March 14, 1939. H. W. SCHRAMM 2,150,345

AIR HEATER

Filed Sept. 28, 1938

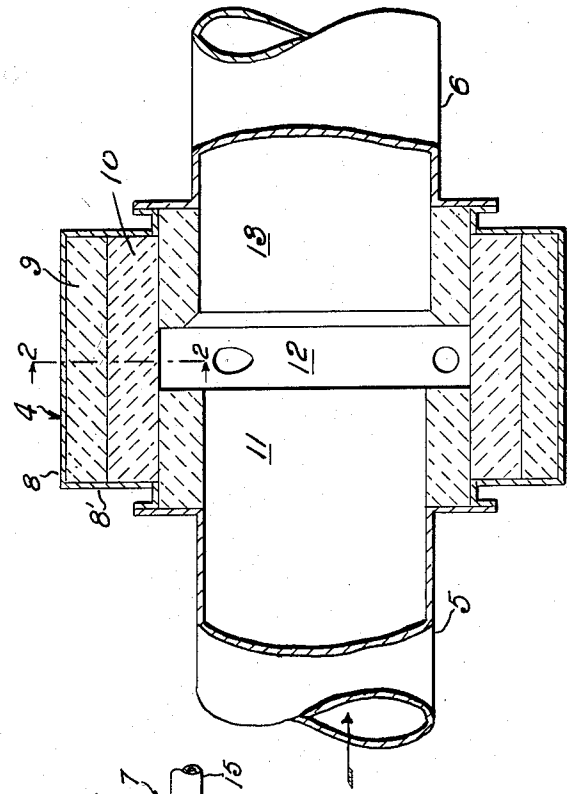


Fig. 1.

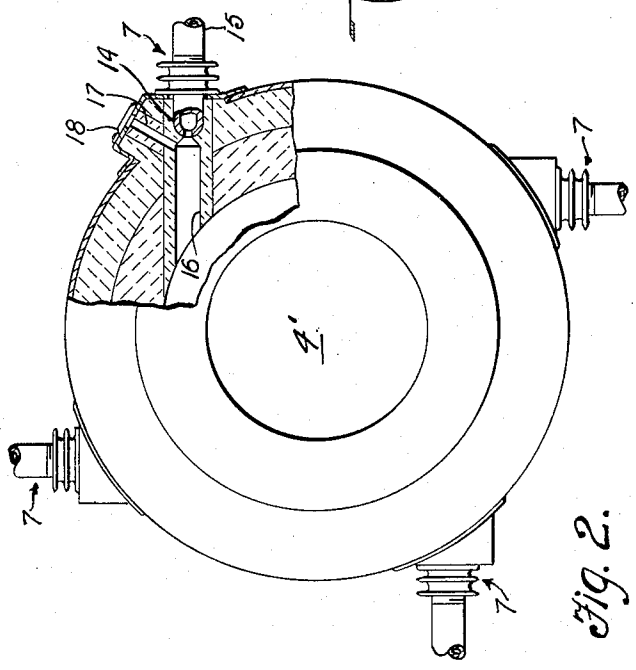


Fig. 2.

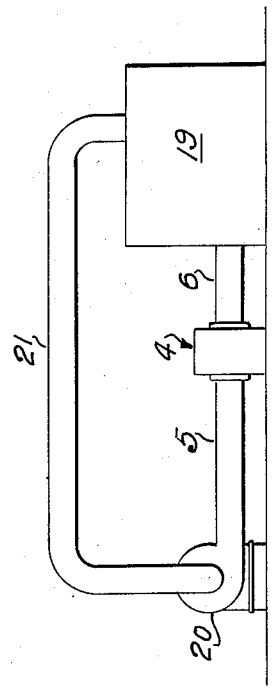


Fig. 3.

Inventor
H. W. Schramm.
By Charles A. Lind
Attorney

Patented Mar. 14, 1939 2,150,345

UNITED STATES PATENT OFFICE

2,150,345

AIR HEATER

Henry W. Schramm, Toledo, Ohio, assignor to Surface Combustion Corporation, Toledo, Ohio, a corporation of New York

Application September 28, 1938, Serial No. 232,059

6 Claims. (Cl. 263—19)

The present invention relates to apparatus for heating air by admixture with hot products of combustion; and the object of the invention is to provide a heater that shall be simple in construction and well adapted for its intended purpose.

In the accompanying drawing wherein the preferred form of the invention is shown—

Fig. 1 is a longitudinal sectional view of the heater;

Fig. 2 is an end view of the heater with a portion in section on line 2—2 of Fig. 1, and

Fig. 3 is a schematic view illustrating how the heater may be utilized for supplying heated air to an industrial oven.

The improved heater comprises a structure 4 having a flow passage 4' extending therethrough for the air to be heated, the ends of said passage being adapted to be coupled to an air supply pipe 5 and an outlet pipe 6, respectively; the air being heated as it flows through said passage by admixture with hot products of combustion produced by pressure burners 7 firing into said passage in a manner to flow around in the passage for reasons hereinafter appearing.

Said structure 4 comprises an external metal casing 8 having inwardly directed side flanges 8'; a layer of insulating material 9 disposed against the inside face of said casing material 9; a layer of refractory material 10 disposed against the inside face of layer 9, and a refractory bushing 11 which terminates short of the burner outlets whereby to provide a setback 12 wherein the flaming gases from the burners are initially protected against the chilling effect of the incoming air for a long enough time to insure complete combustion of the fuel in the flaming gases. The setback 12 therefore constitutes, as it were, a ringlike combustion chamber whose inner side is in open communication with the air passage 4'.

It is preferred that the setback 12 take the form of a channel between the ends of the passage 4' and to this end there is provided another refractory bushing 13 in axial alinement with the bushing 11, the internal diameter of the bushing 13 being preferably somewhat greater than that of the bushing 11.

The burners 7 may be of any preferred type of pressure burner. As shown, the burner comprises a nozzle 14 to which a preformed mixture of air and gas is supplied by a pipe 15, the nozzle discharging into a refractory tunnel 16 arranged to discharge tangentially into the setback 12. Due to the fact that the burners are arranged in a circle and fire tangentially into the setback 12, the flames from one burner will ignite the next adjacent burner thereby making it unnecessary to provide special igniting means for each burner. Any preferred means for initially igniting one of the burners may be employed. As illustrative of a simple way of igniting one of the burners, 17 indicates a lighting hole which leads into the burner tunnel 16 from outside of the heater, the top of the hole being normally closed by a seal 18. To light the burner the seal is removed and a flare inserted into the hole. The number of burners employed will of course depend upon the capacity of the heater.

Referring to Fig. 3 which shows one way of applying the heater to an industrial heating oven, 19 indicates the oven which is to be heated by the hot air from the heater 4. In the pipe 5 which delivers air to the heater is a fan or blower 20 adapted to withdraw the air from the oven by way of a conduit 21 and to deliver it to the heater for reheating.

From the foregoing description it will be seen that the heater of the present invention offers practically no resistance to the flow of air therethrough and that it is well adapted for insertion in a duct system of which the pipes 5 and 6 may be considered a part.

What I claim as new is:

1. Apparatus for heating air by admixture with hot gases of combustion comprising, in combination, a structure having a flow passage therethrough for the air to be heated, said passage inwardly from its air intake end having a peripheral setback, and means for discharging hot gases of combustion into said passage along the wall of said setback.

2. Apparatus for heating air by admixture with hot gases of combustion comprising, in combination, a structure having a flow passage therethrough for the air to be heated, said passage inwardly from its air intake end having a peripheral setback, and means for discharging hot gases of combustion into said setback in a direction to flow around therein coaxial with said passage.

3. Apparatus for heating air by admixture with hot gases of combustion comprising, in combination, a structure having a flow passage therethrough for the air to be heated, said passage intermediate its ends having a peripheral channel, and means for discharging hot gases of combustion into said channel.

4. Apparatus for heating air by admixture with hot gases of combustion comprising, in combination, a structure having a flow passage there-

through for the air to be heated, said passage intermediate its ends having a peripheral channel, and means for discharging hot gases of combustion into said channel in a direction to flow around therein coaxial with said passage.

5. Apparatus for heating air by admixture with hot gases of combustion comprising, a structure forming a flow passage for said air, said passage beginning at a point remote from the air inlet end thereof being of greater cross-sectional area than the preceding portion whereby to form a setback in said passage, and a burner firing into said setback in a manner to cause the hot gases initially to wipe the walls thereof.

6. Apparatus for heating air flowing through a conduit by admixture with hot gases of combustion comprising a casing adapted to be inserted in said conduit, said casing being internally lined with refractory material to form a cylindrical air passage which forms in effect a continuation of said conduit, said passage being recessed intermediate its ends to form an annular channel therein, and a burner firing tangentially into said channel whereby the hot gases from said burner initially encircle the air flowing through said passage.

HENRY W. SCHRAMM.