R. A. MERRILL.

GAS FURNACE.

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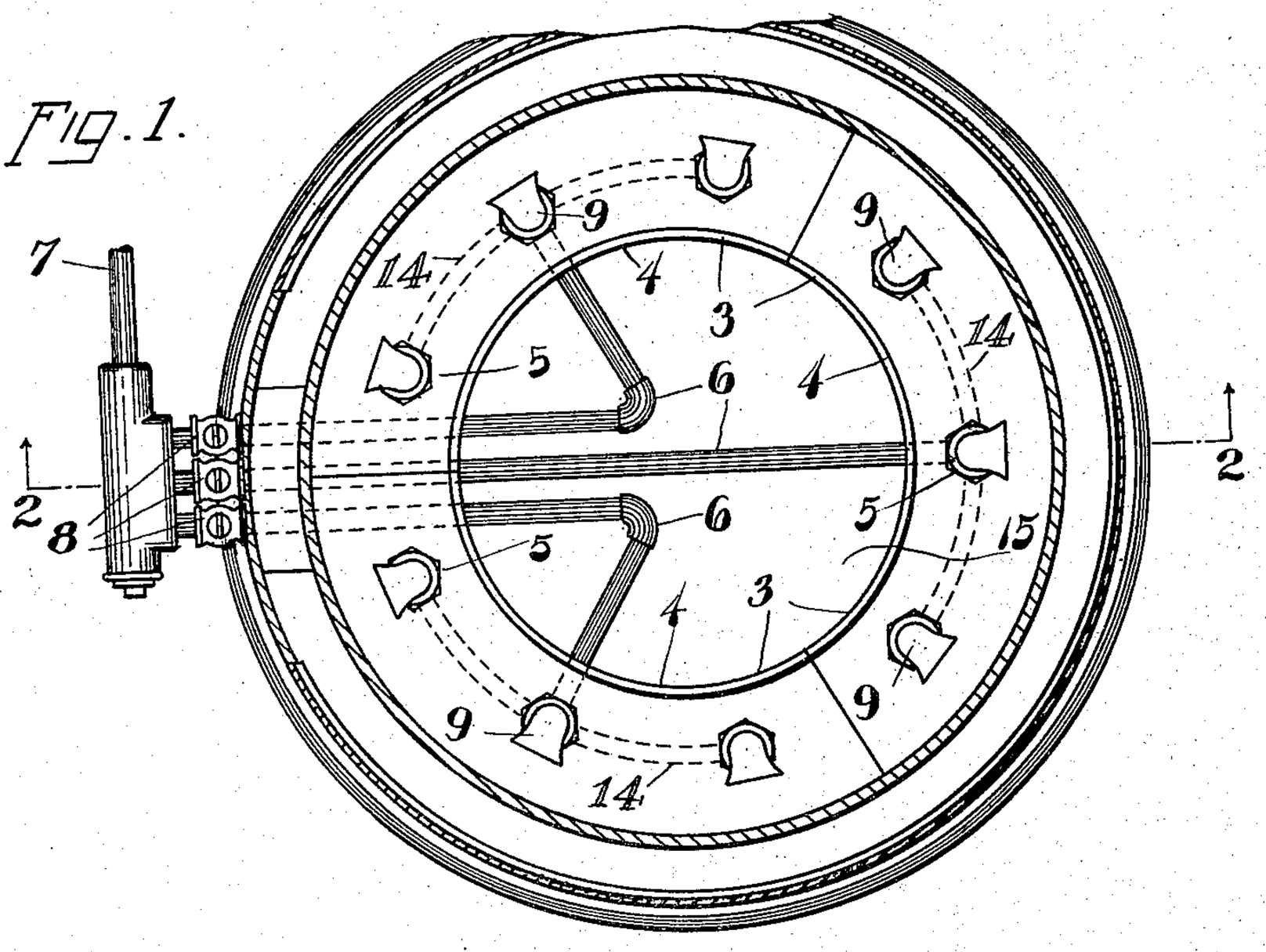
1,166,470.

Fig. 1.



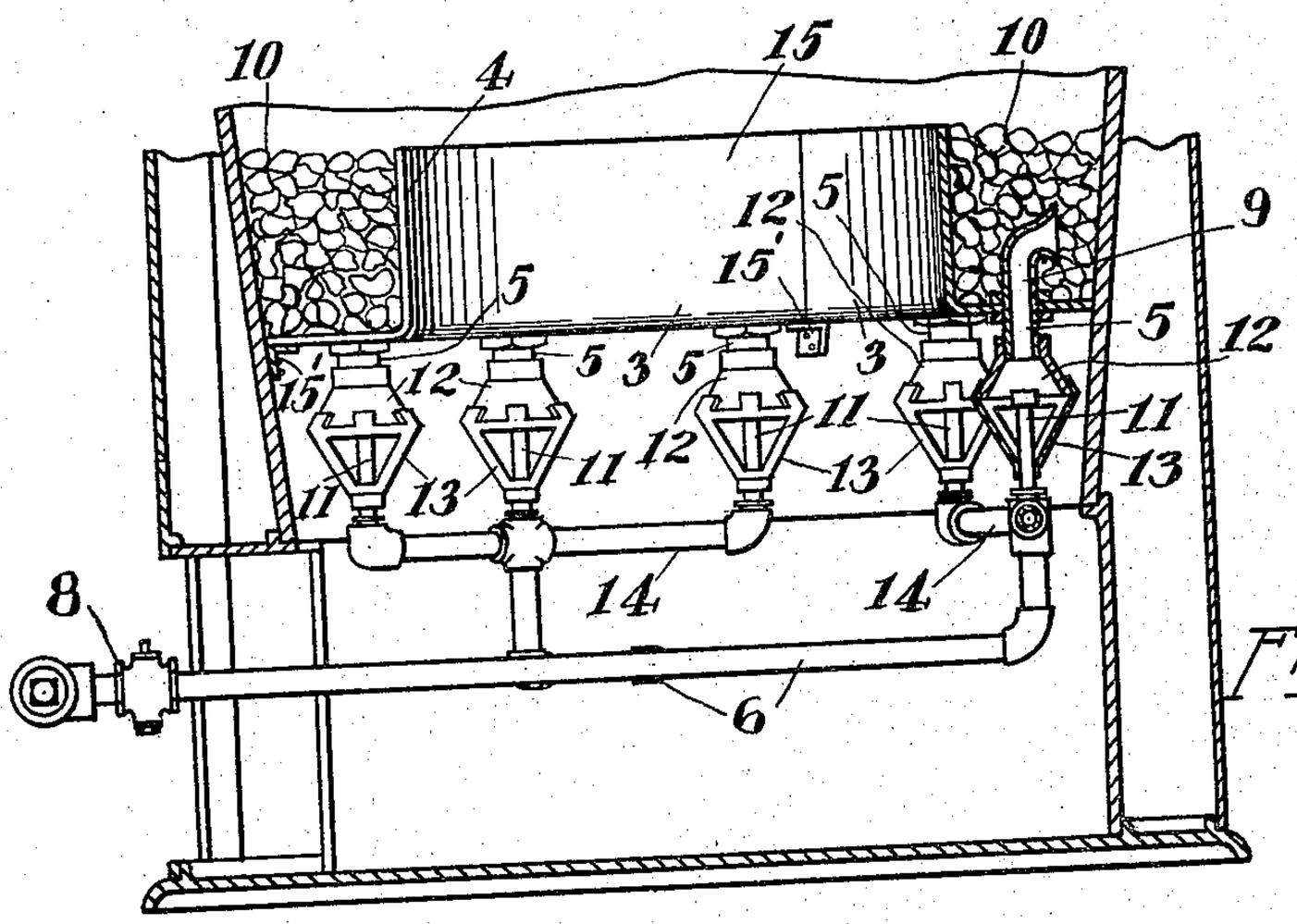


Fig. 2.

WITNESSES

George Garland Brown

E. Thornton Bogert

INVENTOR

Robert A. Merrill

By Huber F. Murray

Atty.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT A. MERRILL, OF CINCINNATI, OHIO, ASSIGNOR TO THE EAGLE WHITE LEAD COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

GAS-FURNACE.

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To all whom it may concern:

Be it known that I, ROBERT A. MERRILL, a citizen of the United States of America, and resident of Cincinnati, county of Hamilton, State of Ohio, have invented certain new and useful Improvements in Gas-Furnaces, of which the following is a specification.

This invention relates to improvements in heating furnaces of the type employing gas as fuel and has for an object to produce a burner which insures a thorough admixture of air with the gas to be burned.

A further object is to produce a gas burner for heating furnaces, which is adapted to distribute the flame as it issues from the burner, so that a more uniform area of flame is presented to the surfaces to be heated.

These and other objects are attained in the apparatus described in the following specification and illustrated in the accompanying drawings in which;

Figure 1 is a transverse sectional view of an ordinary hot air heating furnace with a burner attachment embodying my invention mounted therein. Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

Each of the burners 5, illustrated as an embodiment of my invention, consists of a mixing tube 9, a gas nozzle 11, and a bell shaped hood 12 surrounding the gas nozzle 11 and secured to the mixing tube 9. This hood 12 is provided for the purpose of directing and permitting air to be drawn into the mixing tube 9 and to be properly mixed with the jet of gas issuing from the nozzle 11, so that the proper proportions of gas and air are provided and thoroughly mixed within the mixing tube, previous to being consumed at the gas burning end thereof. I have so constructed the discharge end of the mixing tube, that it is flared to form an unobstructed bell shaped mouth, the end of which is constructed to direct the flow of gas and flame against the outer wall of the furnace fire pot. The particular arrangement of the vertically alined mixing tube, the air gathering bell-shaped hood 12, and the mixing tube 9 with its unobstructed bell mouthed discharge end, producing a most thorough mixture of gas and air which insures complete combustion at the discharge end of the mixing tube. The nozzle 11 is secured to the bell shaped mixing hood 12, by means of a cage 13, which surrounds the hood 12 and is secured to the base of the nozzle 11. By this means the parts of the burner are held in proper position with relation to one another. As illustrated, the burners are divided into groups, the burners of each group are secured to pipes 14 which are connected in turn to the supply pipes 6. The gas nozzles 11 are constructed so that the proper amount of gas is delivered to the burner, and the cages 13 are so constructed as to permit the proper amount of air to pass therethrough, to mix with the gas issuing from the nozzles 11. This permanent regulation of the air and gas is made at the factory where the burners are being assembled, so as to prevent the operator of the furnace from tampering with the furnace and thereby disturbing the proper amount of air and gas delivered thereto.

The apparatus illustrated in connection with my improved burners, consists of a series of sections 3 which are adapted to be arranged within the fire pot of the furnace, so that the sections coöperate with one another in producing a continuous annular ring within the fire pot, for the purpose of receiving pieces of fire brick or clay which constitute the bed of incandescent heat radiating coals after the apparatus has been placed in operation. Each of these sections 3 consists of an angle plate 4, in which is secured the burners 5. The burners of each section are connected to the separate gas supply pipes 6 as above described, which are connected with the main gas supply pipe 7, by means of separate valves 8 adapted to control the supply of gas to the burners of each section.

It will be seen upon referring to the drawing, that the mixing tube of each of the burners 5, extends through the bottom of each angle plate 4 and delivers the burning fuel into and through the bed of coals 10 located on the angle plates. The pieces of fire brick or clay are arranged on the angle plates so that a sufficient quantity thereof is located between the bell mouthed aperture of the mixing tube and the wall of the fire pot, to prevent the direct heat of the flame from injuring the wall of the fire pot and also for the purpose of causing the fire brick to pick up a portion of the heat of combustion as the flame is projected therethrough toward the wall of the fire pot. After the flame impinges upon the surface of the fire

pot and passes upwardly through the entire mass of fire brick, a bed of incandescent coals is produced, which retains the heat of the flame and consequently increases the area of active radiating surface.

My apparatus as illustrated is readily adapted to be installed in ordinary heating furnaces in which coal has previously been used, and for the purpose of carrying out such an installation it is but necessary to remove the grate of the furnace and to assemble the angle plates 4 with their attached burners, to form the ring of sections 3 within the fire pot. Any suitable means such as the brackets 15′, may be provided for supporting the angle plates and the burners within the fire pot after the sections 3 are assembled. The pipes 14 connecting the burners of each section, are then connected to the supply pipe 6 and the valves 8 are then connected to the pipes 6 and the main supply pipe 7. The apparatus is then ready for use after the incombustible fuel 10 is properly placed on the angle plates and around the flared combustion end of the mixing tubes.

In operation: The gas having been ignited will burn at the bell mouthed apertures of the burners, the flame produced by the combustion thereof, passing transversely through the bed of incombustible fuel and striking the surface of the fire pot in a relatively wide expanse of flame, so that the flames of adjacent burners will unite to form a large annular wall of flame contacting the inner surface of the fire box. After striking the wall of the fire box, the flame will be diverted back toward the center thereof and will pass upwardly through the bed of fire brick. This flame passing upwardly through the fire brick will produce a bed of incandescent coals which serve to abstract substantially all of the heat of combustion from the flame passing therethrough and to transmit this heat from the bed of coals to the radiating surfaces of the furnace. This leaves the products of combustion substantially free from heat, so that they may be passed out of the furnace and into the flue. It will be observed that the flame created by my burner attachment, is annular in formation and that this flame contacts and passes upwardly along the inner walls of the fire pot after having passed through the bed of coals located on the angle plates 4. In order therefore, to create more thorough combustion and to cause the products of combustion to pass off more rapidly, I have provided the central opening 15, so that the fresh air from the ash pit will pass therethrough and carry the products of combustion into contact with the walls of the furnace. In addition to these advantages thus secured by this central air duct construction, I am enabled to create a constant circulation of fresh air through the ash pit of the furnace, where the air drawn in through the hoods 12 and mixing tubes 9 of the burners, may be of the purest and richest in oxygen and free from the products of combustion to be found in the upper portions of the furnace. This produces a flame which is intensely hot and which consequently reacts upon the bed of coals and other radiating surfaces, to produce a more efficient heating plant than other heating plants known to me.

Having thus described my invention, what I claim is:

1. In a heating furnace, the combination of a fire pot, and a series of burner sections located within and secured to the inner walls of the fire pot, said sections forming an annular ring adapted to receive incombustible fuel, each of said sections comprising an angle plate, and a series of burners secured to and extending above the fuel supporting surface of said angle plate, said burners being adapted to project flame into the fuel and against the walls of said fire box.

2. In combination in a heating furnace, a fire pot, angle plates located in said fire pot and adapted to support incombustible fuel, burners secured to said angle plates and projecting into the fuel located on said angle plates, said burners comprising a mixing tube secured to the angle plates and having a flared discharge aperture, a gas nozzle located at the inlet end of the mixing tube, and a hood surrounding the nozzle and adapted to direct air into the mixing tube.

3. An attachment for heating furnaces comprising a series of heating sections adapted to fit together to form an annular incombustible fuel holder within the furnace fire pot, and a series of burners secured to the bottom of said fuel holder and extending therethrough, each of said burners comprising a mixing tube having a flared discharge end turned to discharge flame through the incombustible fuel and against the inner wall of the furnace fire pot.

4. A gas burner attachment for heating furnaces comprising a series of angle plate sections adapted to be secured to the walls of the furnace fire pot, said sections forming an annular incombustible fuel container, with a centrally disposed air passage, a series of burners secured to each angle plate, said burners communicating with separate fuel supply pipes, and consisting of a gas nozzle, an air intake hood surrounding the gas nozzle, and a mixing tube secured to the hood, said mixing tube having its discharge end turned toward the wall of said fire pot and flared to produce a relatively wide flame.

5. In combination in a heating furnace, an ash pit, a fire pot mounted on the ash pit, angle plates located within said fire pot to

leave a centrally disposed air passage, a series of burners disposed about the air passage and secured to said angle plates, separate gas supply pipes located in said ash pit and communicating with said burners, and incombustible fuel located on said angle plates between said plates and said fire pot, said burners being adapted to discharge flame through the incombustible fuel located on said angle plates to render said fuel incandescent.

6. In a gas burner the combination of a vertical mixing tube having its upper end bent horizontally and flared outwardly, forming an enlarged unobstructed discharge, and a gas nozzle below the mixing tube and adapted to direct a stream of gas upwardly into the mixing tube.

In testimony whereof, I have hereunto subscribed my name this 26th day of October, 1914.

ROBERT A. MERRILL.

Witnesses:
WALTER F. MURRAY,
W. THORNTON BOGERT.