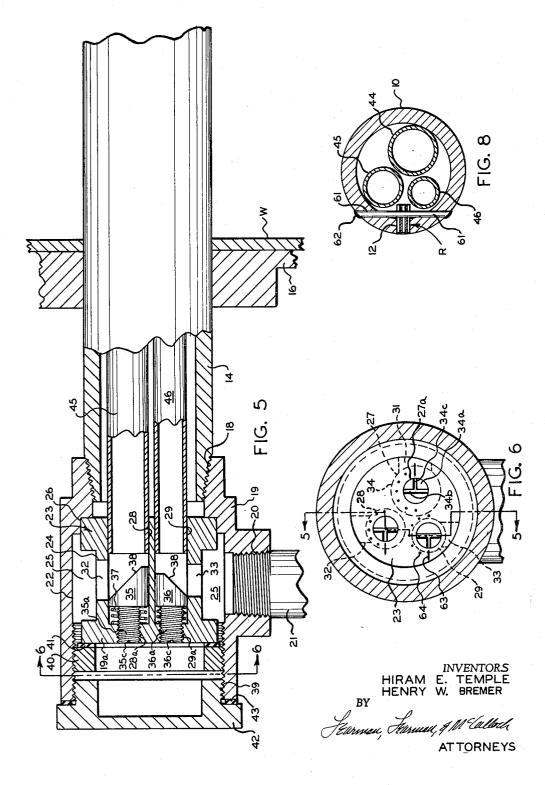


H. E. TEMPLE ETAL RIBBON BURNER ASSEMBLY 3,172,460

Filed Nov. 24, 1961

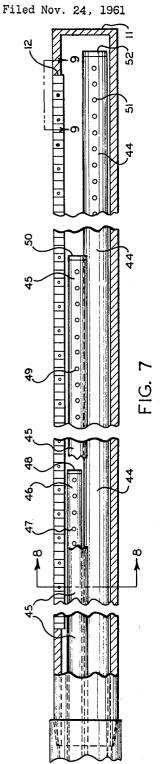
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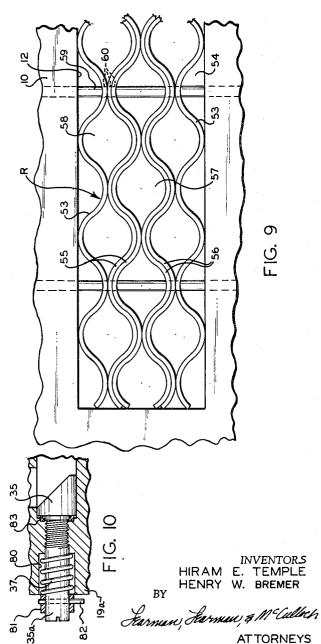


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3,172,460 **RIBBON BURNER ASSEMBLY** Hiram E. Temple and Henry W. Bremer, Saginaw, Mich., assignors to Baker Perkins Inc., Saginaw, Mich., a corporation of New York Filed Nov. 24, 1961, Ser. No. 154,742 7 Claims. (Cl. 158—114)

This invention relates to improvements in gas burners of the type which burn a premixed combustible hydro- 10 carbon gas and air mixture, usually under an appreciable pressure to meet the exigencies of both industrial and domestic uses. The present invention is particularly concerned with a burner for use in the baking ovens of commercial bakeries and is of the type which includes an 15 extremely elongate burner housing or barrel having longitudinally spaced burner ports therein.

One of the prime objects of the invention is to provide a burner assembly, incorporating multiple fuel distribution tubes of varying length, which includes inde- 20 pendent means for varying the flow of gas to each tube from a common source so that temperature zones within the oven may be readily adjusted. The construction permits a baker to selectively increase or decrease the gas flow to a particular portion of the burner barrel to pro- 25 vide the desired lateral heat to a particular zone in the oven.

A further object of the invention is to provide a burner assembly of the character described which is so constructed that the burner can function interchangeably as 30 a left or right hand burner to provide proper heat and flame direction within the oven.

Another object of the invention is to provide a burner construction, including metering or proportioning members for delivering gas to different portions of a given 35 burner, which are so constructed that a fine control of the flow of gas is provided.

Still another object of the invention is to provide a very efficient and highly reliable ribbon burner of relatively simple construction which can be very economically 40 manufactured and assembled.

Other objects of the invention will become apparent from the accompanying description and appended claims. In the drawings:

FIGURE 1 is a front elevational view showing the rib- 45 bon burner construction as mounted in place on an oven wall.

FIGURE 2 is a top plan view of the construction taken on the line 2-2 of FIGURE 1.

FIGURE 3 is a sectional plan view through the elec- 50 trode housing only.

FIGURE 4 is a fragmentary plan view of one end of the electrode housing.

FIGURE 5 is an enlarged, partly sectional, elevational view taken on the line 5-5 of FIGURE 6 and illustrating 55 the metering members which control the distribution of gas to various sections of the elongate burner assembly.

FIGURE 6 is a sectional, elevational view taken on the line 6-6 of FIGURE 5.

FIGURE 7 is a partly sectional, top plan view showing 60 the gas distributing tubes in assembled position within the burner barrel.

FIGURE 8 is an enlarged, cross sectional view taken on the line 8-8 of FIGURE 7.

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FIGURE 9 is a considerably enlarged, fragmentary top plan view illustrating the specific construction of the burner ports.

FIGURE 10 is a sectional view of a modified valve spring assembly.

Referring now more particularly to the accompanying drawings in which only a preferred embodiment of the invention is illustrated, a letter W generally indicates the insulated wall of an enclosed baking oven of conventional design which includes top and bottom walls as well as side walls and is of a type used in the baking of bread and other farinaceous products. The invention is concerned with the gas burner construction generally designated B which is supported in position on a side wall of the oven and includes a tubular casing member 10 projecting longitudinally into the oven usually transversely of the length thereof. In the conventional installation a plurality of longitudinally spaced apart burners B will be employed and, as noted previously, it is one of the prime purposes of the present invention to provide a burner construction which is so constituted as to be capable of creating heat zones within the oven. A typical installation showing a tunnel oven of considerable length and in which a large number of burners are used in transverse disposition is shown in Patent No. 2,801,686 and this disclosure is herein incorporated by reference so that no further disclosure of the oven elements is necessary.

The burner casing or barrel 10 is closed at its inner end by an end wall 11 as shown in FIGURE 7, and a longitudinally extending slot 12 is provided in one of its sides in the usual manner for accommodating the port forming ribbon assembly members generally designated R which will be presently described. At its outer end adjacent the side wall W, burner casing 10 is coupled by sleeve 13 to a housing section 14 which is fixed within a burner box 15 extending through an opening in the wall W and incorporating a cover-plate 16 which can be secured to wall W by cap screws 17. Provided on the outer end of casing 14 are threads 18 which mount a manifold enclosure or fitting 19 having a threaded opening 20 receiving a gas supply tube 21. It is to be understood that the gas supply tube 21 provides a pre-mixed hydrocarbon gas and air mixture under a predetermined pressure from any suitable conventional source.

The interior of fitting 19 is bored as at 22 to receive fuel gas from tube 21 and mounts an interior gas distributing manifold sleeve or housing 23 which is annularly grooved as at 24 so that an annular, gas receiving manifold fuel chamber 25 of substantial size is provided within fitting 19. Manifold sleeve 23 is received within and located by a reduced bore portion 26 of fitting 19 as shown and in the form of the invention shown includes three separate openings 27-29 which are of different diameter for a purpose which later will become apparent. Passages 27-29 include reduced diameter threaded bore sections 27a-29a which extend through the otherwise closed front wall 19a of fitting 19 as shown in FIGURE 5. Provided in the peripheral wall of manifold sleeve 23 are circular ports 31-33, each of which separately communicates fuel receiving chamber 25 with passages 27-29, respectively.

In order to provide a fine metering adjustment of the gas flow through orifices 31-33 a trio of metering members 34-36 are respectively mounted in the passages 27-29. These members 34-36 which include threaded shank portions 34a-36a as shown, are slotted at their ends as at 34b-36b so that an ordinary screw-driver may be used Coil springs 37 provided to revolve members 34-36. between the members 34-36 and front wall 19a of the manifold sleeve 23 prevent any play in the threaded passages 27a-29a and the mating threaded shank portions 34a-36a from affecting the adjustment. Members 34-36 are cylindrical pieces which have a corner cut off as at 1038 so that a very fine metering adjustment of the flow of the gas through ports 31-33 can be obtained.

It will be seen that the enclosing means or fitting 19 is also threaded as at 39 to receive a manifold sleeve retaining ring 40 including sealing gasket 41, and a cap 42, in- 15 cluding a sealing gasket 43, which can be easily removed to obtain access to the metering members 34-36. From the passages 27-29 in manifold sleeve 23 the gas is delivered in metered quantity to the distribution tubes 44-46 seating in the inner ends of passages 27-29, respectively, 20 which feed the fuel to different lengthwise sections of the burner barrel 10. As shown particularly in FIGURE 7, the smaller diameter tube 46 terminates in the front portion of burner barrel 10 at a point about one fourth of the length of barrel 10 and includes spaced apart gas issuing 25 openings 47, the end of the tube being provided with a plug insert 48 which also acts as a spacer. Tube 45 terminates at a point about three fourths of the length of barrel 10 and includes gas issuing ports 49 and an end plug 50. Provided in distributing tube 44 which extends 30 substantially to the end wall 11 of the burner barrel 10 are gas issuing ports 51 and an end plug 52.

As indicated particularly by FIGURE 8, the burner B shown is a so-called left hand burner in which the ribbon orifice 12 is leftwardly disposed. However, clearly the 35 burner could be rotated through 180° so that the slot 12 is rightwardly disposed or through 45° so that it would be possible to issue the flames upwardly or downwardly as desired. Mounted within the slot 12 is the ribbon assembly generally designated R which is, in the present in- 40 stance, formed from identically corrugated strips which can be readily and economically formed with a single die member. As shown in FIGURE 9, ribbon assembly R includes outer strips 53 forming reduced size passages 54 between the marginal side walls of slot 12 and the inwardly projecting corrugations of the strips 53, and nested pairs of oppositely disposed central strips 55 and 56 which form increased size ports 57 which are centrally disposed, and equal sized ports 58 which are formed between the outer of the strips 55 and 56 and the strips 53. As shown partic-50 ularly in FIGURES 8 and 9, the strips 53, 55 and 56 are so arranged that their corrugations abut alternately and pins 59 can be inserted through openings 60 provided in them. Bored in the casing 10 as shown in FIGURE 8 are aligned openings 61 to receive the pins 59 which can be 55 welded in position by weldment material 62.

In addition to the slots 34b-36b each metering member 34-36 includes indicator slot portions 34c-36c which when aligned with lines 63 provided on the face of metering member 23 indicate that the metering members 34-36 60 are in fully opened position. The circularly arranged dots 64 which are provided on the front face of the manifold sleeve 23 indicate more nearly closed positions of the orifices 31-33. The endmost dot proceeding from line 63 indicates the most nearly closed position of the metering 65 members 34-36 beyond which the slot 34c should not be turned.

The burner B also includes a continuous igniter unit generally identified by the letter I which includes a casing or housing 65 extending through an opening in the wall 70 W and insulating end bushings 66 and 67 as shown. The sleeve 65 is, like the sleeve 14, fixed to cover-plate 16 and houses an ignition rod 68 in the usual manner which is slideably received in openings 69 provided in the bushings 66 and 67. An elbow conduit 70 for the current carrying 75 elongate, tubular member having longitudinally extend-

wire 71 may be provided to fit within the bore 72 of bushing 66 and a wire sheath 71a leads from conduit 70. It will be seen that bushings 66 and 67 may include projections 66a which are received in openings 65a provided in sleeve 65 so that the bushings are prevented from rotating relative to the sleeve 65.

Provided on the rod 68 is a fixed washer 73, a fixed washer 74, and a washer 75 which is slideably received on the rod 68 and furnishes an abutment for a coil spring 76 which holds the rod 68 in assembled position in the usual manner. Rod 68 uniquely provides on its inner end a flag-shaped plate 77 having an edge 78 parallel with barrel 10 adjacent to the ribbon assembly R. With current being impressed continuously upon rod 68, sparks continuously jump the gap between edge 78 and the burner B and a wide area sparking surface is provided. While it is of no importance to the present invention, the member designated 79 in FIGURE 1 is a pivotally mounted peep-hole cover which in the usual manner can be swung upwardly to permit viewing through an opening in the wall W.

In FIGURE 10 a modified metering member is shown in which the manifold sleeve front wall 19a is counterbored as at 80 to accommodate the spring 37 which exerts pressure on a collar 81 secured to the stem portion of the metering member. While only the metering member 35 is illustrated in FIGURE 10, it is understood that the other metering members are formed and mounted in exactly the same manner in this modification of the invention. Collar 81 may be anchored in position by a pin 82 which extends through the stem portion 35a and which has an extending end which can serve as a reference in place of slot 35c. In this embodiment of the invention, packing 83 is provided to seal the assembly and no cover plate 42 is necessary. The spring 37 tends to force the collar 81 outwardly and so takes up any play in the threaded portion of the stem 35a.

In operation, the gaseous fuel mixture proceeding through supply pipe 21 is received within the chamber 25and enters the passages 27-29 through orifices 31-33. The flow of gas to distributing pipes 44-46 is governed by the position of metering members 34-36. Each of these metering members 34-36 is independently adjustable through a half a revolution to increase or decrease the size of the orifices 31-33. Different temperature zones are often to be found in ovens because of draft conditions and to provide optimum baking conditions for various products it will be possible, of course, to initially set the members 34-36 so that flames of different size are propagated at the burner ports of the ribbon assembly R to achieve uniformity. Further, it will be possible to finely vary the gas flow through any of the tubes 44-46 during the baking cycle, if desired.

The ribbon assembly R provides relatively high velocity gas passages and relatively low velocity gas passages providing long flames extending to points remote from the burner and relatively short pilot flames immediately adjacent the burner, the relatively short pilot flames serving to maintain the longer flames ignited since the latter flames may be produced by gas moving at such high velocity as to exceed the flame propagation rate of the mixture. The tendency of the spark jumping the gap between the edge 78 and ribbon assembly R is to travel up and down the edge 78 to thereby provide a wide area sparking surface which does not readily erode.

It is to be understood that various changes may be made in the construction shown and described to effectuate the same or similar results without departing from the spirit of the invention or the scope of the appended claims. The foregoing descriptive matter and drawings are intended only as illustrative and the invention is defined by the claims.

We claim:

1. In a ribbon burner construction for an oven; an

ing burner ports; a manifold means mounted on one end of said tubular member and including a plurality of separated, longitudinally extending passages; said manifold means having separate peripheral openings leading radially separately to each passage; means supplying gas to said openings; a plurality of distributing tubes of different length extending within said tubular member and open near one end to said manifold passages and near their opposite ends to different longitudinally spaced apart sections of said tubular member; and a rotatably 10 adjustable metering screw including a spring biased outer shank extending through the manifold means and a metering head with an inclined face in radial alignment with each peripheral opening varying the flow through each peripheral opening in said manifold means to each of 15 said distributing tubes selectively to provide variable heat zones in an oven or the like.

2. In an oven; a ribbon burner construction comprising an elongate, tubular housing having longitudinally extending burner port grid means over most of its length; 20 a fitting at one end of said tubular housing including a port for admitting fuel gas to the fitting; a manifold sleeve within said fitting including a portion between its ends of less diameter than said fitting forming a fuel gas receiving chamber between said portion of the manifold 25 sleeve and fitting; said manifold sleeve having a plurality of separate, longitudinally extending passages from one end thereof to the other; a separate distributing tube extending into each passage and projecting therefrom through said housing to terminate at different locations 30 longitudinally within said tubular housing and deliver fuel gas to different sections of said burner port means; each tube having longitudinally spaced apart ports for uniformly supplying fuel gas over the length of said burner port means; said manifold sleeve having separate orifice means communicating said gas receiving chamber with each passage, and metering means radially opposite each orifice means adjustable in each passage relative to said orifice means to vary the flow therethrough to said distributing tubes and provide variable heat zones in the 40 oven.

3. In an oven; side walls; a ribbon burner construction comprising an elongate, tubular housing extending inwardly from a side wall and having longitudinally extending burner ports over most of its length within said oven; 45a fitting at one end of said tubular housing outside said side wall including a port for admitting fuel gas to the fitting; a manifold sleeve within said fitting perimetrally spaced therefrom to form a fuel gas receiving chamber between said portion of the manifold sleeve and fitting; said manifold sleeve having a plurality of separate, longitudinally extending passages from one end thereof to the other; a separate distributing tube extending into each passage and projecting therefrom through said housing to terminate at different locations longitudinally within 55said tubular housing and deliver fuel gas to different sections of said housing; said manifold sleeve having separate orifices communicating said gas receiving chamber with each passage; and a metering screw rotatably adjustable in each passage relative to an orifice, having 60 a cylindrical metering head with an inclined surface radially opposite the orifice to vary the flow through each orifice to said distributing tubes and provide variable heat zones in the oven.

4. In a ribbon burner construction: an elongate, tubu-65 lar housing having longitudinally extending burner port grid means over much of its length; a fitting at one end of said tubular housing including port means for admitting fuel gas to the fitting; a manifold sleeve within said fitting, including a portion between its ends of less di-70 ameter than said fitting forming a fuel gas receiving chamber between said portion of the manifold sleeve and fitting communicating with said fuel gas admitting port means; said manifold sleeve having a plurality of separate, longitudinally extending passages; a separate dis- 75 metering head means, in radial alignment with each periph-

tributing tube communicating with each passage and extending into said housing, having opening means at different locations longitudinally within said tubular housing to deliver fuel gas to different sections of said burner port means; the opening means of each tube comprising longitudinally spaced apart ports for uniformly supplying fuel gas over the length of said burner port grid means; said manifold sleeve having separate orifice means communicating said gas receiving chamber with each passage; and metering means radially opposite each orifice means adjustable in each passage relative to said orifice means to vary the flow therethrough to said distributing tubes and provide variable heat zones in the oven.

5. In an oven; a ribbon burner construction comprising: an elongate, tubular housing having longitudinally extending burner port grid means over much of its length; a fitting at one end of said tubular housing including port means for admitting fuel gas to the fitting; a manifold sleeve within said fitting and perimetrally spaced therefrom to form a fuel gas receiving chamber between said manifold sleeve and fitting communicating with said port means; said manifold sleeve having a plurality of separated, longitudinally extending passages of different diameter; a plurality of peripherally spaced apart distributing tubes, including a separate distributing tube communicating with each passage and projecting into said housing, having opening means at different locations longitudinally within said tubular housing to deliver fuel gas to different sections of said burner port means; the opening means of each tube comprising longitudinally spaced apart ports, for uniformly supplying fuel gas over the length of said burner port grid means, which are angularly displaced relative to said burner port means; said manifold sleeve having separate orifice means communicating said gas receiving chamber with each passage; and an independent metering means axially adjustable in each passage relative to said orifice means to vary the flow therethrough to said distributing tubes and provide variable heat zones in the oven.

6. A ribbon burner construction for an oven comprising: an elongate, tubular member having longitudinally extending burner port means; manifold means including housing means mounted at one end of said tubular member and including a plurality of separated, longitudinally extending passages; said housing means having separate peripheral openings leading radially separately to each passage; said manifold means also including enclosing means perimetrally spaced from said housing means to provide a fuel gas receiving chamber means therebetween surrounding said openings; means for supplying fuel to said chamber means; a plurality of distributing tubes extending within said tubular member and open near one end to the passages in said housing means, the tubes being also open at differently spaced longitudinal distances from said housing means to different longitudinal sections of said tubular member; and adjustable metering head means, in radial alignment with each peripheral opening in the housing means, disposed radially inwardly thereof for varying the flow through each peripheral opening to each of said distributing tubes selectively to provide variable heat zones in the oven.

7. A ribbon burner construction for an oven comprising: an elongate, tubular member having longitudinally extending burner port means; wall portions forming a fuel chamber at one end of said tubular member and a plurality of distributing tubes extending within said tubular member, the tubes being open at differently spaced longitudinal distances from said fuel chamber to different longitudinal sections of said tubular member; there being a series of perimetrally spaced openings, surrounded perimetrally by said fuel chamber, leading radially separately from said fuel chamber through said wall portions to communicate with each tube separately; means for supplying fuel to said fuel chamber; and adjustable

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7 eral opening, disposed radially inwardly thereof for vary-ing the flow through each opening to each of said distrib-uting tubes selectively to provide variable heat zones in the oven.

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JAMES W. WESTHAVER, Primary Examiner.

FREDERICK L. MATTERSON, JR., MEYER PERLIN, Examiners.