Nov. 8, 1932. G. W. BLAKESLEY 1,886,866

GAS BURNER

Filed Aug. 16, 1929 2 Sheets-Sheet 1

Fig. 1.

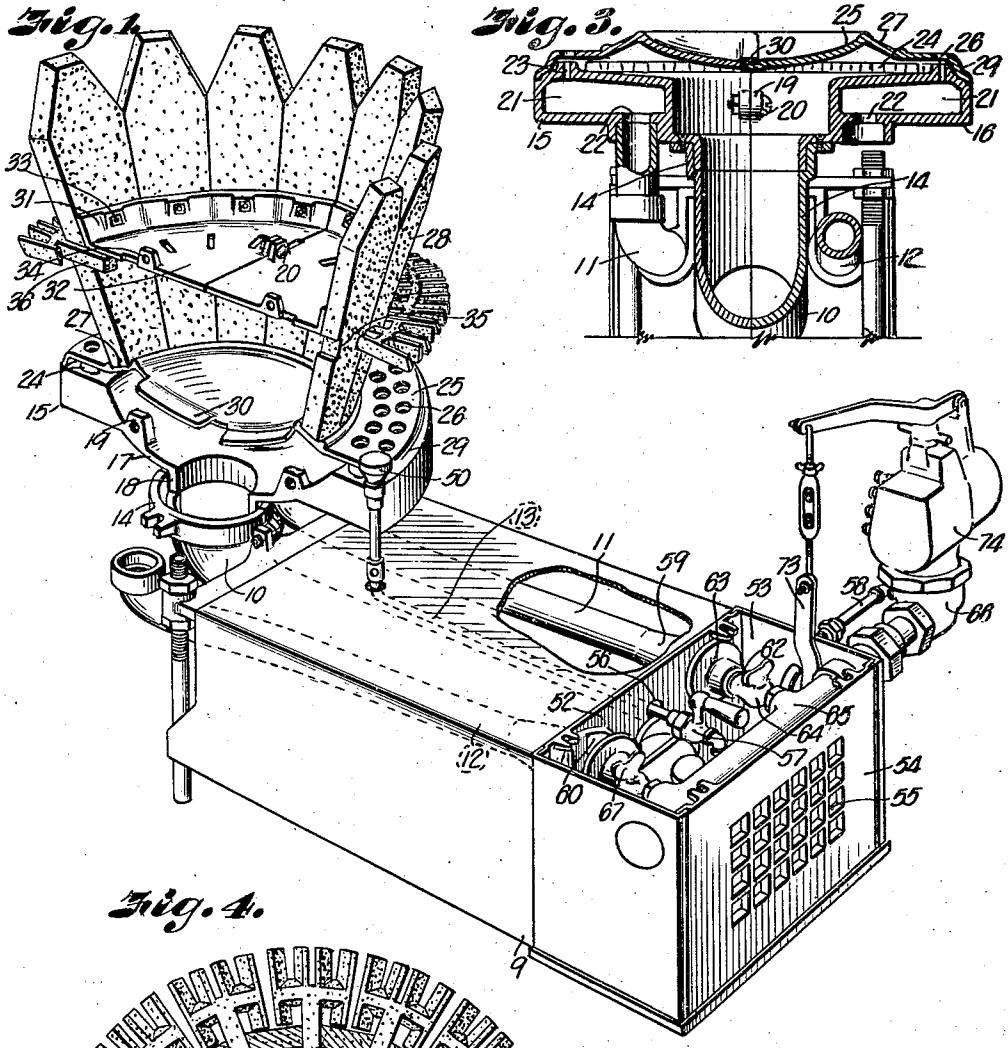
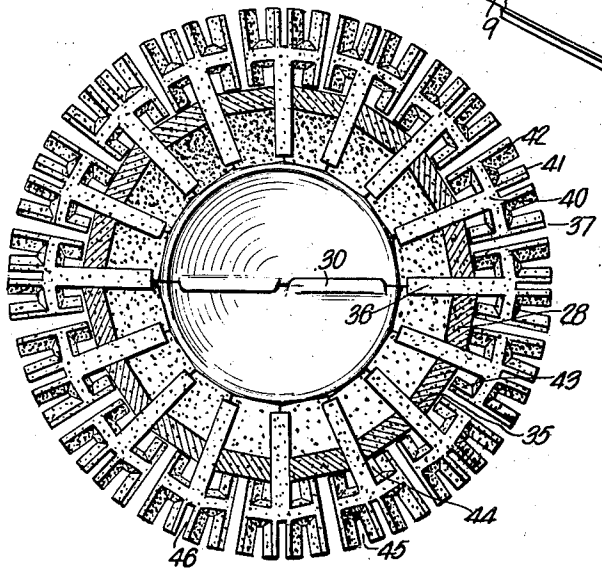


Fig. 3.

Fig. 4.



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Filed Aug. 16, 1929 2 Sheets-Sheet 2

Fig. 2.

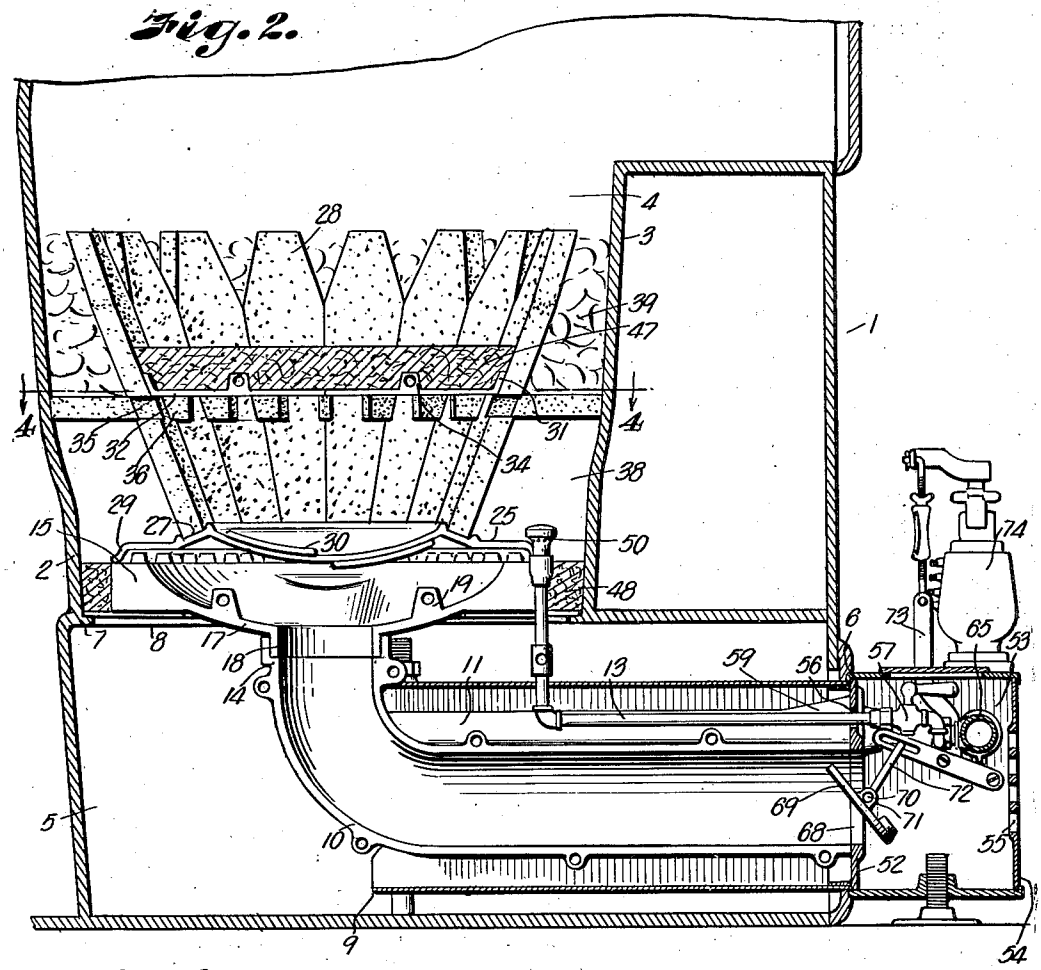


Fig. 5.

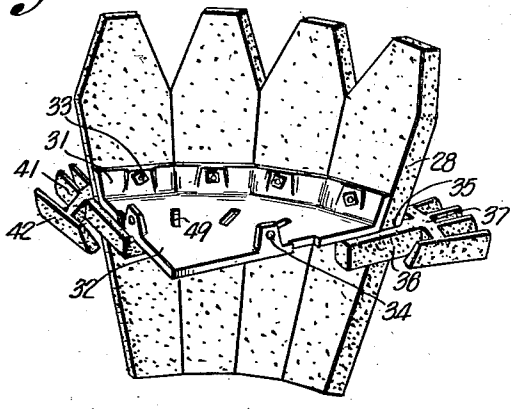
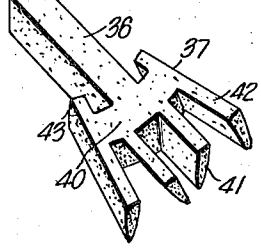


Fig. 6.



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UNITED STATES PATENT OFFICE

GEORGE W. BLAKESLEY, OF KANSAS CITY, MISSOURI

GAS BURNER

Application filed August 16, 1929. Serial No. 386,469.

My invention relates to gas burners, and more particularly to gas burners employed in domestic furnaces and the like, the principal objects of my invention being to control the flow of gas through the fire bowl of the furnace, to retain gases in spaces adjacent the walls of the fire bowl until combustion is substantially completed, to promote the combustion of gases in spaces adjacent the walls of the bowl, and to conserve the heat of burned gases, for increasing the efficiency of gas-burning furnaces.

Further objects of my invention are to adapt deflecting members for adjustably supporting gas-control elements, to mount gas-control elements intermediately of the ends of a deflector member for restricting flow of gases in the bowl, and to facilitate the adjustment of restrictive elements to fit any fire bowl for more effectively influencing gases moving through the bowl.

In accomplishing these and other objects of my invention, I have provided improved details of structure, the preferred forms of which are illustrated in the acompanying drawings, wherein:

Fig. 1 is a perspective view of a fuel control apparatus and sections of a burner in assembled relation, other burner sections being removed to better illustrate the relations of burner parts.

Fig. 2 is a vertical central section from front to back through the lower portion of a furnace equipped with my improved burner.

Fig. 3 is a vertical central section of the burner at right angles to the section shown in Fig. 2, with deflector members and slotted fingers removed.

Fig. 4 is a section of the burner on the line 4—4, of Fig. 2.

Fig. 5 is a perspective view of a deflector member section and lateral fingers slidably supported thereby.

Fig. 6 is an enlarged perspective view of one of the lateral finger members.

Referring in detail to the drawings:

1 designates generally a furnace including a fire bowl 2 having vertical walls 3 forming a chamber 4, an ash pit 5 having a door opening 6, and an annular flange 7 around an opening 8 affording communication between the fire bowl chamber and the ash pit.

Mounted in the ash pit with its outer end projecting from the ash pit door is a housing 9 later described, through which an air draft inlet conduit 10, fuel mixture pipes 11 and 12, and a pilot light tube 13 extend toward the fire bowl.

Mounted on the upwardly turned inner end 14 of the air conduit 10 is a circular base or support comprising a pair of mated similar semi-circular castings 15 and 16 having concave web portions 17 provided with flanges 18 adapted to engage the conduit and form an axial opening in the base registering with the end of the conduit when the base members are mounted thereon. Vertical ears 19 on the webs are adapted to receive bolts 20 for securing the base members together.

The base members have hollow peripheral portions forming chambers 21, and each has a gas inlet opening 22 into which the inner ends of corresponding fuel pipes 11 and 12 are connected. Each base member has a plurality of nozzles 23 formed in upwardly projecting bosses 24 arranged adjacent its outer edge and communicating with the chamber 21.

A cover member 25 mounted on each base member has openings 26 registering with the nozzles 23 and an arcuate groove 27 to receive deflecting members 28 presently described. The covers have depending flaring peripheral flanges 29 shaped to form shoulders for engaging shouldered outer edge portions of the base members, whereby the covers are supported in spaced relation with the nozzle bosses for admitting air to the streams of fuel passing from the chambers 21 to the openings of the covers.

The base thus forms an annular header for distributing fuel mixture, and is adapted for admitting a secondary air supply received through the central opening of the header.

The cover members are adapted to fit together closely to form a sealing top for the bowl-like base. Ears or flanges 30 on the inner edge of the cover member may inter-

lockingly engage adjacent edges of the other member for effecting the connection thereof.

The deflecting members 28 comprise narrow slabs of refractory material mounted on end in the grooves 27 in inclined position and in edge abutting relation to form a closed bowl-like frustro-conical deflector adapted to deflect gases moving from the base openings toward the fire bowl walls.

The inclination of the deflecting members is preferably conferred by forming the grooved portions of the covers with radially inclined grooved floors, and the central portions of the covers are depressed to form a concave closed bottom for the bowl-like deflector when the covers are connected.

The deflecting members 28 are preferably assembled in sections, for example four equal sections each comprising a number of members attached to an upstanding outer edge flange 31 of a quadrant sector plate 32 by bolts 33. The sectors 32 are provided with perforate ears 34 on inner edges to receive bolts for securing the several sections together and forming a partition in the deflector intermediate the upper and lower ends thereof.

Sealing material may be installed between the abutting edges of the deflecting members 28 to prevent entrance of air or gas into the dead air pocket and form a tightly closed inner wall for the annular chamber.

The upper end of the deflector preferably extends in slightly spaced relation with the walls of the fire bowl to form the reduced annular outlet end of an annular upwardly contracted channel for gases moving from the base toward the smoke outlet of the furnace.

Slidably mounted in horizontal slots 35 formed in the deflecting members 28 are the shanks of perforate brackets 37 adapted to be moved into engagement with the walls of the fire bowl for horizontally dividing the annular channel formed by the bowl and deflector to provide a lower mixing and combustion chamber 38 communicating with the fuel nozzles.

Supported by the brackets 37 is a pervious mass of refractory material 39 contacting the deflector and fire bowl walls, and adapted to be heated by the flames of the burning gases, and to absorb and conserve the heat of products of combustion for transfer to the fire bowl walls.

The mass of material 39 preferably consists of small briquettes or biscuits formed of burnt clayey substances or the like.

The brackets further comprise arcuate transverse body portions 40 formed on the outer ends of the shanks 36 and projecting laterally therefrom, fingers 41 extending forwardly from the body in planes parallel with the axis of the shank but tilted with reference to the vertical plane of the shank, and wings 42 attached to the outer ends of the body and extending angularly to the axis of the shank and tilted with reference to the vertical plane of the shank.

The fingers 41 on each bracket preferably comprise a pair of laterally spaced wedge-like projections equally spaced from the extended axis of the shank, and inclined vertically toward each other. The wings 42 diverge outwardly and project inwardly from the bodies toward the shank to provide flange-like stop members 43 adapted to engage the deflecting members to limit inward sliding movement of the bracket and cooperate with the body, shank and deflecting members to form ports 44 for passage of gases from the chamber 38 into the space occupied by the refractory material 39.

The forwardly projecting portions of the angularly positioned wings 42 diverge from adjacent fingers, and the wings and fingers are formed to produce a curve corresponding to the curve of the fire bowl walls so that the outer end faces of the wings and fingers may snugly engage said walls when the bracket is moved outwardly toward the walls.

The forwardly projecting portions of the wings also have vertically converging sides forming taper edges presented in the same direction as the similar taper edges of the fingers. The brackets are preferably mounted with the broader edges of the fingers and wings presented to the streams of gases passing from the chamber 38 whereby upwardly widening channels 45 are formed by adjacent wings and fingers, and upwardly constricted channels 46 are formed by the pair of fingers.

The ports 44 also expand upwardly due to the tapering character of the inner sides of the wing projections 43.

A body of heat resisting and sealing material 47, for example asbestos cement, is installed on the partition formed by the sectors 32 to retain heat in the lower portion of the deflector and constitutes the space below the partition a dead air pocket. Similar sealing means 48 is installed between the periphery of the base and the walls of the bowl to prevent entrance of air to the chamber 38 otherwise than through the conduits provided for the purpose.

The sectors 32 are provided with slots 49 suitably located to admit a tool to the inner ends of the bracket shanks for adjusting the brackets with reference to the fire bowl walls.

The apparatus further includes a constantly burning pilot burner or light 50 in the chamber 38 fed through the tube 13 extending into and through the housing.

An apertured partition 52 in the housing defines a housing chamber 53 exterior to the furnace, having a front or end wall 54 provided with draft inlet openings 55. The pilot burner tube 13 extends through an ap-

erture 56 of the partition and is connected by a valved fitting 57 to a tube 58 leading from the gas supply line and supplied with gas under relatively constant pressure.

The fuel mixture conduits have flaring outer ends 59 abutting the inner face of the partition around air ports 60 therein, and forming funnel-like mixing chambers. Nipples 62 mounted on the partition in a central position with reference to the ports support air control valves or disks 63 and receive the inner ends of valve fittings 64 having outer ends communicating with a header 65 connected with an automatically controlled valve 66 in the gas supply line. Valve stems 67 are manually operable for adjusting the flow of gas through the fittings 64 to the mixing chambers formed by the conduit ends 59.

The outer end of the air conduit 10 is mounted at a relatively large central opening 68 in the partition for communication with the housing chamber 53 for delivering a draft between the upper surface of the hollow base portions and the cover members to the gases moving from the nozzles toward and through the openings of the cover members.

A damper 69 for controlling the draft is pivotally supported at the outer end of the air conduit by a shaft 70 mounted in ears 71 projecting from the partition. A crank arm 72 on the shaft is operable through a link 73 by regulating apparatus generally designated 74.

Suitable means may be provided for rendering the regulating apparatus responsive to changes in temperature in a space to be heated, for opening and closing the damper and the header-like conduit to the fuel mixture pipes.

In using the invention, the housing, together with the regulating apparatus and conduits are installed in indicated relation with the ash pit and fire bowl of a furnace. The halves of the base are mounted on the inner end of the air conduit, and are secured together by bolts.

The cover members are then installed on the base, with edge flange portions in overlapping and interlocking relation, and the several sections of the previously described deflecting members are mounted on the cover, the brackets being installed in the slotted members. The sectors are fastened by bolts to form a securely connected deflector bowl. A tool may then be inserted in the slots of the cover members to move the brackets outwardly into engagement with the fire bowl walls.

Sealing material is then installed in the deflector, and refractory material on the brackets.

The mixture of air and gas moving through the nipple-like bosses of the base into the combustion chamber burns therein and flows slowly through the refractory material, heating the same, and being thoroughly burned before passage toward the smoke outlet of the furnace. The secondary air conduit supplies a draft around the nipples or nozzles of the base for movement into and through the combustion chamber in company with the streams of burning gases.

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

1. In a gas burner, in combination with a fire bowl, a gas inlet, and means including a deflecting member for confining the gas to an annular path through the fire bowl, a bracket horizontally slidably supported by said member in said path in spaced relation with the bowl and movable into engagement with the bowl for the purpose described.

2. In a gas burner, in combination with a fire bowl, a gas inlet, and means including a deflecting member for confining the gas to a path through the fire bowl, horizontally adjustable means supported by said member in said path for absorbing heat from the gas for transfer to the fire bowl.

3. In a gas burner, in combination with a fire bowl, a gas inlet, and means including deflecting members for confining the gas to an annular path through the fire bowl, a plurality of brackets having laterally projecting fingers adjustably supported by said members in said path, and a body of heat-absorbing material mounted on the brackets.

4. In apparatus of the character described including a fire bowl and a gas inlet, an upwardly expanding deflector mounted concentrically in the fire bowl to form therewith an annular channel communicating with the gas inlet, said deflector including slablike members provided with slots, and perforate brackets mounted in said slots and adjustable transversely in said channel.

5. In apparatus of the character described including a fire bowl, and a gas inlet, a slotted frusto-conical deflector mounted concentrically in the fire bowl, slotted brackets slidable in the slots of the deflector, and pervious refractory material mounted on said brackets.

6. In apparatus of the character described including a fire bowl and a gas inlet, an upwardly expanding deflector mounted concentrically in the fire bowl to form therewith an annular channel communicating with the gas inlet, means including slotted plates forming a partition in said deflector, perforate members slidably supported by the deflector in said channel, and having inner ends accessible through the slots of the plates for moving the members slidably.

7. In a gas burner including a circular hollow base having a ring of fuel discharge outlets adjacent its edge, a circular series of deflecting member supported by the base within said ring of outlets, and partition means fixed to said members to form a unitary deflector and to provide a dead air pocket above said base.

8. In a gas burner including a base having a circular series of fuel discharge nipples, a circular series of deflecting members supported by the base, horizontal plates having edges connected with said members to form deflector sections, and means for connecting said plates to form a unitary deflector and to provide a dead air pocket above said base.

9. In a gas burner, in combination with a fire bowl, a header base mounted in the fire bowl having a ring of fuel discharge outlets adjacent its periphery, a circularly arranged series of inclined deflecting members mounted on the header base within said ring, and a plurality of plates connected with said members and adapted to be connected with each other to form a deflector unit and retain the upper ends of the deflecting members in spaced relation with the sides of the fire bowl.

10. In a device of the character described including a fire bowl, a bracket, and a deflector having a slot to receive the bracket for slidably supporting the same.

11. In a device of the character described including a fire bowl and means in the fire bowl forming therewith an annular channel, a bracket having spaced fingers extending radially from said means toward the bowl, and means including said channel-forming means movably supporting the bracket for movement of said fingers toward the bowl.

12. In a gas burner including a fire bowl, a slotted deflector located in the bowl and spaced therefrom to form an annular channel, a horizontal partition in the deflector above the slots therein, and a bracket movably mounted in said slots and having spaced fingers located in said channel.

13. In apparatus of the character described including a fire bowl and a hollow base having an annular series of upwardly directed openings located in the fire bowl, a deflector comprising a circular series of vertically elongated slab-like members supported on end by the base and inclined toward said bowl to form an annular combustion chamber and bracket members supported by said slab members and extending across said annular combustion chamber for retarding the products of combustion passing therefrom.

14. In apparatus of the character described including a fire bowl and a hollow base having an annular series of upwardly directed openings located in the fire bowl, a deflector comprising a circular series of vertically elongated slab-like members supported on end by the base and inclined toward said bowl, and means including plates securing said members in fixed relation for holding said members in spaced relation with the bowl.

15. In apparatus of the character described, a deflector including elongated slabs arranged in edge-abutting relation to form a hollow body, and slab connecting means including plates fixed to said slabs forming a horizontal partition in said body.

16. A gas burner including an annular hollow base having an annularly arranged series of upwardly directed openings, a cover including an annular portion provided with openings registering with said base openings and a central portion covering the central opening in said annular base, a deflector, brackets supported by the deflector, and means including a grooved portion of said cover for supporting the deflector.

17. A gas burner including an annular hollow base having an annularly arranged series of upwardly directed openings, a cover including an annular portion provided with openings registering with said base openings and a central portion covering the central opening in said annular base, a deflector supported by the cover, and brackets supported by the deflector.

18. In a gas burner, in combination with a fire bowl, gas inlet means, and means including a deflecting member for confining the gas to an annular path through the fire bowl, circular series of refractory brackets horizontally supported by said member in said path and in engagement with the fire bowl for retarding the gas in its passage from the fire bowl.

19. In a gas burner, in combination with a fire bowl, gas inlet means, and means including deflecting members for confining the gas to an annular path through the fire bowl, a plurality of brackets having laterally projecting fingers supported by said deflecting members in the path of the gas for retarding the passage of gas from the fire bowl.

20. In a gas burner, in combination with a fire bowl, gas inlet means, and means including deflecting members for confining the gas to an annular path through the fire bowl and having openings therein, a plurality of brackets having laterally projecting fingers engaged in the openings of the deflecting members to support the fingers in the path of the gas for retarding the passage of gas from the fire bowl.

21. In apparatus of the character described including a fire bowl and gas inlet means, an upwardly expanding deflector mounted concentrically in the fire bowl to form therewith an annular channel communicating with the gas inlet, said deflector including slab-like members provided with slots, and perforated brackets mounted in said slots and extending across said annular channel to retard the gas combusted in said fire bowl.

In testimony whereof I affix my signature.

GEORGE W. BLAKESLEY.