3 Sheets—Sheet 1.

# J. A. FREY.

## Apparatus for Vaporizing and Burning Hydro-Carbon Oils.

No. 220,470. Patented Oct. 14, 1879.

Fig. 1.

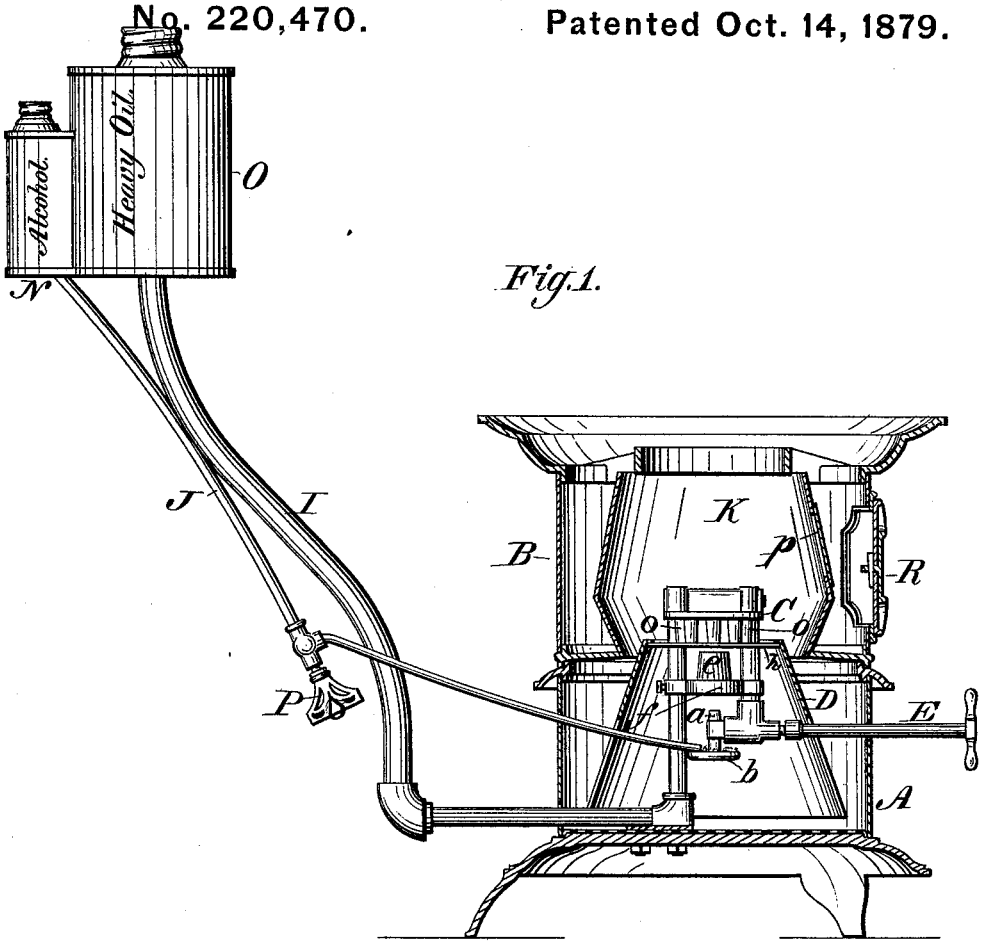
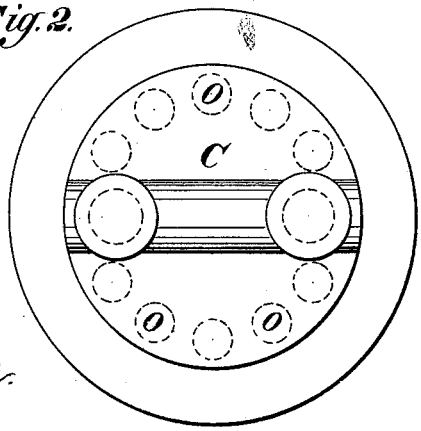



Fig. 2.

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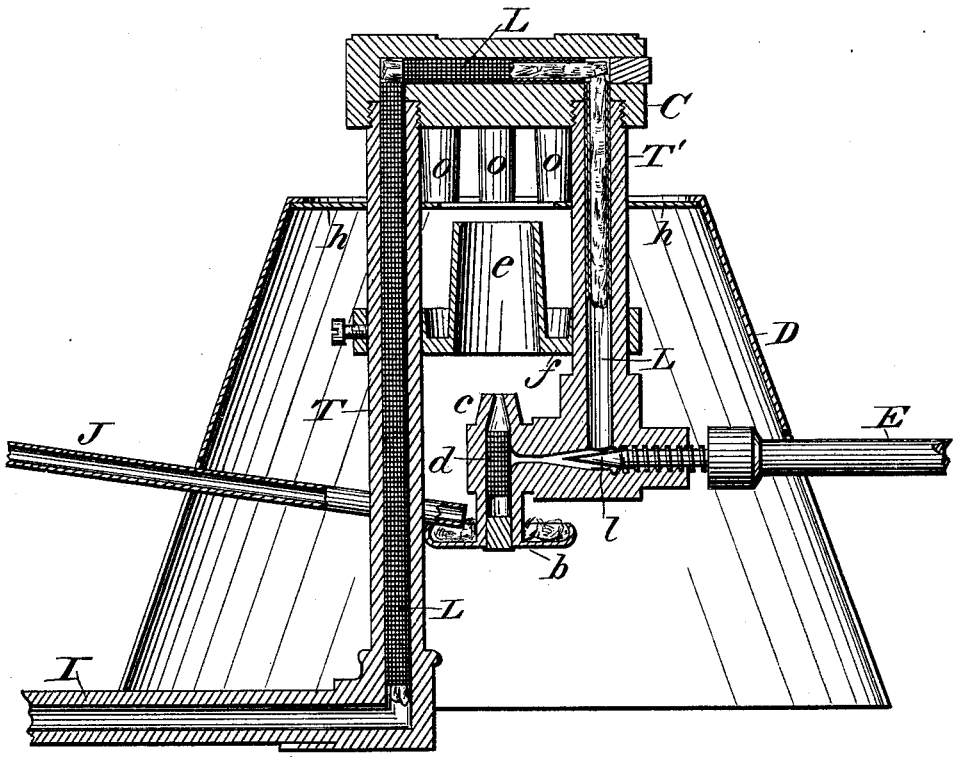
# J. A. FREY.

## Apparatus for Vaporizing and Burning Hydro-Carbon Oils.

No. 220,470. Patented Oct. 14, 1879.

*Fig. 3.*

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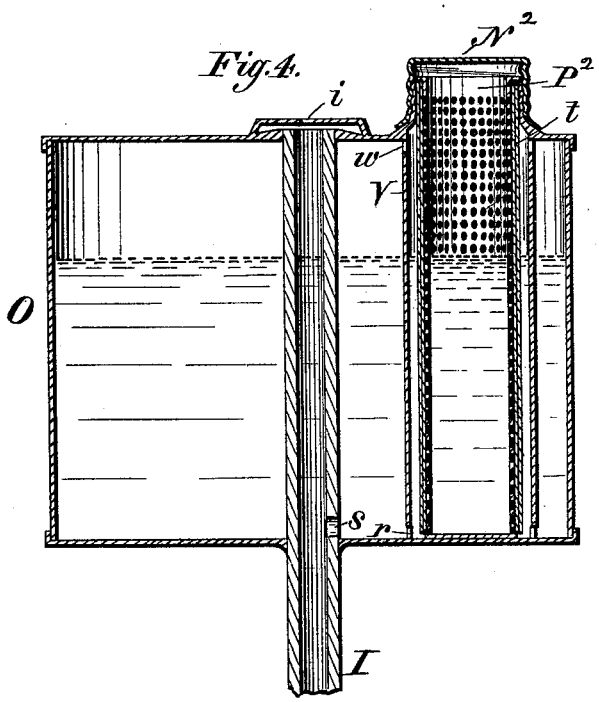
3 Sheets—Sheet 3.

# J. A. FREY.

## Apparatus for Vaporizing and Burning Hydro-Carbon Oils.

**No. 220,470. Patented Oct. 14, 1879.**

*Fig. 4.*

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# UNITED STATES PATENT OFFICE.

JOHN A. FREY, OF NEW YORK, N. Y.

## IMPROVEMENT IN APPARATUS FOR VAPORIZING AND BURNING HYDROCARBON OILS.

Specification forming part of Letters Patent No. **220,470**, dated October 14, 1879; application filed February 13, 1879.

*To all whom it may concern:*

Be it known that I, JOHN A. FREY, of New York, in the county of New York and State of New York, have invented certain Improvements in Apparatus for Vaporizing and Burning Hydrocarbon Oils, of which the following is a specification.

My invention relates to that class of burners by which hydrocarbon oils are first vaporized and then burned, it being more especially designed for use in heating and cooking, and to utilize the heavier class of oils in the form of vapor, thereby dispensing with the use of wicks, cones, deflectors, and similar devices as used when the oil is burned in the liquid form; and the invention consists, first, in a novel construction of the vaporizing and burning apparatus; second, in providing the oil-reservoir with a filter; and, third, in a reservoir for containing alcohol for starting the operation, together with various details, all as hereinafter more fully described.

Figure 1 is a side elevation of a cooking-stove with my improvements applied thereto, the body of the stove being shown in vertical section the better to illustrate the internal arrangement. Fig. 2 is a top-plan view of the cap-plate or vaporizer detached and enlarged. Fig. 3 is a central vertical section of the vaporizing and burning apparatus detached and enlarged; and Fig. 4 is a sectional view of the oil-reservoir, showing the filter.

What are known as "coal-oil stoves" are usually constructed to burn the hydrocarbon oils in the same manner as they are burned in ordinary coal-oil lamps—that is, by means of wicks and cones or deflectors. Various attempts have been made to construct devices which would burn these oils in the form of a vapor; but heretofore those which have been successful have only succeeded in burning effectually the lighter qualities or products of these oils, such as naphtha and gasoline, which are very inflammable, and therefore dangerous for general use.

The special object of my present invention is to produce an apparatus by which the heavier grades of hydrocarbon oils can be vaporized and burned successfully, and thus enable them, instead of these lighter qualities, to be used for cooking and heating, and to do this in such a manner as to avoid the production of smoke and smell, and at the same time produce a powerful heat, or both heat and light.

To accomplish these results I construct the apparatus as shown in the drawings in Fig. 1, of which A represents the lower portion or body of a coal-oil stove, the upper portion, B, being hinged thereto, or otherwise attached so that it can be turned over or removed at will, as is customary, this upper portion, in this instance, being provided with an internal chamber or shell, K, in one side of which is a window, *p*, set in line with the door R, which is also provided with transparent material to enable the attendant to see the condition of the flame inside.

The vaporizing apparatus, which is more fully shown in Fig. 2, consists of a vertical tube or pipe, T, connecting at its upper end with a cap or plate, C, through which there is a continuation of the channel transversely, and to the opposite end of which channel is connected another vertical tube, T′, which latter extends downward and connects with the jet or burner *c*, as shown, there being a conical plug, *l*, provided with a screw-rod, E, arranged to regulate the flow of the vapor to the burner, or to shut it off entirely, as may be desired.

Directly under the burner *c* is secured a shallow metal cup, *b*, which is filled with asbestus, and into which a small tube, J, empties, for the purpose of supplying it with a small quantity of alcohol for starting the operation of the vaporizer, as hereinafter described.

The cap or plate C is circular in form, as shown in Fig. 2, and is provided on its under side with a series of projections, *o*, as shown, though instead of these there may be a vertical flange provided with perforations of any desired form, which will answer the same purpose. This cap or plate C may be made of cast-iron or any similar material, and the tubes T and T′ of ordinary gas-pipe.

As shown in Fig. 2, the channel in these pipes, and also that in the cap C, is filled with asbestus wrapped in fine wire-gauze, as indicated by the letter L. The cavity in the jet *c* is also filled with a roll of wire-gauze, *d*, or with asbestus and gauze, the same as the

pipes T and T′. Instead of asbestus, other porous material may be used; but I prefer asbestus.

About midway between the tip of the burner or jet *c* and the cap C, I secure a diaphragm or plate, *f*, which has a central opening, with a tube, *e*, extending upward therefrom, as shown, the whole being made adjustable vertically. I also provide a conical jacket, D, made of sheet metal, which is made to surround the vaporizing and burning apparatus, with the exception that it stops just below the cap C, its upper edge being provided with an inwardly-projecting flange, which fits over the edge of a horizontal diaphragm or disk, *h*, located a short distance below the cap C, and which has a central orifice or hole a little larger than the tube *e*, as shown in Fig. 2, the object of which is to gather all the air that enters through the bottom and convey it to the burner, for the purpose of supplying a large volume of oxygen to commingle with the vapor as it issues from the jet *c*, and thus produce an intense flame.

The oil to be vaporized is supplied from a reservoir, O, through a tube, L, as shown in Fig. 1, this reservoir being located at such a height as to force the oil by pressure through the vaporizer.

I also provide another and smaller reservoir, N, for containing alcohol, from which a tube, J, extends to the cup *b* under the jet *c*, this latter tube being also provided with a cock, P, for regulating and shutting off the flow, as required.

In order to prevent the gummy substance or other matter contained in the heavy oil from filling up the interstices of the asbestus and gauze in the vaporizer, I place in the reservoir O a filter, which may be made or arranged in any suitable manner. In this case I make it as represented in Fig. 4, in which O represents the reservoir, with a tube, V, extending from the opening through which it is filled down to the bottom, where it has one or more holes, *r*, for the oil to pass through. I then provide another tube, P, preferably of perforated sheet metal and having its bottom closed, around which I wrap one or more layers of flannel or other porous material, and then insert it within the tube V, as shown in Fig. 4, so that by removing the screw-cap $N^2$, and pouring the oil into the open end of tube $P^2$, it will gradually pass through the perforations and the cloth which surrounds the tube, and thus be filtered or cleansed from all thick or gummy matter, or other foreign material, before it enters the reservoir. The filter P is free to be removed, so that it can at any time be taken out and cleaned by removing the refuse matter from its interior, and also by cleansing the cloth *t*, or replacing it by a clean piece whenever necessary.

The pipe I, which supports the reservoir and conducts the oil to the vaporizer, is made to extend entirely through the reservoir, as shown, whereby the latter can be fastened to it at both top and bottom, and thus attach the reservoir securely to the pipe, there being a hole, *s*, in the side of the pipe I, near the bottom of the reservoir, for the oil to enter and pass thence to the vaporizer.

The top of the tube I is covered by a cap soldered permanently in place, with a small vent-hole, *i*, in it; or, if preferred, a plug may be used instead of the cap.

The operation of the apparatus thus constructed is as follows: In the first place, by turning the cock P, a small quantity of alcohol is allowed to flow into the cup *b*, which is then lighted, and by the time it is nearly consumed the cock P is opened, when the gas or vaporized oil will issue from the jet *c*, which is at once lighted. The air entering from below passes through the hood or jacket D, and is drawn upward and made to mingle with the issuing vapor, which thus burns with intense heat, as it issues from the top of the tube *e* and impinges against the under side of the cap or plate C, and is deflected laterally through the spaces between the points or projections *o*.

It will be seen that the heat of the flame will act upon the oil while it is passing through the tubes T and T′ and through the channel in the cap C, so that it is thoroughly vaporized before it reaches the jet *c*.

The jacket D is made removable, for convenience in lighting or cleaning the apparatus.

While I have shown the apparatus arranged within the body of an ordinary coal-oil stove, it is obvious that it may be used in connection with any other suitable device equally well, and that it may be arranged in the fire-chamber of any ordinary cooking or heating stove, or in a fire-place, if desired, and that any number of them may be arranged so as to be used together.

By means of this apparatus I render it possible to use the heavier kinds of hydrocarbon oils, and to burn them in the form of vapor or gas, whereby a very intense heat is produced, and the smoke and smell ordinarily generated by coal-oil stoves, to a greater or less extent, are very much lessened, if not entirely prevented.

Having thus described my invention, what I claim is—

1. The herein-described apparatus for vaporizing and burning hydrocarbon oil, consisting of the tubes T and T′, united by the cap C, with the jet *c* and annular disk *h*, all being constructed and arranged to operate substantially as described.

2. In combination with the vaporizer, constructed substantially as described, the adjustable tube *e*, arranged to operate as set forth.

3. In combination with the vaporizer, the jacket D and adjustable tube *e*, all constructed and arranged to operate substantially as and for the purpose set forth.

4. In combination with the tubes T and T′,

the plate C, with the projecting points *o*, or their equivalents, the whole being arranged to operate as set forth.

5. In combination with the cup *b*, the alcohol-reservoir N, provided with a pipe, J, and cock P, arranged to operate as set forth.

6. In combination with the oil-reservoir O, a filter, $P^2$, arranged to operate substantially as set forth.

7. The combination, in a heating apparatus, of an oil-reservoir, a vaporizing and burning apparatus, an alcohol-reservoir, and a cup or receptacle for burning the alcohol, the combination being substantially such as is herein described.

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