

(No Model.)

G. C. ROBERTS.
HYDROCARBON BURNER.

No. 591,694.

Patented Oct. 12, 1897.

Fig. 1.

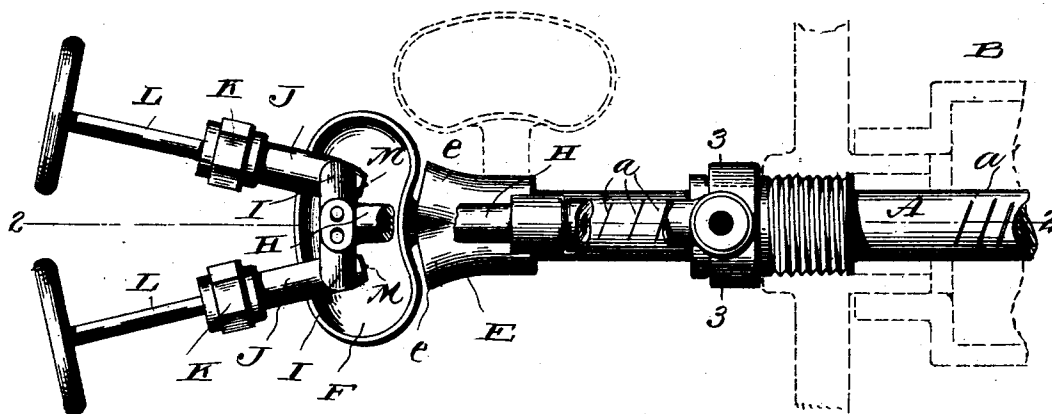


Fig. 2.

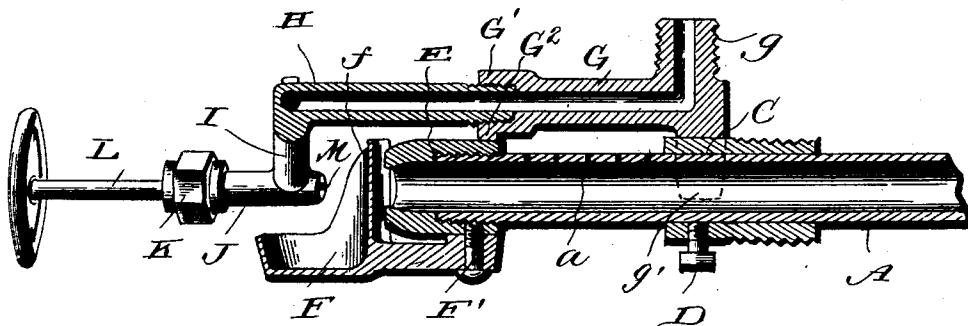
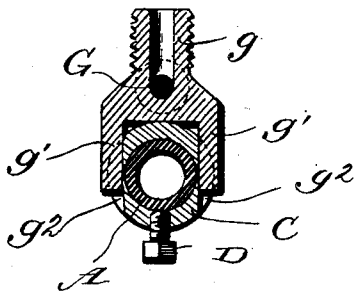


Fig. 3.



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Att'y

UNITED STATES PATENT OFFICE.

GEORGE C. ROBERTS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE TROY
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HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 591,694, dated October 12, 1897.

Application filed August 29, 1896. Serial No. 694,283. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. ROBERTS, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in hydrocarbon-burners of the well-known class in which the generator-chamber is arranged above the burner-tube and so disposed with relation thereto that the gas or vapor after being formed in said generator is caused to pass into the burner-tube; and it has for its primary object to prevent the air and gas, oil, or other heating substance from entering the burner-tube in line with the same, and thus provide for the absolute admixture of the air and gas before and at the time of burning. I arrange the jet-valves at an angle to the axial line of the burner-tube, so that the discharges therefrom are caused to cross each other and, striking the inner face of the burner-tube at an angle, are caused to rebound and again intersect each other. The tubes and their needle-valves being arranged on an angle, carry a larger amount of air into the burner, thus promoting more complete combustion and avoiding smoke and excess of carbon, which in the employment of the invention for rolls in laundry-work is decidedly objectionable. Where an injector or needle-valve is arranged in line with the axis of a burner-tube, parallelism exists to a great extent in the tracks of the air and gas or oil, the gas or oil occupying the axis of the tube and the air enveloping the gas or oil in a quite unmixed condition, thus generating smoke and soot and diminishing the perfection of complete combustion. In disposing the injector or needle-valves, one or more, at an angle to the tube these objections are overcome and perfect combustion and intense and uniformly-distributed heat is produced.

The generator-chamber from which the needle-valves are supported is detachably mounted upon the burner-tube in a novel manner to permit of its ready removal, it being de-

signed to so mount the tank which is connected with the threaded nipple of such generator-chamber that the tank must be removed while being filled, and thus avoiding any possibility of danger in filling the tank while the burner is lighted. The cup is pivotally mounted upon the under side of the burner-tube and has a vertical portion closing the entrance thereof when interposed between the same and the needle-valves.

Other objects and advantages of the invention will hereinafter appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a top plan of my improved burner with a portion broken away. Fig. 2 is a vertical longitudinal section on the line 2 2 of Fig. 1, and Fig. 3 is a vertical cross-section on the line 3 3 of Fig. 1.

Like letters of reference indicate like parts throughout the several views.

Referring now to the details of the drawings by letter, A designates the burner-tube, having near one end upon its upper face the slits *a*, as indicated, and in this instance this burner-tube is shown as extended and applied within a roll B of an ironing-machine, and within said roll the burner-tube is provided with slits or openings *a'*, as indicated in Fig. 1. Upon this burner-tube is sleeved the sleeve C, which is screw-threaded, as shown, to engage the screw-threaded bearing in the ironing-machine or other device in connection with which it is to be employed, and this sleeve is held upon the burner-tube by screw or analogous means D.

Screwed upon the outer end of the burner-tube is the casting or coupling E, the outer end of which is provided with the two inclined portions *ee*, the passages in which converge as they approach the inner end of the casting or coupling, so that the air or gas or oil passing thereinto from the needle-valves hereinafter described will be caused to cross each other and to strike or impinge against the inner wall of the burner-tube, it being

here again stated that it is essential that the entering air and gas or oil be introduced at an angle to the axial line of the tube in order that a more perfect combustion may be provided, and thus avoiding smoke and soot within the burner-tube and roll.

It will be noticed that the direction of the jets from the needle-valves L is such that they impinge directly against the inner walls of the burner-tube A and beneath the slits A' thereof, which are beneath the generator H. Now it therefore follows that the jets do not cross and recross, so as to bound and rebound within the casting or coupling E. The function of this device is simply to prevent the disturbance of entrainment produced by the needle-valves which might occur from drafts in the adjacent atmosphere. The convergent passages of this casting permit entrance of the fuel in two streams without varying their direction. In this respect it differs in function from an ordinary bell-shaped conical casting mouth or trunk in that the contraction of these latter devices at their inner ends tends to condense the streams passing therethrough.

F is the cup into which the gasoline or other oil is placed to start the device in the usual manner, and this is provided with the vertical portion *f*, which, as seen in Fig. 2, is disposed across in front of the casting E and closes the same until the cup is moved away into the position indicated by dotted lines in Fig. 1. This cup is pivoted to the under side of the burner-tube or casting E thereon by a vertical pivot F', as indicated in Fig. 2, so that it can be turned around out of the way after the device has been started and as indicated in dotted lines in Fig. 1.

G is the generating-chamber. It is formed at one end with the vertical threaded portion *g*, with which is adapted to be connected the pipe leading from the tank. (Not shown.) At this end the generating-chamber is provided with the depending portions *g'*, which engage into the grooves *g''* of the sleeve C, as indicated best in Fig. 3, and by which the generator is supported and held in position.

At the outer end the generator is provided with an internally-threaded enlargement G', into which is connected the pipe H, and upon the under side this enlargement is provided with the depending portion G², which rests upon the casting or coupler E and serves to steady and aid in supporting the generator in its position upon the burner-tube. From the outer end of this pipe H extend the convergent tubes I, the lower end of each of which supports a tube J, with which, of course, communication is afforded with the pipe H by the said tubes I, and each of these pipes J is disposed otherwise than in axial line with the burner-tube, as clearly indicated in Fig. 1. The outer end of each of these tubes is furnished with a stuffing-box K, through which passes the stem L of a needle-valve M of known construction. While in this instance I have shown two of these depending tubes I and

inclined tube J with needle-valve, it is evident that this number may be varied. Sometimes may employ but one and in other instances more than two may be desirable, but in all cases they should be arranged otherwise than in line with the axial line of the burner-tube in order to insure the beneficial results hereinbefore outlined.

The operation will be apparent. The device is started in the usual way and then the cup or receptacle F is moved to one side into the position indicated by dotted lines in Fig. 1 and the needle-valve or valves adjusted, and by the disposition of the needle-valve and its tube with relation to the axial line of the burner-tube the gas and incoming air are thoroughly mixed before entering the burner-tube and perfect combustion and intense and uniformly-distributed heat is the result.

It will be observed that by a diagonal or angular disposition of each of these burners the intermediate field of air upon which each is to act is enlarged, so that the entrainment of one jet will not conflict with the entrainment of the other, and consequently more air will be entrained. This is the advantage secured at the rear end of the needle-valves, while the advantage secured at the front is the admixture by angular delivery and crossing and recrossing, abutting and rebutting against and from the interior walls of the burner. These advantages will not occur when the needle-valves are placed parallel with each other and at such a distance apart as to permit of their use conjointly in a single burner-tube of ordinary proportionate internal diameter, as in such an arrangement of the needle-valves the entrainment of each burner on the side toward the other burner must conflict more or less with the entrainment of that other burner, as they are both drawing from the same field of air.

The presence of an unconfined air-space in front of the needle-valves and between them and the burner-tube is also advantageous over a construction in which the valves terminate directly at or within the tube or a hood communicating therewith. In the first instance when the needle-valves terminate at the burner tube or hood the entrainment of air by and in proximity to the jet as and after it leaves the valve is impeded, while an unconfined air-space contributes to entrainment. In the second instance, where the needle-valves terminate within a hood, entrainment is not only impeded by the hood, but the hood becomes a mixing-chamber which tends to limit the distance within the burner communicating therewith to which properly-combined air and gas is projected, so that if the burner be long imperfectly commingled air and gas is the fuel consumed in the more distant portions of the burner-tube and there results imperfect combustion and uneven heat at the end of the burner-tube. Now by dispensing with a hood or mixing-chamber and directing the jets from the

valves so as to cross and recross, bound and rebound within the burner-tube itself a more perfect commingling of air and gas is secured throughout the entire length of the burner-tube.

Modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

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

1. A hydrocarbon-burner having a plurality of convergent needle-valves located to deliver their jets through an unconfined air-space directly into the mouth of a burner-tube, such tube having orifices along the length thereof, substantially as specified.

2. A hydrocarbon-burner having a plurality of needle-valves arranged with their tubes convergent and terminating at a distance from each other and arranged to deliver their jets in lines crossing each other through an unconfined air-space into the mouth of a burner-tube, such tube having orifices along the length thereof, substantially as specified.

3. A hydrocarbon-burner having its generator arranged in a vertical line with and over the burner-tube, and a plurality of needle-valves and tubes each independent of the other and terminating at a distance from the adjacent end of the burner-tube, and constructed and arranged to deliver their jets at angles to the axial line of said tube through an unconfined air-space, and to strike the inner wall of the burner-tube upon opposite sides thereof; substantially as described.

4. The combination with a burner-tube and an end casting thereon having convergent passages, of a generator-chamber and tubes and needle-valves convergent and in line with the convergent passages of the casting and disposed at a distance therefrom to deliver their jets through an unconfined air-space into said burner-tube through the convergent passages of the casting; substantially as described.

5. The combination with the burner-tube and the generator-chamber disposed above the same, of convergent needle-valves and jet-tubes supported from said generator-chamber, and constructed and arranged to deliver their jets into the burner-tube through an unconfined air-space upon lines crossing each other; substantially as described.

6. The combination with the burner-tube

and the generator-chamber disposed above the same, of convergent needle-valves and jet-tubes supported from said generator-chamber, and constructed and arranged to deliver their jets into the burner-tube through an unconfined air-space upon lines crossing each other, and a casting on the end of the burner-tube having convergent passages in line with the needle-valves; substantially as described.

7. The combination with the burner-tube, of a sleeve thereon having vertical grooves, and a generator-pipe having depending portions fitted to said grooves and supported above the burner-tube; substantially as described.

8. The combination with the burner-tube, of a sleeve thereon, a generator-tube detachably supported by said sleeve, and having a depending portion at its outer end, tubes supported from said depending portion independent of each other and convergent, needle-valves mounted in said tubes, and a casting on the end of the burner-tube having convergent passages in line with said tubes; substantially as described.

9. The combination with the burner-tube and its sleeve and casting, of the generator detachably mounted upon the burner-tube and supported and held by said sleeve and casting; substantially as described.

10. The combination with the burner-tube and its sleeve and casting, of the generator detachably mounted upon the burner-tube and supported and held by said sleeve and casting and provided with convergent tubes, and divergent depending tubes communicating therewith and disposed at an angle to the axial line of the burner-tube; substantially as described.

11. The combination with the burner-tube having slits in different portions thereof, of a sleeve mounted upon the tube between the slitted portions, and a generator having depending portions fitted in grooves in said sleeve and at the other end provided with a discharge-tube arranged at an angle to the axial line of the vertical tube and provided with a needle-valve; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE C. ROBERTS.

Witnesses:

J. W. GRIFFEN,
R. W. YATES.