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BURNER AND CHIMNEY FOR INCANDESCENT MANTLE LAMP

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Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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The invention pertains to incandescent mantle lamp burners for illuminating purposes, and comprises an improvement in chimney construction and mode of operation for such burners. It is an object of the invention to produce a chimney and cooperating parts, that will direct outer mantle air upwardly and against the mantle of the burner, to avoid carbon spots on the mantle; it is a further object of the invention to construct the lower portion of a chimney with a conical inner surface converging upwardly, which in cooperation with the gallery of the burner, will direct a conical and tubular column of outer mantle air upwardly and against the mantle of the burner, to avoid carbon spots on the mantle; it is a further object of the invention to construct the outer surface of the gallery of the burner in conical form and parallel with the said conical surface of the chimney; it is a further object of the invention to limit the space between said chimney and gallery surfaces to a small amount of separation, and to admit air to the lower end of said space from outside the burner in a further object of the invention to construct the chimney with a plane lower end surface perpendicular to the axis of the chimney and to support said chimney on a horizontal surface of the gallery having spaced first humps holding said lower end an evenly spaced distance above said horizontal surface; and it is a further object of the invention to provide the lower end portion of the chimney with spaced humps extending laterally from said end portion for holding and separable arrangement with spaced lugs secured to said gallery, and to construct said second humps to center the said conical surfaces of the chimney and gallery relatively to each other by engagement of said second humps with a vertical wall secured to said gallery.

The invention will be best understood by reference to the accompanying drawings illustrating a preferred embodiment thereof, in which:

Fig. 1 shows an enlarged scale a burner of which the invention is a part, in central, vertical sectional view.

Fig. 2 shows a further enlarged scale and in a view similar to Fig. 1, the parts of the burner directly involved in controlling the flow through the burner of the several air currents requisite for the effective operation of the burner.

Fig. 3 is in part a plan view to an enlarged scale of part of the chimney seat carried by the gallery, this view also being a horizontal, sectional view of the chimney and gallery taken along the line 3—3 in Fig. 5.

Fig. 4 is a vertical, sectional, view of part of the structure shown in Fig. 3, taken along the line 4—4 in Fig. 3.

Fig. 5 is a vertical, sectional, view of part of the structure shown in Fig. 3, taken along the line 5—5 in Fig. 3.

Fig. 6 is a vertical, sectional, view of part of the structure shown in Fig. 3, taken along the line 6—6 in Fig. 3.

Fig. 7 is a vertical, sectional, view of the structure shown in Fig. 6 taken along the line 7—7 in Fig. 6.

Similar numerals refer to similar parts throughout the several views.

As shown in Fig. 1, the burner illustrating the operation of the invention, comprises a cylindrical basket 10 of sheet metal, which is provided with numerous perforations to permit the free flow of the air into the basket, required for the operation of the burner. The lower portion of the basket, not shown, is provided in any known manner, with means for mounting the burner on a fuel font or reservoir. While the invention is applicable to different types of burners, the burner illustrated is of the side draft type having an inner wick tube 11 rigidly supported by the basket coaxially therewith, and supplied with inner air from said basket. The inner wick tube 11 supports a wick 12 which is tubular at its upper portion, and movable vertically on said tube by any known wick operating mechanism, not shown. An outer wick tube is shown, consisting of upper and lower portions 13 and 14 respectively, the upper portion 13 at its upper end portion being closely adjacent the outer surface of the wick, and a short distance below its upper end, being or substantially enlarged diameter providing a space between the tube and the wick in which the wick operating mechanism may be located. The lower end of the tube portion 13 is provided with a seat resting on the upper end of the tube portion 14, and aligning the two tube portions so that they are coaxial with each other and with the wick and the inner wick tube. The upper portion 13 is readily removable from the lower portion 14 for cleaning purposes and to facilitate wick renewal. The lower tube portion 14 is rigidly supported at its lower end by the basket 10 to effect the coaxial relationships expressed.

The basket 10 removably supports at its upper end, a gallery 15 comprising a support for a chimney 16 and also a support for a mantle mounting 17, 18 the latter being removable from the gallery to facilitate mantle renewal.
The outer wall of the gallery 15 is conical in form, converging upwardly, and from its inner mid-portion, a baffle 18 extends in the form of a flat cone converging upwardly from the gallery outer wall towards the outer wick tube 13, and then it extends cylindrically and upwardly with a small radial spacing from the upper end of the tube portion 13 and terminates a short distance above the upper end of the said tube portion and a substantial distance below the member 18 of the mantle mounting, said baffle at its upper end being provided with a horizontal flange of small radial extent projecting toward the axis of the burner.

The wick tubes 11 and 13 terminate in substantially the same horizontal plane, and the tube 13 carries at its upper end a flame flange 20 slightly spaced from the vertical portion of the baffle 19.

The member 18 of the mantle mounting constitutes the burner cone of the cent improvised, and it has a vertical wall spaced from the member 17 to receive in a groove formed, the lower edge of the mantle 21 and protect and center the same relatively to the flame produced above the wick 12.

The inner wick tube 11 is provided at its upper end, with a cylindrical flame spreader 22 substantially closed at its upper end and having its vertical wall above the tube 11, perforated to direct inner air A1 to and into the flame of the burner. The vertical, cylindrical portion of the member 18 extends substantially below its seat on the upper end of the gallery 15, and the member 17 is cylindrical above said seat and provided at said seat with a horizontal flange resting thereon and below said seat said member is cylindrical and closely fits the cylindrical lower portion of the member 18, where said members are secured together to form an integral mounting structure for the mantle.

The lower portion of the chimney 16 is conical in form, and is coaxial and of like pitch with and slightly spaced from the conical gallery 15 to provide a restricted passageway 32 for outer air to flow upwardly and through perforations 31 in the upper cylindrical portion of the member 17, to the mantle.

The parts described, unless otherwise stated, are circular, cross horizontally and have a coaxial relation to each other.

Where certain of the parts are above described as readily removable from adjacent parts, said parts are constructed in each case to establish a coaxial relation of the parts, and devices of known kind are preferably employed for removable securing the parts together for use, for example, any desired forms of bayonet connections.

As shown in Fig. 1, the mounting member 17 supports a harp 23 which in turn supports the mantle 21 around the flame of the burner.

In view of the flow of air currents through the burner being an important consideration in the present case, reference is made to Fig. 2 illustrating said flow, from which the present invention may be more clearly understood. As shown in Fig. 2 inner air A flows upwardly from the inner wick tube 14 to and through the perforations in the flame spreader 22 and upwardly and outwardly therewith to the inner portion of the flame 24 to provide the requisite inner air for the production of the blue flame desired to incandesce the mantle 21. It will be noted that the flame spreader 22 is imperforate at its upper end, excepting for a small central aperture 25. This permits a restricted amount of inner air A1 to flow into the flame which is hollow and closed at its upper end, to expand the upper portion of the flame and give it more nearly the form of the mantle, thereby more effectively incandescing the upper portion of the mantle. Inner air B flows upwardly from the basket 10 around the outer wick tube portion 13, between said tube portion and the lower cylindrical portion of the gallery 15, and through an annular row of large perforations 19a in the baffle 19, and through the annular space between the lower cylindrical portion of the member 18 and the upper cylindrical portion of the baffle 19, into a space immediately below the horizontal portion of said member 18; said horizontal portion stops the vertical flow of the tubular column of outer air B, and requires said column to make a substantially 90 degree turn under the horizontal portion of the member 18, so that said column B will be discharged from under the inner edge of said horizontal portion, in a horizontal direction against and into the outer surface of the flame and of the column of vaporized gas ascending from the wick 12; this action is insured by the projection of the lower edge of the member 18, substantially below the upper end of the baffle 19, which prevents column B from taking an oblique course towards the flame and vapor column, which in turn would materially reduce the penetration of the air of column B into said flame and vapor column, with corresponding reduction in the burning efficiency of the flame.

A small part B of the air of column B is bypassed therefrom through small apertures 19b in the upper end of the baffle 21, which air B1 flows around the inner edge of the short cape on the upper end of the baffle, through a clear space between said flange and the wick 12, to join the main column B above the wick; this prevents undue heating of the upper portion of the baffle, and tends to raise the flame from the upper end of the wick. At the same time an smaller amount of air B2 is bypassed from the column B, inside of the upper portion of the baffle and between it and the edge of the flame flange 20, above which it joins bypassed air B3; this prevents the undue communication of heat from the flame flange to the baffle.

The relation of the lower and inner surfaces of the member 18 to the surfaces of the upper end portion of the baffle 19 and of its upper end flange, meters the outer air supplied to the flame and insures that the amount of outer air so supplied shall be optimum for the intended purposes.

The flame 24 delivers a large quantity of gases of combustion C that are very hot, which gases are in large part projected against the mantle 21 and into and through its meshes, to incandesce said mantle.

In the above operation, the effectiveness of incandescing the mantle, is determined not only by the accurate proportioning of the air to the liquid fuel burned, but frequently by the purity of said fuel. In the practical operation of burners in the manner and for the purpose described, it frequently has been found that flares have formed on the mantles and particularly on their lower portions, that have materially reduced the illuminating efficiency of the mantles. To remedy this condition, additional air flow is produced in the burner, as shown in Fig. 2. That is, whereby the air generally of glass, has a lower end that is a plane surface, and rests on equally spaced humps 25.
extending upwardly from the seating portion of the gallery 15 at its lower end; as a result, a small annular air passageway 33 is produced between the lower end of the chimney and the gallery excepting at said humps 26. The lower end of the gallery is surrounded by and rigidly secured to an annular retaining band 27, which band is provided with a row of closely spaced perforations 28 in line with the passageway 33. The lower end of the chimney is provided with equally spaced humps 29 extending laterally and outwards from it for engagement with corresponding holding lugs 30 extending inwardly from the upper edge of the band 27, when the chimney is in place on the humps 26. The humps 29 extend under the lugs 30 to a position closely adjacent the inner surface of the band 27, to center the chimney relatively to the gallery 15, which maintains the passageway 33 between the conical portions of the chimney and gallery of substantially uniform radial extent throughout. Thus air from outside of the burner is drawn in a column D through the perforations 28 and under the chimney and then upwardly through the passageway 33, by the heated air in the chimney, which is projected with substantial velocity through the apertures 31 in the mounting member 17 and then upwards and entirely around the outer surface of the mantle. The air is highly heated in its upward passage between the chimney and the gallery, and unburned carbon particles that may have lodged in the mantle meshes in unburned condition, are very hot from the action of the flame, and as a result, the outer mantle air burns the carbon spots and cleans the mantle of them, thereby improving the illuminating power of the mantle. The holes 18, extending around the upper portion of the baffle 19 prevent accumulation of a tarry deposit on the upper end of the flame flange 20. This deposit, if permitted to form and accumulate, eventually obstructs the small annular space between flange 20 and the baffle 19 to prevent flow of cooling and air recirculation auxiliary air flow of air (Bc) through that space. The air flow through the holes 190 wipes off the vaporized fuel that otherwise stagnates above the flame flange 20 and prevents its lodging and condening on that flange. This action of the air flow through holes 190 is supplemented and reinforced by the air flow Bc passing through the small annular space between flange 20 and the baffle 19.

The drawings above described show two inventions, first, the mantle mounting and its cooperating parts, and second, the chimney and its cooperating parts. The said first invention is not claimed herein, as it constitutes the subject matter of a separate application, Serial Number 101,813 filed May 15, 1950, now Patent No. 2,559,558, the claimed subject matter of the present application being said second invention.

Fig. 3 shows an enlarged scale and partly in plan view, a portion of the chimney seat carried by the gallery 15, and also the conical passageway 33 of small radial extent, between the lower portion of the gallery 15 and chimney 16, this view being taken along the line 3—3 in Fig. 5.

Figs. 4 and 7 show the relation between each of the chimney humps 29 and the corresponding holding lug 30, and also the relation between each of the humps 29 and the band 27, when the chimney is held in place on the gallery by the lugs 30. The result is to hold the chimney firmly against the supporting humps 26, and establishes the air admission passageway 33 between the lower end of the chimney and the adjacent surface of the gallery 15, which is of uniform vertical extent throughout, and which is in alignment horizontally with the apertures 28 in the band 27; and it also, by the relation of the humps 29 to the band 27, centers the chimney 16 relatively to the conical surface of the gallery 15, and establishes a uniform lateral dimension for the conical air passageway 32. As a result, a conical, tubular column of air is projected upwardly by the passageway 32 as above described in connection with Fig. 2, which is of uniform thickness angularly of the mantle, and uniformly avoids carbon spots at all points around the mantle, thereby tending to maintain uniform illumination around the mantle.

Fig. 5 shows the relation of the lower end of the chimney 16 to the adjacent surface of the gallery 15 between any adjacent ones of the lugs 30, and clearly shows the unrestricted communication of the inner portion of the passageway 33 with the lower end of the passageway 32, thereby providing for the flow of air through passageways and thus to the mantle, which is restricted only by the size of said passageways, which are so made as to deliver sufficient air to the mantle to avoid the formation of carbon spots thereon, but insufficient to materially decrease the illuminating efficiency of the mantle.

Fig. 6 shows the relation of one of the chimney humps 29 to a corresponding supporting hump 26, when the chimney is held in place on the gallery. From Figs. 3, 6 and 7, it will be noted that each supporting hump 26 is below and in line with a corresponding lug 30, and that when the chimney is held in place on the gallery, a holding hump 29 of the chimney rests on one of the supporting humps 26 and is held in place by the lugs 30 immediately above said supporting hump 26. This limits the holding strans on the chimney to the holding humps 29, which are thinner parts of the lower end portion of the chimney and are better adapted to withstand said holding strans than are other parts of the lower end portion of the chimney.

As shown by the dotted line 29c, Figure 2, the upper faces of the humps 28 in the 6 slope perpendicularly of the chimney. Each face slopes in like sense so that as the chimney is rotated relative to the gallery 15 (and the lugs 30) the portion of the humps engaged by the lugs rises relative to the base of the chimney and the chimney is brought into progressively snugger engagement with the humps 29 of the band 27.

In a practical embodiment of the present invention it has been found desirable to use 50 or more holes 180 uniformly spaced about the baffle 19, each being 0.046 inch or less in diameter. Moreover, it has been found desirable to make the radial spacing between the outer periphery of the flame flange 20 and the inner periphery of the upper portion of the baffle 19 of the order of 0.006 to 0.008 inch, this spacing being assured by providing small number of radial extensions (not shown) on the flat portion of flame flange 20 extending this distance from the remainder of the outer periphery and seating against the baffle 19. These extensions also center the flame flange relative to the baffle.

While I have shown my invention in the particular embodiment above described, I do not limit myself thereto as I may employ equivalents there-
of without departing from the scope of the appended claims.

I claim:

1. In a burner of the incandescent mantle type, the combination of a chimney having a conical and upwardly converging lower end portion, a gallery having an upwardly converging conical portion within and spaced from the lower end portion of said chimney, said gallery having a seat supporting said chimney, and a cylindrical band around said seat adjacent the lower end of said chimney, the lower end portion of said chimney having spaced humps extending outwardly and laterally therefrom, and said band having inwardly extending lugs above and engaging said humps and removably holding said chimney on said seat, said humps extending laterally to closely adjacent said band and centering said conical portions relatively to each other to form therebetween a closed narrow air passage, the lower end of said chimney being a plane surface perpendicular to the chimney axis, and said seat having upwardly projecting spaced humps engaging said chimney end and spacing it above said seat to form a horizontal air passageway under said chimney end communicating with the lower end of said narrow air passage formed by the chimney and the gallery.

2. In a burner of the incandescent mantle type, the combination of a chimney having a conical and upwardly converging lower end portion, a gallery having an upwardly converging conical portion within and spaced from the lower end portion of said chimney, said gallery having a seat supporting said chimney, said conical portions being substantially coaxial and of like pitch throughout and spaced a small distance from each other to form a narrow, closed, conical air passageway therebetween, a cylindrical band around said seat adjacent the lower end of said chimney, the lower end portion of said chimney having spaced humps extending outwardly and laterally therefrom, and said band having inwardly extending lugs above and engaging said humps and removably holding said chimney on said seat, said humps extending laterally to closely adjacent said band and centering said conical portions relative to each other, the lower end of said chimney being a plane surface perpendicular to the chimney axis, and said seat having upwardly projecting spaced humps engaging said chimney end and spacing it above said seat to form a horizontal air passageway under said chimney end, the inner end of said horizontal passageway opening into the lower end of said conical passageway, said gallery defining a seat for an incandescent mantle above and having its side wall in line with said conical passageway.

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