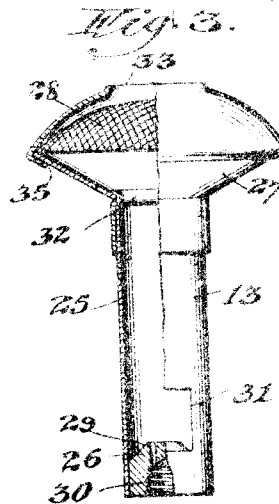
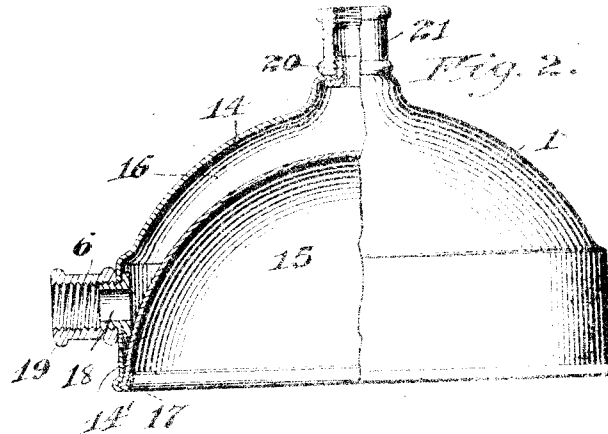


Patented May 13, 1913.



Investor;
Francis J. Doyle
By Alfred Tuck, Counselor at Law.
Ally's.

UNITED STATES PATENT OFFICE.

FRANCIS J. DOYLE, OF CHICAGO, ILLINOIS.

GAS-BURNER.

1,061,360.

Specification of Letters Patent

Patented May 13, 1913.

Application filed July 19, 1909. Serial No. 508,407.

To all whom it may concern:

Be it known that I, FRANCIS J. DOYLE, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Gas-Burners, of which the following is a specification.

This invention relates to improvements in gas burners, and in the present instance is shown in connection with a water heater.

Among the salient objects of the invention are to provide a construction which generates an intense heat due to the increased efficiency of combustion; to provide a construction in which the supply of air to the burner is automatically controlled by the pressure of gas through the jet; to provide a peculiar construction of the outlet end of the burner which prevents the flame, when low, from being blown out by a draft of air; to provide a construction which prevents dust, dirt, etc., from accumulating within the burner without, however, in any way impairing the efficiency of the latter; to provide a simple and efficient construction, which can be manufactured at a very low cost; and in general to provide an improved construction of the character referred to.

The invention consists in the matters hereinafter described and more particularly pointed out in the appended claims.

In the drawings—Figure 1 is an assembled view of a kitchen boiler and water heater, equipped with three of my improved burners, part of the heater being broken out to more clearly show the disposition of the burners. Fig. 2 is a view partly in axial section and partly in side elevation of the heater shown as detached. Fig. 3 is a view partly in side elevation and partly in axial section of the improved gas burner.

Referring to the drawings, 1 designates as a whole the water heater, and 2 an ordinary kitchen tank, which is conveniently supported upon an elevated standard or base 3.

4 designates a supply pipe communicating with any suitable water supply under pressure, entering the upper end of the tank and extending inside the latter down to and delivering at a point near the bottom of the

tank, as indicated in the dotted lines at 4'. With the central portion of the bottom of the tank connects a circulating pipe 5 which leads to and connects with one side of the heater 1, as indicated at 6. From the top of the heater a stand-pipe 7 leads to and communicates with the upper end of the tank, conveniently at the center thereof, as shown. From the stand-pipe 7 a small branch-pipe 8 leads off to any suitable spigot; this branch-pipe being controlled by a turn-cock 9, and the stand-pipe is similarly controlled by a turn-cock 10. The heater is shown as heated by gas burners, and to this end a gas supply pipe 11 leads from any suitable source of gas supply to a point beneath the burner and is there provided with a plurality of branch stubs 12, each of which carries a burner, designated as a whole 13.

Describing more specifically the heater, and referring first to Fig. 2, the main shell of the device is composed of two dome-shaped and semi-spherical casing members 14 and 15; the inner or lower member being arranged in nested relation to the upper member but spaced away from the latter throughout except at their joined edges, so as to provide a relatively thin, sheet-like space or water chamber 16 inside the heater. The member 14 is desirably constructed with a straight or approximately cylindric portion or zone 14' extending from its lower edge upwardly some distance and then merging into the dome portion proper. The inner member 15 is desirably, and as shown, of uniform curvature, i. e., semi-spherical throughout, and the two members are conveniently united to form a hermetical joint at their edges by folding the lower edge of the outermost around the corresponding edge of the inner member, as indicated at 17, and suitably soldering or otherwise sealing the joint. The supply pipe 6 is arranged to communicate with the interior of the heater through the cylindric portion 14' of the outer shell; the latter being to this end provided with a suitable nipple 18 to which the pipe is connected by means of a union 19. The outlet is at the center or top of the dome, and in the sheet metal construction 100

being described comprises a nipple 20 suitably mounted in an opening in the shell 14 and connected with the outlet pipe by means of a union 21.

5 Describing now one of the gas burners 13 which forms the salient object of the present invention, each burner comprises a main stem or draft-tube 25, a jet body or plug 26 seated in the lower end of the draft-tube, a
10 hollow head 27 circular in cross section of oblong form in vertical section, and a perforated or reticulated diaphragm 28 which divides the interior of the head 27. The jet plug 26 is provided with a plurality of
15 small properly distributed jet openings 29 extending through its top, and is internally threaded as indicated at 30 to attach to the supply pipe. At a height coincident with
20 the upper surface of the jet plug, the draft-tube 13 is provided with a large draft opening 31 formed through its side. The draft-tube is unobstructed throughout the remainder of its length and preferably communicates with the head 27 through an
25 opening 32 of the full internal diameter of the draft-tube. The head is provided at its top with an outlet 33 which is located in alinement with the draft-tube and is preferably of the same diameter or slightly larger
30 than the latter. The interior of the head 27 is divided by the dome-shaped diaphragm 28 preferably of wire gauze, which is conveniently secured in position by having its peripheral edge forced into the angle formed
35 at the junction of the upper and lower members of the shell which form the head, as indicated at 35. The curvature of the diaphragm is flatter than that of the upper shell of the head, so that the diaphragm
40 stands away from the latter throughout its entire area, and as to its portion opposite the outlet 33 is some distance inside of the latter, as shown clearly in the drawing.

The operation of the gas burners is apparent. It is to be noted, however, that
45 with the gas supply to the burner properly controlled, the device will burn with a short bluish green cone-shaped jet, issuing from the central part of the burner outlet 33 and
50 surrounded by a solid volume of red flame, the blue flame being predominant. The heat generated by this burner is exceptionally intense, due to the fact that the burner consumes an unusually large proportion of air
55 and that the combustion is very perfect. The device is of such simple construction that the burner may be economically manufactured, and its construction is such that it is substantially self regulating under varying pressures of gas. That is to say, the jets
60 of gas passing through the jet plug entrain the right proportion of air through the ports 31 under wide ranges of gas pressure.

It will be obvious that the details of con-

struction may be modified without departing from the spirit of the invention.

I claim as my invention:

1. A gas burner comprising a draft tube, a jet plug seated in the lower end of said tube and provided with one or more vertical
70 jet openings, said draft tube having a port formed through its side at or above the upper end of said jet-plug, a hollow head approximately oblong in vertical axial section and of greater area in cross section than the
75 tube at the upper end of the latter, said head having an axial inlet and an axial outlet port, said ports being substantially less in cross sectional area than the head, and a gauze diaphragm extending across the interior of said head and separating the same,
80 said diaphragm being dome-shaped in cross section and extending nearly to the upper end of the head to form a restricted passage or chamber between the upper end of the
85 diaphragm and the outlet port of the head.

2. A gas burner comprising a draft tube, a jet-plug seated in the lower end of said tube and having a plurality of vertical openings for the escape of the gas, said tube
90 having an air port formed in the side of the tube at or above the upper end of the jet-plug, the upper part of said tube forming a mixing chamber for the gas and air, a secondary chamber communicating with
95 said mixing chamber and taking the form of an enlarged flattened head having an inlet and an outlet port of substantially the same cross sectional area as the cross section of the tube, and a gauze diaphragm
100 extending across the entire interior of the head, said diaphragm being dome-shaped in cross section and approaching closely the upper half of the head throughout its entire area to form a restricted annular passage in
105 the upper end of the head.

3. A gas burner comprising a primary mixing chamber taking the form of an elongated tube, a jet-plug close to the lower end of the tube and having a jet opening for
110 gas, the lower part of said tube having an air inlet port, a secondary mixing chamber communicating with the upper end of the primary chamber and taking the form of an enlarged head, a dome-shaped gauze diaphragm extending across the said head and
115 so disposed as to closely approach the upper end of the head throughout its length, said head having inlet and outlet ports of substantially the same cross sectional area as
120 the primary mixing chamber.

4. A gas burner comprising a draft tube, a jet plug seated in the lower end of said tube and having a vertical jet opening, an air port formed in the side of the tube and
125 spaced at or above the upper end of this jet-plug, an enlarged hollow head at the upper end of the tube having inlet and outlet

ports, said head flaring outwardly as to its lower half and converging inwardly as to its upper half, and a convex diaphragm mounted in the upper half of the head and
5 closely approaching the inner wall of said upper half, the inlet and outlet ports of said head being of substantially less area than the main body of the head.

FRANCIS J. DOYLE.

Witnesses:

FRANK L. BELKNAP,
ANNA O'BRIEN.