(No Model.)

C. M. HOLLINGSWORTH.

VAPOR STOVE.

No. 490,656. Patented Jan. 31, 1893.

Fig 3.

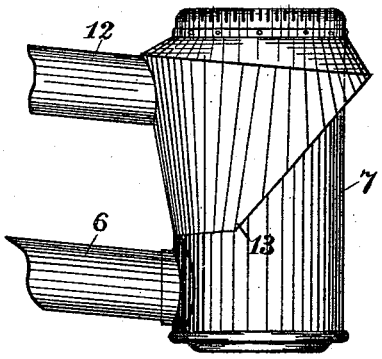

Fig 2.

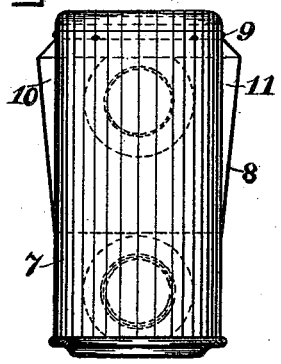

Fig 1.

WITNESSES.

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CHARLES M. HOLLINGSWORTH, OF CLEVELAND, OHIO.

VAPOR-STOVE.

SPECIFICATION forming part of Letters Patent No. 490,656, dated January 31, 1893.

Application filed December 15, 1890. Serial No. 374,849. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. HOLLINGSWORTH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Vapor-Stoves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention is especially designed for use with a vapor stove which includes in its construction a gravity carburetor substantially like that which is shown in my prior patents No. 420,797, dated February 4, 1890, and No. 421,834 dated February 18, 1890.

The object of my invention is to provide means for introducing into the vaporizing chamber, warmed air (in contradistinction to air at the temperature of the surrounding atmosphere) free from the products of the combustion taking place at the burner, for the purpose, primarily, of facilitating the complete vaporization of the liquid hydro carbon which is spread upon the evaporating surfaces; and for the further purpose of vaporizing a considerable quantity of said hydro carbon high up in the vaporizing chamber, and consequently of accelerating the movement of the combined air and vapor toward the point of combustion at the burner cap.

In the drawings Figure 1 is a sectional view of my improved vapor stove; Fig. 2 is a front view of the burner and the parts immediately connected therewith; and Fig. 3 is a view of the burner and a modified form of the surrounding casing.

I will first describe in detail the specific form of the invention shown in Figs. 1 and 2. A reservoir 1, of any approved construction is suitably supported above the closed vaporizing chamber 4. A suitable pipe 2 conducts the liquid hydro carbon from the reservoir to the vaporizing chamber; and the quantity of liquid delivered into the vaporizing chamber is regulated by a suitable valve 3. At 5 is represented a suitable evaporator which is inclosed within the vaporizing chamber, into which the liquid is fed drop by drop. The outlet from the vaporizing chamber, is the pipe 6, which extends downwardly and laterally and is connected at its lower end with the lower part of the burner shell 7. A casing 8, made, preferably, of bent metal, partly surrounds the burner shell. The upper and lower edges of this casing lies close against the burner shell; the former being secured thereto by rivets 9. The casing, between its upper and lower edges lies at a short distance from the burner shell, whereby there is formed between said casing and shell a narrow heating chamber, into which air is admitted (drawn) through the narrow spaces 10 and 11 between the vertical edges of the casing and the burner shell. A pipe 12 is connected at its lower end with the casing 8 at the back side of the burner, and at its upper end with the upper part of the vaporizing chamber; and the air which becomes warmed in the heating chamber passes upward through this pipe and is delivered into the said vaporizing chamber.

In operating the whole apparatus, above described, the process of vaporization must be started and continued for sufficient time to establish a flame at the burner without the aid of the heated air. When, in starting, a suitable feed of liquid is delivered into the vaporizing chamber it spreads downward over its surfaces, and the mixture of vapor and air which is immediately formed passes downward by reason of its weight in a delivering current through the pipe 6. This downward current causes a partial vacuum in the pipe 12 and in the heating chamber which surrounds the burner shell, which in turn causes the air to be drawn through the narrow openings 10 and 11 into the heating chamber and thence through the pipe 12 to the vaporizing chamber. The air thus drawn in, has, at first, only the general temperature of the room or the surrounding atmosphere, but after the flame is established at the burner cap, the burner shell and the casing both become heated, mainly by conduction, and the current of air which passes in thin sheets through the slots 11 and 12, is carried around the burner, in contact with its heated shell and with the heated casing until said air escapes through the pipe 12. In thus introducing warm air into the vaporizing chamber it is not believed that any considerable increase or acceleration of the current within the chamber 4 or pipe 6 is effected due

merely to the buoyancy or the levity of the air passing upward through the pipe 12; for as the temperature of the air in the pipe 12 is raised, tending to accelerate the upward movement therein, the temperature of the mixture of air and vapor in the chamber 4 is also raised and this increase of temperature retards the downward movement of the current. But by the use of warm air, precipitation of moisture on the evaporating surfaces is prevented, and the vaporization of the liquid is generally completed within the vaporizing chamber and pipe 6; and a greater part of the liquid is vaporized at a higher level than it would otherwise be, thus accelerating the rate of travel of the mixture to the burner; and I find that these advantages more than balance the disadvantages due to the frictional retardation offered by the pipe 12 to the influx of air to the vaporization chamber.

I do not intend to be understood as representing that the precise construction hereinbefore described is the only form in which this invention may be embodied, but it is a valuable specific form having certain specific advantages. For example the heating chamber in the form shown in Figs. 1 and 2 is formed by a casing which extends about half way around the burner shell. But it might extend a greater or less distance around it. If it extended a less distance around the shell, the air would be heated to a less degree. If it extended a greater distance around the shell, the air would be heated to a greater degree, but the casing would be more expensive to manufacture. The casing shown in Figs. 1 and 2 may be formed at a single operation between suitable dies, may be easily secured in place, and the chamber which it forms around the burner shell is of a size and shape adapted to heat the air sufficiently to secure the results sought. The casing lies close to the shell, and the air as it moves from the slots 10 and 11, to the pipe 12, is brought into close contact with the heated shell or casing. Instead of admitting the air through the slots formed between the vertical edges of the casing and the shell, it may be admitted under the lower edge of the casing which need not be in contact with the shell. In Fig. 3 the casing encircles the shell. Its entire upper edge is in contact with the shell, which prevents any of the products of combustion entering the chamber with the air. Only the back part of the lower edge is in contact with the shell, while the front part of said edge, beginning at about the point marked 13, sets away from the shell slightly whereby the air enters the heating chamber under said lower edge through the opening thus formed, circulates around the shell in contact therewith and then enters the pipe 12. Whether the casing wholly or partly surrounds the burner shell, it is necessary that its upper edge shall lie in contact with the burner shell, and that the entrance to the heating chamber shall be below the level of the burner flame, for thereby all of the products of the combustion at the burner cap are excluded and pure air only, that is, air having the normal percentage of free oxygen is taken into the heating chamber, is fed to the vaporizing chamber; and any escape of the warmed air except through the pipe 12 is prevented. It is an important specific feature of construction that the inlet openings to said heating chamber and outlet pipe shall be placed in such relative positions that the air taken into the chamber, must travel a considerable distance around the burner in contact with the heated shell before it enters the discharge pipe. And it is also an important specific feature of construction that the chamber shall be narrow whereby all of the air passing through the chamber, shall during its passage come directly in contact with the heated burner shell or casing.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. The combination of a closed vaporizing chamber and suitable means for delivering a regulated supply of liquid hydro carbon thereto, a conducting pipe extending downward and laterally therefrom, and a burner shell communicating with said pipe, with a casing adjacent to said burner shell, the upper edge of said casing being in close contact with the burner shell below the burner cap, a suitable opening for admitting air between the casing and burner shell, and a pipe connected with said casing and with the vaporizing chamber, and adapted to deliver into said vaporizing chamber, the air taken into the chamber formed between the casing and burner shell, substantially as and for the purpose specified.

2. The combination of a closed vaporizing chamber, and suitable means for delivering a regulated supply of liquid hydro-carbon thereto, a conducting pipe extending downward and laterally from said vaporizing chamber, and a burner shell communicating with said pipe, with a heating chamber, formed in part by a casing adjacent to said burner shell, and in contact therewith below the burner cap, said chamber being provided with suitable inlet openings for the admission of air thereto, and a pipe connecting the said heating chamber with the upper part of the vaporizing chamber, said inlet openings and outlet pipe being arranged with reference to each other, substantially as shown whereby the air passing through said chamber travels partly around said burner and in contact with the burner shell, for the purpose specified.

3. The combination of a closed vaporizing chamber, and suitable means for delivering a regulated supply of liquid hydro carbon thereto, a conducting pipe extending downward and laterally from said vaporizing chamber, and a burner shell communicating with

said pipe, with a suitably bent metallic casing partly surrounding said burner shell with its upper and lower edges in contact therewith, the former just below the burner cap, whereby a heating chamber is formed, into which the air may pass through slots left between the vertical edges of the casing and the burner shell, and a closed pipe leading from said heating chamber to the vaporizing chamber, substantially as and for the purpose specified.

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