No. 711,936. Patented Oct. 28, 1902.

F. L. CARTER.

HYDROCARBON BURNER.

(Application filed Dec. 12, 1901.)

(No Model.)

Fig. 1.

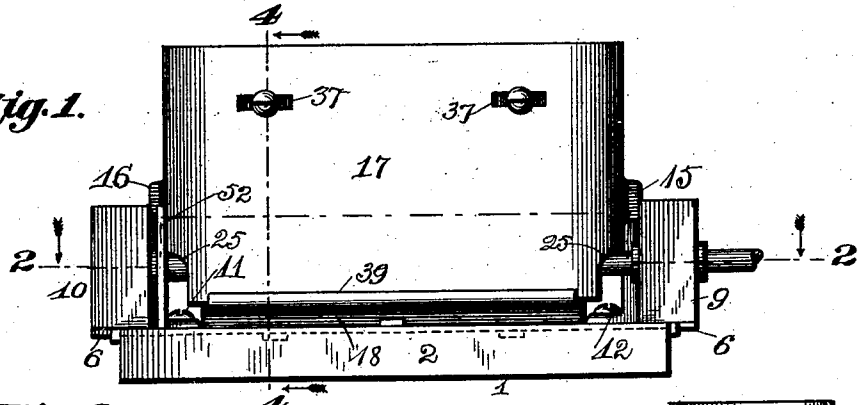


Fig. 2.

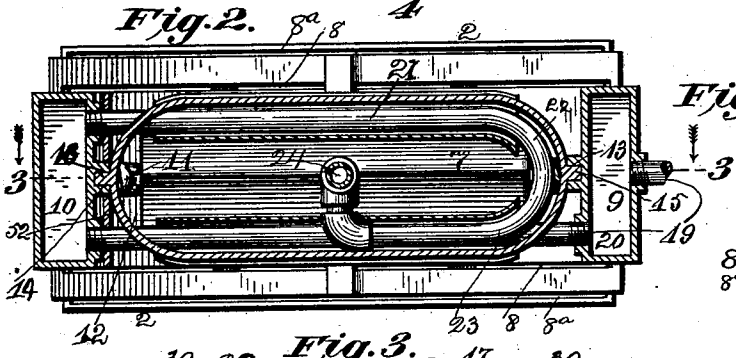


Fig. 4.

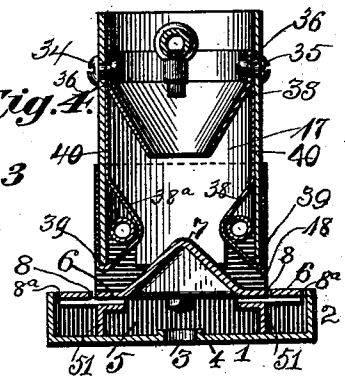


Fig. 3.

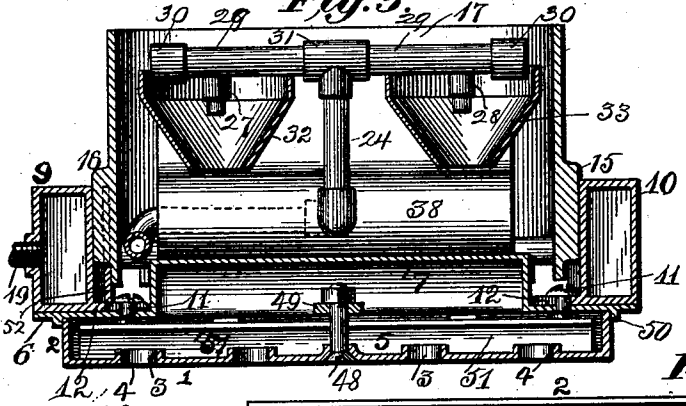


Fig. 5.

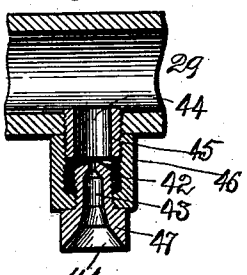


Fig. 6.

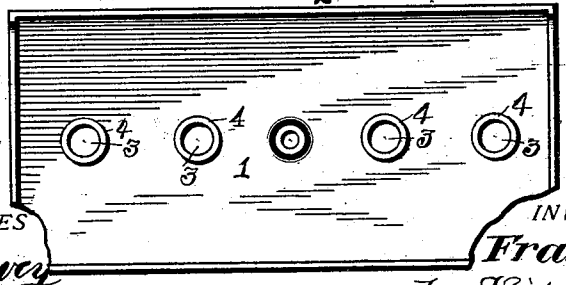
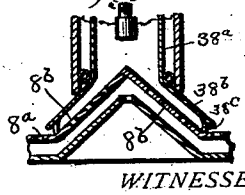


Fig. 7.



Fig. 8.



WITNESSES

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HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 711,936, dated October 28, 1902.

Application filed December 12, 1901. Serial No. 85,654. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. CARTER, a citizen of the United States, residing at Dorsey, in the county of Howard and State of Maryland, have invented certain new and useful Improvements in Hydrocarbon-Burners; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to hydrocarbon-burners, and has for its general object to provide an improved burner of this class adapted for use in ranges, cooking and heating stoves, furnaces, grates, and other analogous structures.

A special object of the invention is to provide improved means whereby the air supplied to the combustion-chamber to facilitate combustion will be heated before coming into contact with the unconsumed vaporized oil or gas or the flames, whereby all danger of chilling is avoided and all possible condensation of unconsumed vapor prevented.

A further object of the invention is to improve the construction of the burner with a view to economy of construction and ready separation or assembling of the parts to facilitate taking down and setting up for repairing or other purposes.

With these objects in view the invention consists in the improved construction, arrangement, and combination of parts of a burner of the class specified, all as fully described hereinafter and afterward specifically claimed.

In the accompanying drawings, in which the invention is illustrated as of a form suitable for use in an oblong fire-box, such as is common in cooking stoves and ranges, Figure 1 is a view in side elevation of a burner constructed in accordance with my invention. Fig. 2 is a horizontal sectional view on the broken line 2 2 of Fig. 1. Fig. 3 is a vertical sectional view on the broken line 3 3 of Fig. 2. Fig. 4 is a transverse sectional view on the broken line 4 4 of Fig. 1. Fig. 5 is a detail sectional view of one of the burner-jets. Fig. 6 is a top plan view of the base or hot-air chamber, the upper parts being removed and two corners broken away. Fig. 7 is a fragmentary perspective view of a modified form of hot-air chamber. Fig. 8 is a sectional view of a modification.

Like parts are indicated by the same reference-numerals wherever they occur in the several figures of the drawings.

Referring to the drawings by numerals, 1 indicates the base-plate, which is provided with a vertical peripheral flange 2, making it serve the purpose of a pan, as hereinafter specified. The plate 1 is provided with openings 3 3, surrounded on the upper surface of the plate by flanges 4. These openings are shown circular and longitudinally arranged in the center of the plate. Their shape and number may be varied to suit the particulars of each case. As before stated, this plate 1 is the base-plate of the burner, and it also forms the base or bottom of a chamber 5, which chamber is completed by the addition of a top plate 6, having its center raised, forming a longitudinal deflector 7 of substantially inverted-V shape. In the top plate 6 are provided two longitudinal slots 8 8^a, so placed as to be out of register or out of vertical alinement with openings 3 3 of the base-plate, the slots 8 8^a being preferably nearer to the sides of the plate 6 than are the openings 3 3 to the sides of plate 1, and the openings 3 3 preferably in the center of the plate.

9 10 designate two chambers or retorts, preferably of oblong rectangular form and of a length somewhat less than the width of chamber 5, such form and size being variable when desired within reasonable limits. These chambers are mounted centrally and transversely at and upon the ends of the top plate 6 of chamber 5 and are secured thereupon in any suitable manner—as, for instance, by means of bolts 11, passing through plate 6, and suitable horizontal lugs or flanges 12, projecting from the bottom of the chambers.

In the inwardly-facing side walls of the chambers 9 and 10 are formed vertical grooves 13 14 to receive vertical flanges 15 16 on the end walls of a combustion-chamber 17, whereby the said chamber will be supported at a

suitable distance above plate 6 to provide spaces 18 for the discharge of the products of combustion from the combustion-chamber. The chamber 17 is open at the bottom and also at the top, as hereinafter mentioned.

19 indicates a pipe tapped into retort 11, leading from any suitable supply of oil, (not shown,) which pipe may be provided with any suitable valve for regulating the supply of oil.

20 indicates a horizontal pipe connecting retorts 11 and 12, being tapped into the inner walls of each.

21 indicates a pipe tapped into the inner wall of retort 10 and lying in substantially the same horizontal plane as pipe 20, as at 22, to near the retort 11, where it is curved back, as at 23, and led to the center of chamber 17, where it bends into vertical position, as at 24, its upper end being threaded. The pipe 20 and the part 22 of pipe 21 lie just within the lower edge of chamber 17, and the walls of that chamber are notched at 25 to admit said pipes.

The burner proper consists, essentially, of a horizontal pipe closed at its ends and provided with nozzles 27 28, depending vertically therefrom. The burner proper in this instance is shown as of two short lengths of pipe, as at 29, with caps 30 at their outer ends and connected by a T-fitting 31, the stem of which depends in line with the nozzles and is arranged to be threaded on the projecting threaded end of the vertical portion 24 of pipe 21. Surrounding each nozzle is an inverted conic frustum of suitable metal, as at 32 33, which converge downward and serve to concentrate the air drawn through them by the flame from the jets, and thus facilitate complete and perfect combustion by insuring a more sure and thorough admixture of the air and burning gas. These frustums, which I shall term "concentrators," are secured to the inner sides of the walls of the combustion-chamber by bolts 34 35 passing through horizontal slots 36 in the concentrators and similar slots 37 in the chamber-walls.

Pipes 20 and 21, if not protected, are heated to such a high degree that oil will be carbonized in them. To prevent this, I provide guards or shields 38 38^a, composed, preferably, of sheet metal and provided with bottom hook-flanges 39 to engage under the walls of the combustion-chamber, and with upwardly-extending plates 40, having vertical slots 41 for the passage of the bolts 34 and 35, which also support the shields, the slots permitting of the vertical movement and adjustment of said shields into position, the hook-flanges and bolts preventing the shields from warping inward away from the walls which support them. I also provide a guard or shield 52, (to prevent carbonization of oil in the retort 9,) which consists of a sheet or plate of metal provided with two circular openings whereby it may be slipped upon the pipes 20 and 21 and cut away to slip over the flanges 15 16 on the walls of the combustion-chamber. When in place, as shown in Figs. 1, 2, and 3, the guard is held against displacement by the walls of the combustion-chamber and prevents the direct contact of the flame with the retort 12, whereby excessive heating thereof is prevented.

Each of the nozzles 27 and 28 is preferably made with a flaring mouth 41, a chamber 42, an inner tube 43 projecting into said chamber, and a wide inner opening 44 from the burner-pipe. A nozzle of this form is shown in Fig. 5, consisting of a thimble 45, threaded into the burner-pipe, a sleeve 46, threaded upon the thimble, and a tip 47, threaded into the sleeve; but the whole nozzle may be made of one piece threaded directly into the burner-pipe. The flaring mouth permits of the spreading of the flame within its limits and of the ready insertion of a wire to clear the nozzle of any obstruction, the wide inner opening assuring the best application of the pressure of gas from the burner and the chamber extending below the inner end of the inner tube receiving any obstruction punched inward out of the jet-tube.

The base-plate and the whole superstructure are held together by a bolt 48 passing upward through the base-plate, and a cross-bar 49, formed on or secured to the plate 6, as shown in Fig. 3, the plate 6 being provided with downwardly-projecting flange 50, which fits over the upwardly-projecting flange 51 of the base-plate, thus, when the parts are secured together by bolts 48, completing the air-chamber and holding all the parts of the burner together.

In operation, to start a fire oil is permitted to flow through the pipes, retorts, and nozzles and to drip upon the plate 6, where it is ignited. The flame from this oil or from any suitable kindler impinging upon the various parts will heat them, so that the oil will soon begin to issue from the nozzles in the form of an inflammable gas or vapor and the jets of flame will be projected downward into the chamber 17 and into contact with all the parts of the burner, heating them to a high degree. The jets will cause a downdraft through the concentrators in the top of the combustion-chamber, which will supply the oxygen necessary to support combustion, and the products of combustion will pass out of the combustion-chamber through spaces 18, taking an upward course between the walls of the chamber and the walls of the fire-box in which the device is used. Without the air-heating chamber these products of combustion in passing out through spaces 18 would strike an upward draft of atmospheric air between the walls of the chamber and fire-box and the contact therewith would tend to chill the vapors and to condense any unconsumed gas. In such construction this mixed air and the chilled vapors would pass up and part of the mixture be again carried through the combustion-chamber, the air in the mixture sup-

plying the necessary oxygen. With the air-heating chamber there would be no side draft of cold air. The air for such side draft will be heated in its passage through the heating-chamber, so that when the vapors of combustion mix with it there will be no chilling and no condensation of unconsumed gases, thus materially facilitating perfect combustion, the result being, as ascertained by practical use, a perfect blue flame and almost entire absence of soot or other residuum. The location of openings 3 3 and slots 8 8ª out of vertical alinement with each other retards the passage of air out of the slots before being properly heated. When the flame from the nozzle strikes the deflector 7, each jet will be divided and deflected sidewise out of openings 18, thus entirely filling the fire-box in which the burner is used, greatly facilitating the heating of the sides of the fire-box, such arrangement greatly facilitating the heating of water in the water-back of a range and the oven of a range or cooking-stove.

The slots 8 8ª extend from end to end of the air-chamber and combustion-chamber and assure the issue of continuous unbroken sheets of heated air from the air-chamber to mix with the flame deflected over the slots, as before described, thus effecting complete admixture at all parts of the flame and preventing the alternating of blue and yellow flame along the length of the burner, as is the case where rows of perforations are used instead of slots.

The preferable location of the openings 3 3 in the base-plate is in the center thereof, whereby air entering them must pass laterally a considerable distance before reaching the discharge-slots 8 8ª, thus causing the air to be fully heated before being discharged.

In the modified form of air-chamber shown in Fig. 7 the slots for discharge of air are shown on one side of the deflector 7ª, while perforations are shown on the other side, the principal object of the modification being to show that the air-chamber may be made of a single piece of metal, either sheet or cast, thus cheapening and simplifying it, and that the bends may be rounded, the base-plate curved, and the sides of the deflector curved, if desired.

The oil in passing through the retort 9 will be partially or wholly vaporized and the vaporization will be perfected in the passage of oil or vapor through the pipe 20, retort 10, pipe 21, and the burner, the vapor being retarded, dried, and superheated in its passage through the second retort 10, and this condition being preserved and continued during its further passage through pipe 21 and the burner the vapor will be delivered from the nozzles in condition for perfect combustion. Should any oil pass into chamber 5 while starting the fire, it will be held therein until it is vaporized, passed through slots 8 8ª, and consumed, thus preventing it from dripping down into the fire-box or ash-pit and being wasted.

In Fig. 8 the guards 38ª are bent outward at 38ᵇ and provided with supporting-lugs 38ᶜ, resting on the top of the hot-air chamber, and additional draft holes or slots 8ᵇ are provided to prevent vapors from gathering in the combustion-chamber and depositing carbon on the jets after the oil is cut off to extinguish the flame.

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

1. A hydrocarbon-burner comprising an air-chamber forming the base, a combustion-chamber open at the bottom and supported a slight distance above said base, burner-jets discharging downward in the combustion-chamber, continuous slots in the top of the air-chamber outside of and adjacent to the spaces between the sides of the combustion-chamber and the top of the air-chamber, and a row of openings in the longitudinal center of the base-plate of the air-chamber, substantially as set forth.

2. A hydrocarbon-burner comprising a combustion-chamber, jets discharging downward in said chamber, oil-conducting pipes in the chamber upon which the discharge from the jets might impinge, guards or shields over said pipes provided with hook-flanges along their lower edges to engage the lower edges of the combustion-chamber walls, and means for securing the upper edges of the shields to said walls, substantially as described.

3. A hydrocarbon-burner comprising a combustion-chamber, jets discharging downward in said chamber, oil-conducting pipes in the chamber upon which the discharge from the jets might impinge, guards or shields over said pipes having hook-flanges at their lower edges and vertical slots near their upper edges, and bolts passing through said slots and openings in the combustion-chamber walls, substantially as described.

4. A hydrocarbon-burner comprising a combustion-chamber having horizontal slots in its walls, a jet discharging downward in the combustion-chamber, a concentrator consisting of an inverted conic frustum surrounding the jet, and bolts passing through the concentrator and said slots whereby the concentrator is adjustably secured in position, substantially as described.

5. A hydrocarbon-burner comprising a basic air-chamber consisting of a single piece of metal shaped to form a base-plate having vertical side flanges and a centrally-arranged series of openings, and a cover-plate having its center raised forming a central double-faced longitudinal deflector and having openings in its outer portions parallel with and adjacent to said deflector, substantially as described.

6. A hydrocarbon-burner comprising a base, a combustion-chamber mounted upon

and above the base leaving a space below its walls and the top of the base, a retort mounted at one end of the base adjacent to the combustion-chamber, a pipe passing through the chamber to the retort, a pipe leading from the retort into the chamber, and a guard or shield between the end of the chamber and the retort having openings through which said pipes pass, whereby the guard is supported on said pipes, substantially as described.

In testimony whereof I affix my signature.

FRANK L. CARTER.

In presence of—

SHIPLEY BRASHEARS,

M. C. LYDDANE.