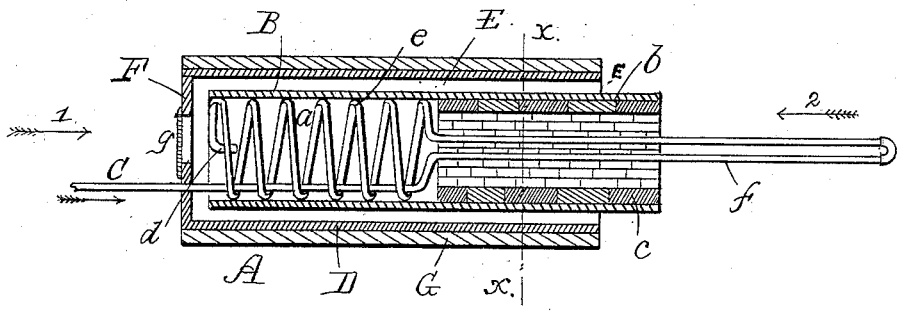
(No Model.)

T. L. STURTEVANT.

VAPOR BURNER.

No. 422,993. Patented Mar. 11, 1890.

Fig. 1.



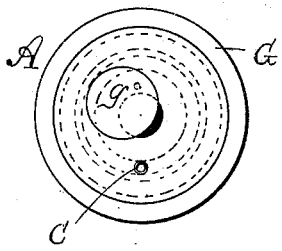


Fig. 2.

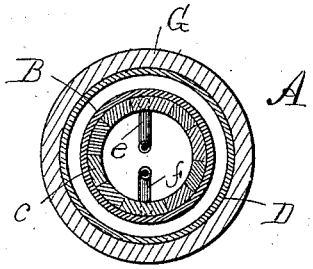


Fig. 3.

Witnesses.
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Inventor.
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by H. E. Lodge. Atty.

UNITED STATES PATENT OFFICE.

THOMAS L. STURTEVANT, OF FRAMINGHAM, MASSACHUSETTS.

VAPOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 422,993, dated March 11, 1890.

Application filed August 17, 1889. Serial No. 321,136. (No model.)

To all whom it may concern:

Be it known that I, THOMAS L. STURTEVANT, a citizen of the United States, residing at Framingham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Vapor-Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in vapor-burners for heating purposes; and it consists in peculiarities of construction by which certain objections now existing in burners of this class are obviated.

One feature consists in the construction of the vaporizing-tube, which is to be made of two kinds of metal, one refractory to be exposed in the hottest part of the flame to avoid melting of the same and to extend beyond the body of the burner in order to afford greater heating surface, and the other of metal less refractory, but a better conductor, since it is not to be subjected to such intense heat.

A second feature is the construction of the heater-tube proper, which consists of a tube open at both ends and surrounded by a second tube or hood of larger diameter to create an air-heating space. Further, in the arrangement of fire-brick within a part of the lamp proper to form a combustion-chamber, leaving the unlined portion to act as the ignition-chamber.

Other details of construction, as likewise the method of operating said vapor-burner, will be hereinafter fully explained.

In the drawings, Figure 1 represents a central longitudinal sectional elevation of a vapor-burner embodying my invention. Fig. 2 is an end view in direction of arrow 1 in Fig. 1. Fig. 3 is a transverse section on line *x x* in Fig. 1 in direction of arrow 2.

In the drawings accompanying this specification, A represents the vapor-burner as an entirety, composed of a cylindrical tube B, open at both ends. Said tube is divided into two portions *a b*, which are, for convenience of definition, termed, respectively, the "ignition" and the "combustion" chamber. The latter is lined with fire-brick *c*, and since it serves by aid of this lining to retain the heat generated, as hereinafter set forth, and thereby maintains combustion, it is styled the "combustion-chamber." The other part *a* is without a lining of fire-proof material and contains the outlet end or the nozzle *d* of the vaporizing portion *e* of the feed-pipe C. It is here the liquid fuel and vapors first escape, and here ignition occurs by lighting the liquid fuel at the nozzle *d*, which may be only the open end of the pipe *e*, to start vaporization; hence the part *a* of the interior of the tube B is named the "ignition-chamber."

In vapor-burners of similar general construction it has been found that the coil part of the liquid-fuel feed-pipe is quickly destroyed, owing to the intense heat to which it is subjected. To obviate this trouble, I propose to construct the vaporizing part of said fuel feed-pipe C of two different kinds of metal. One portion *e*, that located in the ignition-chamber, where the heat is not so great, is coiled and made of some metal highly sensitive to heat, as copper tubing. The other part *f*, situated in or near the combustion-chamber *b* and more exposed to the flame, is, on the other hand, to be of some highly-refractory metal to resist the temperature, which is nearly maximum at that point where the combustion is most perfect. To provide for a larger amount of vaporizing-surface, this portion—viz., that composed of the refractory material—is extended some distance beyond the end of the tube B. Thus the benefit of more heat is obtained, while the lamp or vapor-burner is kept small and compact. This portion *f* may be extended into or beneath the object to be heated by the burner.

Exteriorly about and almost but not always entirely inclosing the tube B, I have disposed a hood D. The latter is somewhat larger in diameter than the inclosed tube B, to create an air-heating space E. This hood is open at the combustion end of the burner, but closed at the ignition end by a cap or end head F, in which is fitted an air valve or damper *g*. Exteriorly about the hood is secured a covering G, of asbestus or analogous material, to prevent the radiation of heat.

The operation of this vapor-burner is as follows: Liquid fuel flows, as indicated, through the supply-pipe C. The latter passes through the bore of the tube B, composed of the ignition and combustion chambers, and thence extends some distance exteriorly, sufficiently far to provide proper heating-surface. It is now bent back upon itself and returns through the lined part of the combustion-chamber *b*. This part of the vaporizing-pipe may be straight; but from this point the metal used is a better conductor of heat and generally of some less refractory metal, and is generally in the form of a coil to render the heating device more compact, and thereby provide a suitable vaporizing length of pipe, which, being a better conductor of heat than the more exposed portion, responds more quickly to the heat given off by the igniting liquid fuel. Such heat soon starts vaporization of liquid fuel in the coil. This form of pipe (coil) allows such to be exposed to that portion of the flame where the heat is at its minimum in order to prevent burning out and speedy destruction of such tubing, which would otherwise occur. Said portion *e* terminates in the nozzle *d*, which is located centrally of the bore of the tube B. Thus, as before stated, the liquid fuel or oil, passing through the feed-pipe, enters the vaporizing portion *f* thereof—a straight-looped piece—thence returns and courses through the coil *e* and emerges, when first starting the burner, as liquid fuel, and afterward as combustible vapor, from the nozzle, where ignition occurs. At a point further beyond more complete combustion ensues, and to maintain such and render it more complete the burner is lined interiorly with fire-brick. To insure complete combustion, a supply of air is requisite, and this is furnished by means of the air-passage E. The heat, radiating from the tube B, warms the air passing over and about it, and said air is then heated, which renders it much more potent when mixed with the vaporized fuel for immediate combustion. The damper *g* is a further means for regulating the supply of air, or, as such air may be cool for checking the heat of the vapor-burner.

What I desire to claim is—

1. A vapor-burner composed of a tube open at both ends and forming two separate chambers — ignition and combustion chambers, the latter fitted interiorly with a lining of refractory absorbent material—a second tube closed at one end and surrounding the first, and a vaporizing-pipe extending through the said ignition and combustion chambers, one end terminating in a nozzle within the vapor-burner, and the other leading to the liquid-fuel reservoir, substantially as herein stated.

2. In vapor-burners, the combination, with a cylindrical tube open at both ends and a second tube closed at one end and concentrically about the first, of a vaporizing-pipe composed of two parts, a coiled portion the end of which forms a feed-nozzle, and a portion extending beyond the burner in the direction of the hottest part of the flame and returned through the burner, finally leading to the oil-reservoir, substantially as herein specified.

3. In a vapor-burner, a cylindrical tube open at both ends, provided in part with a lining of refractory absorbent material, a vaporizing-pipe composed of a coiled or tortuous portion within the bore of said tube, and a projecting piece, part within and part beyond the bore of said tube, a hood closed at one end concentrically about the latter to form an air-heating space, and a damper to control the air-supply, substantially as herein described.

4. A vapor-burner composed of a hood exteriorly covered with asbestus or analogous material and closed at one end, the latter containing an air-valve, a tube open at both ends concentrically within the bore of said hood and of less diameter to form an air-heating space, ignition and combustion chambers *a b*, and a vaporizing-pipe composed of two metals, a looped portion *f* of highly-refractory metal, and a coiled portion *e* of high conductivity of heat, the latter located in the ignition-chamber, and all operating substantially as herein described, and for purposes stated.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS L. STURTEVANT.

Witnesses:
H. E. LODGE,
WILLIAM FOSTER.