

1,383,741.

J. MILLER.
GAS BURNER.
APPLICATION FILED APR. 8, 1920.

Patented July 5, 1921.
2 SHEETS—SHEET 1.

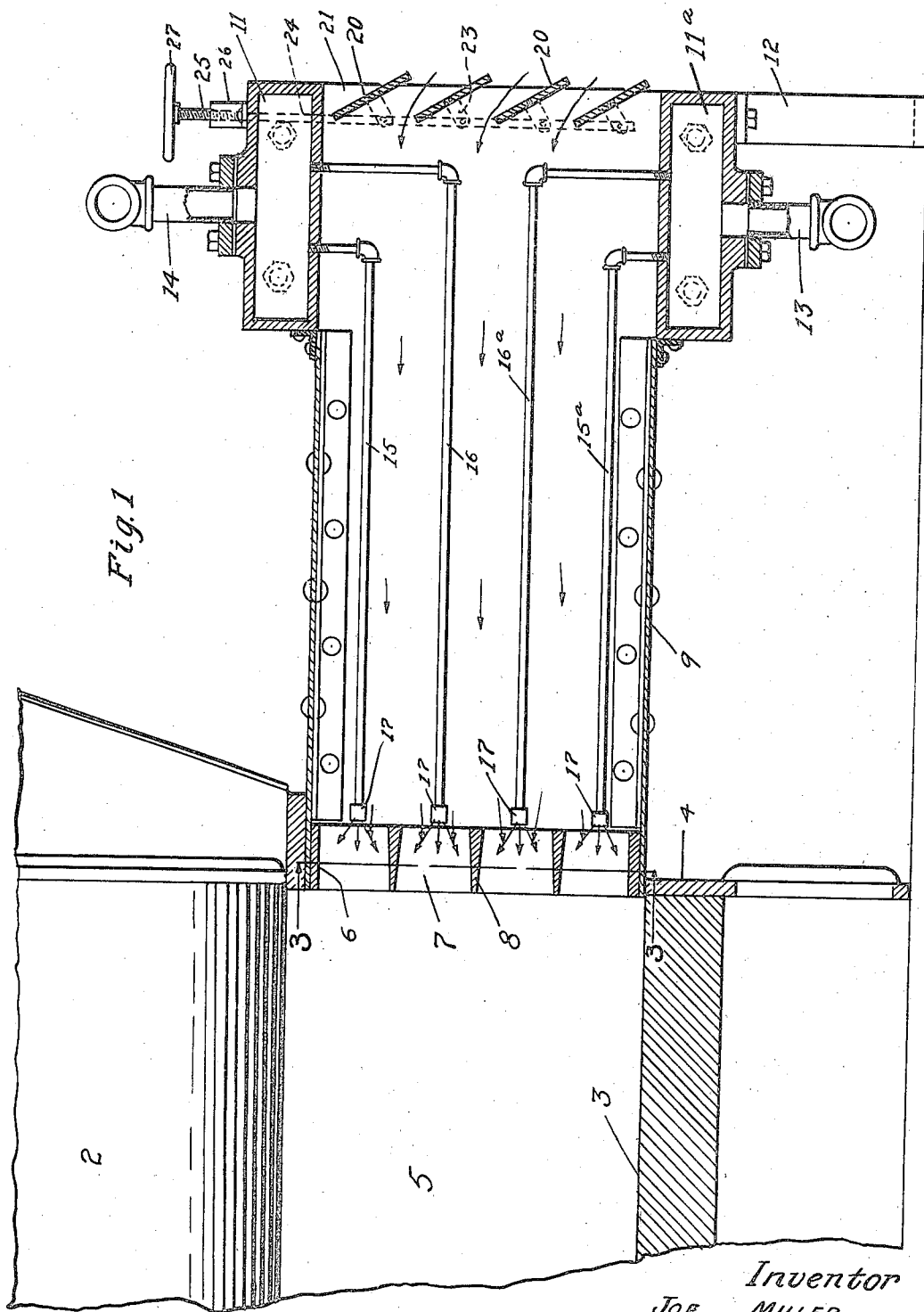


Fig. 1

Inventor
JOE MILLER
By *Paul & Paul*
His Attorneys.

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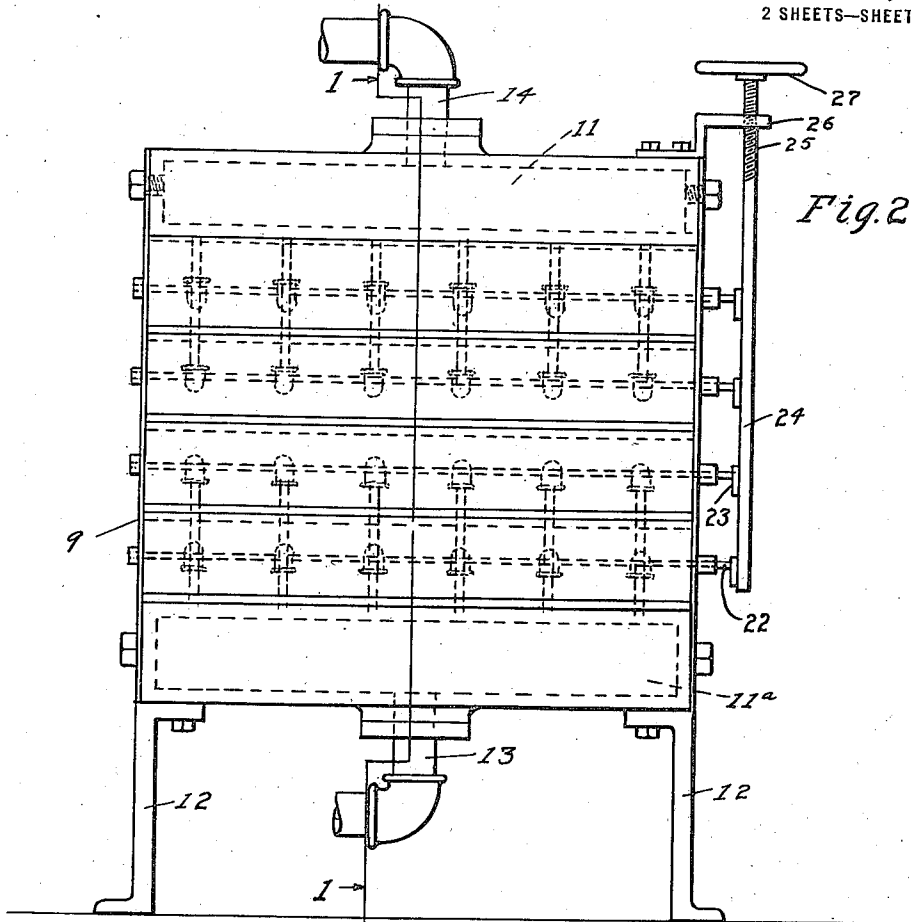


Fig. 2

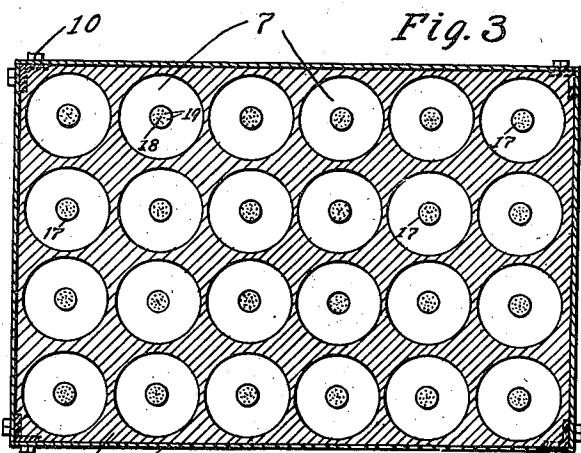


Fig. 3

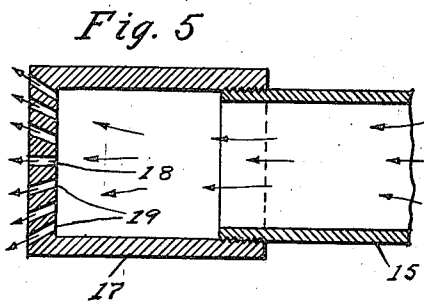


Fig. 5

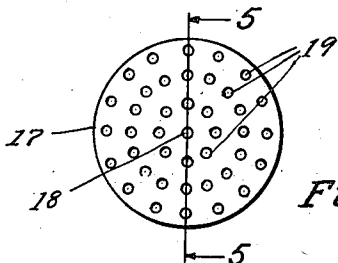


Fig. 4

Inventor

J. E. MILLER
By Paul & Paul
His Attorneys.

UNITED STATES PATENT OFFICE.

JOE MILLER, OF LITTLE ROCK, ARKANSAS.

GAS-BURNER.

1,383,741.

Specification of Letters Patent.

Patented July 5, 1921.

Application filed April 8, 1920. Serial No. 372,204.

To all whom it may concern:

Be it known that I, JOE MILLER, a citizen of the United States, resident of Little Rock, county of Pulaski, State of Arkansas, have
5 invented certain new and useful Improvements in Gas-Burners, of which the following is a specification.

My invention relates to burners designed particularly for handling natural gas and
10 the object of the invention is to provide improved means for delivering the gas to the burner and further to provide means for equalizing the delivery of air to the burners to the end that combustion of the gas at the
15 nozzle will be complete and uniform.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming part of this specification,

25 Figure 1 is a vertical sectional view, taken on the section line 1—1 of Fig. 2.

Fig. 2 is an end elevation of the apparatus applied to the front of a boiler.

Fig. 3 is a sectional view on the line 3—3 of Fig. 1,

30 Fig. 4 is an end view of one of the burners,

Fig. 5 is a sectional view on the line 5—5 of Fig. 4,

In the drawing, 2 represents a boiler of the horizontal type, having the usual setting 3 and front 4. 5 is the combustion chamber beneath the boiler. A casting 6 is mounted in the boiler front and provided with a series of openings 7 separated from each other by webs 8. A box or casing 9 is
40 mounted at one end in the front of the boiler and encircles the fire brick 6. This box is perfectly rectangular in cross section, the top and bottom and side walls being secured to the fire bricks 6 by any suitable means,
45 such as bolts 10. At the outer end of the box I provide gas chambers 11 and 11^a, arranged at the top and bottom of the box 9 and supported by suitable means, such as legs 12. These chambers extend the full
50 width of the box 9 and have pipe connections 13 and 14 with a suitable supply of

natural gas, the device being intended for burning this kind of fuel.

As shown in Fig. 3, I provide a series of the openings 7 in the front of the boiler and
55 pipes 15 and 16 and 15^a and 16^a communicate respectively with the gas chambers 11 and 11^a and extend forwardly therefrom to points near the openings in the wall 6. These pipes deliver the gas in uniform
60 volume from the chambers and on the end of each pipe is mounted a cylindrical nozzle 17, preferably by threading the pipe and tapping the nozzle. The nozzle is cup-shaped in form and is provided with a central port 18 and a series of similar ports 19
65 grouped around the central port and inclined outwardly therefrom and positioned near the opening 7 in the fire brick, sufficient space being provided around the nozzle to
70 admit currents of air to mix with the gas and produce a perfect combustion within the firebrick opening and near the gas nozzles. The purpose of this is to decrease the rapidity of flow of the gas through and under
75 the boiler and thereby effect a greater economy in the consumption of gas and a larger degree of heat from such consumption. It will be noted that the openings 7 in the firebrick gradually increase in cross
80 sectional area from their outer toward their inner ends, thereby incorporating the principle of a Venturi tube. When a hole is provided adjacent a gas nozzle and embodying this principle, should there be any variation in the quantity of gas, the difference
85 between the gas pressure and the atmospheric pressure increases in proportion to the difference in the squares of the former and new velocities, the flow of gas through
90 an orifice being proportional to the square root of the pressure difference. The air drawn in by the suction will vary directly with the gas flow and once adjusted, the rate of gas and air is constant. By giving the
95 gas a flare from a straight line through the nozzle, the mixture of air and gas is more rapid and combustion takes place nearer to the end of the burner proper.

To regulate the delivery of air to the
100 burner, and insure an equal distribution to all of them, I provide a series of shutters

20 mounted in an opening 21 between the gas chambers 11 and 11^a and having shafts 22 journaled in the side walls of the box and provided with cranks 23 connected by a
 5 vertical rod 24 which is threaded at 25 and is mounted in a bracket 26 on the gas chamber 11. A wheel 27 is mounted on the rod 24 by means of which the rod is raised or
 10 dampers and regulate the flow of air to the burners.

The advantage of this arrangement of dampers is that air will be admitted uniformly to follow the pipes leading to all
 15 the burners. The pipes in the center receive the same volume of air as those adjacent the walls of the box.

With this apparatus the gas is admitted to the box in front of the boiler from
 20 the chambers extending across the top and bottom of the box, the arrangement of the pipes being such that the gas from the corresponding burners travels substantially a uniform distance and the air being admitted
 25 through an opening of substantially the same cross sectional area as the box, it follows that each pipe and burner nozzle will receive substantially the same amount of air and a uniform mixture will take place
 30 at the point where the gas is discharged into the openings in the firebrick and uniform and complete combustion will result. I have found in actual practice that the burner flame will not project through the openings
 35 in the firebrick, but a blue flame will be projected from the nozzles and the heat flowing slowly back through the space beneath the boiler, will contact with the exposed surface thereof at all points.

40 I claim as my invention:

1. The combination, with a boiler front, of a burner brick setting mounted therein and provided with a series of holes increasing in cross sectional area from their outer
 45 toward their inner ends, pipes and gas nozzles therefor terminating adjacent the outer ends of said opening, said nozzles having flaringly arranged ports therein for directing the gas toward the walls of said openings, and means for delivering currents of
 50 air to pass through said openings around said nozzles.

2. The combination, with a boiler front having an opening therein, of a gas nozzle terminating near the outer end of said opening and provided with a series of flaringly
 55 arranged ports therein and means for supplying currents of air to said opening around said nozzle.

3. The combination, with a boiler front having a wall composed of refractory material and a series of openings therein, of a box projecting outwardly from said wall and encircling said openings, gas pipes arranged
 60 within said box and terminating opposite

and near the outer ends of said openings and having nozzles for directing the gas into and through said openings, and a series of
 70 shutters provided in the outer portion of said box for delivering currents of air uniformly to said pipes and holes.

4. The combination, with a boiler front having a plurality of openings therein, of a series of gas nozzles mounted adjacent to
 75 said openings and having a plurality of flaringly arranged ports therein for directing the gas toward the walls of said openings, and means for supplying air to said openings around said nozzles.

5. The combination, with a boiler front, of a wall of refractory material mounted therein provided with a series of openings, of a box encircling said wall and openings and projecting outwardly therefrom, gas
 80 chambers mounted upon opposite sides of said box at the outer portion thereof and having pipes for communication with a gas supply, pipes leading from said gas chamber and extending through said box and having
 85 nozzles terminating opposite and near the openings in said refractory wall, the end wall of said box between said gas chambers being open and a series of shutters mounted therein for regulating the uniform flow of
 90 air to said box and through said nozzles.

6. The combination, with a boiler front, of a burner setting mounted therein and provided with a series of openings, a box encircling said openings and projecting outwardly therefrom, gas chambers mounted
 100 on the outer opposite walls of said box, pipes leading from said chambers and having gas nozzles terminating near said openings respectively and said box having an air intake opening for said nozzles between said
 105 gas chambers.

7. The combination, with a boiler front, of a burner setting mounted therein and provided with a series of openings, a box fitting over said openings and projecting outwardly therefrom, a gas chamber arranged
 110 on the walls of said box, pipes leading from said gas chamber and extending to a point near said openings and having nozzles for discharging gas through said openings and said box having an air intake opening in its
 115 outer walls and adjacent the outer ends of said pipes for delivering air to flow around said pipes and mingle with the gas discharged from said nozzles.

8. The combination, with a boiler front, of a burner brick setting mounted therein and provided with a series of openings, pipes and gas nozzles therefor terminating adjacent the outer ends of said openings, said
 120 nozzles having flaringly arranged ports therein for directing the gas toward the walls of said openings, and means for delivering currents of air to pass through said openings around said nozzles.

9. The combination, with a boiler front, of a wall of refractory material mounted therein provided with a series of openings, a box encircling said wall and openings and projecting outwardly therefrom, gas chambers mounted upon opposite sides of said box at the outer portion thereof and having pipes for communication with a gas supply, pipes leading from said gas chambers and extending through said box and having nozzles terminating opposite and near the openings in said refractory wall, the end wall of said box between said gas chambers being open to admit air to said nozzles.

In witness whereof, I have hereunto set my hand this 8th day of March, 1920.

JOE MILLER.