(No Model.)

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HYDROCARBON BURNER.

No. 435,755. Patented Sept. 2, 1890.

Fig. 1.

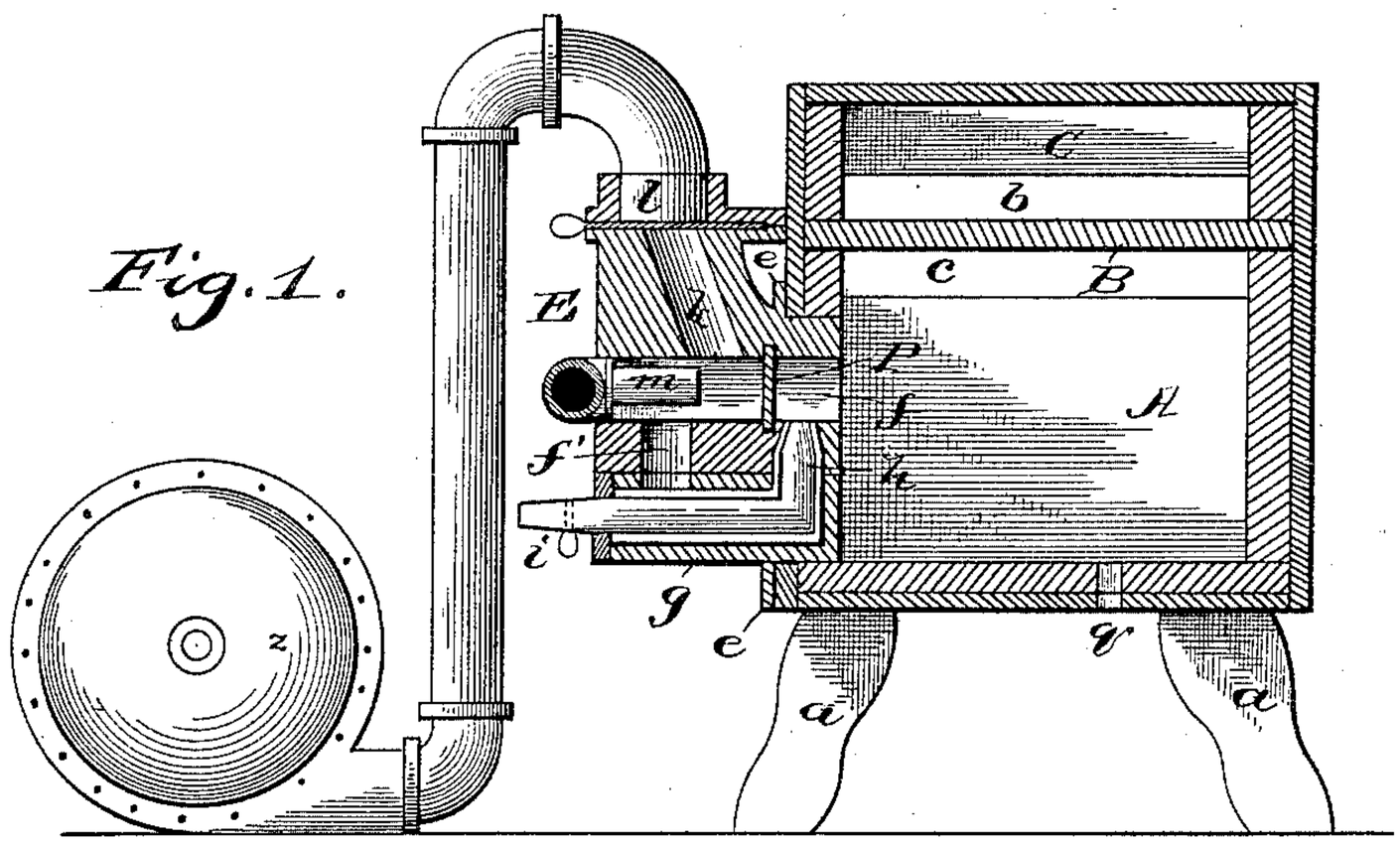


Fig. 2.

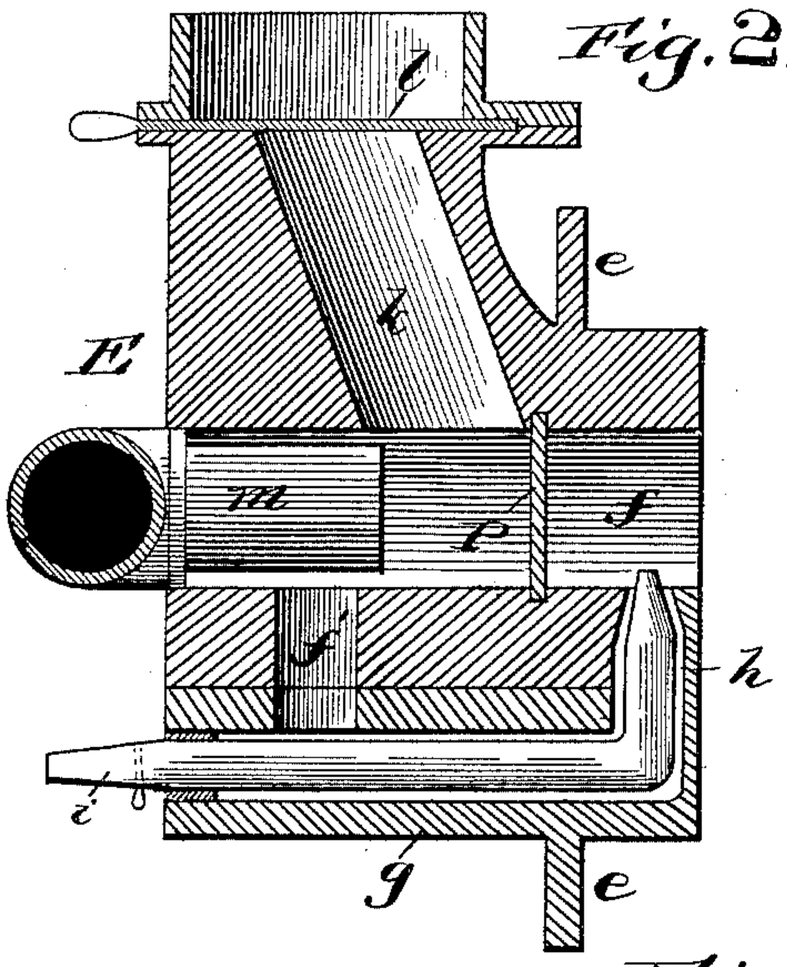


Fig. 3.

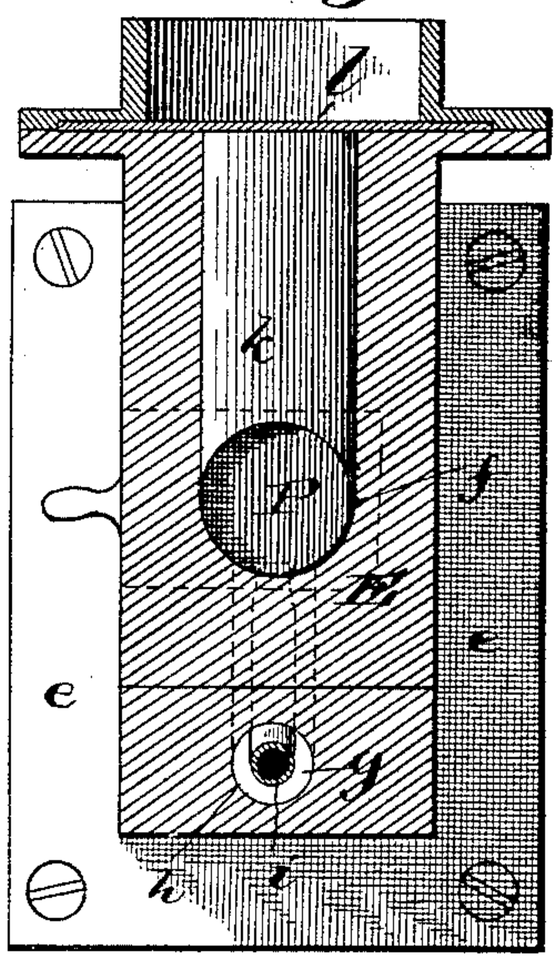
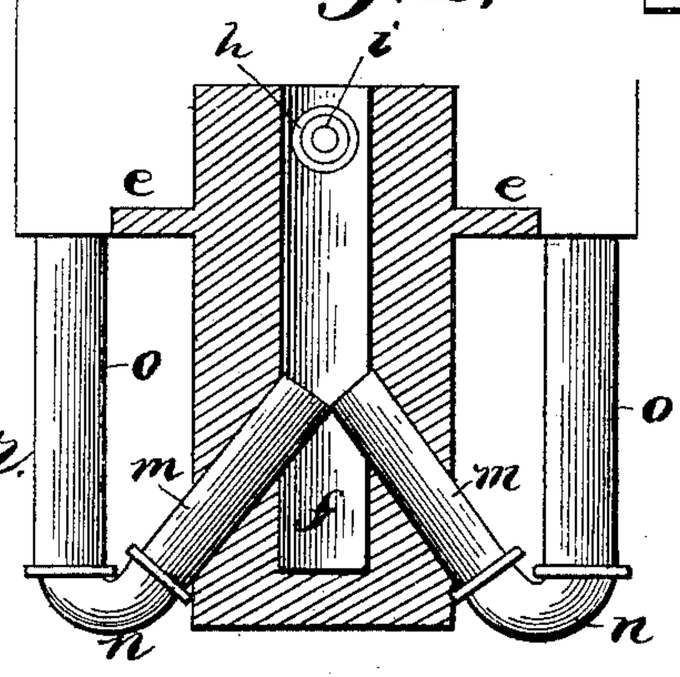


Fig. 4.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 435,755, dated September 2, 1890.

Application filed December 13, 1889. Serial No. 333,585. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM W. LAKE, EDWIN TARBLE JACOBS, and GILBERT S. SMITH, citizens of the United States, residing, respectively, at Fort Plain, in the county of Montgomery and State of New York, have invented certain new and useful Improvements in Hydrocarbon-Burners; and we do hereby declare the following to be 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.

The invention relates to various new and useful improvements in hydrocarbon-burners for heating and melting metals and for other uses.

The objects of the invention are to provide and produce a hydrocarbon-burner wherein a small quantity of oil will be used, and wherein the pressure required to atomize and spray the oil will be very slight and can be easily produced by an ordinary blower or fan by reason of the peculiar manner we have devised of atomizing the oil, which consists in spraying the oil by an air-blast and simultaneously directing another blast at right angles thereto, so as to further vaporize the oil and force it into the combustion-chamber of the furnace; and a further object of the invention is to provide means whereby the supply of oil and of air may be conveniently and easily regulated by the operator independent of each other.

For a better understanding of the invention attention is invited to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a longitudinal sectional view of the burner, showing the same in connection with a metal-heating furnace; Fig. 2, an enlarged vertical sectional view of the detached burner; Fig. 3, a horizontal sectional view; and Fig. 4, an enlarged horizontal sectional view of the burner, showing a modification in the arrangement of the hot-air pipes from the furnace.

In all the above views corresponding parts are designated by identical letters of reference.

In Fig. 1 of the drawings we have shown our improved burner in connection with a metal-heating furnace of novel construction which will form the subject-matter of a future application, but it should be understood that our hydrocarbon-burner may be used in other connections and that we make no claim to the said furnace in this specification.

A represents the furnace, which is preferably mounted upon standards or feet *a a a* in the smaller sizes, and upon a suitable base or foundation in the larger sizes. This furnace is preferably rectangular in form, although it may be of any other desired form, and is constructed, by preference, of iron or steel, and within the same is placed a partition B, dividing the furnace proper from the oven C, above the same. This partition is made, preferably, of fire-brick and is either preferably flat, as in the small size furnaces, or arched, to secure great strength, as in the larger furnaces. The partition B does not extend from side to side of the furnace, but is arranged so as to have a passage on each side thereof, by which communication is had from the furnace beneath to the oven above the partition. The iron work to be melted or heated is first inserted into the oven through suitable openings or "glory-holes" *b b*, cut in the side walls of the furnace directly above the line of the partition until it is as hot as possible. Directly beneath each of these openings *b b* is a similar opening *c*, leading into the furnace proper beneath the partition B, and within which the metal is inserted after leaving the oven for a more advanced heating. By thus first heating the metal in the oven when it is placed in the furnace it is immediately heated to a higher degree without smoking or carbonating, which would not be the case if the metal were inserted cold in the furnace, so as to chill the flame. The combustion is therefore more perfect and a saving in oil is effected.

The burner for the oil, which will now be described and which forms the subject-matter of this specification, is secured to the furnace at any suitable point, either to the front or back or side walls, or possibly to the bottom of the furnace. It consists of four distinct coacting parts—viz., means for con-

veying the oil to the burner, means for atomizing and forcing the oil into the furnace, means for establishing a hot blast within the burner, and means for regulating the oil and the air through the burner.

E represents the main or body portion of the burner, made of metal, mortised into the furnace-walls, so as to open into the interior thereof, and provided with a flange *e* all around, whereby it may be bolted to the furnace or to the furnace-door. This body portion is made of a general rectangular shape, and is constructed in any suitable manner—such as by casting entirely or in part, or by boring, &c. Extending from the forward to the rear end of this main portion is a circular passage *f*, leading into the furnace. Directly beneath this passage *f* and parallel therewith is a smaller passage *g*, which branches up near the forward part of the body portion at *h* and enters the passage *f*. Within this passage *g* is placed a pipe *i* of smaller diameter and branching up at its forward end to correspond with the shape of the passage. The upper end of this pipe is contracted somewhat, and the passage *g*, surrounding it at that point, is similarly contracted, so as to leave only a small space beneath the pipe *i* and the branch *h*, for the purpose to be hereinafter explained. The rear end of the pipe *i* connects in any suitable way with a tank of oil arranged at any convenient point. Communication is had from the rear portion of the passage *f* to the rear portion of the passage *g* by means of a short connecting-passage *f'*. It will be understood that while the pipe *i* is entirely within the passage *g* it in no way connects with said passage. Extending down from the top of the burner is an inclined passage *k*, leading into the passage *f*, and which connects at its upper end with a suitable fan or blower *z* or other source of air-blast. The quantity of air passing through this passage is regulated by means of a valve *l* of any suitable construction, but preferably a double slide-valve. Connecting with the rear end of the passage *f* and extending some distance therein is a pipe *m*, which branches off into a right-angle pipe *n*, and which again branches off into short conducting-pipes *o o*, leading into the interior of the furnace. In Fig. 4 a modification of this is shown. In this modification the conducting-pipes lead from the interior of the furnace into the passage *f*, directly behind the passage K, at an angle of about forty-five degrees. The flow of air through the passage *f* is regulated and controlled by means of valve *p*, arranged about midway within the said passages between the passage *k* and the mouth of the oil-tube. The flow of oil through the tube *i* is also regulated and controlled by means of an appropriate valve.

The operation of the burner is as follows: Oil flows through the pipe *i* up into the passage *f*. Air under pressure passes down the passage *k* and enters the passage *f*. A portion of this air rushes down the passage *g* around the oil-pipe and enters the passage *f* in a pointed form, by reason of the contraction of the said oil-pipe and branch *h*, as was before explained. This causes a vacuum to be formed over the mouth of the oil-tube, which will draw the oil forcibly out of the tube in an atomized or vaporized condition. Another portion of the compressed air passes along the passage *f* and coming in contact with and at right angles to the vaporized-oil pipe will force or blow the oil into the furnace, where it is ignited in its volatilized condition. The same compressed air, in passing through the passage *f*, will cause a partial vacuum to be formed over the mouth or mouths of the conducting-pipe *m* or pipes from the furnace, and a quantity of superheated air from the furnace will be drawn into the burner, and the vaporized oil will enter the furnace with this heated air, so as to form an intensely-hot flame, which is entirely consumed within the furnace. By means of the valve *p* the passage of compressed air through the passage *f* may be directed more or less to the passage *g*, as will be evident, until the proper proportion of air in the passage *g* to vaporize the oil and in the passage *f* to eject the oil will be reached. Any pressure of air within the furnace may be relieved by means of a vent *q* in the side of the furnace, and the products of combustion from the oven may be conveyed off by a suitable flue arranged in the usual way.

It should be understood that the oil-burner can be used independently of the furnace in other connections, such as with boilers, &c. It should be further understood that the conducting-pipes from the furnace can be dispensed with, but it is much preferable to use them. It will be also understood that instead of compressed air steam or other gaseous fluids under pressure may be used, and that instead of oil tar or other hydrocarbon may be used, and it should be still further understood that the air-blast may be directed against the oil at other angles than at right angles.

Having now described my invention, what is claimed as new therein is as follows:

1. An improved hydrocarbon-burner, consisting of a body E, having an annular passage *f*, leading into the combustion-chamber, a smaller passage *g* beneath said passage and having a branch *h* at its forward part which communicates with the passage *f*, a pipe *i* within said passage *g* and of smaller diameter than the same and branched at its smaller end to correspond with the branch *h*, with a small space between said pipe and said branch for the purpose set forth, said pipe *i* being connected with a vessel containing the burning compound, a connecting-passage connecting the rear portion of the passage *f* with the rear portion of the passage *g*, a passage *k*, leading into the passage *f* and connecting with the air-blast, and a regulating-valve *l* in

the passage *k*, all combined and arranged substantially as set forth.

2. An improved hydrocarbon-burner, consisting of a body E, having an annular passage *f*, leading into the combustion-chamber, a smaller passage *g* beneath said passage and having a branch *h* at its forward part which communicates with the passage *f*, a pipe *i* within said passage *g* and of smaller diameter than the same and branched at its forward end to correspond with the branch *h*, with a small space between said pipe and said branch for the purpose set forth, said pipe *i* being connected with a vessel containing the burning compound, a connecting-passage connecting the rear portion of the passage *f* with the rear portion of the passage *g*, a passage *k*, leading into the passage *f* and connected with the air-blast, a regulating-valve *l* in the passage *k*, conducting-pipes *m*, *n*, and *o*, leading from the combustion-chamber and connecting with the passage *f*, whereby hot air is fed thereto, and a valve *p* within the passage *f*, all combined and arranged substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM W. LAKE.
EDWIN TARBLE JACOBS.
GILBERT S. SMITH.

Witnesses:
FRANK S. BROWN,
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