

July 23, 1929.

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1,722,253

COMBINATION BURNER MOUNTING AND AIR CONTROL

Filed Dec. 14, 1926

2 Sheets-Sheet 1

Fig. 1.

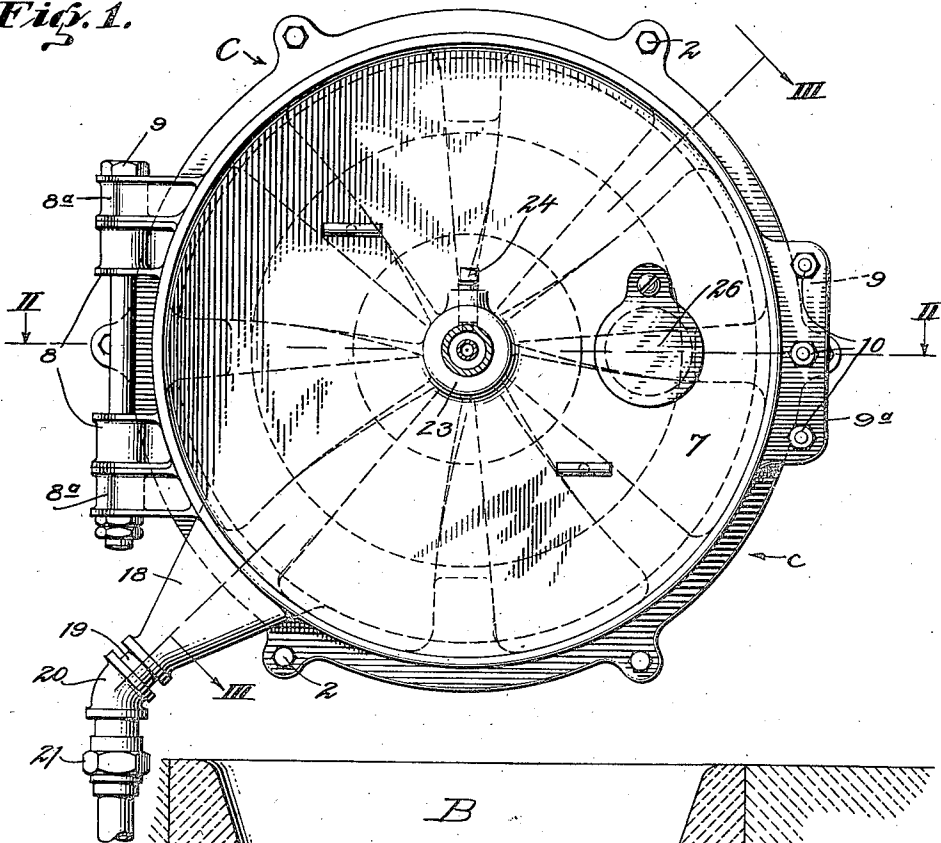
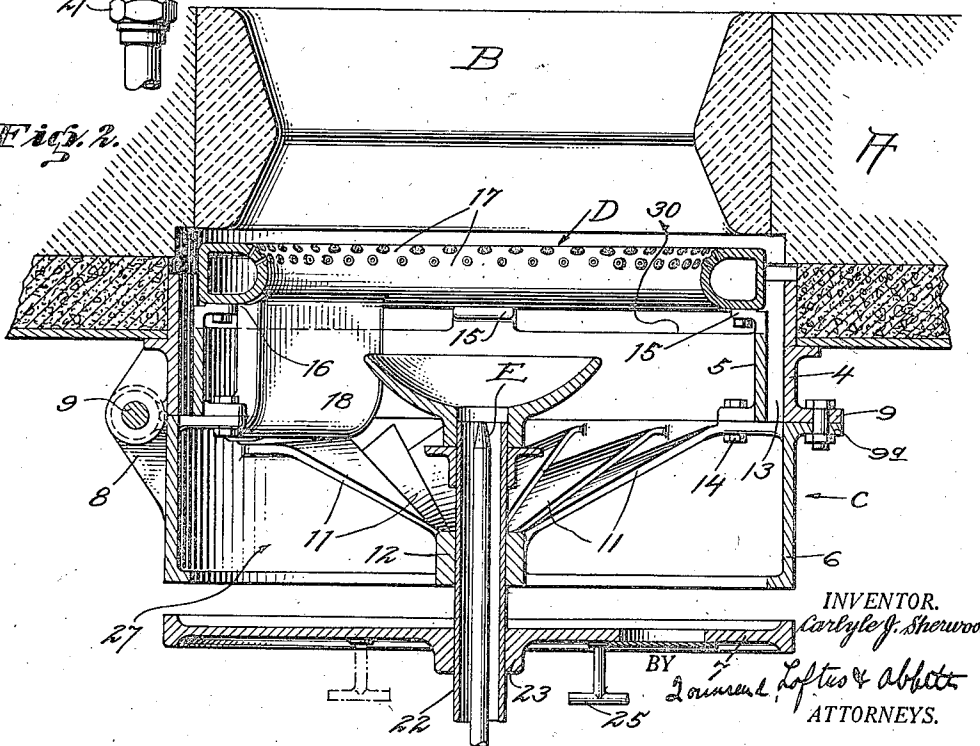


Fig. 2.



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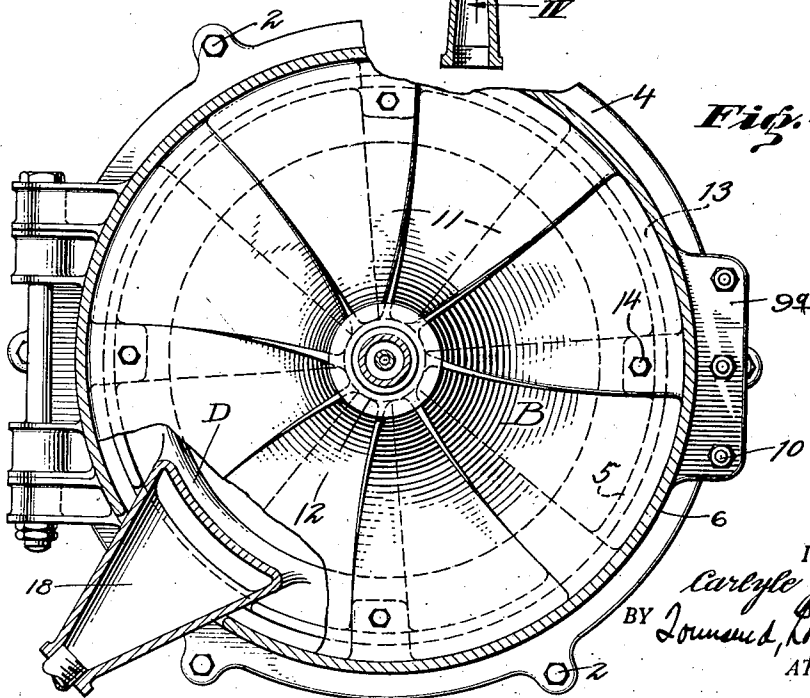
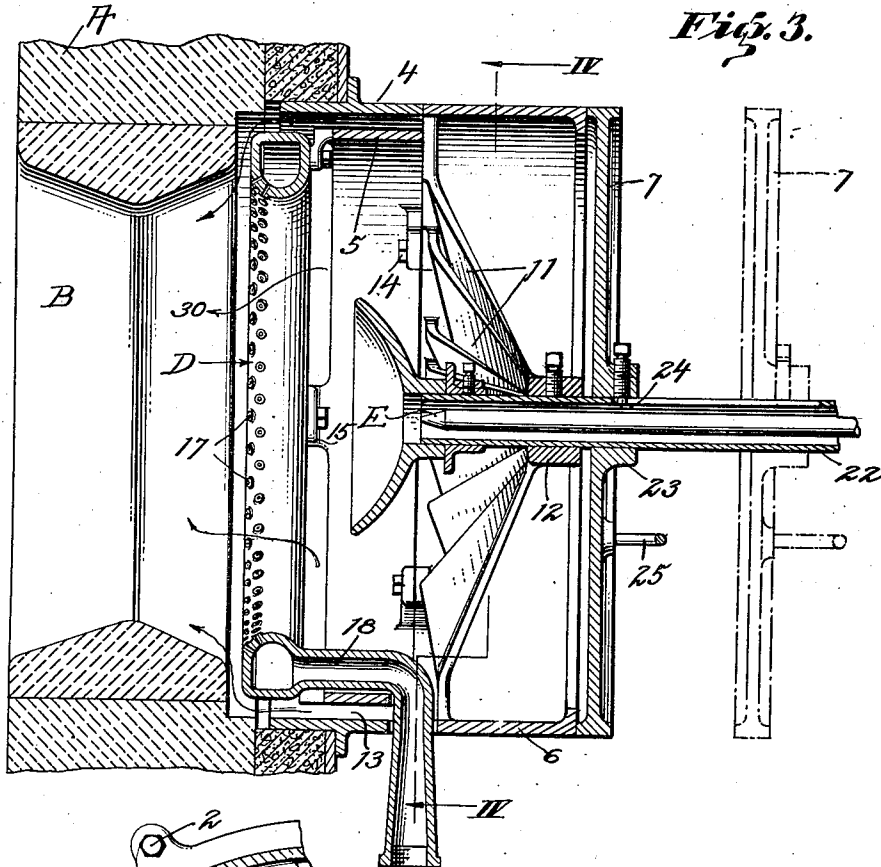
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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COMBINATION BURNER MOUNTING AND AIR CONTROL.

Application filed December 14, 1926. Serial No. 154,692.

This invention relates to burners such as are adapted for use on furnaces generally referred to as industrial furnaces and furnaces for power purposes, etc., and particularly to improvements on the structure shown in my co-pending application entitled "Gas burner," filed June 16, 1926, Serial Number 116,339.

Modern industrial furnaces usually employ oil burners of the so-called mechanical type in which the oil is injected in a cone-shaped spray into the furnace through a circular opening in the brickwork of the furnace wall, together with the necessary volume of air to support combustion. The air for combustion is usually controlled by an air register which is so constructed that a swirling motion is imparted to the air as it enters the furnace so that it will thoroughly co-mingle with the oil spray and form a homogeneous combustible mixture.

The object of the present invention is to generally improve and simplify the construction and operation of burners of the character described; to provide a register or mounting whereby a gas burner and an oil burner may be supported and so positioned with relation to each other as to cooperate or burn in unison or independently; to provide a register embodying an adjustable air control which will serve to supply air equally well to either burner or both in unison and further to provide a pivotal mounting for the register whereby the burners may be swung outwardly away from the furnace front for inspection, cleaning, repairs, etc.

The invention is shown by way of illustration in the accompanying drawings, in which:

Figure 1 is a front view of the register,

Figure 2 is a horizontal longitudinal section taken on the line II—II of Figure 1,

Figure 3 is a longitudinal section taken on the line III—III of Figure 1,

Figure 4 is a cross section taken on the line IV—IV of Figure 3.

Referring to the drawings, in detail, and particularly to Figures 1 and 2, A indicates the brickwork or front wall of a furnace in which is formed a circular opening B. Secured to the furnace in alignment with the opening B and in front thereof by lugs and screws 2 or other suitable means is a burner mounting and an air regulating device generally indicated at C. A mounting of this character is usually referred to as an air regis-

ter as it directs and regulates the air delivered to support combustion within the furnace, but in the present instance, it also serves another function, to-wit, that of supporting a gas burner generally indicated at D and an oil burner E.

The register consists of four main castings, generally indicated at 4, 5, 6 and 7, the construction and function of which will now be described. The casting 4 is ring-shaped or circular in cross section and is provided with a series of radially disposed lugs 2 by which it is bolted and permanently secured to the furnace front by screws, bolts or other suitable means. Formed on one side of the casting are a pair of hinged lugs 8 and formed on the opposite side thereof is a perforated flange 9; the function of which will hereinafter be described.

Positioned in alignment with the casting 4 which may be termed the base casting, is a second casting 6. This is also ring-shaped or circular in cross section and it is supported from the base casting by hinged lugs 8^a and a pintle 9 which extends through the lugs 8 and 8^a. The opposite side of the casting is provided with a flange 9^a which registers with the flange 9 on the base casting and both of these flanges are drilled to receive bolts 10, whereby the casting 6 may be secured against pivotal movement about the pintle 9. Formed integral with the inner surface of the casting 6 are a plurality of radially disposed overlapping vanes 11, the inner ends of which terminate in a hub member 12. Each vane presents a convolute or warped surface similar to that of an impeller or fan and as they overlap each other the entire projected area is covered and heat loss by radiation is prevented. The vanes also serve the function of imparting a swirling motion to the air which is admitted to the furnace to support combustion. Any suitable number of vanes may be employed and they are sufficiently separated with relation to each other to permit the proper volume of air to enter.

The vanes are arranged in a cone-shaped formation as shown in Figures 2 and 3, but their inner ends are flattened and terminate at right angles to the inner wall of the casting 6. A series of supporting surfaces are thus formed and these serve as a support for the casting 5. This casting is also ring-shaped and has a diameter smaller than the interior diameter of the casting 4 thereby

forming an annular space 13 through which air may circulate, as will hereinafter be described. The casting 5 is secured to the outer ends of the vanes 11 or the flat surfaces presented thereby, by means of bolts 14. The opposite edge of the ring or casting 5 is provided with a series of supporting lugs 15 and these serve as a support for the gas burner generally indicated at D, the burner being bolted or otherwise secured to lugs 15 as indicated at 16. The gas burner employed in the present instance, is substantially identical to the gas burner disclosed in my co-pending application heretofore referred to and a detail description of the same is, therefore, thought unnecessary. It suffices to say that the burner is ring-shaped and is provided with one or more rows of perforations, as shown at 17, which are drilled on the different angles and tangentially disposed so as to cause the discharging gas to enter with a swirling motion.

It might further be stated that the gas ring is provided with an angular extension 18 and that this is connected with a gas supply pipe 19 through means of an elbow 20 and a union 21, the pipe 19 being disposed directly below the pintle 9 and in alignment therewith so that the burner may swing in unison with the castings 4, 5, and 6, when they are swung about the pintle 9, as will hereinafter be described. The casting 6 serves four functions: First that of a support for the oil burner E; secondly that of a support for the gas burner D; third that of a support for the vanes whereby the air admitted is given a swirling motion and fourth that of a support for the castings 7 whereby the amount of air admitted is regulated.

The plate 7 is circular or disc-shaped and is slidably mounted on the pipe 22 which is secured in the hub member 12. The plate 7 is provided with a hub member 23. A set screw 24 or the like passes through the hub and enters a slot formed in the pipe and rotary motion of the plate is thus prevented. The plate is, otherwise, provided with handles 25 whereby it may be adjusted to and from the casting 6 and it is further provided with a torch door 26 to permit introduction of the lighting torch when the burners have started.

In actual practice, it will be understood that the gas supplying pipe 19 may be provided with a valve (not shown) or like means whereby gas flow to the burner D is regulated. In starting the furnace a lighting torch is introduced through the torch door 26 and the gas is turned on. The gas is ignited by the flame of the torch and if it is desired to operate the gas burner alone, it will only be necessary to regulate the damper door 7 to supply the right amount of air. This air enters through the annular opening 27

formed between the castings 6 and 7 and then passes between the vanes 11, these impart a swirling motion to the air and it thus mingles with the gas discharging from the perforations 17. These are preferably disposed tangentially and in a reverse direction to the vanes 11, thus discharging the gas in its swirling movement in a direction opposite to the swirling movement of the air, thereby causing a homogeneous mixture and promoting better combustion.

If it is desired to operate the oil burner, at the same time, it is only necessary to turn on the oil, as this will be ignited by the gas flame and then to regulate the damper 7 to supply an additional amount of air. The major portion of the air will, of course, pass between the vanes 11, but a good proportion of the air will pass inwardly between the castings 4 and 5 through the annular space indicated at 13. This air will finally enter the furnace by passing between the brick work and the gas burner and through the openings 30 formed between the lugs 15 which supports the gas burner and as such will increase the homogeneous mixing of air and fuel. The bypassing of a certain amount of the air is of considerable importance, in the present instance, as it not only promotes combustion by causing a better mixing of air and fuel but it also tends to cool the gas burner and the innermost castings which are subjected to the greatest proportion of radiated heat from the flame and the interior of the furnace.

If, at any time, it is desired or necessary to inspect, clean or repair the burners, it is only necessary to release the bolts 10. This permits the several castings to be swung about the pintle 9 and as the burners are supported by these castings they will be swung outwardly away from the furnace front where they will be accessible. The mounting of the fuel supply pipe 19 in direct alignment with the pintle 9 is also of importance, as it will only be necessary to loosen the union connection 21 when the burners are swung away from the furnace. In other words, it will not be necessary to break the fuel gas connection when the register is open.

While certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly that the materials and finishes of the several parts employed may be such as the manufacturer may decide or varying conditions or uses may demand.

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

1. In a device of the character described, comprising a base casting adapted to be secured to a furnace front, a register hingedly supported on the base casting, a gas burner supported by the register, a plurality of ra-

dially disposed vanes formed within the register, said vanes terminating at their inner ends in a hub member, a pipe extending through the hub member and having an oil burner projecting therethrough, and a damper plate supported by the pipe and movable to and away from the register to regulate the admission of air to the register, said vanes within the register imparting a swirling movement to the air before it co-mingles with the oil and gas discharging from the burners.

2. A device of the character described, comprising a base casting adapted to be secured to the furnace front, a register hingedly supported on the base casting, a ring-shaped casting secured to the register and concentric therewith to form an annular air passage, a gas burner supported by the ring-shaped casting, a plurality of vanes formed interior of the register, an oil burner supported by the inner ends of the vanes, and a damper plate movable to and away from the register to regulate the admission of air to the register, said vanes being angularly disposed to impart a swirling motion to the air so as to co-mingle with oil and gas when discharged by the burners and said vanes being also angularly disposed to deflect a portion of the incoming air around the ring-shaped casting to cool the same and also the gas burner.

3. In a device of the character described, comprising a circular base casting adapted to be secured to a furnace front, a register carried thereby and hinged in relation thereto, said register being of cylindrical formation and registering with the cylindrical wall of the base, an annular casting disposed within the base and spaced apart therefrom to form an annular air passageway between the casting and the wall of the base, said casting being secured to the register portion of the structure and adapted to swing outwardly with it, an annular gas burner carried by the register portion of the structure and secured to the forward edge of the annular internal casting whereby air may pass through the central opening of the burner as well as around the edge thereof, and a plurality of radial vanes disposed within the center of the register and acting to impart a swirling motion to air passing through the register and centrally of the base and the burner to provide air for combustion of the gas in the burner, said vanes acting to divert a portion of the air around the outside the burner to commingle with the flame produced thereby.

4. A device of the character described, comprising a cylindrical base member adapted to be secured adjacent to and in communication with a furnace opening, a cylindrical register hinged to said base member and adapted to swing outwardly therefrom, a

plurality of radial vanes secured within the register and extending outwardly and forwardly from the central axis thereof, a cylindrical ring disposed within the base member and being of a lesser diameter than the internal diameter of said base member whereby an annular passageway is formed between the wall of the base member and the wall of the cylindrical ring, means for attaching said ring to the register adjacent the outer ends of the radial vanes, means for attaching a gas burner at the forward edge of said cylindrical ring, a gas burner in the form of an annular ring secured to said attaching means and disposed in central longitudinal alignment with the ring and the register whereby air passing through the register and the ring may pass through the central portion of the gas burner, said radial vanes acting to create a swirling motion of the air passing through the center of the gas burner and also acting to divert a portion of the flowing air outwardly to flow through the annular passageway between the ring and the base and to thereafter flow around the outer edge of the gas burner to commingle with the flame produced thereby.

5. A device of the character described, comprising a cylindrical base member adapted to be secured adjacent to and in communication with a furnace opening, a cylindrical register hinged to said base member and adapted to swing outwardly therefrom, a plurality of radial vanes secured within the register and extending outwardly and forwardly from the central axis thereof, a cylindrical ring disposed within the base member and being of a lesser diameter than the internal diameter of said base member whereby an annular passageway is formed between the wall of the base member and the wall of the cylindrical ring, means for attaching said ring to the register adjacent the outer ends of the radial vanes, means for attaching a gas burner at the forward edge of said cylindrical ring, a gas burner in the form of an annular ring secured to said attaching means and disposed in central longitudinal alignment with the ring and the register whereby air passing through the register and the ring may pass through the central portion of the gas burner, said radial vanes acting to create a swirling motion of the air passing through the center of the gas burner and also acting to divert a portion of the flowing air outwardly to flow through the annular passageway between the ring and the base and to thereafter flow around the outer edge of the gas burner to commingle with the flame produced thereby, a pipe secured centrally through the radial vane structure and carried by the register, a damper plate secured upon the pipe and adapted to move longitudinally thereof to regulate the effective opening of the register, and an oil burner extending through the pipe

and adapted to project a flame through the space enclosed by the gas ring.

6. A device of the character described, comprising a cylindrical base member adapted to be secured adjacent to and in communication with a furnace opening, a cylindrical register hinged to said base member and adapted to swing outwardly therefrom, a plurality of radial vanes secured within the register and extending outwardly and forwardly from the central axis thereof, a cylindrical ring disposed within the base member and being of a lesser diameter than the internal diameter of said base member whereby an annular passageway is formed between the wall of the base member and the wall of the cylindrical ring, means for attaching said ring to the register adjacent the outer ends of the radial vanes, means for attaching a gas burner at the forward edge of said cylindrical ring, a gas burner in the form of an annular ring secured to said attaching means and disposed in central longitudinal alignment with the ring and the register whereby air passing

through the register and the ring may pass through the central portion of the gas burner, said radial vanes acting to create a swirling motion of the air passing through the center of the gas burner and also acting to divert a portion of the flowing air outwardly to flow through the annular passageway, between the ring and the base and to thereafter flow around the outer edge of the gas burner to commingle with the flame produced thereby, a pipe secured centrally through the radial vane structure and carried by the register, a damper plate secured upon the pipe and adapted to move longitudinally thereof to regulate the effective opening of the register, an oil burner extending through the pipe and adapted to project a flame through the space enclosed by the gas ring, and a cone shaped diffuser secured upon the forward end of said pipe and acting to shield the flame from the oil burner from the air passing through the radial vanes to the furnace opening.

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