

F. P. CROSBY.
VAPOR BURNER.

No. 416,574.

Patented Dec. 3, 1889.

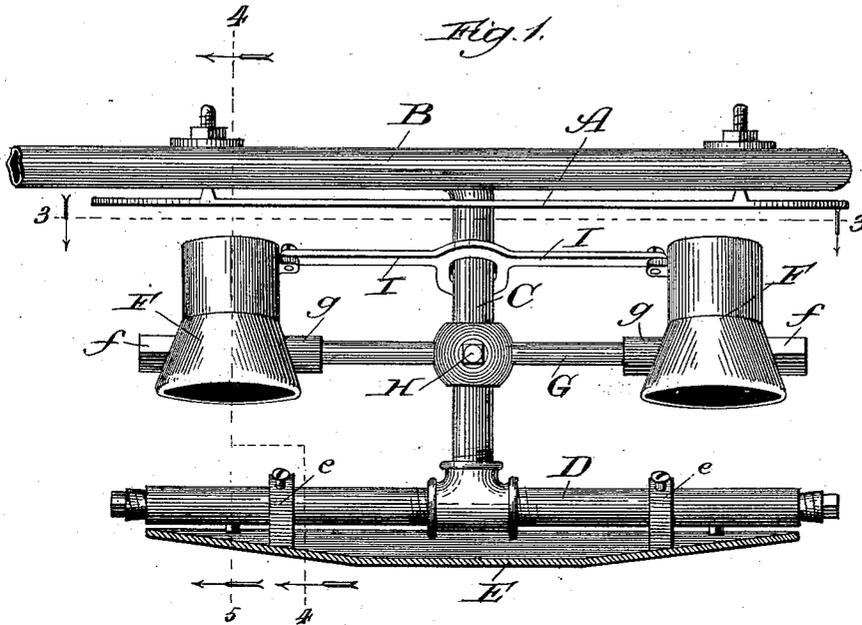
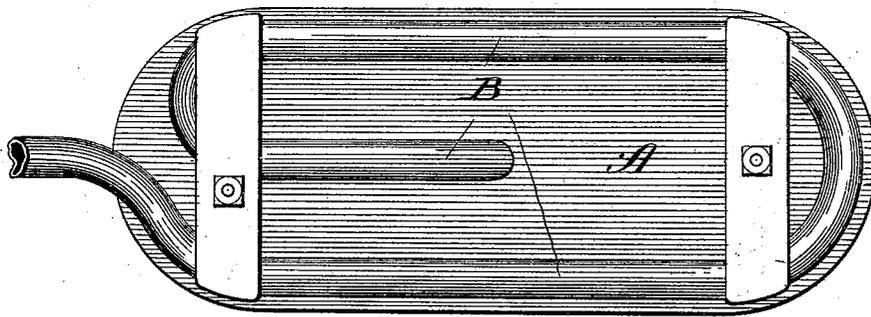


Fig. 2.



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(No Model.)

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Fig. 3.

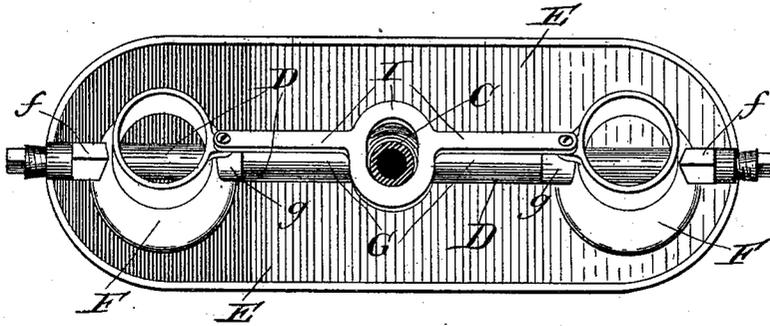


Fig. 4.

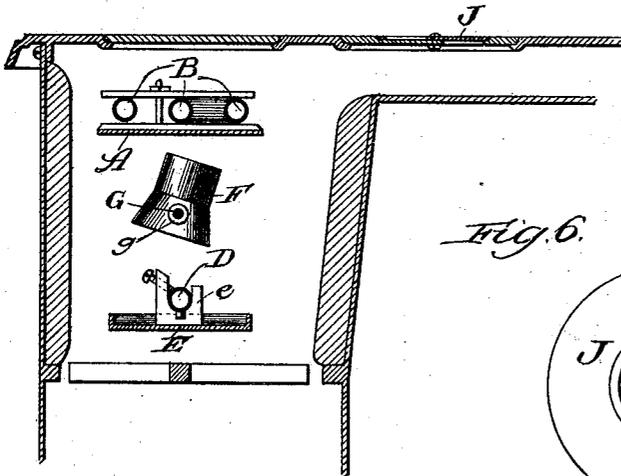


Fig. 5.

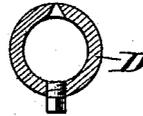
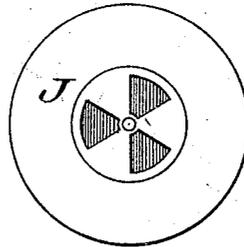


Fig. 6.



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UNITED STATES PATENT OFFICE.

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VAPOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 416,574, dated December 3, 1889.

Application filed February 8, 1889. Serial No. 299,208. (No model.)

To all whom it may concern:

Be it known that I, FRANK P. CROSBY, residing at Chicago, Illinois, have invented certain new and useful Improvements in Vapor-Burners, of which the following is a specification.

In the drawings, Figure 1 is a side elevation of my improved vapor-burner, with the drip-pan in section. Fig. 2 is a plan view of the same. Fig. 3 is a plan view taken in the line 3 3 of Fig. 1. Fig. 4 is a cross-section of the burner as used in a cooking-stove, taken on the line 4 4 of Fig. 1, except that the mixing-tube is shown in elevation. Fig. 5 is a transverse section of the jet-pipe, taken through the jet-orifice in the line 5 of Fig 1; and Fig. 6 is a plan view of a damper for regulating the flame of the vapor-burner.

In making my improved vapor-burner I use a spreading-plate A, intended to spread or distribute the flame of the burning vapor. I carry a pipe B from any desired source or supply of oil intended to be vaporized, and preferably arrange this pipe as shown in Fig. 2, leading back and forth over the spreading-plate, so that it will become heated, and thereby heat the oil flowing through the same. I prefer to elevate this supply-pipe slightly above the spreading-plate, so as to leave an air-space between it and the spreading-plate, as shown in Fig. 1, and to that end I prefer to provide the spreading-plate with upwardly-projecting ridges or lugs adapted to hold the supply-pipe a proper distance above the same. The supply-pipe may, however, if preferred, lie directly on the spreading-plate, although, as above stated, I prefer to elevate it somewhat above it, as it would not be so liable to be burned out and destroyed by the heat.

The supply-pipe is provided with a stand-pipe or downward extension C, that extends down through the spreading-plate, which is furnished with a proper hole or opening to permit it to be arranged therein. At the lower end of the stand-pipe I arrange one or more jet-pipes D, which are intended to be carried out from the stand-pipe, preferably on each side, although in some applications of the vapor-burner it will be found desira-

ble to carry it out on but one side, and in other cases it will be found desirable to use several branches extending in different directions, the object in all cases being to adapt the jet-pipe in form and position to the particular place of use. This jet-pipe is intended to be provided with one or more jet-orifices, through which the vapor may pass to the place where it is burned. As shown in Fig. 5, the jet-orifices are formed in a conical shape inclining from the inside of the pipe to its outer edge. In order to make the orifice of this shape, a hole can be bored in the opposite side of the pipe to permit the jet-orifices to be formed. This hole can be stopped by a plug, as shown in Fig. 5. By having the orifice thus formed small at the outer edge of the pipe and of increasing size to the inside of the pipe its capacity may be easily enlarged by filing off the outer edge of the pipe immediately over the opening. Of course the size of the jet-orifice will be increased as the thickness of the pipe at that point is diminished. In this way we can secure substantial uniformity in the capacity of the different jet-orifices and insure the escape of the same amount of vapor at each of them.

Below the jet-pipe is arranged a drip-pan E, into which the oil which overflows at the jet-orifices before the fire is lighted will be caught. This drip-pan, thus catching the overflowing oil, affords an easy means of lighting the fire, as all that is necessary to start the fire will be to apply a lighted match to the oil in the drip-pan. The oil thus igniting and burning will heat the jet-pipe, the stand-pipe, and the spreading-plate, and thus cause the incoming oil to be vaporized, so that instead of oil vapor will issue from the jet-orifices. This drip-pan is preferably suspended or held in place by means of ears or lugs e, embracing the drip-pipe and attached thereto by means of screws, as shown in Figs. 1 and 4, although other means of holding it in place may be employed, if desired.

Immediately above the jet-orifices I arrange mixing-tubes F. (Shown in the drawings.) These mixing-tubes are preferably of an enlarged diameter at their lower ends, so

as to catch the vapor escaping from the jet-orifices. They may be described as somewhat of a bell or dome shape. They are preferably mounted on the stand-pipe and made adjustable up and down thereon. To thus mount them and hold them in place, I employ a horizontal bar G, preferably arranged with round ends fitting into a socket g, cast or otherwise attached to the mixing-tubes. This horizontal bar is also preferably arranged to be adjusted up and down on the stand-pipe by means of a set-screw H. This will enable the lower or enlarged ends of the mixing-tubes to be adjusted at a proper distance from the jet-orifices, so as to catch the vapor escaping therefrom. At the same time a space should be left between the lower ends of the mixing-tubes and the jet-orifices to enable air to be drawn into the lower ends of the mixing-tubes to become mixed with the vapor from the orifices. The upper ends of the mixing-tubes are preferably connected together by means of a yoke I, provided with an elongated slot or opening around the stand-pipe.

At the outer sides of the mixing-tubes are preferably arranged square or angular projections f, adapted to receive a wrench or key to enable the mixing-tubes to be adjusted at an angle forward or backward. To permit this adjustment is the object of employing an elongated opening or slot in the yoke surrounding the stand-pipe.

By adjusting the mixing-tubes at an angle forward or backward the flame from the burning vapor may be directed against the forward or against the rear side of the spreading-plate, as may be desirable from time to time, or by leaving them in a vertical position the flame and heat will be directed against the central portion of the spreading-plate.

To apply the key or wrench to the purpose of adjusting the position of the mixing-tubes, the door of the stove, when a stove is used, as shown in Fig. 4, may be opened and the adjustment made. It will be obvious that the lower mouth of the mixing-tubes must be wider than the range of movement of that mouth in the adjustment described, so that the fluid discharged through the jet-orifice shall be received by the mixing-tube at whatever position the latter may be placed within the possible range of its adjustment. It is obvious, also, that in order that the deflection of the flame, which is the purpose of this adjustment, may be accomplished the spreading-plate shall be wider than the range of movement of the upper end of the mixing-tubes.

In order to regulate the flame from the burning vapor and direct it back toward the flue, I employ a damper J in the rear lid of the stove, as shown in Figs. 4 and 6. This damper is formed of sliding plates that permit openings to be made through the top of the stove to allow air to be drawn in and up

the flue. While I have shown this damper in one of the rear lids of the stove, yet it is obvious that it may be made independent of the lid and arranged in any proper position in the top of the stove or even at its sides, the object being to permit an access of air back of the vapor-burner to cause the flame to be drawn back through the stove toward the flue. I have found by practical experience that this damper not only secures the results above explained, but that it also prevents noise from the burning vapor.

In operation the oil is admitted into the supply-pipe from the reservoir in which it is kept by means of a cock or valve that will permit the proper amount to constantly flow into the supply-pipe. After traversing the supply-pipe over the spreading-plate it passes down through the stand-pipe and into the jet-pipe. Flowing along the jet-pipe it reaches the orifices and overflows into the drip-pan. When lighted in the drip-pan, as above explained, the jet-pipe and other parts are so heated that the oil is converted into vapor and issues in the form of vapor from the jet-orifices. It then passes up, together with the air which becomes mingled with it, into the mixing-tubes, and emerges at the top, where it is burned immediately beneath the spreading-plate. This operation will continue as long as oil is admitted through the supply-pipe.

I have described my improvement in vapor-burners in connection with a cooking-stove, as shown in Fig. 4, although it is obvious that it may be employed in other kinds of stoves, in steam-generators, water-heaters, and in various other places and for various other uses. I do not mean, therefore, to confine myself in the use of my improvements to a cooking-stove alone, but intend to employ them for all uses to which they are adapted.

What I regard as new, and desire to secure by Letters Patent, is—

1. In a vapor-burner, the combination of a supply-pipe, one or more jet-orifice pipes having one or more jet-orifices, one or more mixing-tubes arranged over the jet orifice or orifices and uninlosed at the upper end underneath the spreading-plate, and said spreading-plate, whereby an intense flame is generated under and spread by said plate, causing the latter to become intensely heated, the supply-pipe being located on top of the spreading-plate very near thereto, but separated therefrom by a slight interval, whereby the presence of the intensely-heated spreading-plate reliably heats the supply-pipe, and the interval between said spreading-plate and supply-pipe prevents overheating of the latter, substantially as set forth.

2. In a vapor-burner, the combination of a supply-pipe, one or more jet-orifice pipes having one or more jet-orifices, one or more mixing-tubes arranged over the jet orifice or orifices and uninlosed at the upper end, and a

spreading-plate located above the mixing tube or tubes, one of said last-mentioned parts being supported and movable up and down on a standard which is fixed with respect to the other, substantially as set forth.

5 3. In a vapor-burner, the combination of a supply-pipe, one or more jet-orifice pipes having one or more jet-orifices, one or more mixing-tubes arranged over the jet orifice or orifices and uninclosed at the upper end, a spreading-plate located above the mixing tube or tubes, horizontal pivots on which the mixing tube or tubes are supported and adapted to be rocked back and forth, the lower open end of the mixing tube or tubes being wider than the range of the rocking movement of such lower end, and the spreading-plate being wider than the range of movement of the upper end, whereby the jet of vapor discharged into the mixing-tube may be deflected in passing there-through to vary the point and angle of its impact against the spreading-plate, substantially as set forth.

15 4. In a vapor-burner, the combination of a supply-pipe, one or more jet-orifice pipes having one or more jet-orifices, one or more mixing-tubes arranged over the jet orifice or orifices, a spreading-plate located above the mix-

ing tube or tubes, and a drip-pan located below the jet-orifice pipe or pipes substantially parallel and opposite to the spreading-plate, a slight space being left between the jet-orifice pipe or pipes and the drip-pan, whereby the heated currents generated at the under surface of the spreading-plate are reflected back and forth between the spreading-plate and the drip-pan and circulated between such pan and the jet-orifice pipes, substantially as set forth.

30 5. In a vapor-burner, the combination of a supply-pipe, one or more jet-orifice pipes having one or more jet-orifices, one or more mixing-tubes arranged over the jet orifice or orifices, a spreading-plate located above the mixing tube or tubes, and a drip-pan located below the jet-orifice pipe or pipes substantially parallel and opposite to the spreading-plate, the drip-pan having an upwardly-projecting flange or rim to guard the jet-orifice pipe or pipes from laterally-cooling currents, substantially as set forth.

40 45 50
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