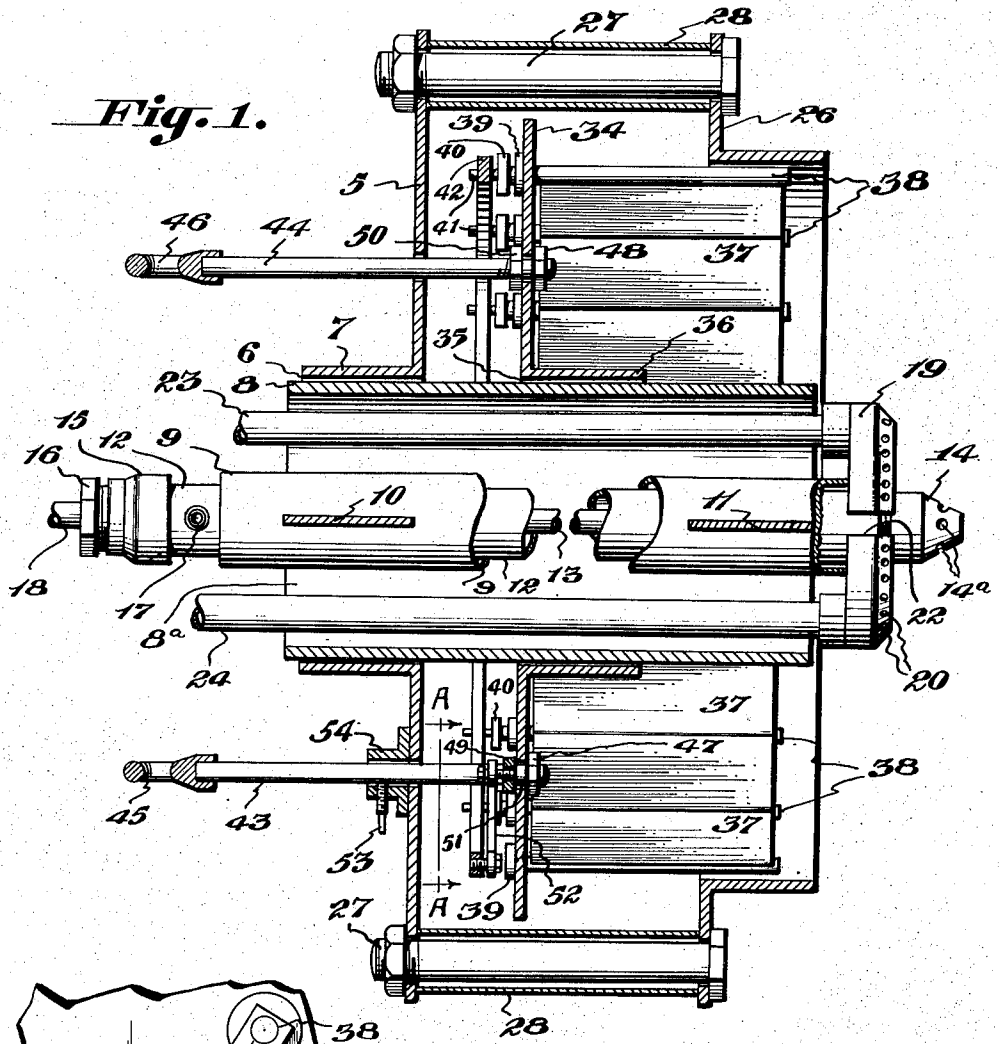
Dec. 28, 1937. J. S. ZINK 2,103,605

COMBINATION BURNER

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Fig. 1.



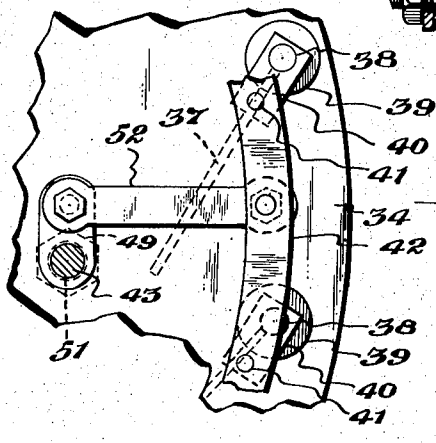


Fig. 2.

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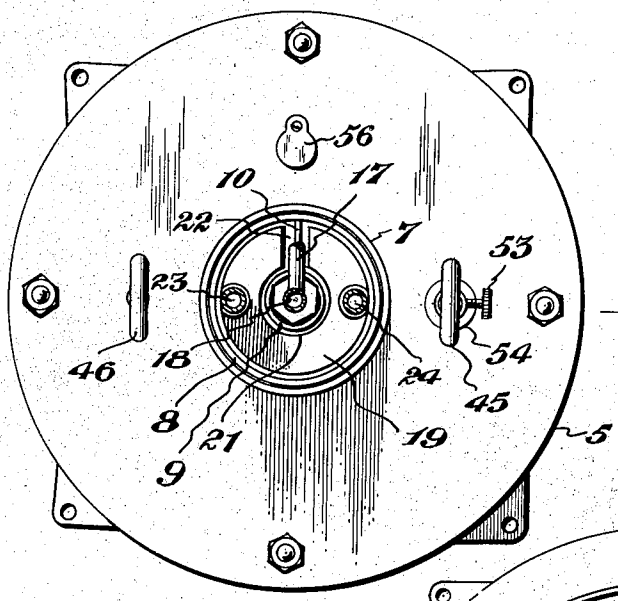


Fig. 3.

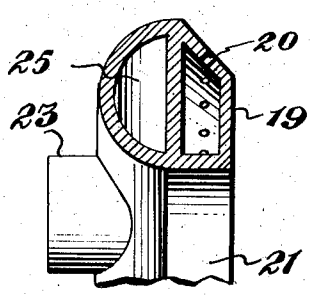


Fig. 6.

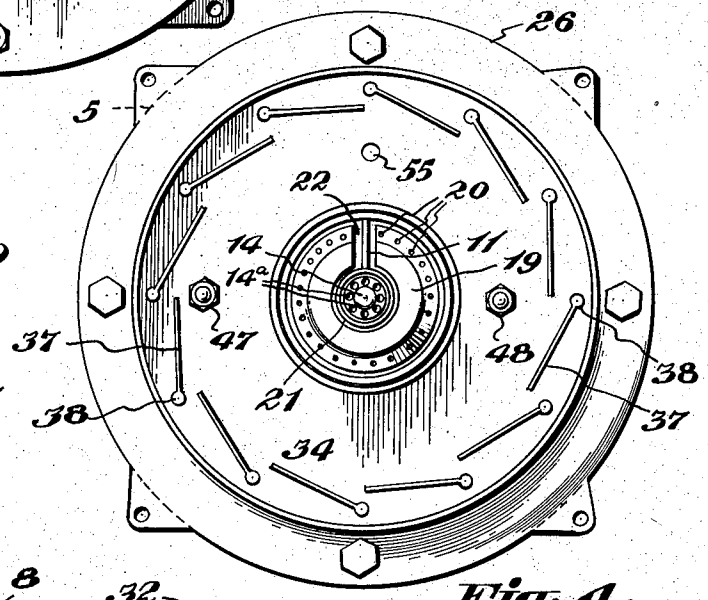


Fig. 4.

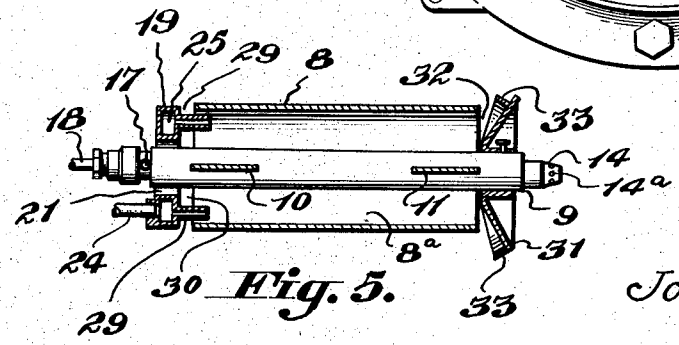


Fig. 5.

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UNITED STATES PATENT OFFICE

2,103,605

COMBINATION BURNER

John S. Zink, Tulsa, Okla.

Application January 11, 1937, Serial No. 120,073

7 Claims. (Cl. 158—11)

This invention relates to burners and more particularly to combination oil and gas burners for use in heating stills, boilers and other industrial furnaces.

A principal object of this invention is to provide a highly efficient combination oil and gas burner, wherein either the oil or gas burner may be removed from the combination asembly without disturbing the operation of the remaining burner, without requiring the dismantling of the main burner housing or supporting structure and without requiring alteration or dismantling of auxiliary appliances such as registers for admission and control of air for combustion.

Another object of this invention is to provide a combination burner having the above advantages and which, at the same time, will be cheaper to construct and simpler to operate.

The present invention is for improvements in the combination burner described in my copending application, Serial Number 108,101, filed October 28, 1936, and the present application is a continuation-in-part of the former application.

Other objects and advantages of my new burner will become apparent from the following description when read in conjunction with the accompany drawings which illustrate several forms of my new invention.

Fig. 1 is a horizontal median view, partly in section, of a complete burner assembly in accordance with this invention.

Fig. 2 is a fragmental view taken along line A—A of Fig. 1.

Fig. 3 is an elevation of the outside end of the burner assembly.

Fig. 4 is an elevation of the furnace end of the burner assembly.

Fig. 5 is a horizontal median view, partly in section, of another modification of a burner assembly in accordance with this invention.

Fig. 6 is a detail of the gas burner head.

Referring to the drawings, the burner assembly comprises a cover or mounting plate 5 having a central opening 6 surrounded by a collar 7. An elongated support tube or conduit 8 extends through opening 6 and is slidable in collar 7 which acts as a bearing for conduit 8. A second elongated conduit 9, of smaller diameter than conduit 8, is supported longitudinally of and substantially within the center of conduit 8 by means of spacer plates 10 and 11 which depend inwardly from the top of conduit 8 parallel to the axis thereof and are rigidly connected to the outside of conduit 9, which is somewhat longer than conduit 8 and extends beyond each end thereof. By this arrangement of conduits 8 and 9, an annular space 8a is provided between the inner wall of conduit 8 and the outside of conduit 9. An oil burner of the type well known in the burner art and consisting of a steam pipe 12 enclosing an oil pipe 13 joined together at the burner end to form a burner head 14 having fuel emission ports 14a, is slidably mounted within conduit 9 so that burner head 14 extends beyond the end of conduit 9 and is adjustable horizontally with respect thereto. At the end opposite the burner head 14, a closure is effected between steam pipe 12 and oil pipe 13 by means of a collar 15 mounted on the end of pipe 12 and a bushing 16 surrounding pipe 13 and which screws into collar 15. Steam and oil supply pipes 17 and 18 respectively are connected to their respective burner pipes 12 and 13 and are so arranged as to connect therewith in the same vertical plane as spacer plates 10 and 11. That is, spacer plates 10 and 11, steam supply pipe 17 and oil supply pipe 18 are all in the same vertical plane at right angles to the horizontal axis of conduits 8 and 9.

The gas burner consists of a hollow torus-shaped burner head 19 having a series of gas emission jets 20 arranged on the front surface thereof for emission of gaseous fuel from a hollow annular gas supply chamber 25 within head 19. The outside diameter of head 19 is slightly less than the inside diameter of conduit 8 which permits head 19 to be slidably inserted through conduit 8. The central opening 21 in head 19 is of slightly larger diameter than the outside diameter of conduit 9 thereby permitting head 19 to slide over conduit 9 while being inserted into conduit 8 through annular space 8a. Head 19 is split at one point in the circumference thereof to provide a slot 22 parallel to the longitudinal axis of head 19 which permits head 19 to pass by steam and oil supply pipes 17 and 18 respectively and spacer plates 10 and 11 when being inserted through annular space 8a to its operating position which, longitudinally, is between the furnace end of conduit 8 and the furnace end of conduit 9. Conduit 9 acts as a support for head 19. A pair of gas supply pipes 23 and 24 are connected to the back of head 19 at opposite sides of slot 22 and communicate with chamber 25. By this arrangement, each of the pipes is at one side of the plane of pipes 17 and 18, plates 10 and 11 and will be out of contact with these members when being inserted or removed from the assembly. Pipes 23 and 24

are of such size as to be freely insertable through annular space 8a.

By the arrangement of the parts as above described, it will be clearly evident that the oil and gas burning portions of the combination burner are entirely independent of each other and may be separately removed from the combination assembly or replaced therein without interference with each other.

In a commercial combination burner of the type described, conduit 8 is a length of standard six inch pipe, about 24 inches long. Conduit 9 is 2 inch standard pipe 30 inches long, pipe 12 is 1¼ inch standard pipe, pipes 13, 17 and 18 are ⅜ inch standard pipe and pipes 23 and 24 are ¾ inch standard pipe. Plate 5 is about 28 to 30 inches in diameter.

It will be noted that the oil and gas burning portions of the combination burner are supported independently of each other; the oil burner being supported within conduit 9 and head 19 of the gas burner on the outside of conduit 9. Thus removal of the oil burner will not leave the gas burner unsupported.

It will also be evident that, by the above arrangement, both the oil and gas burners are confined within the relatively small central area of conduit 8 and in this arrangement form a compact assembly. As a result, the assembly may be simply and cheaply constructed and will be simple to operate. The compact arrangement of the gas and oil burner heads provides a relatively small area for generation of combustion gases and very efficient mixing of both fuels will take place particularly when both burners are in operation at the same time. A high efficiency burner results therefrom.

The burner assembly may be mounted in a furnace opening by bolting plate 5 to the furnace wall, or the assembly may be spaced from the furnace wall by providing a throat ring 26 which is bolted to the furnace wall and by connecting plate 5 to ring 26 by means of bolts 27 which pass through spacer sleeves 28, the length of which determines the distance which plate 5 is spaced from ring 26.

Fig. 5 illustrates another modification of my new burner, wherein head 19 is mounted on conduit 9 but at the outer end of the assembly rather than at the furnace end as in the above described modification, and is spaced from the outer end of conduit 8 by a space 30. A series of parallel nozzles 29 mounted in the forward face of head 19 communicate with chamber 25 and extend into space 8a. A circular diffuser plate 31 is mounted on the furnace end of conduit 9 and at an angle of about 60° with respect to the longitudinal axis of conduit 9, the slope of the angle being toward the furnace end of the burner and providing an annular orifice 32 between the end of conduit 8 and diffuser plate 31. Helical vanes 33 are mounted at right angles to the orifice face of plate 31 and radiate from the center to the outer edge thereof. The oil burner portion of this modification is substantially the same as in the previously described modification and gas burner head 19 is slotted in the manner previously described to permit of its withdrawal past spacer plates 10 and 11 and steam and oil supply pipes 17 and 18 respectively. The relative arrangement of conduits 8 and 9 in this modification is the same as in the previously described modification.

In the operation of this modification, when the gas burner is in use, gas discharging through nozzles 29 will mix with air entering space 8a from space 30 between head 19 and the outside end of conduit 8. The resulting pre-mixed air and gas then flows through annular space 8a and is further mixed and given a swirling motion by means of the vanes 33 on diffuser plate 31 as the mixture is discharged from orifice 32 where the mixture is commingled with additional air from the outside of conduit 8 where combustion takes place.

The operation of the oil burner portions of both modifications is well known and understood by those skilled in the art. In both modifications, the gas and oil burners may be operated at the same time or separately and either burner may be removed from the assembly or replaced therein without adversely affecting the operation of the remaining burner.

In the form of burner illustrated in the drawings, a louvre type air register, as shown in Figs. 1 to 4, may be used to regulate the volume and direction of the air admitted for combustion of the fuels used. As illustrated, the register comprises a plate 34 having a central opening 35 surrounded by a collar 36 extending at right angles to plate 34. The opening 35 and collar 36 form a hub for slidably mounting plate 34 in a vertical position on conduit 8. A series of louvres 37, mounted on shafts 38 set in a circle about the outer edge of plate 34, extend horizontally from the plate 34 toward the furnace end of the burner. Shafts 38 extend through plate 34 and individual bearing bosses 39 and each shaft 38 is connected to one end of one of a series of cranks 40. The other end of each of the cranks 40 is connected by means of pins 41 to a crank ring 42, rotation of which will radially adjust louvres 37 by the action of cranks 40. The change in the relative positions of louvres 37 will be regulated by the arc through which ring 42 is turned.

A pair of shafts 43 and 44 extend through suitable openings in plate 5 and registering openings in plate 34. Handles 45 and 46 are rigidly mounted on the ends of respective shafts 43 and 44 which extend outside of plate 5. The opposite ends of shafts 43 and 44 which extend through plate 34 are threaded and are held against withdrawal from plate 34 by means of suitable nuts 47 and 48, respectively, on the furnace side of plate 34. Mounted on shafts 43 and 44 on the outside of plate 34 are hold-down nuts 49 and 50 respectively. Nuts 47 and 49 and nuts 48 and 50 cooperate with their respective openings in plate 34 to form bearings within which shafts 43 and 44 may rotate while preventing longitudinal movement of the shafts relative to plate 34. A lever arm 51 is rigidly mounted on one of the shafts, in this case shaft 43, and is connected by means of a link 52 to crank ring 42. Rotation of shaft 43 by means of handle 45 will act through arm 51 and link 52 to rotate ring 42 and thereby change the radial position of louvres 37. By means of handles 45 and 46 and shafts 43 and 44, the register may be moved horizontally along conduit 8 to any desired position so as to vary the opening between plate 34 and throat ring 26. At the same time, rotation of shaft 43 by handle 45 will permit any desired setting of the louvres 37. When plate 34 and louvres 37 are set as desired, they may be fixed in the positions so set by the tightening of a set screw 53 which extends through a bearing boss 54 which is mounted on the outside of plate 5 and surrounding shaft 43. Registering peep-holes 55 are provided in plates 5 and 34, the one in plate 5 being covered by a cover plate 56.

The above described type of register may be utilized with either of the described modifications of burners and may be utilized in connection with forced or natural draft. However, with the burners described, air registers are not required and may or may not be used.

While conduit 9, as described above, is useful for providing independent supports for the oil and gas burners, other type of individual supports may be used. For example, the gas burner may be supported by placing pipes 23 and 24 on brackets extending horizontally from the sides of conduit 8 while the oil burner may be suspended in the center of conduit 8 by means such as hooks depending from the inner top wall of conduit 8. Slot 22 in head 19 may be altered or adjusted to permit removal of the gas burner without interfering with the oil burner and the supports for the oil burner so arranged that it may also be withdrawn from the assembly or replaced therein without interfering with the gas burner.

It will be obvious to those skilled in the art that various changes may be made in the details of construction and in the arrangement of the several parts without departing from the principal features of the invention as herein set forth.

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

1. A combination oil and gas burner assembly comprising an outer tubular member, an inner tubular member extending through the outer tubular member and spaced from the latter by a substantially annular passageway, supporting means for the inner member secured to the outer member, pipes having portions extending through and projecting from the inner member, an oil burner head secured to the projecting ends of said pipes, a substantially annular gas burner head substantially surrounding said inner member and having a slot to permit of its passage by said supporting means and by portions of said pipes, and gas conveying conduit means connected to the gas burner head, said gas burner head and gas conveying conduit means being removable from the assembly while the oil burner head and said pipes are in operation without disturbing the latter, and said pipes and oil burner head being removable from the assembly while the gas burner is in operation without disturbing the latter.

2. A combination oil and gas burner assembly comprising a supporting plate, an outer tubular member extending through the plate and supported thereby, an inner tubular member extending through the outer tubular member and spaced from the latter by a substantially annular passageway, supporting means for the inner member secured to the outer member, pipes having portions extending through and projecting from the inner member, an oil burner head secured to the projecting ends of said pipes, a substantially annular gas burner head substantially surrounding said inner member and having a slot to permit of its passage by said supporting means and by portions of said pipes, and gas conveying conduit means connected to the gas burner head, said gas burner head and gas conveying conduit means being removable from the assembly while the oil burner head and said pipes are in operation without disturbing the latter, and said pipes and oil burner head being removable from the assembly while the gas burner is in operation without disturbing the latter.

3. A combination oil and gas burner assembly comprising a throat ring, a supporting plate spaced from the ring, means rigidly connecting the ring and plate for supporting the plate from the ring, an outer tubular member extending through the plate and supported thereby, an inner tubular member extending through the outer tubular member and spaced from the latter by a substantially annular passageway, supporting means for the inner member secured to the outer member, pipes having portions extending through and projecting from the inner member, an oil burner head secured to the projecting ends of said pipes, a substantially annular gas burner head substantially surrounding said inner member and having a slot to permit of its passage by said supporting means and by portions of said pipes, and gas conveying conduit means connected to the gas burner head, said gas burner head and gas conveying conduit means being removable from the assembly while the oil burner head and said pipes are in operation without disturbing the latter, and said pipes and oil burner head being removable from the assembly while the gas burner is in operation without disturbing the latter.

4. A combination oil and gas burner assembly comprising an outer tubular member, an inner tubular member extending through the outer tubular member and spaced from the latter by a substantially annular paassageway, supporting means for the inner member secured to the outer member, pipes having portions extending through and projecting from the inner member, an oil burner head secured to the projecting ends of said pipes, a substantially annular gas burner head substantially surrounding said inner member and having a slot to permit of its passage by said supporting means and by portions of said pipes, gas conveying conduit means connected to the gas burner head, said gas burner head and gas conveying conduit means being removable from the assembly while the oil burner head and said pipes are in operation without disturbing the latter, and said pipes and oil burner head being removable from the assembly while the gas burner is in operation without disturbing the latter, and air controlling means surrounding the outer tubular member for controlling combustion air passing toward said oil burner.

5. A combination oil and gas burner assembly comprising a supporting plate, an outer tubular member extending through said plate, an inner tubular member extending centrally through the outer tubular member and spaced from the latter by a substantially annular passageway, supporting means for the inner member secured to the outer member, pipes having portions extending through the inner member and projecting from the inner member, an oil burner head secured to the projecting ends of said pipes, a substantially annular gas burner head substantially surrounding said inner member and arranged in close proximity to said oil burner head, said gas burner head having a slot to permit its passage by said supporting means and by portions of said pipes, and gas conveying conduits connected to said gas burner head and extending through said passageway at opposite sides of the inner tubular member, said gas burner head and gas conveying conduits being removable from the assembly while the oil burner head and said pipes are in operation without disturbing the latter, and said pipes and oil burner head being removable from the assembly while the gas burner is in operation without disturbing the latter.

6. A combination oil and gas burner assembly comprising an outer tubular member, an inner

tubular member extending centrally through the outer tubular member and spaced from the latter by a substantially annular passageway, means for supporting said inner member from the outer member and including an element arranged substantially radially within said passageway, pipes having portions extending through the inner member and projecting from the latter, an oil burner head secured to the projecting ends of said pipes, a substantially annular gas burner head substantially surrounding said inner member and having a slot to permit of its passage by said supporting means and by portions of said pipes, and gas conveying conduit means connected to the gas burner head, said gas burner head and gas conveying conduit means being removable from the assembly while the oil burner head and said pipes are in operation without disturbing the latter, and said pipes and oil burner head being removable from the assembly while the gas burner is in operation without disturbing the latter.

7. A combination oil and gas burner assembly comprising an outer tubular member, an inner tubular member extending through the outer tubular member and spaced from the latter by a substantially annular passageway, supporting means for the inner member secured to the outer member, oil conducting means having a portion extending through and projecting from the inner member, an oil burner head secured to the projecting end of said oil conducting means, a substantially annular gas burner head substantially surrounding said inner member and shaped to permit of its passage by said supporting means and by a portion of said oil conducting means, and gas conveying conduit means connected to the gas burner head, said gas burner head and gas conveying conduit means being removable from the assembly while the oil burner head and said oil conducting means are in operation without disturbing the latter, and said oil conducting means and oil burner head being removable from the assembly while the gas burner is in operation without disturbing the latter.

JOHN S. ZINK.