(No Model.)

R. FLICK.

VAPOR STOVE.

No. 483,051. Patented Sept. 20, 1892.

Fig. 1.

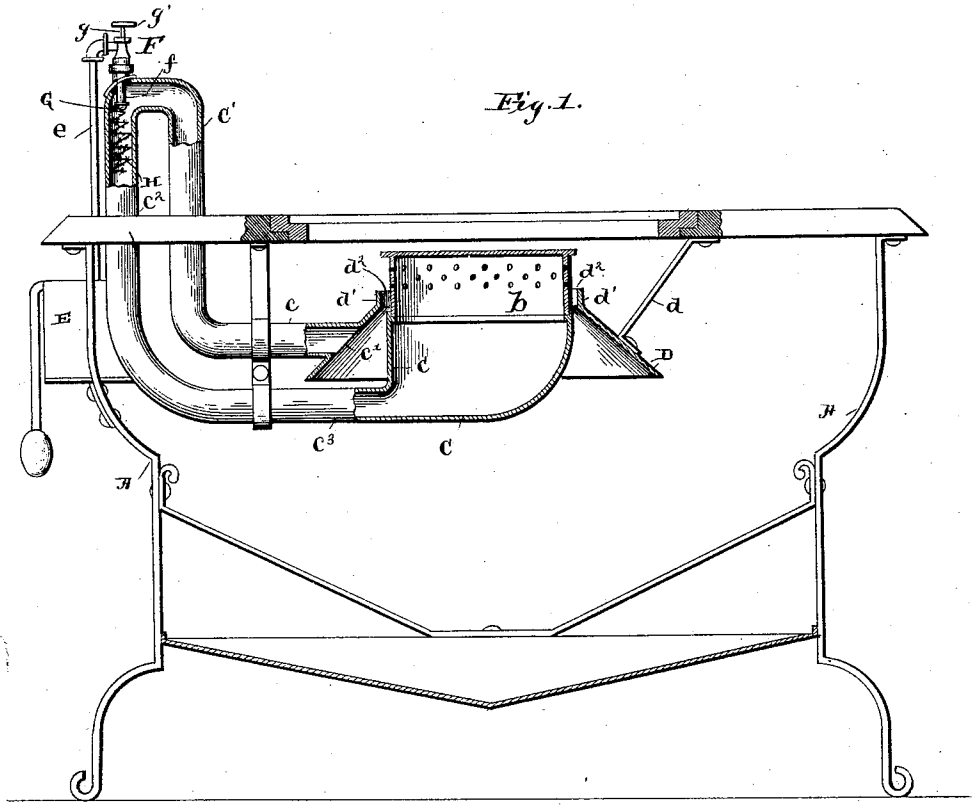


Fig. 2.

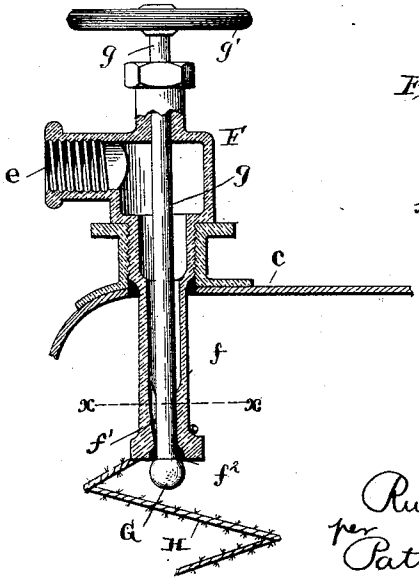
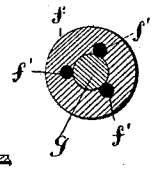


Fig. 3.



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UNITED STATES PATENT OFFICE.

RUDOLPH FLICK, OF CLEVELAND, OHIO.

VAPOR-STOVE.

SPECIFICATION forming part of Letters Patent No. 483,051, dated September 20, 1892.

Application filed January 9, 1890. Serial No. 336,397. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH FLICK, 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; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in vapor-burners; and the object of the invention is to provide a burner with means whereby the burner may be provided with combustible vapor or gas and promptly lighted without other preliminary labor or attention.

Heretofore in starting a vapor burner or stove at least one burner in the group of two or more had to be initially started by turning a quantity of oil into a drip-cup or its equivalent beneath or about the burner and then lighting the oil and generating a heat which would put the burner into a vaporizing condition. If the stove were an individual-burner stove, this process had to be gone through with each burner in turn before it could be used, unless, as in some cases, a heating-tube were provided from a burner that was lighted. In case the stove were what is known as a "single generator," the generating-burner would be thus initially started and gas or vapor for the side burners would be provided from the central generator-burner. These represent the common ways by which initial starting of a burner was effected. Other ways and means have been tried, but not generally with success or satisfaction, and the practical methods heretofore known and employed of starting a burner may be said to be covered by the foregoing statement.

My invention is designed to overcome the objections to the drip-cup and to avoid the complications and numerous valve and other attachments necessary in connection with heating and lighting tubes which are designed in part to replace the original method of initial starting, and this is accomplished by providing a tube with a valve and mechanism whereby the fluid is fed into a supply-tube and converted immediately into a vapor which supplies combustion.

My invention is further designed to prevent by an auxiliary device condensation of the carbureted air in the vapor-conducting tube, which is a serious objection under certain conditions, and at times renders the stove virtually inoperative, and at the same time by this same means assist vaporization of the hydrocarbon liquid.

To this end the invention consists in the construction, arrangement, and combination of parts substantially as shown and described, and particularly pointed out in the claims.

In the drawings, Figure 1 is an end elevation of a stove provided with my invention, a part of which is broken in sections to more clearly disclose the construction. Fig. 2 is a vertical central sectional view, enlarged, of the valve and spraying mechanism. Fig. 3 is a cross-section of the valve-tube, taken on line *x x*, Fig. 2.

A represents a stove-frame, which may be of any well-known style or form, and B is the burner. This element of the invention also may be of any common and well-known kind.

As shown in Fig. 1, the burner is provided with a cap *b*, suitably perforated, slotted, or the like, as burners usually are, for the escape of the vapor, which cap rests upon a ledge on the inside of the upturned end of the lower branch of the pipe C. The pipe C, as here shown, extends, ordinarily, from near the outside of the base of the burner back horizontally and thence up vertically some distance above the plane of the burner and has placed in its upper end a fluid-supply tube, as shown, to be particularly referred to hereinafter, the carbureted air being fed to the burner through the pipe C by gravity.

In cold weather the carbureted air in the vapor-tube condenses very considerably and in cold climates to such a degree as at times to render the stove virtually inoperative. For the purpose of preventing condensation in burners of the character herein described, I connect at the upper end of the vapor-pipe an auxiliary device comprising a hot-air pipe C′, which forms at the point of connection a U-shaped bend, as shown. Hot air is conducted through this pipe C′ to the point of evaporation from the burner, as will hereinafter appear, and prevents condensation of the carbureted air, and at the same time assists vaporization. Of course the particular form of bend herein

illustrated need not be exactly followed; but I regard it as material and important that the bend or U-shaped portion should be brought to a plane above the burner, so that the operation of the device will be more satisfactory and effective than it would be on a lower plane.

At the lower end *c* of the hot-air pipe C′, I provide, as shown here, a flaring or substantially funnel-shaped deflector D, into which the lower end of pipe C extends at one side, and where the two parts are firmly soldered or otherwise secured together. The deflector D is secured to the under side of the top plate of the stove by braces *d*, but may be fixed in position by any other suitable means. The shape or form of the deflector may of course be varied from that shown, if desired, without affecting its efficiency. From the point *d′* the deflector flares downwardly upon all sides for some distance, so as to be the means of gathering and concentrating a considerable volume of hot fresh air to supply combustion as well as to feed a steady volume of air to and through the pipe C′, thereby assisting or increasing the carbureting effect or process.

It is my design to so place the mouth *c′* of the pipe C′ with respect to the burner and in the deflector and preventing condensation of the carbureted air in the vapor-pipe that when the burner is heated the air which enters the pipe C will likewise be more or less heated, and thus contribute to vaporization of the injected fluid and prevent condensation of the carbureted air in the vapor-pipe regardless of the temperature of the atmosphere in which the stove is operated.

E, Fig. 1, represents an oil-tank. A supply-pipe *e* leads from the tank to the valve-tube F. (Shown more clearly in Fig. 3.) This valve-tube, preferably, is provided with a neck *f*, having three several small channels *f′* for the passage of the fluid, and in the bottom of which is a cavity f^2, forming a socket or seat for the ball-valve G. A stem *g* and handle *g′* serve to control this valve. The valve, as will be seen, enters the top of bend of the pipe C in such position as to inject the fluid down into the vapor-conducting pipe C, so that the vapor will not settle into the branch c^2, and thereby cause flashing back from the burner. Ordinarily the valve G, suitably constructed and controlled with the oil under suitable pressure, will be sufficient in itself to atomize and break up the oil in such small particles that its vaporization will immediately follow, and of course as this occurs the temperature will be materially lowered and the vapor by its own gravity, and under the conditions pertaining to it will sink down in the branch c^2 of the pipe C and appear at the mouth of said pipe ready for combustion. This settling down and movement of the vapor of course establishes a circulation in the pipe C, which circulation contributes to vaporization, the result I am seeking. Then when the vapor is ignited and the burner started the draft or circulation through pipe C of course is materially increased, and as the burner is heated the air which enters the pipe C′ also is heated in consequence, and the circulation not only becomes more rapid, but much more effectual in the vaporization of the oil, as the heat of the air passing through the pipe materially contributes to accomplish this result. Thus with the mechanism provided for spraying and atomizing the fluid, assisted by the hot air from about the burner, I readily vaporize all the fluid that is necessary for any and all purposes of the burner, and the action is continuous, uniform, and highly satisfactory as long as the burner is used. By this construction I not only add a volume of heated air to the vapor and commingle the air and vapor together in the feed-tube, but the burner is provided with air in a heated condition, which is gathered and concentrated by the deflector D and fed to the burner jets or openings about its side through the narrow opening d^2. Of course vapor will combine with air much more readily when the air is heated than when cold, and hence the advantage of taking the supply of air from about the burner rather than elsewhere, where it would be cold.

To facilitate the process of atomizing and vaporizing of the fluid, as shown in Figs. 1 and 2, I insert a spiral wire brush H in the down section *c′* of the pipe immediately beneath the supply-valve. As the oil is sprayed from the valve, particles that are not otherwise broken up will gather upon this wire brush and, being exposed to the draft and the heat through the pipe C′, are speedily taken up and converted into vapor and carried away, as before described.

I do not, of course, limit myself to any special construction of atomizing or spraying mechanism, as this may be materially varied and still accomplish the result I seek.

The novelty of the invention comprises, broadly, a spraying, atomizing, or vaporizing construction located and inclosed and serving the purpose herein described, in connection with a supply and commingling hot-air tube.

During evaporation of the oil the air is cooled and the temperature reduced, so that if cold air be used there is a tendency for the air to condense and deposit its moisture, which prevents thorough commingling of air and vapor; but by using hot air the opposite effect is obtained, and the heat produces or causes rapid vaporization and admixture or commingling of the air and vapor or gas.

In Fig. 2 the mechanism is much enlarged, so as to more clearly show the construction. The valve, for example, in practical use is not much larger than a pin-head, and the slight grooves or channels *f′* incline in converging lines toward the valve-seat and point of discharge.

It will be understood that the oil or fluid

herein referred to and used in connection with this burner is gasoline, naphtha, or other of the lighter and more volatile hydrocarbons.

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

1. In a vapor-stove, a vapor-conducting pipe having a burner at its lower portion, an evaporating apparatus connected with a fluid-supply and with the pipe above the burner, a hot-air-collecting chamber adjacent to the side of and below the upper end of the burner and having an air-inlet, and a hot-air-conducting pipe connecting the said chamber and the evaporating apparatus, the parts combined for the purpose specified.

2. In a vapor stove, a vapor-conducting tube having a burner at its lower portion, an evaporating apparatus at its upper portion, an oil-supply, a hot-air-collecting chamber surrounding the burner below its upper end and having an opening for feeding air to the burner for combustion, and a hot-air-conducting pipe connecting the said chamber and the evaporating apparatus, the parts combined for the purpose described.

3. The herein-described method of generating hydrocarbon vapor, which consists in feeding hydrocarbon liquid in small particles and atomizing the same to secure vaporization thereof, simultaneously feeding and mixing therewith heated air at substantially the same point to prevent condensation, and feeding the resulting vapor to a burner by gravity, substantially as set forth.

4. The herein-described method of generating hydrocarbon vapor, which consists in feeding hydrocarbon liquid in small particles and atomizing the same within a conductor closed to the surrounding atmosphere to secure vaporization thereof, simultaneously feeding and mixing therewith heated air at substantially the same point to prevent condensation, and feeding the resulting vapor to a burner by gravity, substantially as specified.

5. The herein-described method of generating hydrocarbon vapor, which consists in feeding the liquid under pressure against an object to atomize and vaporize the same and feeding the vapor to a burner by gravity, and assisting vaporization and preventing condensation by simultaneously conducting heated air from a burner to the point of atomization, substantially as specified.

6. In a vapor-stove, a supporting-frame, a vapor-pipe having a burner at its lower end, an evaporating apparatus at the upper end of the said pipe, a truncated cone surrounding the said burner and aside of its top, and a hot-air pipe connecting this cone and the said vapor-pipe, all combined substantially as set forth.

7. In a vapor-stove, a framework, a vapor-pipe having a vertical portion, a burner at the lower end of said pipe, a hot-air collector adjacent to the burner, a hot-air-conducting pipe connected at its lower end to the said collector and its upper end connected with the said vapor-tube to form with the said vapor-pipe a continuous pipe doubled upon itself, substantially as shown, and an evaporating apparatus in the upper end of said vapor-pipe substantially at the junction of the two pipes, all combined substantially as shown and described.

8. In a vapor-stove, a vapor and a hot-air pipe having each a substantially vertical and horizontal portion, as shown, the upper ends of the two pipes connected to form together a continuous pipe doubled upon itself, a burner at the lower end of the vapor-pipe, a hot-air collector adjacent to the said burner and below its upper end, and an evaporating apparatus substantially at the junction of the said pipes, all combined substantially as described.

Witness my hand to the foregoing specification this 24th day of December, 1889.

RUDOLPH FLICK.

Witnesses:

H. T. FISHER,

NELLIE L. MCLANE.