Nov. 19, 1940. H. W. STRONG 2,222,092

LAMP BURNER ASSEMBLY

Filed Feb. 6, 1939 2 Sheets-Sheet 1

Fig. 1.

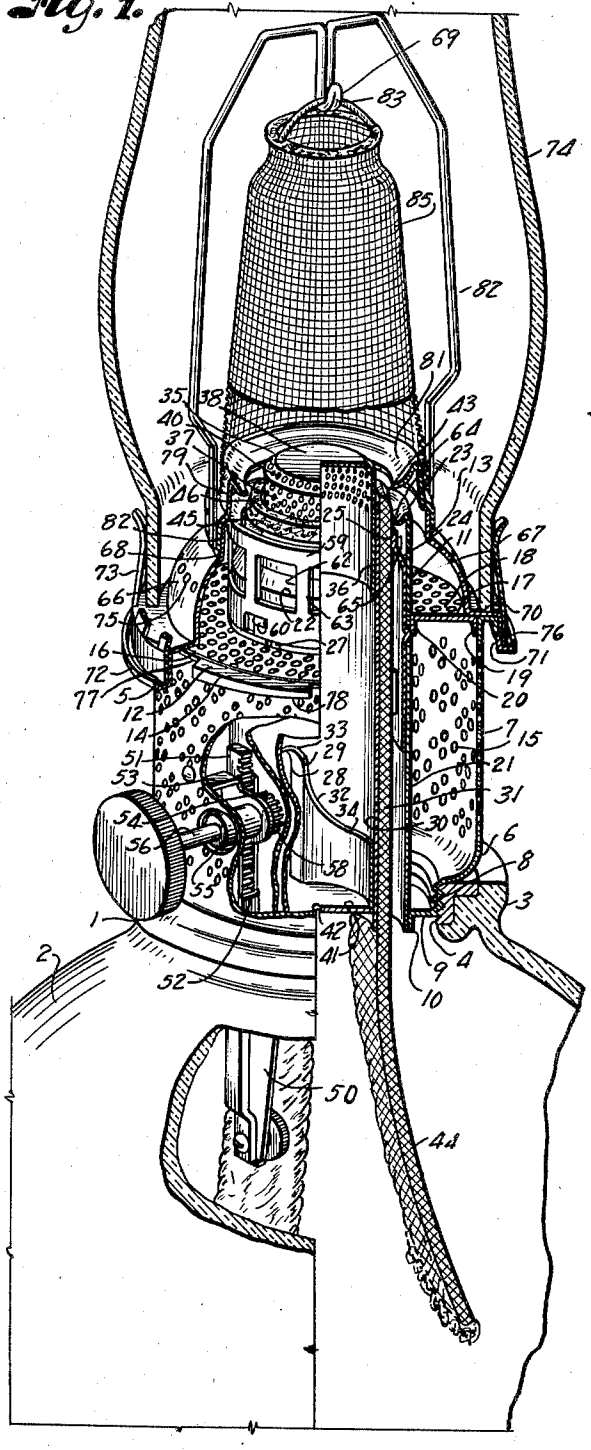

Fig. 2.

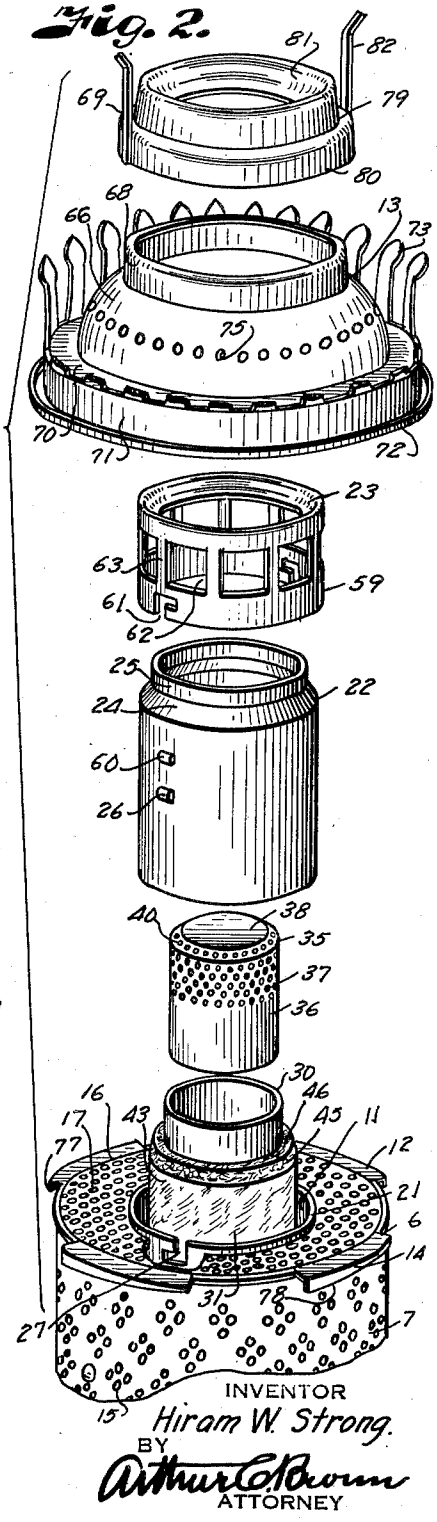

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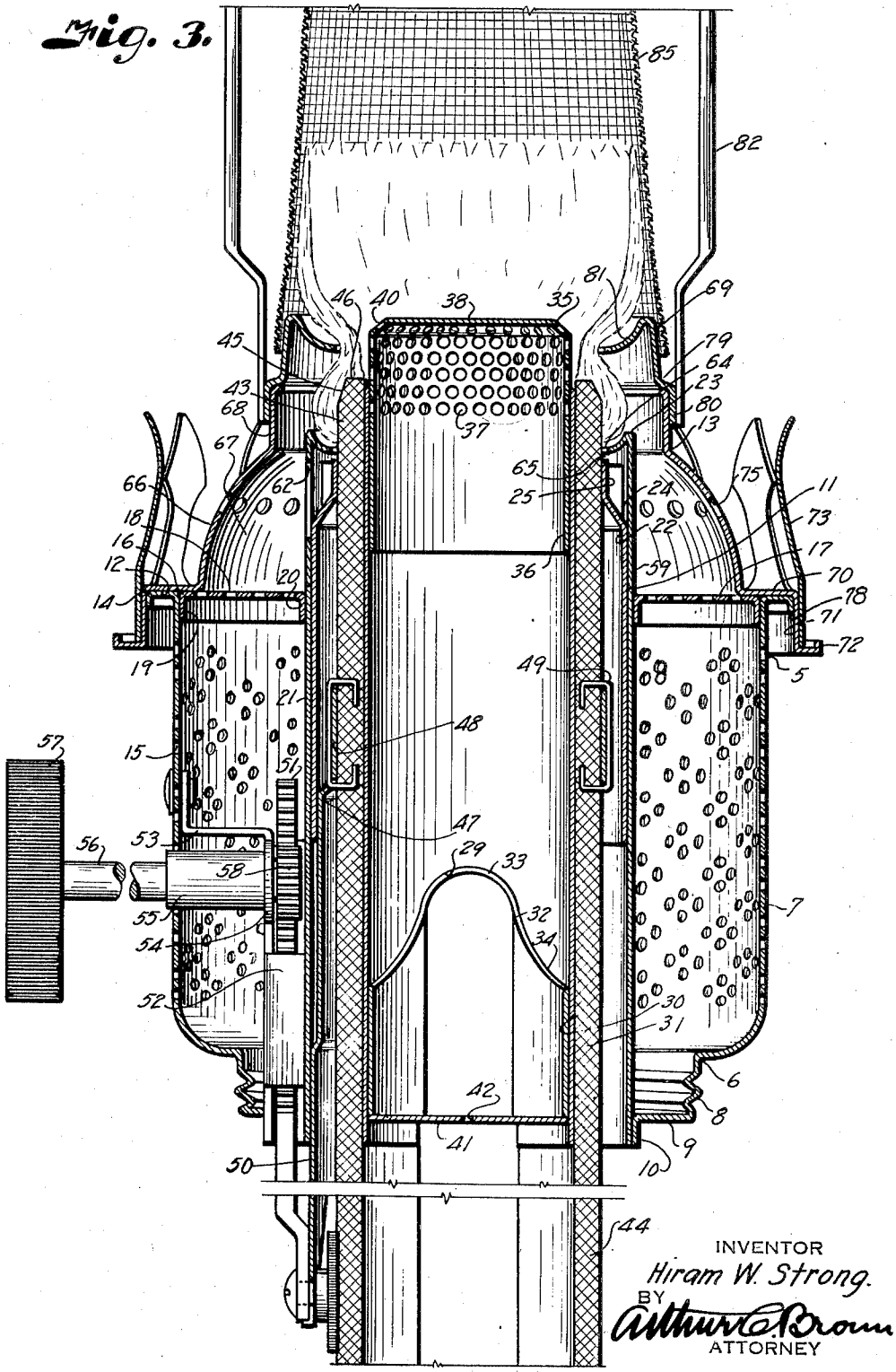
Fig. 3.



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UNITED STATES PATENT OFFICE

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LAMP BURNER ASSEMBLY

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Application February 6, 1939, Serial No. 254,775

11 Claims. (Cl. 67—38)

This invention relates to lamp burners, particularly those of the wick and mantle type whereby a hydrocarbon liquid, such as kerosene, is conveyed from a font through capillary action of the wick to a flame propagating zone and the resulting flame is caused to produce incandescence of the mantle.

It is well known that in burners of this character it is necessary to maintain a fuel vaporization zone circumferentially of the wick in order to produce a flame of desired size and color for producing maximum incandescence in the mantle. This positioning of the flame may be most readily effected by a flame flange supported in close circumferential relation with the wick so as to direct a controlled amount of combustion supporting air in contact therewith to start the point of combustion and at the some time permit a main air flow through the burner at sufficiently high velocity to effect penetration of the flame which is necessary in attaining the desired flame color. When the flame flange is properly located, it receives the intense heat of the flame and becomes very hot. This heat makes it difficult to provide support for the flange in the burner. Most designers have pointed out that when heat of the flame flange is conducted through the outer wick tube into the wick, there is too rapid vaporization of the fuel. The excess vapor throws the air and fuel ratio out of proper proportion causing the flame to smoke and the mantle to blacken. Consequently these designers have devised various methods of supporting the flame flange or equivalent baffle upon the gallery of the burner so that the heat is conducted away from the wick tube.

I have discovered this method of mounting the flame flange is also not satisfactory as there is insufficient vaporization effected in the wick and a tendency for the wick tubes to collect condensate and to carbonize.

It is, therefore, a principal object of the invention to provide mounting of the flame flange on the wick tube and provide controlled conduction of heat thereto in an amount necessary in promoting efficiency of the burner and to keep the wick tubes sufficiently hot to prevent condensation and carbon from collecting thereon.

Another object of the invention is to provide a burner of this character designed so that the combustion supporting air is directed and controlled to effect efficient and stable flame conditions.

It is a further object of the invention to provide a burner structure which rapidly attains and then maintains a uniformly constant flame intensity during the entire burning period of the lamp.

Other objects of the invention are to provide a burner construction which facilitates lighting of the wick; to provide a burner with a detachable flame flange separate from the burner gallery so as to facilitate replacement of the gallery after lighting the wick, and to avoid injury to the wick; and to provide a flame flange of such shape that it may be of smaller diameter, thereby providing a larger air channel around the exterior of the flame flange and providing the desired heat retentivity to effect generation of the required amount of gas.

In accomplishing these and other objects of the invention, as hereinafter pointed out, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a fragmentary perspective view of a lamp equipped with a burner embodying the features of the present invention, parts thereof being shown in section to better illustrate the construction.

Fig. 2 is a detail perspective view of the burner parts, shown in disassembled spaced relation.

Fig. 3 is an enlarged vertical section through the burner.

Referring more in detail to the drawings:

1 designates a lamp having a font 2 for containing a liquid hydrocarbon fuel, such as kerosene, and which has a neck 3 provided with an internally threaded opening 4 as in standard lamp construction. Supported by the neck 3 is a burner assembly 5 constituting the subject matter of the present invention.

The burner assembly 5 includes a basket 6 having a cylindrical wall 7 terminating at the bottom thereof in a threaded flange 8 to engage the internally threaded opening 4 of the font. The lower end of the flange 8 is turned inwardly to form an annular ring portion 9 having a depending collar 10 supporting the wick tube assembly, generally designated 11, and covered specifically in my copending application Serial No. 254,776 filed of even date herewith.

The upper rim of the basket wall 7 terminates in an encircling ring portion 12 to form a seat for the gallery 13, later described, the periphery of the ring 12 being flanged downwardly as indicated at 14, to reinforce the rim of the basket and form an attachment for the gallery. The wall of the basket is provided with a plurality of perforations 15 wherethrough combustion supporting air is admitted into the burner responsive

to draft produced incidental to operation of the lamp. Inset within the upper end of the basket is a damper ring 16 including a horizontal portion 17 provided with apertures 18 through which the combustion supporting air is uniformly distributed into the burner cone of the gallery. The damper ring 16 has a peripheral flange 19 sleeved within the basket and secured thereto in any suitable manner. The inner periphery of the ring carries a collar 20 which cooperates with the collar 10 in supporting the lower outer wick tube 21. The tube 21 has its ends rigidly attached to the collars 10 and 20 respectively by soldering or the like.

Removably supported within the tube 21 is an upper, outer wick tube 22, having its upper portion projecting above the lower wick tube to centeringly support a flame flange 23 later described. The upper terminal of the tube is swedged inwardly, as at 24, to form a narrow wick guide collar 25 corresponding to the diameter of the wick, later described. The upper tube 22 is detachably connected with the lower tube by a bayonet joint including a lug 26 struck from the wall of the tube and engagable in a bayonet slot 27 that is formed in the upper end of the tube 21, as illustrated in Fig. 2. Formed at opposite diametrical sides of the tube 21, near the lower end thereof, are elongated openings 28 registering with similar openings 29 in an inner wick tube 30 of smaller diameter than the collar 25 to accommodate a wick 31 therebetween.

The inner wick tube extends from a point in lateral registry with the lower edge of the outer wick tube to a point above the guide collar 25 to enhance rigidity of that portion of the wick which extends above the outer tube. The inner tube is rigidly supported concentrically of the outer tubes on a bridge member 32 having arch-shaped ends 33 extending through the registering openings 28 and 29 and connected by webs 34 fitting within and conforming to the inner surface of the wick tube. The ends of the bridge thus constitute air ports whereby a portion of the air admitted to the basket is directed into the lower end of the inner wick tube to discharge through the top thereof for spreading the flame in radial directions under control of a flame spreader 35.

The flame spreader 35 includes a cylindrical skirt 36 sleeved within the upper end of the inner tube 32 and has vertically spaced series of circumferential perforations 37 formed therein above the upper terminal end of the inner wick tube for discharge of combustion supporting air laterally against the circle of the flame so that it is directed outwardly toward the mantle, thereby keeping the flame in circular form and preventing overheating of the spreader. The top of the perforated portion of the spreader is closed by a plate 38 having an annularly bevelled portion 39 joining with the upper end of the skirt 36, and in which is a series of perforations 40, which, due to their location, cause the jets of air moved therethrough to position the flame, as later described. The lower end of the inner wick tube is closed by a plate 41 abutting against the bridge and which may have one or more orifices 42 for venting the font.

Slidably supported circumferentially of the inner tube and projectable through the space formed within the guide collar 25, is a wick 31 having a tubular upper portion 43 circumferentially engaging the tube 32 and a bifurcated lower portion 44 straddling the ends of the bridge and extending into the liquid contained in the font 2. The upper end of the wick is bevelled, as at 45, and terminates in a flat face 46 which is precharred so as to retain its shape and produce evenness of the flame around its entire periphery. It is thus obvious that the wick contacts the outer wick tubes only at the collar 25 so that the wick tubes may be kept sufficiently hot to prevent condensation thereon and the formation of carbon deposits without causing excessive vaporization of fuel in the major body of the wick, but the heat that is transmitted through contact of the collar 25 is beneficial in promoting vaporization in the upper flame propagating zone of the wick.

The wick is attached to a wick carrier 47 having a band portion 48 encircling the wick and which is secured thereto by wire staples 49 straddling the band and having ends bent retractively into the body of the wick. Extending downwardly from one side of the collar is an arm 50 for connecting a wick raising and lowering mechanism including a rack bar 51. The rack bar 51 is slidable within a tubular guide 52 located within the basket to the side of the wick tube 21 and has its lower end extending through an opening in the ring portion 9. The upper end of the guide is braced by a bracket-like arm 53 having a lateral extension 54 carrying a bearing sleeve 55 which extends through the wall of the basket. Rotatable in the bearing 55 is a shaft 56 having an adjusting wheel 57 located on the outer end thereof and a pinion 58 on its inner end which meshes with the teeth of the bar 51, as shown in Figs. 1 and 3. By turning the hand wheel 57, the wick is raised and lowered with respect to the inner and outer wick tubes so as to vary the flame portion of the wick exposed therebetween.

In order to control the direction of the combustion supporting air admitted through the apertures of the damper, the burner includes the flame flange 23 above referred to. The flame flange 23 is supported by a cylindrical skirt portion 59 sleeved over the upper end of the tube 22 and secured thereto by a bayonet joint including a lug 60 on the tube, and a bayonet slot 61 in the lower edge of the skirt. The skirt is provided with a plurality of openings 62 to leave relatively narrow connecting portions 63 therebetween and which are capable of conducting only the amount of heat from the flame flange to keep the wick tubes sufficiently hot to avoid condensation and carbon deposits from forming thereon and to supply a controlled amount of heat to the wick by way of the collar 25.

The flange 23 is curved downwardly and inwardly to terminate in slightly spaced relation with the upper end of the collar 25 so as to provide a restricted annular air passageway 64 therebetween and a connecting annular air passageway 65 encircling the wick whereby the air is brought into close contact with the wick at substantially high velocity to sweep the flame away from the tip of the collar 25 and to start the burning point slightly above the flame flange. The air entering the openings 62 strikes under the curved surface of the flange and is preheated before passing through the annular space 64 into the flame.

The gallery 13 includes a dome-like body or cone 66 having the base thereof slightly overlapping the damper ring and the upper portion curving toward the flame flange to form a main annular air passageway 67 therearound and terminates in an upwardly extending cylindrical col-

lar 68 for seating the mantle unit 69, later described. The base of the gallery has a laterally extending annular flange 70 seating upon the ring 12 and which terminates in a depending flange 71 sleeved over the flange 14. The lower edge of the flange 71 has an outwardly extending rim 72. Secured to the periphery of the flanges 71 is a plurality of flexible fingers 73 for engaging the base of a lamp chimney 74 which is seated on the flange 70. The dome portion is provided with a plurality of vent openings 75 so that some of the air spills therethrough for supplying air to the outer surface of the mantle and to cool the chimney. The gallery is removably locked upon the basket by means of lugs 76 which are passed through notches 77 in the ring 12 and engage under cam-like edges 78 of the depending flange 14 when the gallery is rotated.

The mantle unit is formed as a part of the burner cap 69, which cap includes a ring having a skirt 80 sleeved over the collar 68 of the gallery. The skirt is offset above the gallery flange and is coned inwardly toward the axis of the burner where it terminates in substantial registry with the top of the flame spreader in a downwardly and inwardly curved annular flange 81 so that the peripheral edge thereof is concentric with the wick.

Fixed to the outer sides of the skirt 80, at opposite sides of the burner cap, are the legs 82 of a mantle supporting wire forming an arch over the burner, and having a depending hook 83 for suspending a mantle 85 with the lower edge thereof sleeved over the cone portion of the cap whereby the wall of the mantle is contacted by the flame of the burner.

In lighting a lamp constructed as described, the gallery 13 is removed and a lighted match is applied to the wick where it is exposed above the flame flange 23. The gallery carrying the chimney 74 and mantle 85 is then reapplied on the burner basket. This is readily effected without danger of extinguishing the flame, or injury to the wick since there are no close parts such as the flame flange to slip over the wick when the gallery is moved to position on the basket. The heat of the flame creates a draft through the apertures of the basket 6, damper ring 16, burner cone, and chimney. The major portion of this air passes directly through the burner cap and through the space between the cone collar and the outer side of the flame flange at sufficient velocity so that it penetrates the flame as it passes the burner cap. This air strikes the flange 81 and is sufficiently contacted thereby to have absorbed sufficient heat and is well preheated. Because of the high velocity and preheating of the air, it is enabled to better penetrate the flame and thereby effect the required combustion necessary in producing a flame of maximum temperature. Some of this air stream will, of course, be crowded to the outer side of the flame to shape the flame according to the curvature of the burner cap flange and at the same time prevent contact with the metal that might cause overheating of the metal parts of the gallery. Simultaneously a stream of air flows upwardly through the inner wick tube 30 and is diverted through the apertures of the flame spreader 35 to shape the flame to follow the contour of the mantle and effect high incandescence and uniform brilliancy over most of the mantle.

A smaller and no less important stream of air passes through the openings 62 of the flame flange support and moves at suitable high velocity through the restricted annular passages 64 and 65 to sweep the flame away from the tip of the wick tube and prevent engagement thereon so that it is not excessively heated as would be the case if the flame directly contacted the wick tube. This stream of air is also directed incidental to the curved cross-section of the wick tube so that the burning point of the flame starts just above the inner edge of the flame flange. After passing the flame flange there is sufficient drop in pressure to allow expanding and rounding out of the flame in correspondence with the concave curvature of the flange as shown in Fig. 3. This expanded flame is softer or less dense and is more easily penetrated by the preheated air. The flame flange heats up and some of the heat is carried by conduction to the wick tubes to maintain them sufficiently hot so that they are free of condensate and carbon accumulation. Some of this heat is conducted by way of the collar 25 to facilitate vaporization in the wick so that the flame soon attains its burning size.

Attention is directed to the fact that due to the directional movement of the cool air through the openings 62 in the support and around the relatively narrow connecting portions 63 at the sides of the openings, this heat is not accumulative but the excessive heat is dissipated and carried away with the air. This dissipated heat is used to preheat the main stream of air and thereby promote combustion at higher temperature. The vaporization zone of the wick is thus not allowed to creep below the wick tube collar and therefore the rate of vaporization is well within safe limits of the capillary feed of the fuel. With the rate of vaporization controlled, there is a minimum creeping up of the flame during operation of the burner. Consequently after the size of the flame is once adjusted by raising or lowering of the wick to the desired point there is little need of further adjustment.

It is thus obvious that I have provided a burner construction wherein the parts soon reach their working temperature shortly after lighting thereof and that the working temperature remains constant throughout the burning period of the lamp. The flame is, therefore, very stable and maintains maximum incandescence of the mantle to give greater candle power for the fuel consumed.

What I claim and desire to secure by Letters Patent is:

1. A burner of the character described including a wick, a wick tube encircling the wick and having its upper end spaced below the end of the wick to form a flame propagating zone circumferentially of said wick, a flame directing member having an apertured skirt concentrically supported on the wick tube, and a circumferential flange carried by said skirt and having an inner peripheral edge spacingly encircling the wick at a point adjacent the upper end of the wick tube and below the upper end of the skirt to form a preheating zone thereunder for preheating air drawn through said skirt apertures and passed under said flange into the flame propagating zone.

2. In a burner of the character described, a perforated basket, a gallery including a burner cone carried on said basket, a wick tube supported in said basket, a wick encircled by said wick tube and projecting from the top thereof to form a flame propagating zone circumferentially of the wick, a flame flange carried by the

wick tube and encircling the wick below said flame propagating zone for protecting the flame in said zone from the main stream of air moving through the basket incidental to operation of the burner, a burner cap removably mounted on the burner cone and having an inwardly and downwardly curving flange with its inner peripheral edge terminating above said flame flange to divert and preheat the main stream of air prior to contact with the flame, mantle supporting means carried by the burner cap, and a mantle suspended from the mantle supporting means and in contact with the flame issuing from said propagating zone.

3. In a burner, a basket, inner and outer wick tubes supported concentrically of the basket, a wick adjustably positioned between said tubes, a gallery supported by the basket and having a burner cone terminating in an annular collar spaced radially of said wick, a flame flange supported by the outer wick tube, a burner cap carried on the collar of the burner cone including a downwardly and inwardly curving flange cooperating with the flame flange for positioning a flame on the circumference of the wick, and a flame spreader carried by the inner wick tube for effecting radial discharge of combustion supporting air to spread said flame above said downwardly and inwardly curving flange of the burner cap.

4. In a burner of the character described, a wick, a wick tube surrounding the wick and having a reduced collar portion contacting the wick, a flame flange including an annulus sleeved over the upper end of the wick tube and having openings for passing air into contact with the tube, and a downwardly and inwardly curved flange carried by said annulus and terminating short of said wick for controllingly directing said air stream in contact with the wick in circumferential registery with the terminal of said curved flange, the outer portion of said curved flange forming an upwardly projecting guard for protecting the flame propagated above said flame flange from air passing exteriorly of said annulus.

5. In a burner of the character described, a perforated basket, a gallery including a burner cone carried on said basket, an outer wick tube supported in said basket and projecting upwardly within the burner cone, an inner wick tube supported concentrically of the outer wick tube, a wick adjustable between said wick tubes, a flame placement member including a perforated skirt encirclingly spaced from the wick and extending above the upper edge of the outer wick tube for protecting a flame surrounding the upper end of the wick from the draft of air moving from the basket through said cone for supplying combustion supporting air to said flame, and an annular flange carried by said skirt and having an annular inner edge terminating in slightly spaced relation with the wick and the upper end of said outer wick tube to form air passageways in contact with the wick to control the beginning point of said flame.

6. In a burner of the character described, a basket, a gallery carried by the basket having a burner cone, a wick tube in the basket, a wick adjustably movable in said wick tube, a flame positioning member carried by the wick tube, and annular flanges respectively carried by said burner cone and flame positioning member, said flanges being downwardly and inwardly curved in the direction of said wick to direct air streams moving through said basket for positioning and shaping a flame propagated around said wick.

7. In a burner of the character described, a basket, a gallery carried by the basket having a burner cone, a wick tube in the basket, a wick adjustably movable in said wick tube, a flame positioning member carried by the wick tube, annular flanges respectively carried by said burner cone and flame positioning member, said flanges being downwardly and inwardly curved in the direction of said wick to direct air streams moving through said basket for positioning and shaping a flame propagated around said wick, and means conducting heat from one of said flanges to the wick tube.

8. In a burner of the character described, an inner wick tube, a wick surrounding the inner wick tube, an outer wick tube having a portion contacting the wick at a point spaced below the upper end of the wick, an imperforate flame flange encircling the wick and having an inner annular edge facing said wick and spaced therefrom at a point slightly above the contacting portion of the outer wick tube, said facing edge corresponding in width to the thickness of the metal from which the flange is constructed to form a relatively short air passageway in direct contact with the wick, and an apertured skirt supported on the outer wick tube in spaced relation with said contacting portion and connected with the outer edge of the flame flange to support said flame flange and conduct a selected amount of heat to said outer wick tube.

9. In a burner of the character described, an inner wick tube, a wick surrounding the inner wick tube, an outer wick tube spaced from the wick and having a reduced portion at its upper end contacting the wick, an apertured annulus sleeved on the outer wick tube and spaced from said reduced portion, and an imperforate flame flange extending inwardly from said annulus in the direction of the wick and having an inner annular edge terminating in spaced facing relation with the wick and spaced slightly above said reduced portion to direct an upwardly passing air stream in contact with the wick, said facing edge corresponding in width to the thickness of the metal of said flange whereby said contact point of the air stream is relatively short to effect start of flame propagation in definitely close relation with the reduced portion of the outer wick tube.

10. In a burner of the character described, an inner wick tube, a wick surrounding the inner wick tube, an outer wick tube having a reduced collar portion contacting the wick, a flame flange including an annulus sleeved over the upper end of the outer wick tube and engaging said wick tube at a point below said collar portion, said annulus having openings for passing air into contact with the wick, and an imperforate flame flange curved inwardly and downwardly from said annulus and terminating in an inner annular edge facing said wick in spaced relation therewith and at a point slightly above said reduced collar portion to form a restricted air passageway corresponding in length to the thickness of the metal from which said flange is constructed whereby said air stream is directed in contact with the wick for controlling position of the flame, the curvature of said imperforate flange providing gradual expansion of the air for beginning of the flame slightly above said edge and for rounding out thereof.

11. In a burner of the character described, a basket, inner and outer wick tubes supported within the basket, a wick adjustable longitudi-

nally between said wick tubes an annular flame flange encircling the wick with the outer periphery located above the outer wick tube and the inner portion having an edge located at a lower position at a point slightly above the outer wick tube for protecting a flame surrounding the upper end of the outer wick tube from the draft of air moving from the basket, an annulus supporting the flame flange from said outer wick tube including means for conducting heat from the flange to said wick tubes, said edge of the inner portion of the flame flange terminating in spaced facing relation with the wick forming an air passageway directly above the outer wick tube and of a length corresponding to the thickness of the metal from which the flange is formed to space the flame slightly thereabove by expansion of air moving through the passageway, and means supplying said air delivered through the passageway in heat exchange relation with said conducting means for controlling the amount of conducted heat accumulating in said tubes.

HIRAM W. STRONG.