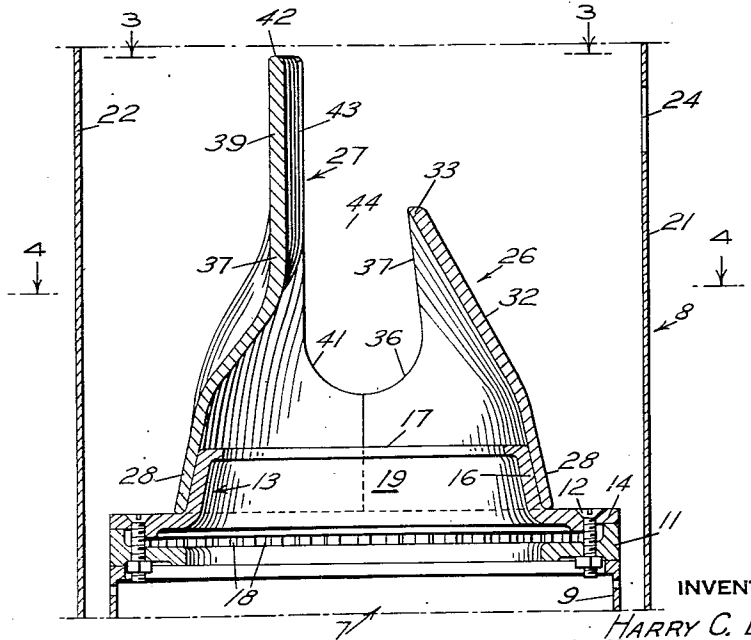


Fig. 2.

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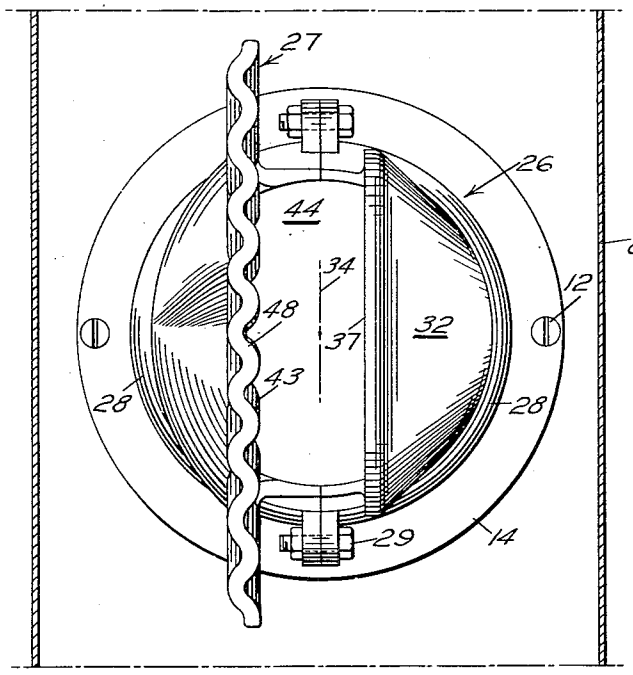


Fig. 3.

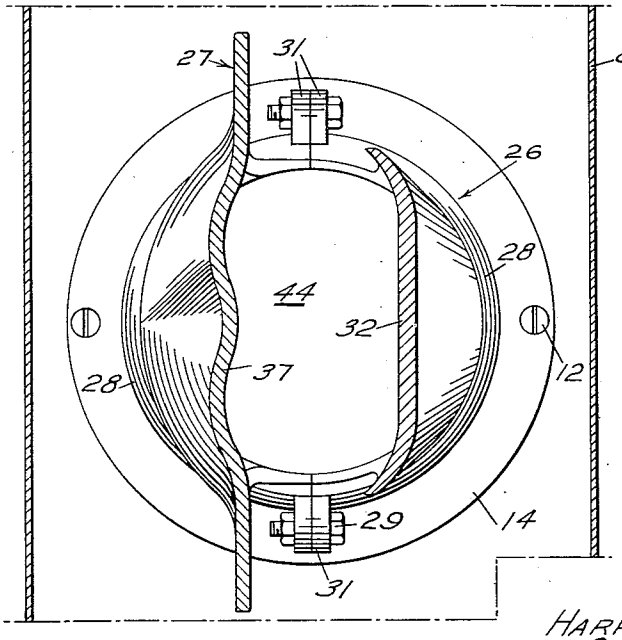


Fig. 4.

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United States Patent Office 2,766,819 Patented Oct. 16, 1956

2,766,819

FLAME SPREADER

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Application March 5, 1951, Serial No. 213,913

3 Claims. (Cl. 158—113)

This invention relates to flame spreaders for use with burners having a flame discharge opening so as to alter the shape of the flame as it passes through such opening.

An object of the present invention is to provide a flame spreader of the character described which will convert the generally circular flame emitting from a burner throat into a better fan-shaped elongated flame than those previously obtainable so as to provide optimum heat transfer for heating the walls of a heater disposed in superimposed relation to the burner.

Another object of my invention is to provide a flame spreader of the above type in which means are provided for guiding portions of the flame along selected paths of generally upward travel after the flame has passed from the discharge opening of the spreader.

A further object of this invention is to provide a spreader of the type described which is provided with heat radiating means so as to increase the wall temperature of the heater surrounding the spreader, and, at the same time, permitting ready visible observation of the flame characteristics from exteriorly of the heater.

A still further object of the invention is to provide a spreader of the character described which may be produced at a low cost and which readily lends itself to mass production methods of manufacture.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to the drawings:

Figure 1 is a vertical view, partly in section, of a heater and burner, showing the flame spreader of the present invention operatively installed in the burner.

Figure 2 is a vertical sectional view taken along the plane indicated by the line 2—2 of Figure 1.

Figure 3 is a top plan view taken in the plane indicated by the line 3—3 of Figure 2.

Figure 4 is a sectional plan view taken in the plane indicated by the line 4—4 of Figure 2.

In the past, various types of flame spreaders have been introduced to the trade, but either have not adequately performed their requisite functions, or have been so costly to produce that, for reasons of economy they have not acquired a satisfactory reception. In general, such spreaders included a dome-shaped device arranged to be disposed immediately over the circular flame discharge opening of a burner, and being provided with a slot or orifice extending along the upper edge thereof. Due to the required upward draft present in this type of heating apparatus, it has been found that although the flame in passing through such spreaders will be flattened to correspond with the width of the slot, the flame has a tendency

to be restrained and confined in transverse length to its original diametrical extent with little or no burning occurring at the orifice edges. Obviously, this is not desirable and will not produce a flame of substantially equal cross-section to that of the flame emitting from the burner throat.

With the present invention I have overcome the foregoing and other disadvantages present in the prior art devices and have provided a spreader which will produce a flame of desired shape and size best adapted to heat the walls of a heater surrounding the same. With reference to the drawings, I have shown the flame spreader of the present invention in use with a conventional type liquid fuel burner 7 and space heater 8. The burner as here shown comprises a housing 9 arranged to be supported entirely within the heater 8 and provided with an annular ring 11 releasably secured to the upper end of the housing. Secured to the ring 11 by means of bolts 12 or the like is a collar member 13, the latter including a generally horizontal flange portion 14 and a generally vertically extending cylindrical member 16, the upper portion thereof defining a flame discharge opening 17. It will be noted that the burner ring as here shown includes a plurality of radially extending grooves 18 through which secondary air may pass into the burner throat 19 defined by the ring and collar member so as to insure complete combustion of the volatile fuel-air mixture rising from interiorly of the housing 9. The particular operation of this type of burner is well known in the art, so no detailed explanation of either its structure or mode of operation is deemed necessary, and it is believed apparent that due to the circular form of the burner throat, the upwardly directed flame will similarly possess a generally circular cross-sectional shape. If the heater 8 was also constructed of cylindrical form, no change in flame shape would be required. However, in most instances, air circulating space heaters have a preferably oblong cross-sectional configuration, and therefore, in order to uniformly distribute the flame and to make it substantially equidistant from all of the walls of the heater, it is necessary to modify the circular flame shape into one of generally rectangular cross-sectional area. It will be seen that the heater 8 encloses the burner 7, and is provided with front and rear walls 21 and 22 respectively and side walls 23. Preferably, the front wall includes a Pyrex window or sight glass 24 through which the characteristics of the flame may be readily observed. Heaters of this general nature naturally include a vent usually positioned on the back wall adjacent the top thereof, but for the purpose of simplifying the drawings, and as such construction is well known in the art, no detailed showing or description is believed warranted.

The flame spreader of the present invention is arranged to be operatively inserted in the heater 8 in superimposed relation to the burner throat 19, and will effect a gradual and unrestricted conversion of the circular flame leaving the burner to a flame of generally rectangular shape. For economy of production and to facilitate its operative connection to the burner, the spreader is preferably made in two sections, here designated as a front section 26 and a rear section 27, the terms front and rear corresponding to the front and rear walls of the heater. The lower portion 28 of each of the sections is of generally arcuate form and arranged to lie in contiguous overlapping relation to one-half of the periphery of member 16, and when both sections are placed in position, they will be supported by the flange 14 of the collar member and completely encircle the latter. To secure the sections in place relative to the member 16, bolts 29 may be inserted through aligned apertures provided in lugs 31, the latter compris-

ing opposed integral diametrical extensions of the respective sections.

Although the lower portions of the sections are substantially symmetrical, permitting their connection to the burner collar, the remaining portions are entirely dissimilar, as will be presently described. Front section 26 includes a wall member 32 extending generally vertically upwardly from portion 28, and as best seen in Figure 1, the wall is limited in a transverse direction to substantially the diameter of the base portion. In cross-section, it will be noted that the wall slopes radially inwardly, the arcuate lower portion 28 gradually converging into a substantially flat portion adjacent the upper end 33 of the wall. Referring to Figures 2 and 3, it will be also noted that the wall 32 is not coextensive with the portion 28, but joins the latter adjacent the common section diameter indicated by the numeral 34 along an arcuate path 36. Thus, the inner edge 37 of the wall which is spaced from and generally parallel to diameter 34 together with the upper end 33 of the wall defines one-half of the flame orifice of the spreader.

The rear section 27 of the spreader defines the other half of the flame orifice, and as previously set forth, this section is not a symmetrical counterpart of the other section. Section 27 includes a wall member 37 extending upwardly from its portion 28, and immediately adjacent such portion, is transversely extended as indicated at 38. In cross-section, the wall, immediately above the lower portion, slopes radially inwardly and converging into a substantially planar portion 39 which is also coplanar with terminal portions 38. As in the case of the front section, the rear section wall 37 is not coextensive with its integral portion 28, but joins the latter along an arcuate path 41, similar to the path 36 of the front section. It will be noted that the upper edge 42 of wall 37 extends vertically beyond the end 33 of wall 32, and the wall portions extending vertically and transversely beyond the outer limits of wall 32 all lie in substantially coplanar relation. The inner surface 43 of wall 37 is also spaced from and generally parallel to diameter 34 as well as to the edge 37 of the front section and cooperates with the latter to define the flame orifice 44 of the spreader.

Orifice 44, as defined by the respective spreader sections is of generally rectangular and elongated shape, and extends horizontally along diameter 34 for substantially the entire length of the diameter of the burner throat. The orifice then continues vertically downwardly to the arcuate portions 36 and 41 of the spreader sections, the overall cross-sectional area of the orifice being substantially equal to the burner throat area so as to neither restrict nor expand the flame passing therethrough.

Should rear section 27 be modified so that its outer edges 46 were substantially opposed to the outer edges 47 of the front section, it would be difficult if not impossible to obtain the desired elongated flame shape. However, by providing the aforesaid vertical and transverse extensions, the flame, after passing from the burner throat into the spreader will be initially and gradually moved radially inwardly toward the common diameter 34 of the sections, after which it will emerge from both the horizontal and vertical portions of the orifice and be directed against and tend to follow the general shape of the vertically and transversely extending coplanar portions of wall 37. This will result in a relatively flat flame which substantially follows and completely covers the inner surface of portions 38 and 39 of the wall.

Preferably, in order to assist in guiding the flame along a transverse as well as upward path, portion 39 of the wall is provided with a series of radially extending corrugations or grooves 48, which will serve to fan the flame outwardly as it rises therealong. Also, by means of such corrugations, additional radiation surface is provided which will result in more efficient heating of the heater walls.

From the foregoing description, it will be seen that the flame spreader of the present invention will efficiently modify and convert the circular flame into a flat fan-shaped flame without restricting or otherwise interfering with the natural draft characteristics of the apparatus, and insuring the production of a flame which is of a greater transverse width than the original diameter thereof.

I claim:

1. A flame spreader of the character described comprising a substantially hollow member having a circular base portion and opposed side walls extending substantially vertically from said base portion and defining therebetween a flame discharge orifice, one of said walls including a substantially planar portion extending vertically above and horizontally beyond the top and end portions of said orifice, and guide means on the inner surface of said one wall for directing the flame upwardly and outwardly as the flame passes through the orifice, the total cross-sectional area of said orifice being substantially equal to the cross-sectional area of said circular base portion.

2. A flame spreader of the character described comprising a substantially hollow member having a circular base portion for receiving a flame, means on said member defining a pair of opposed walls extending upwardly from diametrically opposed portions of said base portion and defining therebetween an elongated generally rectangular orifice having a horizontal portion substantially equal to the diameter of said base portion and vertical portions extending downwardly from the respective ends of said horizontal portion and substantially normal thereto to adjacent said base portion, and means on one of said walls including a substantially vertical planar portion extending above and diametrically beyond said respective orifice portions for engaging portions of said flame as the latter passes through said orifice, said vertical and horizontal orifice portions being substantially of the same length.

3. A flame spreader of the character described comprising a substantially hollow member having a circular base portion for receiving a flame, means on said member defining a pair of diametrically opposed walls extending upwardly from said base portion and defining therebetween an elongated generally rectangular orifice having a horizontal portion substantially of the same length as the diameter of said base portion and being vertically spaced therefrom, said orifice also including vertical portions extending downwardly from the ends of said horizontal portion to adjacent said base portion, one of said walls including a substantially planar portion extending vertically above and diametrically beyond said orifice, and means on said latter portion including a plurality of angularly related grooves for directing the path of the flame as the latter passes vertically through said orifice.

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