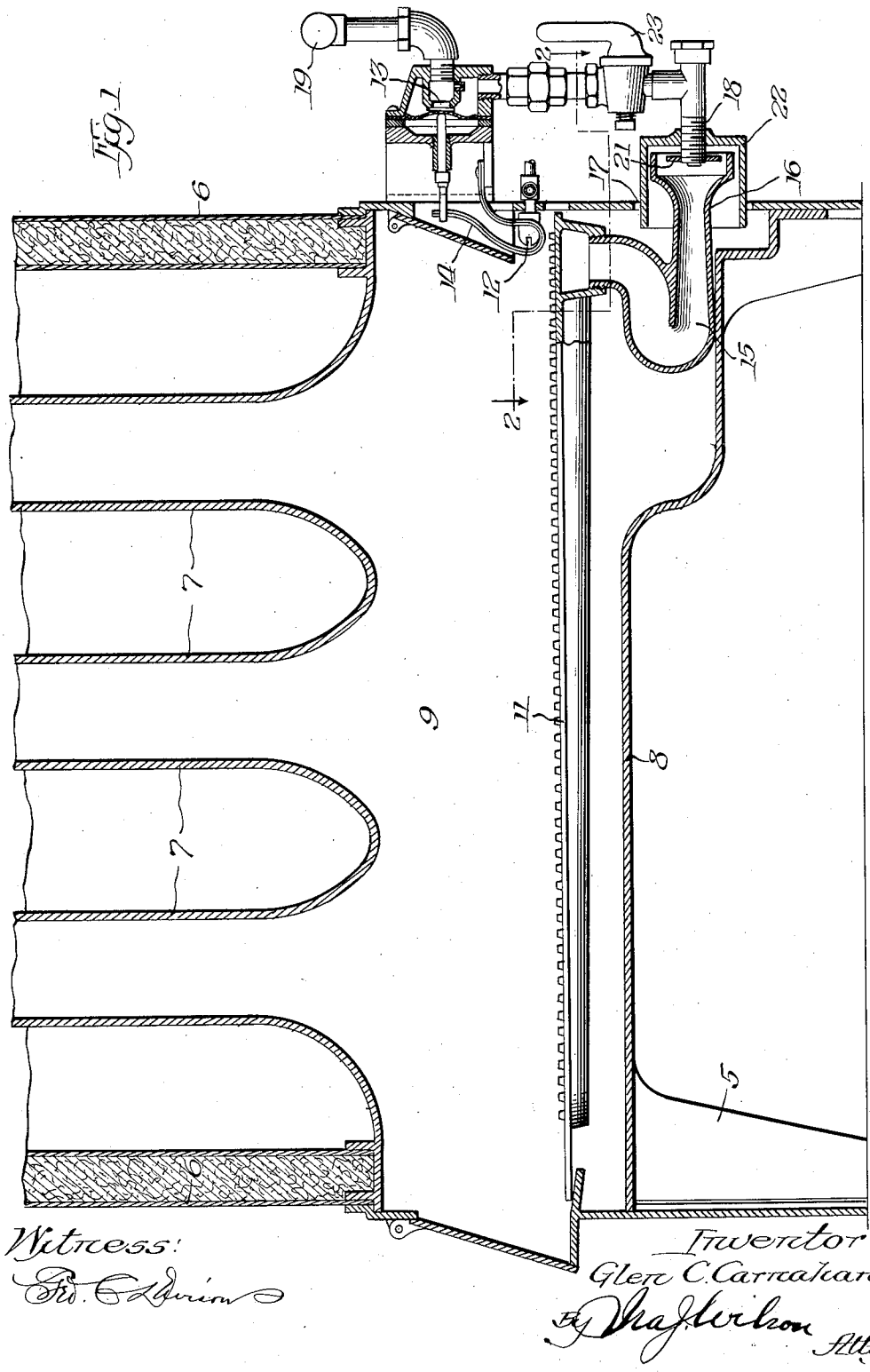
July 14, 1931. G. C. CARNAHAN 1,814,076

GAS BURNING DEVICE

Filed July 7, 1928 2 Sheets-Sheet 1



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Fig. 3

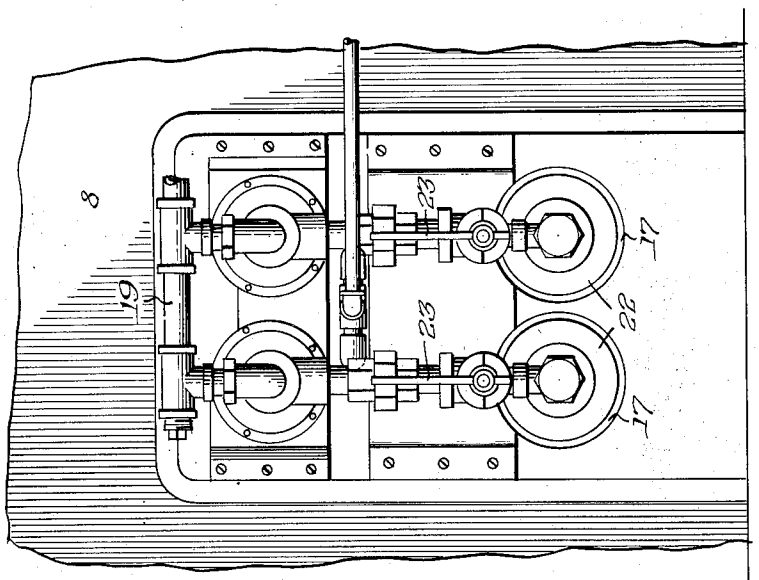
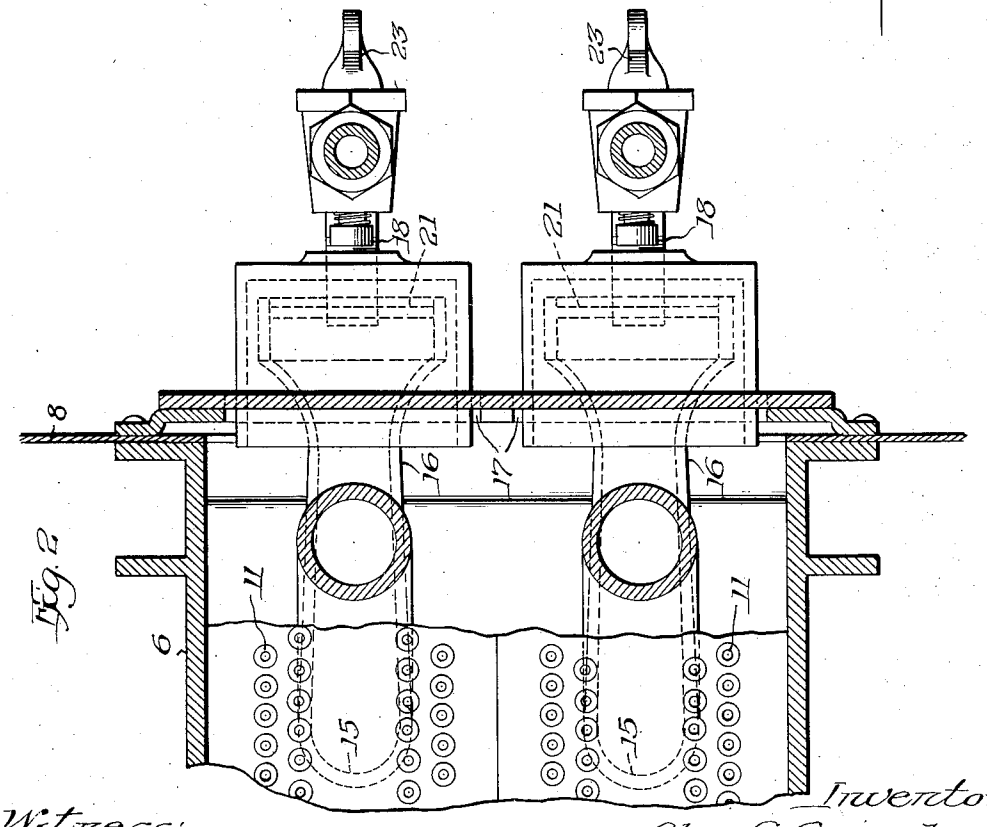


Fig. 2



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Patented July 14, 1931

1,814,076

UNITED STATES PATENT OFFICE

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GAS BURNING DEVICE

Application filed July 7, 1928. Serial No. 290,896.

This invention pertains generally to gas burning apparatus and while the principles of my invention may be embodied in various types of apparatus the specific embodiment of the invention shown herein for illustrative purposes is illustrated in connection with a gas fired heater.

When the gas supply to the burner is shut off in apparatus of this general character an objectionable flareback or popping has heretofore resulted when the primary air supplied to the air and fuel mixing device was at atmospheric pressure for the reason that the air flow, because the combustion chamber was below atmospheric pressure, continued through the mixture after the gas was shut off with the result that the mixture in the mixing device became so thin, due to the inflowing air, that the rate of flame propagation became greater than the rate of flow of the mixture, consequently the flame traveled back in the mixer from the burner causing a relatively small but objectionable explosion.

One of the primary purposes of my present invention is to provide an apparatus which will obviate this flareback by utilization of air from the combustion chamber at a pressure below atmospheric pressure for the primary air in the mixer. The air flow is induced by the inflowing gas to the mixer and when the gas is shut off the air flow into the mixer immediately ceases so that the richness of the mixture is not reduced and no flareback occurs.

Another object of my invention is to provide a device for controlling the primary air supply to the mixer which will be disposed largely outside the combustion chamber and will be accessible outside the chamber for adjustment to regulate the supply of primary air.

Another feature of my invention resides in the fact that the apparatus is simple in construction, economical to manufacture, may be readily assembled and is efficient and durable in use.

Other objects and advantages of my invention will be readily appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawings. Referring to the drawings:

Fig. 1 is a vertical sectional view through an apparatus embodying my invention,

Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 1, and

Fig. 3 is a fragmentary end elevation of the apparatus shown in Fig. 1.

Referring now to the drawings more in detail, reference character 5 indicates the base of the heating apparatus carrying the surrounding walls 6 and the partition walls 7 of the heating unit. These surrounding walls, together with the bottom 8, form a combustion chamber 9 within which one or more, in the present instance two, main burners 11 are mounted. The pilot burners 12 for igniting the main burners and the shut-off valves 13 controlled by the thermostatic elements 14 for shutting off the gas supply to the main burners upon extinguishment of the pilot lights form the subject matter of my copending application Serial No. 290,895, filed July 7, 1928.

A combustible mixture of air and gas is supplied to each main burner 11 from a mixer indicated generally by reference character 15 which includes a Venturi tube 16 for inducing inflow of primary air and effecting the mixture. The major portion of the mixer is disposed as shown in Fig. 1 within the combustion chamber but the intake end extends outwardly through an opening 17 formed in the front wall of the combustion chamber. Gas is supplied to the intake end of the mixer by a pipe 18 equipped, if preferred, with a suitable nozzle which pipe receives its gas from the main pipe 19. The inner end of the supply pipe 18 is externally threaded and connected with the mixer by being screwed into a web 21 formed as a part of the mouth of the mixer. A controlling device in the form of a cup-shaped member 22 having a tapped opening through its closed end is adjustably threaded upon the pipe 18 so as to be movable toward and from the mouth of the mixing device to regulate the amount of air entering the device. The side walls of the cup-shaped member sur-

round the mixing device and project inwardly through the opening 17 in the wall of the combustion chamber so as to leave clearance between the walls of this opening and the walls of the member through which air may enter the combustion chamber.

When the burners are in operation the pressure within the combustion chamber is below atmospheric pressure by reason of the upflow of the air heated by the burners, and air entering the combustion chamber through the opening 17 around the regulating member will normally tend to rise around the burners and pass out of the top of the apparatus. The inflow of gas into the mixing device from the pipe 18, however, induces a flow of this air below atmospheric pressure in the combustion chamber back into the cup-shaped member and into the mixing device where it is mixed with the air and delivered to the burners.

When the gas is shut off by means of the shut-off cock 23 or other shut-off device, the induction of air into the mixing device immediately ceases with the result that the mixture in the device is not diminished in richness as it would be if air under atmospheric pressure were admitted directly into the mixer and consequently the rate of flame propagation is not increased so as to cause a flareback or popping.

It will be manifest, therefore, that my apparatus by its use of air below atmospheric pressure from the combustion chamber as the primary air to be admixed in the mixer with the fuel, precludes the objectionable flareback heretofore prevalent in mixers open to atmosphere. Furthermore, the regulating device is disposed entirely outside the combustion chamber where it is readily accessible for adjustment and is not subjected to the heat of the combustion chamber. The device is simple in construction, easy to assemble, is accessible for adjustment and serves to preclude popping or flareback upon shutting off the burners.

While I have shown and described a preferred embodiment of the invention obviously the details may be varied within wide limits without departing from the essence of the invention as defined in the following claims.

I claim:

1. In a gas burning apparatus, the combination of a combustion chamber, a burner therein, a mixing tube communicating with said burner and extending outwardly through the wall of said chamber, means for supplying fuel to the outer end of said tube, and means for controlling the admission of primary air to said tube comprising an adjustable cup surrounding the outer portion of said tube and projecting into the combustion chamber for causing the primary air supplied to the tube to be drawn in regulated quantities from the combustion chamber.

2. In a gas burning apparatus, the combination of a combustion chamber provided with an opening in one wall thereof, a burner within the chamber, an air and fuel mixing device communicating with the burner and projecting outwardly through said opening, means for supplying gas to the mixing device, and means for controlling the admission of air to said device, said last named means comprising a cup-shaped member surrounding the projecting end of said mixing device and projecting through said opening into the chamber whereby air from within the chamber and below atmospheric pressure is delivered to said mixing device in regulated quantities.

3. In a gas burning apparatus, the combination of a combustion chamber having one wall thereof provided with an opening, a burner within said chamber, an air and gas mixing device communicating with the burner and projecting outwardly through said opening, a fuel supply pipe communicating with the outer end of said mixing device, and a cup-shaped regulating member adjustably mounted on said pipe and projecting inwardly through said opening with clearance between said member and the surrounding walls of the opening and between said member and the mixing device for causing the delivery of air from the combustion chamber to the mixing device in regulatable quantities.

4. In a gas burning apparatus, the combination of a combustion chamber provided with an opening in one wall thereof, a burner within the chamber, an air and gas mixing device communicating with the burner and projecting outwardly through said opening, means for supplying gas to said mixing device, and an adjustably mounted cup-shaped member surrounding the outer end of the mixing device and projecting through said opening into the combustion chamber for controlling the admission of air to said mixing device.

5. In a gas burning apparatus, the combination of a combustion chamber provided with an opening in one wall thereof, a longitudinally adjustable cup-shaped member projecting through said opening with its closed end disposed outside said chamber, an air and gas mixing device disposed within the combustion chamber and having its outer end projecting outwardly through said opening and into said cup-shaped member, and means for supplying gas through said member to said mixing device.

In witness of the foregoing I affix my signature.

GLEN C. CARNAHAN.