J. J. RIDDLE & W. S. GRAY.

PETROLEUM VAPOR STOVE.

No. 65,507. Patented June 4, 1867.

Fig. 3.

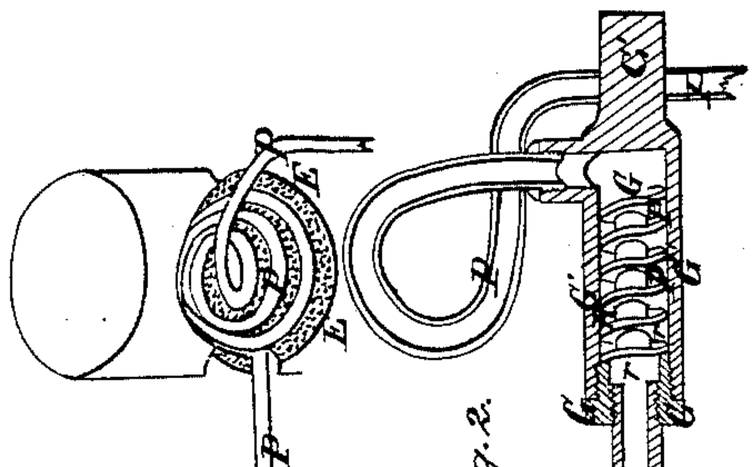


Fig. 2.

Fig. 5.

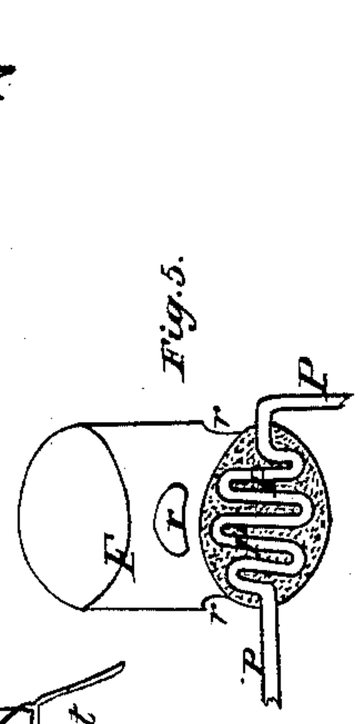


Fig. 1.

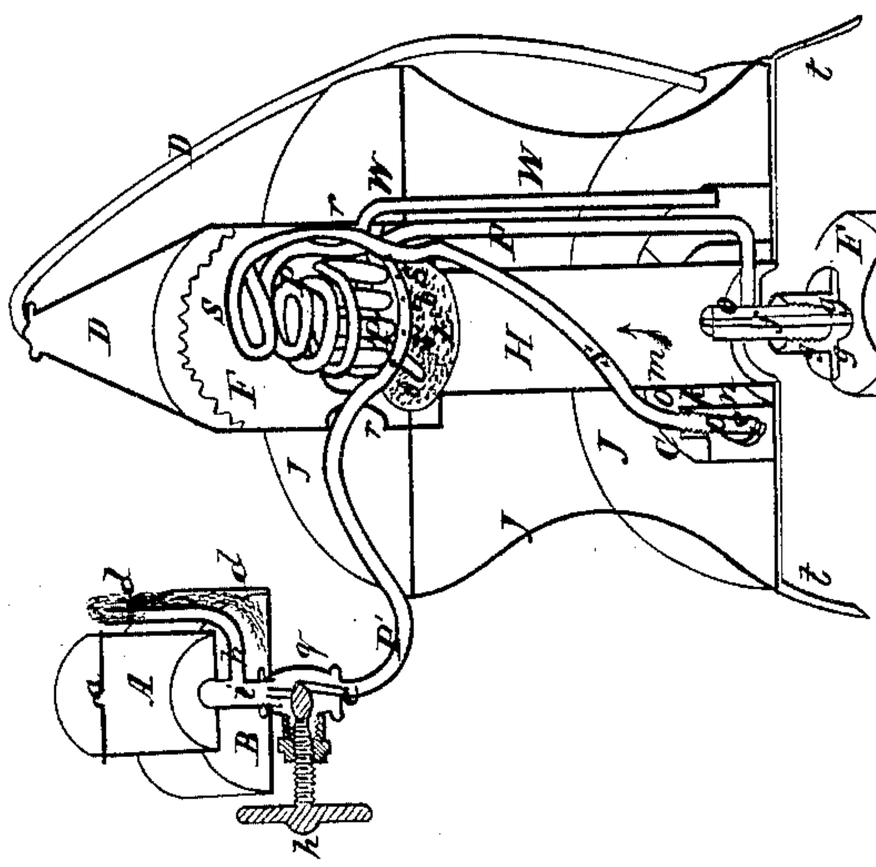
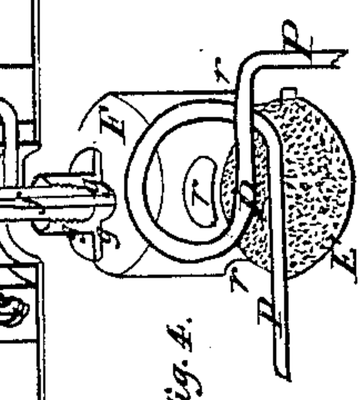


Fig. 4.



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Letters Patent No. 65,507, *dated June* 4, 1867.

IMPROVEMENT IN PETROLEUM-VAPOR STOVES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, J. J. RIDDLE and W. S. GRAY, of the city of Pittsburg, county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Petroleum-Vapor Stoves; and we do hereby declare that the following is a clear, full, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a perspective view of the stove, the front half being cut away that the different parts of said stove may be more clearly seen.

Figure 2 is a similar view of the heater or oil vaporizer in a different shape.

Figures 3, 4, and 5 are similar views of the oil vaporizer in different shapes.

This invention relates to a new and improved method of heating petroleum of any gravity, or other carbon oils, to any degree of heat desired, and burning the same without carbonaceous deposit on the inside of the heater, and without the usual odor and unhealthy gases arising from the combustion of carbon oils.

To enable those skilled in the art to understand and construct our invention, we will proceed to describe it.

The reservoir A, (fig. 1,) is made of tin or other metal. A is filled with oil by means of hole *a*, which hole is closed when A is filled. The oil runs down the metal pipe *i* to valve-seat *q*, but can go no lower until the valve is drawn back out of its seat *q* by turning the wheel *p*, when it goes down the hole *e* into pipe P′, and along P′ to P and P″, down to case *o* of needle *f*, and around *f* up through the needle-valve *v*, up into chamber H, where if the oil has been vaporized by heater P, the oily vapor or gas mixes with the heated air entering H from the bottom of H, and ascends through the foraminous plate or cap E, and burns or is set afire on the upper side of said plate E. The air entering the fire-chamber F through openings *r* in F, (see fig. 4,) mixes with the flame, and makes the combustion complete. In a few minutes heater P is red hot. The size of the flame is regulated by turning wheel *g*, which raises or lowers needle *f* into valve *v*. The fire is lit by heating the pipe P″ with a lamp, or with oil burning in box *x* for four or five minutes, and if the oil is very heavy heating the pipe P′ with a lamp near the point where it enters the fire-chamber F at the same time. If valves *q* and *v* be now opened, P′, P, and P″ will vaporize the oil flowing from fountain A, said vapor-gas will pass through *v* up the mixing-chamber H, and through the perforated plate E, where it can be lit with a match applied upon the upper side of E. Plate E and its perforation should always be kept clean and free from soot, that the combustion may be perfect. E and F may be made of iron, tin, or other suitable metal, but brass is the best because it best resists the action of the fire. The heater or burner P may be made out of brass, wrought iron, or other suitable metal. We have found wrought iron very good. Pipes W, P″, S, P′, *i*, and *h* may be made out of brass, iron, or other suitable metal. Valve *q* can be made out of the metals ordinarily used for such purposes. Needle *f* should be steel, its case *o* and wheel *g* of iron or brass. A B C D R H may be made of sheet iron, tin, brass, or other suitable metal. The stove-frame J and its legs *t* may be made of cast iron. The heater P, when used for light oils only, should have a continuous conduit of not less than ten or twelve inches in the flame surrounded by F. Such a conduit is shown in figs. 3, 4, and 5. Where heavy or light oils are used, the continuous conduit heater or burner P in the flame, and surrounded by it in F, should be from two to four feet long. Such a heater is shown in figs. 2 and 1. We find that the oil cannot be heated too hot. But we also find when the oil is heated hot enough to burn up all the carbon in the heater, that a large amount of oxygen and moisture in the atmosphere is consumed, leaving the atmosphere too dry, and probably mixed to a certain extent with carbonic acid. At any rate headache is the consequence invariably when the room is closed tight. The oxygen and moisture can be restored, and the carbonic acid, whatever there may be, not only be absorbed but probably destroyed by giving out its oxygen to the hydrogen of the water, the combustion of the two gases forming a moist atmosphere. If more than the proper amount of water is passed into the flame in chamber F, (which is the plan we adopt to restore moisture to the atmosphere,) an oily smell is produced. Having used the stove for several weeks in our families for cooking and heating rooms, we know that there is no deposit of carbon on the inside of heater P, that there is no odor or smell, and that persons who are subject to headache from the use of coal-stoves are free from it when using our stove. That the amount of water passed into the flame may be regulated nicely and easily, we pass from a vessel of water, R, placed in any convenient position, a tube or pipe, W, into the fire-chamber F, and continue it in any ordinary shape and of any length desired in said chamber F, having in

said pipe in chamber F one or more openings *b*, for the exit of steam into the flame. In said pipe W, from the level of cap E, we fill that part of pipe W running to the water-vessel R with cotton strings or other capillary substances, said cotton strings going to the bottom of vessel R. If said cotton strings W′ carry up water too fast, raise a part of them out of the water. When it is desirable to have the vessel of water closed, a pipe, S, is placed in chamber F, similar to pipe W, and continued to said water-vessel C, placed at any convenient point on the stove or about the flame, (on or around a radiator, for example,) said pipe being continued some distance in water-vessel C, and having an opening, *n*, near the top of vessel C in it, (pipe S,) that steam may pass up said pipe. This pipe S may be filled with any capillary substance up to the level of E or not, as desired. Pipe S heats the water in vessel C if said vessel is close to the fire. For convenience a connecting-nut, *k*, connects that part of S outside of C to that inside of vessel C. The water is poured into C through hole *m*, which is then closed. When heavy oils are used, or intense heat is needed, it is very desirable to mix some water, not drops, but as much like mist as possible, with the oil before it is heated. This we do by placing a vessel of water, B, at any convenient point. From the bottom of B cotton strings *d*, encased or not, go to the top of tube *h*, which is as high as the top of reservoir A, and down tube *h* to pipe *i*. The water is drawn up strings *d* by capillary attraction to the top of *h*, and down *h* to and into pipe *i*. By said capillary action the water is drawn up to the top of *h*, and down *h* in such a manner that it is absorbed by the oil as it enters pipe *i*. Part of said strings *d* can be raised out of B and the water in it, if they carry up water to the top of *h*, and down *h* too fast. If heater P be made of wrought iron a great deal of this water is burned. Pipes W and S will also burn water if made of wrought iron. How economical or useful this may be remains to be seen.

Many persons complain because the atmosphere at the floor is not heated. This difficulty we overcome by passing a pipe or pipes, D, sufficiently large to not obstruct the draught up from the fire-box F and down as near the floor as desired.

Fig. 2, which shows a modification of heater P, (fig. 1,) is a coil formed by cutting a screw six or eight threads, G, to the inch, with deep matrices P, said threads G being covered closely by a case, G′, screwed or otherwise securely fastened on to the piece in which said threads G are cut, thus forming by said matrices P a circuitous conduit of three or more feet around a piece two and a half inches long. Said coil may be placed horizontal or perpendicular, or both, and be used for heating the water as well as for heating the oil. As length of conduit within the flame is absolutely essential to a good heater, we consider it (fig. 2) practically the best shape for a heater. Fig. 5 shows a heater which may be used either horizontal or perpendicular, or both.

We do not wish to use or claim any conduit heater which cannot be used in the horizontal and perpendicular plans combined, or in either separately, and be so surrounded by the flame that we may use the heat of the blue part of the flame, and the reducing and oxidizing parts of it. We do not wish to use or claim a sinuous, serpentine, or spiral heater, above the flame, because such heater is necessarily short, and in the horizontal plane to get the greatest heat, with its lower surface only exposed to the flame, and its upper surface to draughts of air. We think it suitable only for light oils. Nor do we wish to throw the gas through a cold atmosphere against the burner, part burning and part escaping, when mixing-chamber H and foraminous cap E are not used.

But what we do claim as new, and desire to secure by Letters Patent, is—

1. A coiled, curved, or other ordinary shaped continuous conduit heater P within the flame, and of sufficient length to vaporize any of the different grades of petroleum oils, in combination with foraminous cap E, and mixing-chamber H, for the uses and purposes mentioned substantially as described.

2. The carrying of water from a vessel, R, into the flame in chamber F, by means of tube W filled with any ordinary capillary substance W′, for the uses and purposes mentioned substantially as described.

3. The carrying of steam from a closed vessel, C, by means of tube S into the flame in chamber F, for the uses and purposes mentioned substantially as described.

4. The carrying of water into the cold oil from a vessel, B, by means of the capillary substance *d* and tube *h*, for the uses and purposes mentioned substantially as described.

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