(No Model.)

# W. J. DUDLEY.

## GAS BURNER.

No. 568,130. Patented Sept. 22, 1896.

Fig. 1.

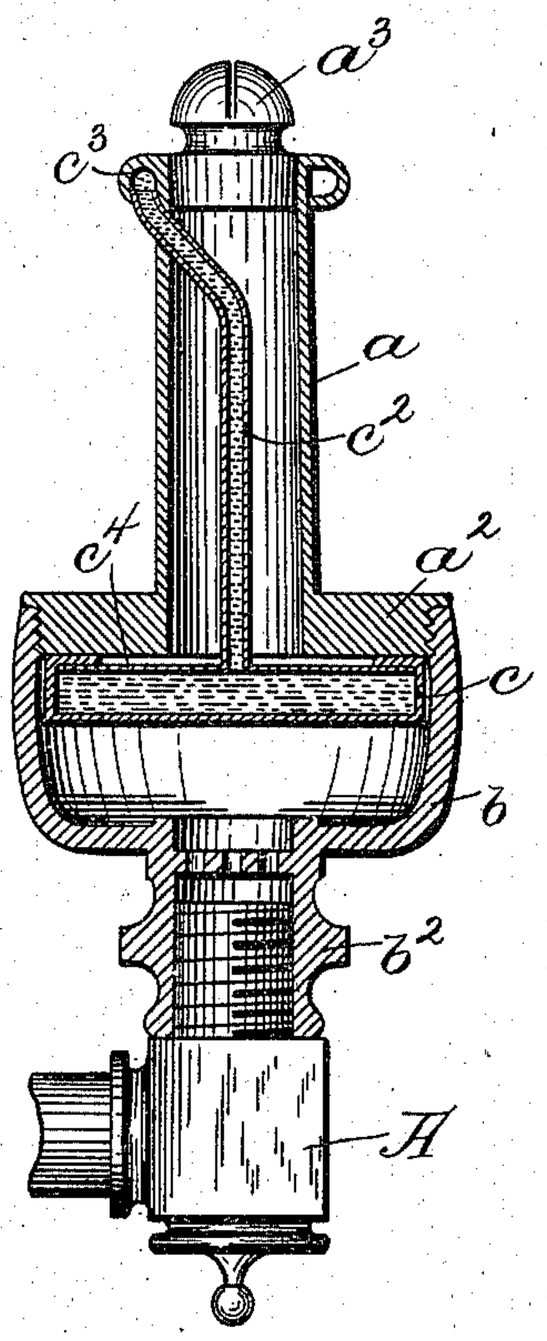
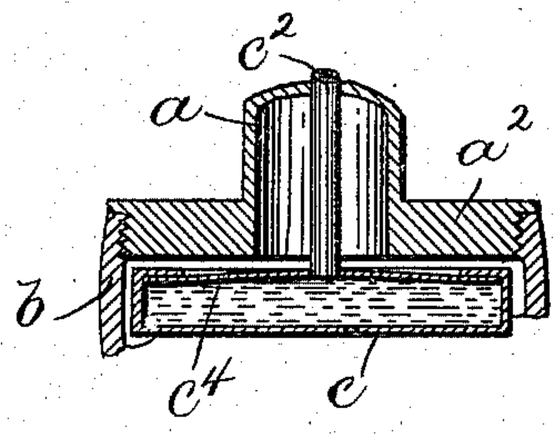



Fig. 2.




Witnesses,
Jas. J. Maloney.
H. J. Livermore.

Inventor,
Walter J. Dudley.
by Jos. P. Livermore
Att'y.

# UNITED STATES PATENT OFFICE.

WALTER J. DUDLEY, OF SOMERVILLE, MASSACHUSETTS.

## GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 568,130, dated September 22, 1896.

Application filed August 3, 1896. Serial No. 601,422. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER J. DUDLEY, of Somerville, county of Middlesex, and State of Massachusetts, have invented an Improvement in Gas-Burners, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a gas-burner, and is embodied in a burner provided with an automatic shut-off or valve which is adapted to close if the flame becomes accidentally extinguished while the gas supply is still turned on. The shut-off employed in the burner embodying the invention is of that class which operates in response to the expansion and contraction of a liquid, or, more strictly speaking, to the expansion and contraction due to vaporizing and condensing a portion of said liquid, the shut-off being normally closed and adapted to open in response to the heat applied to light the gas and to be maintained open by the heat of the flame, and to close upon the contraction or condensation of the liquid due to the absence of the heat after the flame is extinguished.

The invention consists mainly in an improved construction and arrangement of parts, the object being to provide a burner in which the liquid employed to operate the automatic shut-off is partially contained in a chamber or reservoir subjected to substantially the same degree of heat when the flame is turned low, as when it is burning with a maximum supply of gas, and said reservoir communicates with a diaphragm-chamber controlling the shut-off, so that the vaporizing of the fluid in said reservoir forces the unvaporized liquid into said chamber, whereby the shut-off will be maintained open if a flame is present, regardless of the size thereof, while the liquid will not ever be exposed to excessive heat or a heat greater than that required to vaporize the liquid in the reservoir, which might result in pressure so great as to be detrimental.

A further object of the invention is to produce a safety-burner which will be neat in its appearance, closely resembling the ordinary burner, and one which at the same time is easily and inexpensively constructed.

Figure 1 is a vertical section, of the burner embodying the invention, drawn on a somewhat enlarged scale. Fig. 2 is a similar sectional view of a portion thereof, showing the cut-off valve open.

The burner proper consists of a tube $a$, having at its lower end a flange $a^2$, adapted, as shown, to be secured as by a screw-thread to the mouth of a gas-chamber $b$, having a coupling extension $b^2$, adapted to be secured to the end of a gas fixture or chandelier A just as an ordinary burner is secured thereto. The burner proper, $a$, is provided with a tip $a^3$ of any suitable or usual construction.

The cut-off consists, essentially, of a diaphragm-chamber $c$, which is preferably substantially in the shape of a disk fitting closely against the lower surface of the flange $a^2$ and thereby cutting off communication between the chamber $b$ and the burner $a$, as shown in Fig. 1. The said chamber $c$ communicates through a tube $c^2$ with an annular reservoir or chamber $c^3$, extending around the upper end of the burner $a$ just below the tip, as shown, and the chamber $c$, the pipe $c^2$, and annular reservoir $c^3$ are filled with a liquid (alcohol being preferably used) and hermetically sealed. Since the annular chamber $c^3$ is adjacent to the tip $a^3$, it is obvious it will be subjected to the heat of the flame, thus causing a portion of the liquid contained therein to vaporize and expand, thus forcing the liquid through the tube $c^2$ into the diaphragm-chamber $c$. The position of said annular chamber $c^3$ is such that it will be subjected to substantially the same amount of heat when the flame is burning low as when it is burning with full force, since it is wholly below the said flame, which spreads laterally over the said annular space, it being obvious that the heating effect is the same regardless of the lateral extent of the flame, since the main portion of the larger flame or that portion of it which extends out laterally from the burner is wholly beyond the annular space $c^3$ and consequently has substantially no heating effect thereon. In order that the excess of liquid thus driven into the chamber $c$ may cause a passage for the gas to be opened from the chamber $b$ to the burner $a$, the chamber $c$ is closed by an elastic diaphragm $c^4$, which is secured to the end of the pipe $c^2$ at a point at or near its middle and at its

edges to the side walls of the chamber *c*. The said diaphragm is arranged, as shown in Fig. 1, so that when in its normal position or not subjected to pressure it will hold the marginal portion of the upper surface of the chamber *c* snugly against the bottom of the flange $a^2$, it being obvious, however, that when pressure is applied within the chamber *c* by the excess of liquid driven from the reservoir $c^3$ it will act upon said diaphragm, tending to force the same outward or cause the said diaphragm to bulge out, as shown in Fig. 2. Since the middle of the diaphragm, however, is secured to the end of the pipe $c^2$, it is obvious that the bulging effect thereof will react upon the main portion of the chamber, causing the chamber as a whole to move downward from the surface of the flange $a^2$, as indicated in Fig. 2, thus leaving an annular space or passage for the gas to pass through from the chamber *b* to the burner *a*.

As shown herein, the side walls of the chamber *c* are flanged or turned inward along their upper edges and the diaphragm secured to the under side of said inturned portions, this being a convenient construction and affording an annular projecting seating portion, which is desirable, as it insures tight closing and complete cutting off of the gas when the diaphragm is not expanded. Such construction, however, is obviously not essential, as it is necessary only that the diaphragm-chamber should seat tightly and close the gas-inlet when the diaphragm is contracted, and should unseat and thus open the gas-inlet when the diaphragm is expanded by the expansive effect of the liquid contained in the diaphragm-chamber.

The burner embodying the invention is very neat in appearance, the tube communicating with the expansion-chamber being substantially wholly contained within the burner-tube itself, while the annular heating-chamber is neat in appearance and not suggestive of anything uncommon or out of the way. The said annular chamber may be formed in any suitable way, it being practicable, however, to spin over the edge of the tube and join it to the outer walls thereof, the tube $c^2$ being let through an opening in the side of the burner *a* and sealed in the lower wall of the annular chamber $c^3$, as shown.

I claim—

1. In a gas-burner, the combination with a heating or vaporizing chamber wholly below the flame-orifice of said burner and adapted to contain liquid, of a tube extending from said chamber substantially to the inlet end of the burner-tube, an annular surface or valve-seat around said inlet end, an elastic diaphragm secured to said tube and overlying the said annular surface to close said inlet, and a diaphragm-chamber secured to said diaphragm and communicating with said tube and vaporizing-chamber, said diaphragm forming one wall of said diaphragm-chamber, substantially as described.

2. In a gas-burner, the combination with a burner-pipe, of an annular vaporizing-chamber extending around the upper edge of said burner-pipe below the tip, a tube communicating with said annular chamber and extending downward through said burner-pipe to the inlet thereof, an annular flange or extension around the said inlet, a disk-shaped chamber communicating with the annular expansion-chamber through the tube extending downward therefrom, and a diaphragm forming one wall of said chamber, and secured at a point near its middle to the said tube, substantially as described.

3. In a gas-burner, the combination with a vaporizing-chamber adapted to be subjected to the heat of the flame, of a diaphragm forming a wall of a chamber communicating with said vaporizing-chamber, a support for said diaphragm at or near the center thereof, a pipe for gas, and a laterally-extending annular flange at the end of said pipe, the surface of which flange is normally in contact with the marginal portion of said diaphragm, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER J. DUDLEY.

Witnesses:
FRANCES B. CROWELL,
ALICE G. CROWELL.