Feb. 2, 1932. H. R. HUMPHREY ET AL 1,843,451

GAS BURNER

Filed March 6, 1930 3 Sheets-Sheet 1

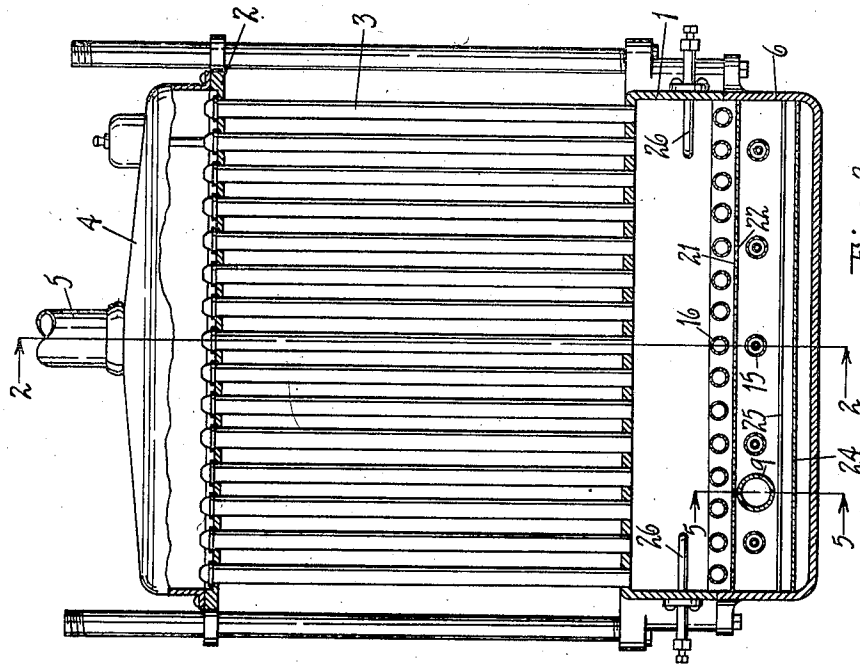


Fig. 3

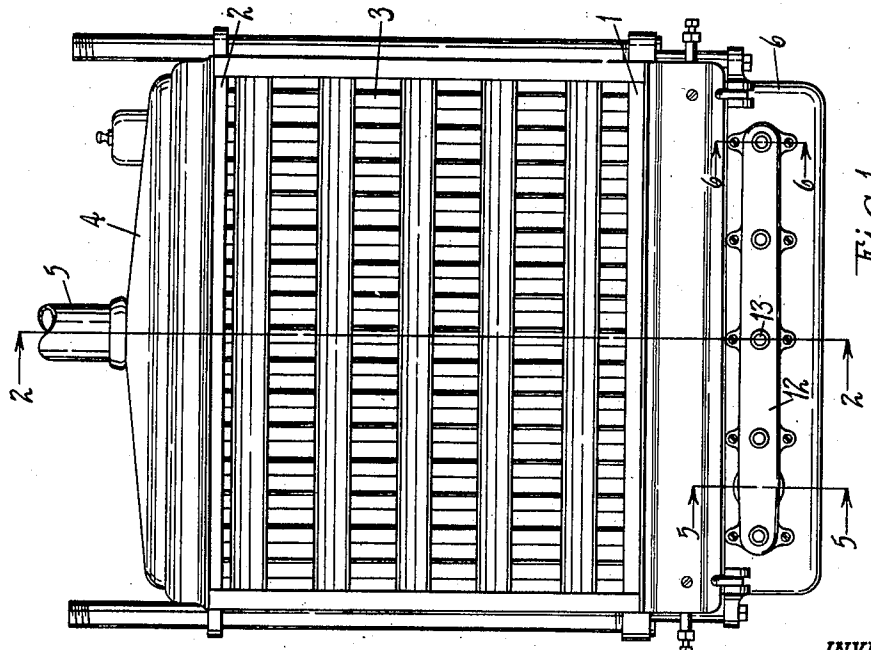


Fig. 1

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GAS BURNER

Filed March 6, 1930 3 Sheets-Sheet 2

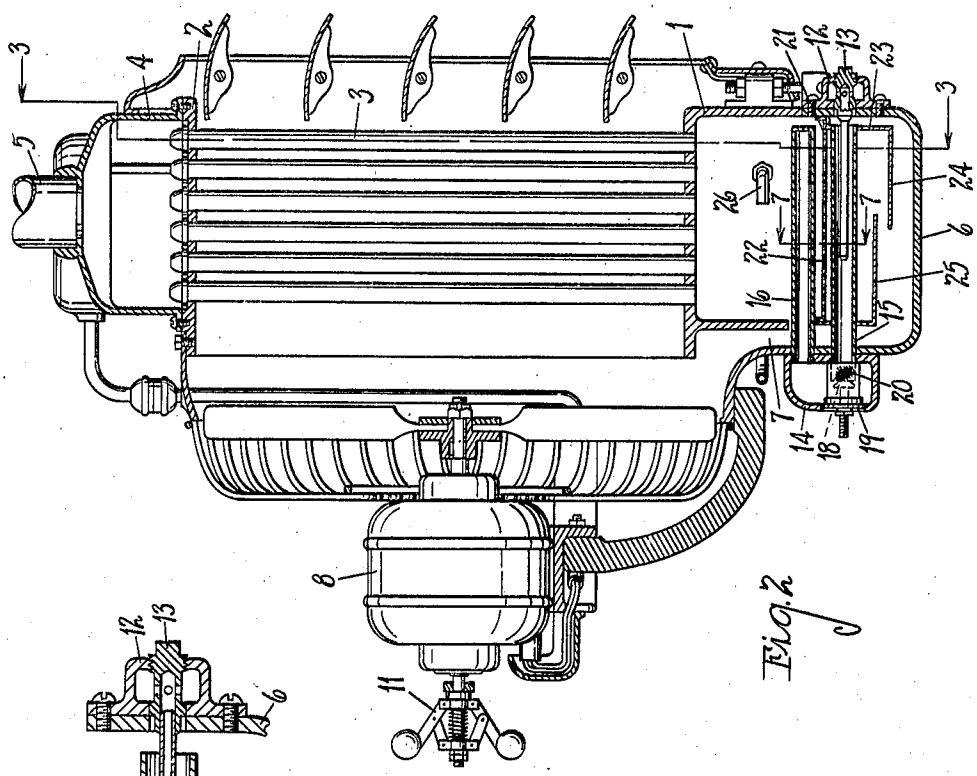


Fig. 2

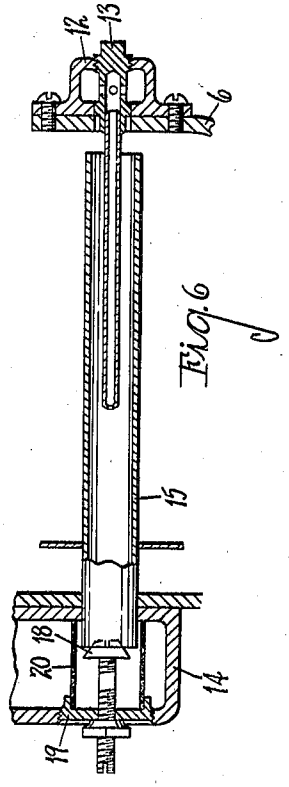


Fig. 6

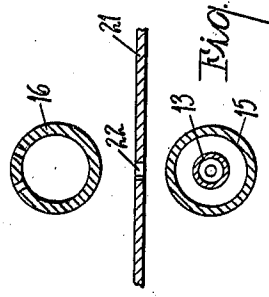


Fig. 7

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GAS BURNER

Filed March 6, 1930 3 Sheets-Sheet 3

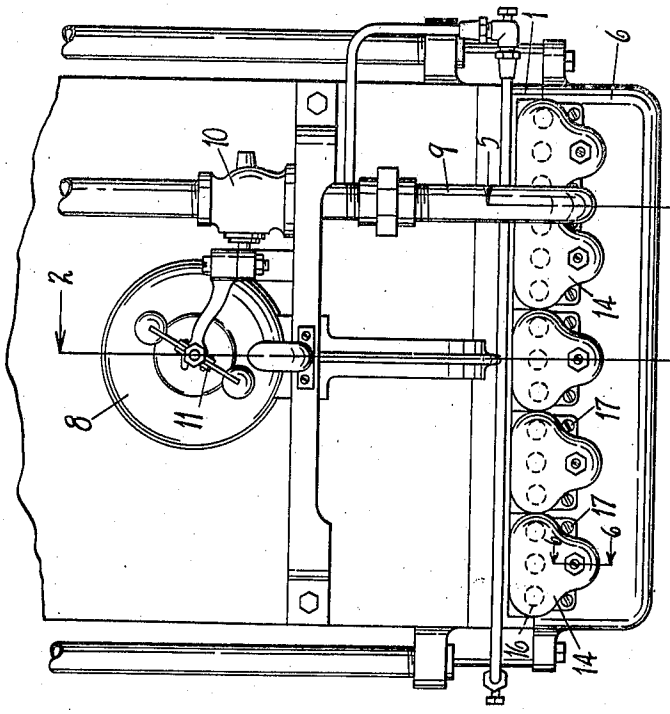


Fig. 4

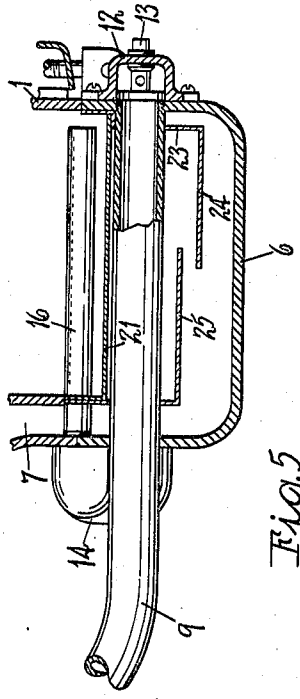


Fig. 5

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UNITED STATES PATENT OFFICE

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GAS BURNER

Application filed March 6, 1930. Serial No. 433,533.

This invention is a continuation in part of our application for Letters Patent for heating apparatus filed November 3, 1928, Serial No. 314,017 which has resulted in Letters Patent No. 1,754,952, issued April 15, 1930.

The main object of the invention is to provide a burner especially adapted as a heating burner which is of large capacity and at the same time very efficient.

A further object is to provide a burner of the class described to which the air is delivered from a fan or blower or other source of supply under pressure.

Objects relating to details and economies of our invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of our invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a front elevation of a heating apparatus embodying our improved burner, the discharge flue being partially broken away.

Fig. 2 is a fragmentary view partially in vertical section on line 2—2 of Figs. 1, 3 and 4.

Fig. 3 is a fragmentary view partially in vertical section on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary rear elevation.

Fig. 5 is an enlarged detail partially in vertical section on line 5—5 of Figs. 1, 3, and 4.

Fig. 6 is a fragmentary view in section on line 6—6 of Figs. 1 and 4 showing details of the mixing tube.

Fig. 7 is a detail section on line 7—7 of Fig. 2.

In the embodiment of our invention illustrated, we provide a base member 1 and top member 2, these members being provided with aligned openings to receive the flues 3, these flues providing a radiator unit.

The header member 4 is provided for the top member 2, this header member having a discharge flue 5 connected thereto.

The burner housing 6 is mounted on the base member 1 coacting therewith to provide a closed combustion chamber, this chamber having an air inlet 7, its discharge being the flues 3.

The air inlet 7 is operatively associated with the blower designated generally by the numeral 8 which delivers a blast of air across the flues and also delivers air to the combustion chamber. The air inlet 7 extends substantially across the combustion chamber or the full length thereof.

The gas supply pipe 9 which is provided with a valve 10 controlled by the governor mechanism 11 operatively associated with the blower motor delivers to the gas header 12 mounted on the front wall of the burner housing, this header being provided with a plurality of nozzles 13 projecting horizontally into the combustion chamber. The nozzles are preferably removable so that the burner may be supplied with nozzles having orifices of suitable size, thereby readily adapting the apparatus for natural gas or artificial gas.

In the embodiment illustrated, we provide a plurality of burner units each consisting of a head member 14 carrying a mixing tube 15 extending across the combustion chamber into operative relation to one of the nozzles 13, the mixing tube opening within the combustion chamber adjacent the front wall thereof.

Each header is provided with a plurality of tubular burners 16 disposed in a plane above the mixing tubes and opening to the header. The burner units are secured to the rear wall of the housing by the screws 17, the rear wall having openings to receive the burners and the mixing tubes so that these units may be independently removed.

The conical valves 18 coact with the ends of the mixing tube and are adjustable from outside of the head members. These valves are carried by plugs or blocks 19 which also carry the tubular screens 20 surrounding the ends of the mixing tubes, as shown in Figs. 2 and 6, so that the screens may be readily removed for cleaning.

Between the burners and the mixing tubes, we arrange an air directing plate 21 having a series of holes 22 therein positioned relative to the burners for directing the secondary air to the burners. Further, thus directed, the secondary air serves as a cooling

means for the burners. The air passing through the passage 7 also acts as a cooling means for the burners.

An air directing baffle 23 depends from the air directing plate 21 and has openings therein to receive the ends of the mixing tube. Horizontally disposed baffles 24 and 25 are also preferably provided, these baffles being disposed with their inner ends centrally of the combustion chamber and spaced to direct the air centrally into the combustion chamber with the result that it is quite uniformly distributed to the burners through the air distributing plate 21. These baffles further prevent the forming of disturbing air currents around the primary air inlets of the mixing tubes.

We preferably provide a pilot conventionally indicated at 26. The connections for the pilots are not illustrated.

As stated, the air is delivered to the combustion chamber from the fan or blower whereby highly efficient combustion of the gas is maintained. This enables the making of a very compact unit of large capacity, a large amount of gas being efficiently burned in a relatively small combustion chamber. Further, the heated gases or products of combustion are forced into the flues by the blast of air which renders it practical to employ flues of relatively small dimensions.

We have illustrated and described our improvements in an embodiment which we have found very practical. We have not attempted to show other adaptations or embodiments thereof as we believe this disclosure will enable those skilled in the art to embody or adapt our improvements as may be desired.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. The combination of a combustion chamber provided with a discharge at the top for the products of combustion, a plurality of burners arranged horizontally within said combustion chamber, mixing tubes disposed in a plane below and operatively associated with said burners and having primary air inlets within said combustion chamber, gas nozzles operatively associated with said mixing tubes, a secondary air directing plate disposed horizontally between said mixing tubes and burners and provided with openings for the passage of secondary air to the burners, horizontally disposed baffle plates disposed below said mixing tubes with their inner ends in spaced relation centrally of said combustion chamber, and means for delivering a blast of air to said combustion chamber below said baffle plates.

2. The combination of a combustion chamber provided with a discharge at the top for the products of combustion, a plurality of burners arranged horizontally within said combustion chamber, mixing tubes disposed in a plane below and operatively associated with said burners and having primary air inlets within said combustion chamber, gas nozzles operatively associated with said mixing tubes, a secondary air directing plate disposed horizontally between said mixing tubes and burners and provided with openings for the passage of secondary air to the burners, and horizontally disposed baffle plates disposed below said mixing tubes with their inner ends in spaced relation centrally of said combustion chamber.

3. In a heating apparatus, the combination with a combustion chamber, of a plurality of burners arranged horizontally within said combustion chamber, mixing tubes operatively associated with said burners and having primary air inlets within said combustion chamber, said mixing tubes being arranged in a plane below said burners, gas nozzles operatively associated with said mixing tubes, a secondary air directing plate disposed horizontally between said mixing tubes and burners and provided with rows of openings for the passage of air arranged below the burners, the plate being otherwise substantially imperforate, and a baffle depending from said plate adjacent the primary air inlets of said mixing tubes.

4. In a heating apparatus, the combination with a combustion chamber, of a plurality of burners arranged horizontally within said combustion chamber, mixing tubes operatively associated with said burners and having primary air inlets within said combustion chamber, said mixing tubes being arranged in a plane below said burners, gas nozzles operatively associated with said mixing tubes, and a secondary air directing plate disposed horizontally between said mixing tubes and burners and provided with rows of openings for the passage of air arranged below the burners, the plate being otherwise substantially imperforate.

5. In a heating apparatus, the combination with a combustion chamber, of a plurality of burners arranged horizontally within said combustion chamber, mixing tubes operatively associated with said burners and having primary air inlets within said combustion chamber, said mixing tubes being arranged in a plane below said burners, gas nozzles operatively associated with said mixing tubes, a secondary air directing plate disposed horizontally between said mixing tubes and burners and provided with secondary air openings for the burners, and a baffle depending from said plate adjacent the primary air inlets of said mixing tubes.

6. In a heating apparatus, the combination with a combustion chamber, of a plurality of burners arranged horizontally within said combustion chamber, mixing tubes operatively associated with said burners and

having primary air inlets within said combustion chamber, said mixing tubes being arranged in a plane below said burners, gas nozzles operatively associated with said mixing tubes, and a secondary air directing plate disposed horizontally between said mixing tubes and burners and provided with secondary air openings for the burners.

7. The combination of a combustion chamber, a plurality of burners arranged horizontally within said combustion chamber, mixing tubes operatively associated with said burners and having primary air inlets within said combustion chamber, said mixing tubes being arranged in a plane below said burners, and a secondary air directing plate disposed in said combustion chamber between said mixing tubes and burners and provided with air openings aligned with said burners.

8. The combination of a burner housing, a gas header on the one side of said burner housing member and provided with a plurality of inwardly directed gas delivery nozzles, a plurality of independently removable burner units mounted on the opposite wall of said burner housing member and each comprising a chambered head member, a plurality of burners mounted on said head members and projecting into said housing member, and a mixing tube delivering to said head member and extending across said housing member into coacting relation with one of said gas nozzles, said mixing tube having primary air inlets within said housing member.

9. The combination of a burner housing, a gas header mounted on one wall of said burner housing and provided with a plurality of gas delivery nozzles, a plurality of independently removable burner units mounted on the opposite wall of said burner housing and each comprising a chambered head member, a mixing tube delivering to said head member and extending across said burner housing into coacting relation with one of said gas nozzles, said mixing tubes having air inlets opening within said housing, a plurality of burners mounted on each head member, and regulating valves on said head members coacting with the delivery ends of said mixing tubes.

10. The combination of a burner housing, a gas header mounted on one wall of said burner housing and provided with a plurality of gas delivery nozzles, a plurality of independently removable burner units mounted on the opposite wall of said burner housing and each comprising a chambered head member, a mixing tube delivering to said head member and extending across said burner housing into coacting relation with one of said gas nozzles, said mixing tubes having air inlets opening within said housing, and a plurality of burners mounted on each head member.

11. In a heating apparatus, the combination of a base member, a burner housing member mounted on said base member to coact therewith to provide a combustion chamber, a gas header provided with a plurality of inwardly directed gas delivery nozzles, a plurality of burners removably mounted on the wall of said burner housing opposite said gas nozzles, and mixing tubes operatively associated with said gas nozzles and burners and having primary air inlets within said combustion chamber.

12. The combination of a burner housing, a gas header provided with a plurality of inwardly directed gas delivery nozzles mounted on one wall of said burner housing, a plurality of independently removable burner units mounted on the opposite wall of said burner housing and each comprising a chambered head member, a mixing tube delivering to said head member and extending across said burner housing into coacting relation with one of said gas nozzles, said mixing tubes having air inlets opening within said housing, and a plurality of burners mounted on each head member.

13. A burner unit comprising a chambered head member, a plurality of burners opening to said head member, a mixing tube delivering to said head member and having a primary air inlet at its outer end, a gas nozzle operatively associated with said mixing tube, and a regulating valve on said head member coacting with the inner end of said mixing tube so that it is common to all of said burners.

14. The combination of a burner housing, a gas header provided with a plurality of inwardly directed gas delivery nozzles mounted on one wall of said housing, a plurality of burners mounted on the opposite wall of said housing in a plane above the said nozzles, and mixing tubes operatively associated with said nozzles and burners and having primary air inlets within said combustion chamber.

15. The combination of a closed combustion chamber, a plurality of gas delivery nozzles projecting into said chamber, a plurality of burners disposed horizontally within said chamber in a plane above said delivery nozzles, and mixing tubes operatively associated with said gas nozzles and burners and having primary air inlets within said combustion chamber.

16. The combination of a combustion chamber, a gas header provided with a plurality of inwardly directed gas delivery nozzles mounted on one wall of said chamber, a plurality of burners removably mounted on the opposite wall of said combustion chamber, and mixing tubes operatively associated with said gas nozzles and burners and having primary air inlets within said combustion chamber.

17. The combination of a closed combustion chamber, a plurality of gas delivery nozzles projecting into said chamber, a plu-

rality of burners disposed in said combustion chamber in a plane above said nozzles, mixing tubes operatively associated with said gas nozzles and burners and having primary air inlets within said combustion chamber, and means for delivering a blast of air to said combustion chamber below said mixing tubes.

18. The combination of a closed combustion chamber provided with a discharge at the top for the products of combustion, said discharge comprising a plurality of flues uniformly disposed relative to the top of the combustion chamber, a plurality of tubular burners disposed within said combustion chamber, a secondary air directing plate disposed below said burners and having openings positioned so that the air passing therethrough is discharged against the under side of said tubular burners, and means for delivering a blast of air to said closed combustion chamber below said distributing plate, said burners having primary air inlets open to said blast of air in advance of said plate.

19. The combination of a closed combustion chamber provided with a discharge at the top for the products of combustion, said discharge comprising a plurality of flues uniformly disposed relative to the top of the combustion chamber, a plurality of burners disposed within said combustion chamber, a secondary air directing plate disposed below said burners, and means for delivering a blast of air to said closed combustion chamber below said distributing plate, said burners having primary air inlets open to said blast of air in advance of said plate.

20. The combination of a closed combustion chamber provided with a discharge at the top for the products of combustion, a plurality of tubular burners disposed within said combustion chamber, a secondary air directing plate disposed below said burners and having openings positioned so that the air passing therethrough is discharged against the under side of said tubular burners, and means for delivering a blast of air to said closed combustion chamber below said distributing plate, said burners having primary air inlets open to said blast of air in advance of said plate.

21. The combination of a closed combustion chamber provided with a discharge at the top for the products of combustion, a plurality of burners disposed horizontally within said combustion chamber, a secondary air directing plate disposed horizontally below said burners and provided with openings for the passage of secondary air to the burners, and means for delivering a blast of air to said combustion chamber below said plate, said burners being provided with primary air inlets opening to the blast of air in advance of said secondary air directing plate, the secondary air openings of said plate being positioned so that the secondary air is directed upon the burners and acts as a cooling means therefor.

22. The combination of a closed combustion chamber provided with a discharge at the top for the products of combustion, a plurality of burners disposed horizontally within said combustion chamber, a secondary air directing plate disposed horizontally below said burners and provided with openings for the passage of secondary air to the burners, and means for delivering a blast of air to said combustion chamber below said plate, said burners being provided with primary air inlets opening to the blast of air in advance of said secondary air directing plate.

In witness whereof we have hereunto set our hands.

HUBERT R. HUMPHREY.
GEORGE A. HUMPHREY.