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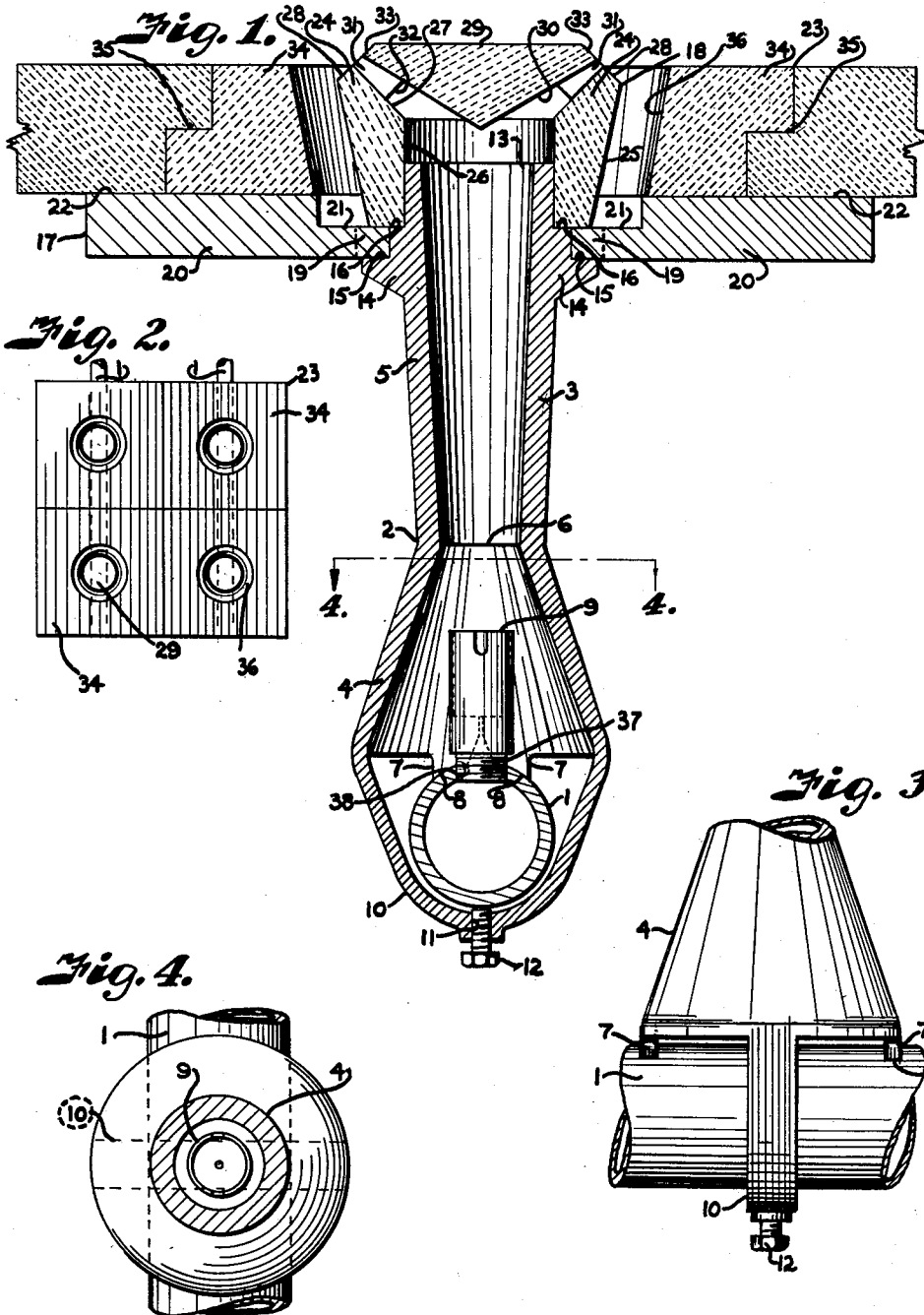
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GAS BURNER AND SECTIONAL HEARTH

Filed July 14, 1947

2 SHEETS—SHEET 1



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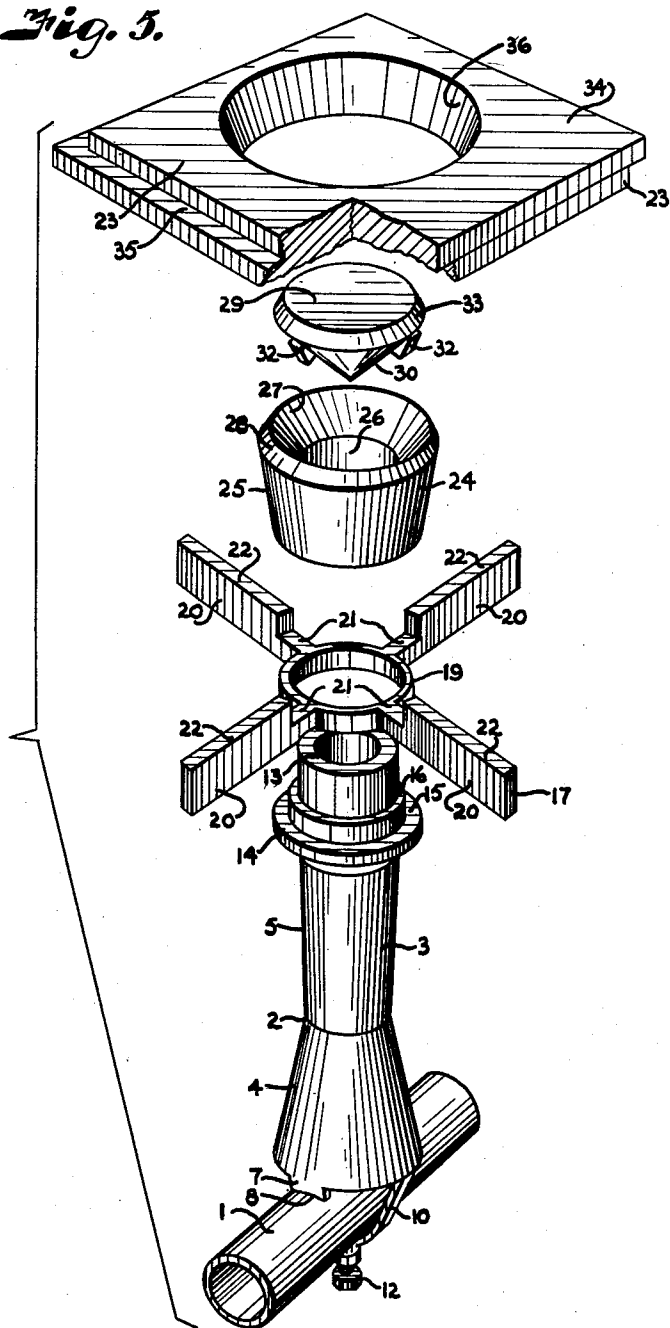
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2 SHEETS—SHEET 2

Fig. 5.



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GAS BURNER AND SECTIONAL HEARTH

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6 Claims. (Cl. 158—99)

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This invention relates to hydrocarbon burners, particularly for installation in the firebox in a furnace, boiler, or similar heating apparatus requiring one or more burner units to be distributed over the area of the firebox and having outlet through a hearth forming the top of the secondary air supply chamber, the principal object of the present invention being to provide burners with supports for carrying individual platform sections or blocks composing the hearth, thereby simplifying installation and assembly of the burner units.

Other objects of the invention are to provide highly efficient burner units having flame discharge across secondary air inlets through the hearth and to provide a burner and hearth structure which facilitates removal and repair of the burner parts. It is also an object of the invention to provide an upright burner body having a burner head provided with an annular fuel mixture outlet and a platform or hearth having an opening of larger diameter than the head and forming an annular outlet for secondary air substantially at the fuel mixture outlet opening of the burner head.

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

Fig. 1 is a vertical section through a portion of a hearth and burner unit constructed in accordance with the present invention.

Fig. 2 is a plan view of a hearth made up of a plurality of platform sections, each of which is supported by a burner unit.

Fig. 3 is a side elevational view of the inlet end of a burner unit showing the mounting thereof on the fuel supply duct.

Fig. 4 is a horizontal section through the body of the burner on the line 4—4 of Fig. 1.

Fig. 5 is a perspective view of the parts of the burner unit and a platform section shown in spaced relation.

Referring more in detail to the drawings:

1 designates a supply duct adapted to extend transversely across the lower portion of a firebox and which provide for support of burner units 2 which are constructed in accordance with the present invention. Each burner unit includes a tubular body member 3 having bell-shaped air inlet ends 4 and upwardly tapering outlet ends 5 for forming a flow passageway having a Venturi throat 6. The edge of the bell-shaped inlet is provided on diametrically opposite sides

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thereof with depending lugs 7 having seating faces 8 conforming to the upper faces of the ducts on which the burners are mounted. For example, in the illustrated instance the fuel supply ducts are of substantially cylindrical cross section and the faces 8 of the lugs are of corresponding arcuate formation to seat the tubular body on the duct in encircling relation with a fuel discharge nozzle 9 later described. Extending across the bell-shaped inlet intermediate the lug 7 is a yoke 10 adapted to extend under the fuel supply duct and which is provided with an internally threaded opening 11 to mount a clamping device such as a set screw 12 which is adapted to draw the seating faces of the lugs 7 against the duct to rigidly support the tubular body of the burner thereon. The discharge end of the body member is provided below the outlet end 13 thereof with an annular flange 14 having upper and lower stepped shoulders 15 and 16 to provide annular seats for a spider 17 and a burner head 18 respectively.

The spider 17 includes a ring-like portion 19 which encircles the tubular body of the burner and is supported on the shoulder 15 as best shown in Fig. 1. Extending radially from the collar portion of the spider are lateral arms 20 having upper edge faces 22 offset from the upper face 21 of the ring portion 19 for seating a platform section 23 later described.

The burner head 18 includes a collar member 24 having an upwardly and outwardly tapering annular periphery 25 and an inner bore 26 for closely engaging over the discharge end of the tubular body of the burner. The upper portion of the bore of the collar is outwardly tapered to provide an annular face 27 which is encircled by an outer beveled face 28 on the peripheral edge of the collar.

29 designates a burner cap or cover comprising a substantially inverted cone, the conical surface 30 of which is at an angle to the flaring face 27 of the collar member to provide an annular passageway 31 therearound which is directed outwardly and upwardly and which tapers toward the outlet to maintain velocity of the fuel mixture, the passageway being maintained by supporting the cap from the ring-shaped head on lugs 32 which in the illustrated instance are formed as a part of the cap as best shown in Figs. 1 and 5. The apical portion of the cone-shaped cap is thus carried in coaxial relation with the passageway through the tubular body for dividing and diverting the fuel mixture for even flow through the annular passageway 31. The cir-

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cumference of the cap is preferably beveled as at 33 corresponding with the bevel of the collar members of the head as shown in Fig. 1. The collar and cap portions of the head are preferably formed of a refractory material for resisting heat of the flame when the burner is in operation.

Each platform section includes a substantially flat rectangular block 34 having rabbet edges 35, the rabbets on one edge being arranged reversely to the rabbets of the opposite edges for interengaging with adjacent platform sections carried on the spider of adjacent burner units. The spider member 17 of each burner unit is supported on the tubular body and the platform sections are of a thickness so that the upper faces thereof substantially register with the annular outlets of the burner heads and provide a hearth for the firebox in which the burner units are installed. Each platform section is provided with an opening 36 of larger diameter than the collar portions of the burner heads and which are tapered corresponding to the taper of the heads to provide upwardly and outwardly extending annular passageways for discharge of secondary air in close contact with the jets discharged through the fuel passageway 31, the secondary air passageway having inlet between the arms of the spider so that air from below the hearth may move uniformly in encircling relation with the burner heads.

The nozzle 9 is of tubular shape and has threaded ends 37 engaged in threaded openings 38 which are located at suitably spaced intervals along the length of the fuel supply ducts. The nozzles may be furnished in different lengths relatively to the Venturi throat so as to provide the proper mixture of primary air and fuel when the burner is in operation. The primary air is admitted through the openings formed between the bell-shaped inlet and fuel supply duct as shown in Fig. 1.

In installing burner units in a firebox sufficient burner units are provided to generate the required heat. The burner units are arranged in rows with the units in each row connected with and supported on a fuel supply duct, the ducts being supported in any suitable manner. The tubular bodies of the burners are mounted on the fuel supply ducts by sliding the yoke portions over ends of the ducts and locating the bell-shaped inlets concentrically with respect to the threaded openings 38. The burner body members are then supported in fixed relation with the ducts by tightening the set screws 12. The burner nozzles are inserted through the upper ends of the tubular bodies and turned into the threaded openings of the ducts. A spider 17 is then applied over the discharge end of each tubular body member so that the ring portions 19 thereof seat upon the shoulders 15 as shown in Fig. 1. The platform sections are then placed on the spiders so that they are supported on the arms thereof with the rabbet edges of one section interengaged with the rabbet edge of an adjacent section to provide a closed hearth with the exception of the openings in the respective sections. The collar members 24 of the burner heads are then passed through the openings of the platform sections to seat upon the shoulders 16 after which the cap members 29 are applied with the lugs 32 thereof supported on the outwardly flaring end faces 27 of the collar portions of the burner heads.

When the burners are in operation the fuel delivered to the ducts is discharged through the

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nozzles 9 and the draft through the firebox causes primary air to move through the bell-shaped inlets of the burner body members to mix with the fuel discharged through the nozzles so that a combustible mixture is discharged through the upper ends of the tubular bodies and distributed by the cone-shaped cap members 29 for uniform flow through the annular passageways 31 while secondary air is being drawn through the passageways formed by the openings of the platform sections.

From the foregoing it is obvious that I have provided a burner structure wherein the platform sections composing the hearth are adapted for support on the tubular body members of the burner units which in turn are carried on the fuel supply ducts. This construction facilitates assembly of the burner units and hearth supported thereby and assures an adequate supply of secondary air for completing the combustion of the fuel mixture discharged through the passageways of the burner heads. It is also obvious that the structure facilitates removal and repair of the burner parts including the platform sections of the hearth.

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

1. A burner including an upwardly directed tubular body member having an axial outlet in the end thereof for discharging a fuel mixture and provided with outwardly and downwardly stepped shoulders spaced below the outlet of the tubular body, a hollow burner head having a substantially circumferential fuel outlet and having a portion encircling the outlet and seated upon the smaller shoulder with said outlet end above said smaller shoulder extending into the burner head and in communication with said tubular body, a spider encircling and seated on the larger shoulder, and a platform section carried on the spider and having an opening of sufficient diameter to receive the burner head therein and provide an annular secondary air passageway encircling said head separate from and located below said circumferential fuel outlet.

2. A burner including an upwardly directed tubular body member having an outlet at one end thereof for discharging a fuel mixture and provided with outwardly and downwardly stepped shoulders spaced below said outlet, a spider having a collar portion encircling the outlet end of the tubular body and seated upon the larger of said shoulders, a hollow burner head including a collar member encircling the outlet end of the tubular body and seated upon the smaller of said shoulders, said last mentioned collar member having an upwardly and outwardly flaring outer face, a cap seated on the collar member and spaced therefrom to provide an annular outlet in said burner head for a combustible mixture in encircling relation with said cap, and a platform section carried on the spider and having a downwardly tapering opening passing the head, said opening being of larger diameter than the outwardly flaring outer face of the collar member of the burner head to provide a secondary air passageway encircling said head and terminating substantially at the annular outlet in said burner head for discharging secondary air around said annular outlet.

3. A burner including a tubular body member having an outlet at one end, a spider having a collar portion encircling the outlet end of the tubular body and supported on said body, a burner head including a collar member encircling

the outlet and having an upwardly and outwardly flaring periphery terminating at an annular beveled face at the top of the collar, said collar having an outwardly flaring inner face joining with the beveled face, a cap having an outwardly flaring under face provided with lugs seated upon the inner flaring face to provide a converging annular outlet for a combustible mixture in encircling relation with said cap, and a platform section carried on the spider and having an outwardly tapering opening in which the head is received, said opening being of larger diameter than the head to provide an upwardly and outwardly discharging secondary air passageway encircling said head and terminating substantially at said annular outlet.

4. A gas burner including a gas supply pipe having an upwardly directed opening for passing gas from said supply pipe, a tubular body member having a bell-shape at one end forming an inwardly tapering air inlet for primary air and having an oppositely tapered fuel mixture outlet at the other end with the restriction therebetween forming a venturi, said bell-shaped end of the tubular body having spaced seats engaging the fuel supply pipe on opposite sides of said opening for supporting the bell-shaped end of the tubular body member axially of said opening and spaced from the gas supply pipe to admit said primary air into the inwardly tapering air inlet, means on the tubular body and engaging the gas supply pipe for retaining said tubular burner body in an upright position and said seats in contact with the gas supply pipe, a tubular nozzle removably engaged in said opening of the gas supply pipe and extending into the inwardly tapering inlet, said tubular nozzle being of a length to cooperate with the bell-shape of the tubular body to provide an annular passageway for the primary air of a desired size relatively to the amount of gas passed from said nozzle to provide an effective fuel mixture when discharged through said venturi, a spider having a collar encircling the tubular body and carried on the said fuel mixture outlet end, a hollow burner head covering said outlet end of the tubular body and having an annular fuel mixture discharge outlet, and a platform section horizontally carried on the spider and having an opening of larger diameter than the burner head and in which the burner head is received to provide an annular secondary air passageway around said burner head substantially at said fuel mixture outlet thereof.

5. A burner including a substantially horizontal fuel supply pipe, a fuel discharge nozzle projecting upwardly from the fuel supply pipe, a tubular burner body having an outlet for a fuel mixture at one end and a substantially bell-shaped portion at the other end forming an inlet for primary air, said bell-shaped portion having diametrically spaced seats corresponding with the upper transverse section of the fuel supply pipe for engaging and supporting the tubular body and having an annular fuel mixture fuel supply pipe substantially coaxially over said nozzle, a yoke fixed to the bell-shaped portion

of the burner body intermediate said seats and extending under the supply pipe, clamp means carried by the yoke and engaging the side of the supply pipe opposite said seats for retaining the tubular burner body in said upright position on the supply pipe, a spider having arms extending radially from the outlet end of the tubular burner body, a hollow burner head supported on the tubular burner body above the spider and in covering relation with said outlet and having an upwardly and outwardly directed annular fuel mixture outlet passage, and a platform supported substantially horizontally on the arms of the spider and having an opening of larger size than the burner head cooperating therewith in forming an annular secondary air passageway around the burner head and terminating substantially at the discharge of the fuel mixture outlet passage.

6. A burner including a substantially horizontally positioned fuel supply pipe, a fuel discharge nozzle projecting upwardly from the fuel supply pipe, a tubular burner body having an outlet at one end and a substantially bell-shaped portion at the other end forming an inlet for primary air, said bell-shaped portion being provided with diametrically spaced seats for engaging the fuel supply pipe on the respective sides of said nozzle and having a yoke adapted to extend around the supply pipe below said nozzle, a setscrew carried by the yoke and engaging the supply pipe opposite said seats for retaining the tubular body in an upright position on the supply pipe, said tubular body having substantially concentric annular shoulders of different diameter encircling said tubular burner body below the outlet end with the smaller shoulder nearer said outlet, a spider having a collar encircling the outlet end of the tubular burner body and supported on the larger of said shoulders, a hollow burner head carried on the other shoulder in covering relation with said outlet end and having an upwardly and outwardly directed annular fuel mixture discharge passage, and a platform section carried horizontally on the spider having an opening of larger size than the burner head to accommodate the burner head and provide a secondary air passageway therearound and terminating substantially at the discharge of the fuel mixture outlet passage.

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