Oct. 25, 1932. C. J. SHERWOOD 1,884,894

FUEL BURNER

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Fig. 2

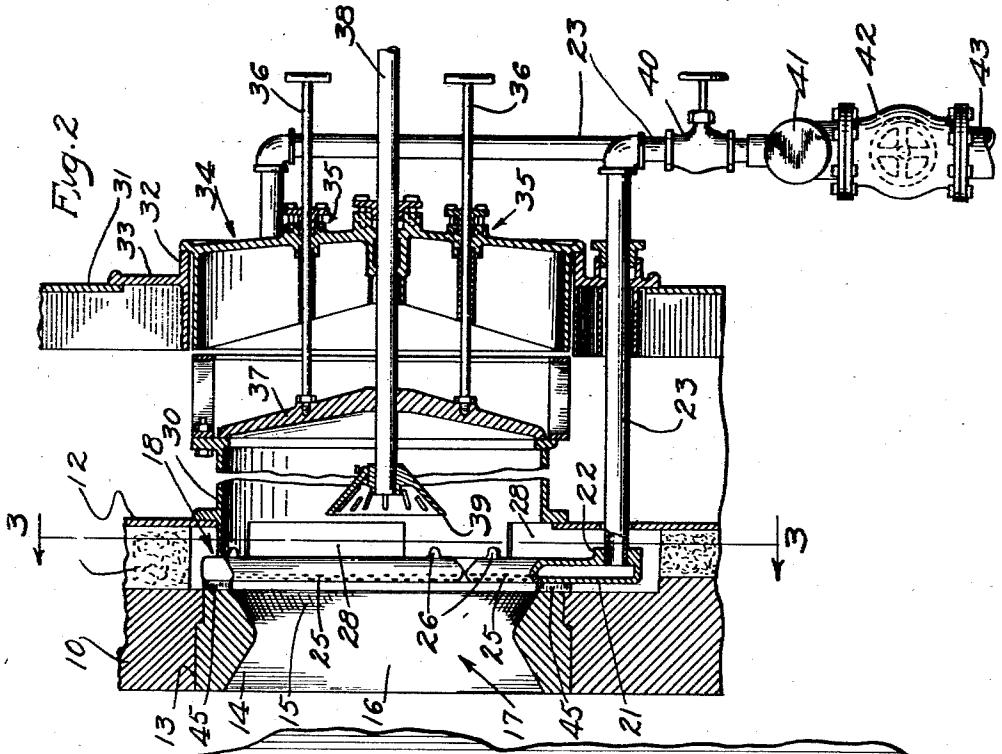
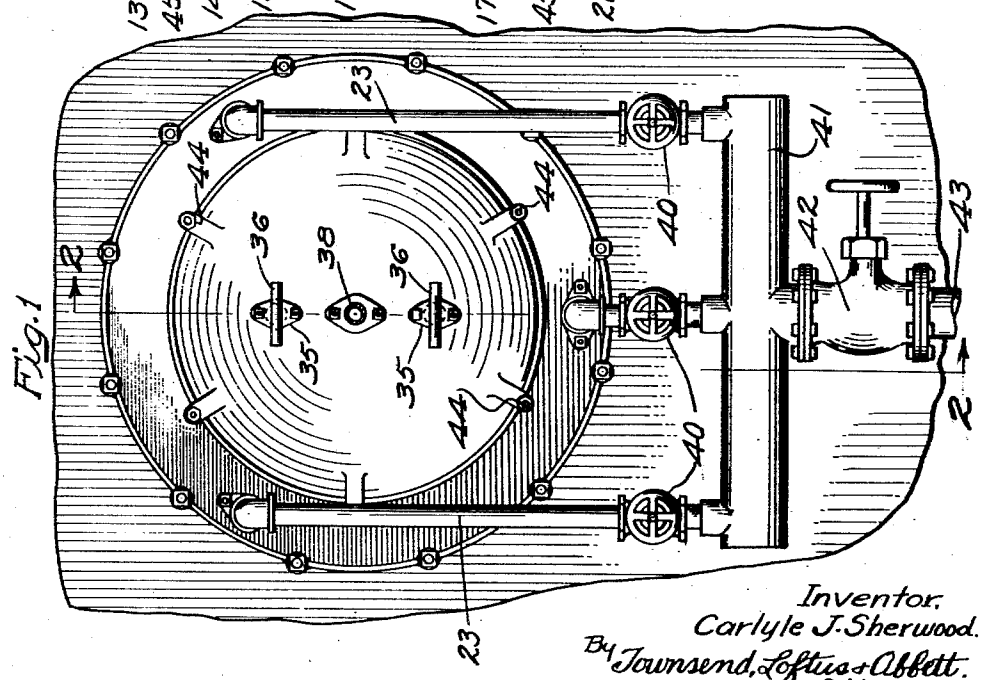


Fig. 1



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FUEL BURNER

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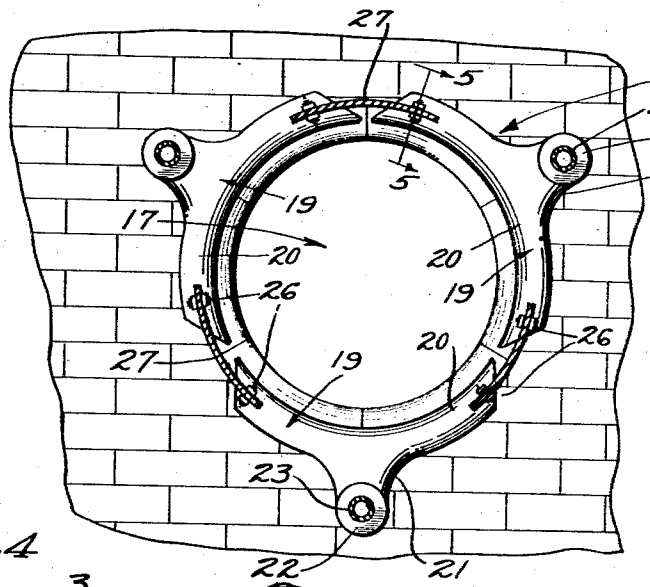


Fig. 3

Fig. 4

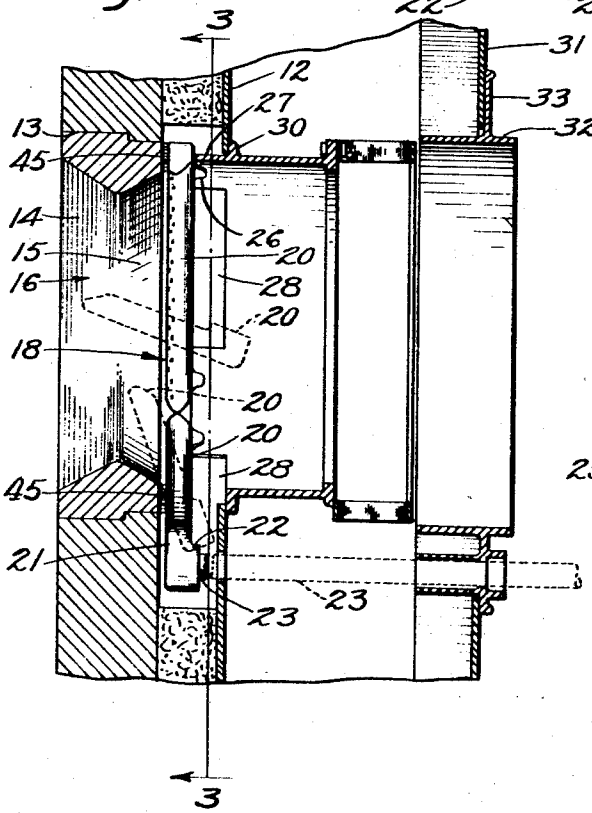
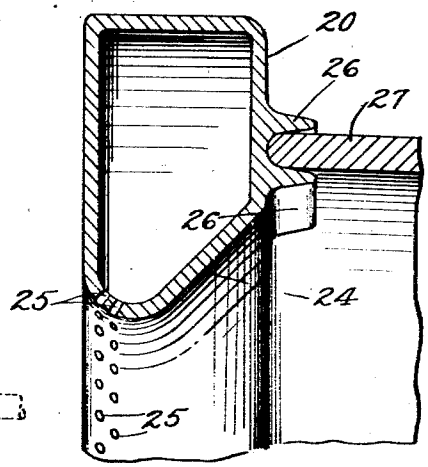


Fig. 5



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UNITED STATES PATENT OFFICE

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FUEL BURNER

Application filed December 11, 1929. Serial No. 413,322.

This invention relates to fuel burners and particularly pertains to a burner simultaneously utilizing liquid and gaseous fuel.

In the type of burner shown in my issued patent, entitled "Combination burner mounting and air control", Patent No. 1,722,253, dated July 23, 1929, an annular gas burner was shown adjacent to the firing opening of the furnace and through which a flame from another centrally disposed fuel burner projected, and with which flame the flame of the gas burner co-mingled. In this type of burner a high degree of heat is obtained and it sometimes occurs that the annular fuel burner becomes damaged and must be replaced. It also has been found desirable to variably regulate the flow of fuel at various points around the circumference of said burner. When the contents of the annular burner must be removed it is now necessary to shut down the furnace and to dismantle the entire burner structure so that the annular fuel burner may be replaced.

It is the principal object of the present invention to provide a burner construction in which a sectional annular burner is provided and is so mounted within the structure as to be easily removed without dismantling the entire burner, and easily removed in its entirety without dismantling the entire burner structure, or any one of its sections to be replaced in a convenient manner, the structure further providing means whereby the various sections of the burner will be supplied with fuel, and individually or collectively regulated.

The invention is illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a view in elevation showing the assembled burner embodying the present invention.

Fig. 2 is a view in central vertical section through the burner as seen on the line 2—2 of Fig. 1 and with parts broken away for the sake of convenience.

Fig. 3 is a view in section through the burner structure, as seen on the line 3—3 of Fig. 2, showing the assembled annular burner.

Fig. 4 is an enlarged fragmentary view showing the outer portion of the burner structure removed and indicating the manner in which one of the annular burner sections may be removed.

Fig. 5 is an enlarged view in transverse section through the annular burner, as seen on the line 5—5 of Fig. 3 and showing the manner in which the burner sections may be conveniently positioned with relation to the housing.

Referring more particularly to the drawings, 10 indicates the wall of the furnace, having a front cover 12. An opening 13 is formed through the wall 10 of the furnace and is lined with a suitable annular fire clay throat 14. The passageway through said throat is tapered inwardly by a wall 15 to a point midway the thickness of the throat and is then formed with an outwardly tapering wall 16, flaring into the body of the furnace. The tapered wall 15 forms a Venturi like passageway into the furnace and through which the fuel, products of combustion and air may be projected. Circumscribing the mouth of the firing opening 17 which occurs through the lining 14 is an annular ring-shaped burner structure 18. This burner structure is particularly shown in Fig. 3 as being formed by multiple segments 19, each of which comprises an arcuate burner length 20, a radially extending pipe connection 21 and a boss 22 at the outer end thereof, to receive a fuel supply pipe 23. The ends of the arcuate sections are suitably beveled and are disposed parallel to the central radial axis of the section, so that the sections may be individually moved radially of the assembled structure and thus may be conveniently removed from the assembled burner, and replaced with relation thereto.

The inner walls of the burner sections have an inwardly tapered face 24 terminating in an outwardly curved portion through which fuel ports 25 are formed. The angle of the face 24 of the burner wall substantially agrees with the angle of the face 15 of the fire opening and thus forms a continuation of that throat. The separate burner sections are fitted with a plurality of pairs of lugs 26

which straddle the edge of a burner housing 27. The burner housing 27 is disposed with its longitudinal axis horizontally and coincident with the longitudinal axis of the fire opening and the annular burner structure 18. Adjacent to the separate sections 19 of the burner structure are cutaway portions 28 formed through the wall to permit access to the pipes 23, and to make it possible for a torch to be used in cutting off the pipes when it is necessary to replace the burner sections.

A flange 30 is formed around the body of the burner housing 27 and secures the housing to the front plate 12 of the furnace. An outer wall 31 is here shown as being provided and as spaced from the main furnace wall. This wall receives an annular member 32 secured to it by a flange 33 and within which a damper plate 34 is positioned. Guide glands 35 are formed through the end wall of the damper plate 34 and receive operating rods 36 which project inwardly and are connected to a frusto-conical damper member 37, which may be horizontally moved with relation to the open end of the burner housing 27. Extending longitudinally through the members 34 and 37, and disposed along the horizontal longitudinal axis thereof, is a fuel supply pipe 38, through which liquid fuel may be supplied to its outlet end. A conical diffuser plate 39 is mounted on the end of the pipe 38 to insure that the co-mingled air and fuel will be projected forwardly and into the throat of the furnace in a state of mixture which will insure proper combustion of the liquid fuel and gaseous fuel. It is understood that if desired the pipe 38 might be enlarged and powdered fuel fed therethrough without departing from the spirit of the invention.

The various pipes 23 of the arcuate burner sections are here shown as separatelv provided with regulating valves 40, which control the flow of fuel through the individual pipes from a manifold 41. This manifold is fitted with a regulating valve 42 interposed between it and a fuel supply pipe 43.

In operation of the present invention the burner structure is assembled as shown in Fig. 2 of the drawings. At this time a regular supply of fuel may be deliverd through the pipes 23 and 38 to the respective burner outlets. If desired the flow of fuel to the individual arcuate burner sections 19 may be separately regulated by the valves 40, after which the flow of fuel to all of the arcuate burner sections may be simultaneously regulated by the valve 42. The ignited fuels from both burners will co-mingle and will be projected inwardly and centrally of the passage 17 through the throat lining 14. The combustion performance may be controlled by the dampers.

In the event that any one of the arcuate segments of the annular burner becomes damaged, or for any other reason requires removal or replacement, the supply of fuel is discontinued to all of the pipes 23 and 38, after which bolts 44 are removed to permit the entire damper structure to be withdrawn. The burner will then be disassembled to the extent indicated in Fig. 4 of the drawings, and an acetylene torch or other equivalent appliance may be inserted into the housing 27 and through one of the openings 28 therein, so that the pipe 23 of the burner section 19 may be disconnected from the pipe and removed through the housing 27. It is assumed that the extreme condition of heat under which the burner has operated will prevent the pipe 23 from being unscrewed from the boss 22 of the burner section 19, as this usually proves to be the case. In any event, after the burner section has been disconnected from its pipe, it may be moved radially and drawn between the adjacent ends of the other two sections. After this has been removed and the pipe 23 has been replaced, it is then possible to place a new burner section in position and to screw the pipe 23 into it. At that time the lugs 26 of the burner section are positioned upon opposite sides of the edge of the housing 27 and act to position the burner section while the pipe 23 holds it in place.

As shown in Fig. 2 of the drawings, a packing ring 45 is interposed between the lining ring 14 and the burner segments. This packing ring is preferably made of asbestos or similar material. Prior to the removal of the burner segments it may be necessary to tear out this ring to leave clearance space, as shown in Fig. 4 of the drawings, in which case it will be necessary to replace the ring when the burner segments are replaced.

It will thus be seen that by the structure here disclosed, it is possible to replace or interchange a burner, or a segment thereof, without necessity for completely dismantling the burner structure, and without making it necessary to shut down the furnace for any appreciable period of time.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in combination, construction, and arrangement of parts by those skilled in the art without departing from the spirit of my invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A burner structure comprising a central fuel burner adapted to project a flame through a firing opening, a housing adjacent said burner and the mouth of the firing opening, and an annular burner ring concentric with the axis of the mouth of the firing open-

ing, and interposed between the wall of the furnace, through which the firing opening occurs, and the forward end of the housing, said annular burner being formed in arcuate segments disposed in interlocking relation with the end of said housing.

2. In a burner structure, a composite ring shaped burner arranged around a firing opening, and adapted to project a flame thereinto, said burner comprising a plurality of disassociated separate arcuate sections, a fuel connection extending laterally from each of said burner sections and away from the zone of furnace heat, and fuel pipes, one connected with each section, for supplying fuel thereto, and by which said sections are individually supported.

3. In a burner structure, a ring shaped burner arranged around a firing opening in a furnace wall, and adapted to project a flame thereinto, said burner comprising a plurality of separate arcuate sections, a fuel connection extending from each of said burner sections, and fuel pipes, one connected with each section, for supplying fuel thereto, and by which said sections are individually supported, a burner housing at one end of which said annular burner is positioned said burner sections being interposed between the end of the burner housing and the furnace wall, and means carried by the burner sections engaging the housing and holding said sections in relation thereto and to each other.

4. In combination with the wall of a furnace through which a firing opening is formed, an annular burner concentric with the axis of the mouth of said opening, said burner being formed in a plurality of arcuate sections, fuel pipes, one connecting with each of said burner sections and supplying fuel therefor, a burner housing permanently supported with relation to the wall, the annular burner being interposed between said housing and the wall, and means for detachably positioning the separate burner sections with relation to the end of the housing.

5. In combination with the wall of a furnace through which a firing opening is formed, an annular burner concentric with the axis of the mouth of said opening, said burner being formed in a plurality of arcuate sections, fuel pipes, one connecting with each of said burner sections and supplying fuel therefor, a burner housing permanently supported with relation to the wall, the annular burner being interposed between said housing and the wall, and means for detachably positioning the separate burner sections with relation to the end of the housing, and the opening through the wall of the housing, rendering the points of connection between the individual burner sections and their fuel pipes accessible.

6. In a burner construction, an annular housing, a plurality of arcuate burner sections positioned adjacent the end thereof and arranged to form a ring-shaped burner, separate fuel pipes, one connecting with each of said burner segments and acting to supply fuel thereto, and to individually support the same, and lugs carried by each of the burner sections and adapted to engage the end of the burner housing in a manner to position the burner with relation thereto.

7. In a burner construction, an annular housing, a plurality of arcuate burner sections positioned adjacent the end thereof and arranged to form a ring-shaped burner, separate fuel pipes, one connecting with each of said burner segments and acting to supply fuel thereto, and to individually support the same, and lugs carried by each of the burner sections and adapted to engage the end of the burner housing in a manner to position the burner with relation thereto, and an opening through the housing wall to render the point of connection between the burner segments and their fuel pipes accessible.

8. A fuel burner construction, comprising a cylindrical burner housing, the walls of which extend along the perimeter of an opening in the wall of a furnace, said housing being supported with its forward end in spaced relation to said wall, arcuate sections of the forward wall of said housing being cut away at spaced intervals along the circumference thereof, a plurality of burner sections forming a composite circular burner interposed between the furnace wall and the forward end of the burner housing, and means carried upon the separate burner sections for interlocking with the portions of the burner housing occurring between said arcuate cut away sections whereby the burner will be held in its assembled position.

9. A fuel burner construction, comprising a cylindrical burner housing, the walls of which extend along the perimeter of an opening in the wall of a furnace, said housing being supported with its forward end in spaced relation to said wall, arcuate sections of the forward wall of said housing being cut away at spaced intervals along the circumference thereof, a plurality of burner sections forming a composite circular burner interposed between the furnace wall and the forward end of the burner housing, and means carried upon the separate burner sections for interlocking with the portions of the burner housing occurring between said arcuate cut away sections whereby the burner will be held in its assembled position, and separate fuel supply means for each of said burner sections acting to support the sections.

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