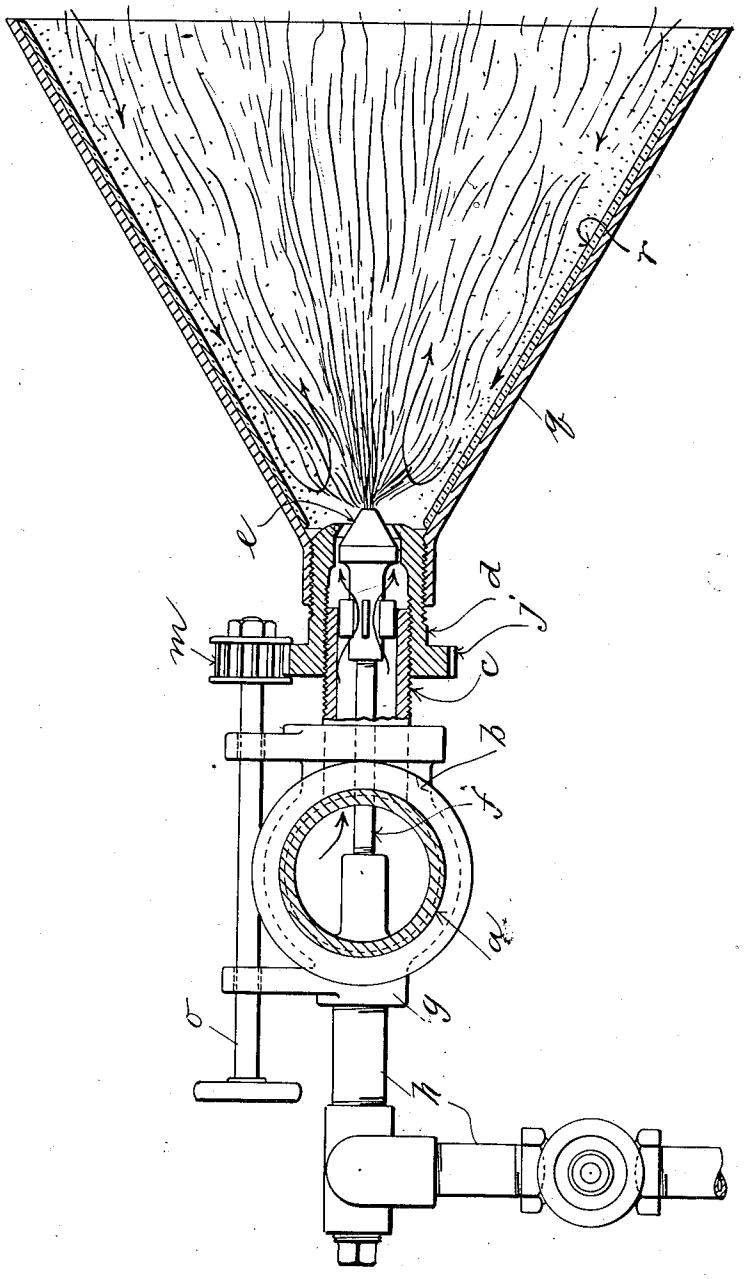
No. 825,290. PATENTED JULY 10, 1906.

J. F. BARKER.

HYDROCARBON BURNER.

APPLICATION FILED APR. 25, 1904.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

No. 825,290. Specification of Letters Patent. Patented July 10, 1906.

Application filed April 25, 1904. Serial No. 204,767.

To all whom it may concern:

Be it known that I, JOHN F. BARKER, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification.

This invention relates to hydrocarbon-burners; and it relates especially to that class of burners in which air under pressure is used to atomize the fuel. Burners of this type, which are used to burn the heavier oils, require a relatively high air-pressure to properly atomize the oil, and this results in the formation at the burner-nozzle of a jet of mixed air and oil having a high initial velocity which draws against it and carries with it such a volume of air that when fire is applied no combustion takes place within several inches of the nozzle of the burner, and it is only when the jet has widened out considerably that the proper quantity of oxygen becomes incorporated with the hydrocarbon to permit combustion to take place.

It is a well-established fact that the flame of one of the burners of the type above described does not receive sufficient oxygen to effect the complete combustion of the carbon in the fuel unless the flame be projected against some obstruction, whereby it is broken up and a larger area thereof presented to the air permits the taking up of sufficient oxygen to completely consume the carbon, or substantially so. This blowing away of the point of ignition from the nozzle is due to the inrush of air of a relatively low temperature against the jet of hydrocarbon and air where it issues from the burner and at a point where the jet is in its most compact form, and this so reduces the temperature of the jet as to hold the point of ignition at some distance from the point of the burner. The result of this condition of course is the projection on the longitudinal center of the jet of a mixture of air and atomized oil in which the proportion of air is deficient. The fact that good combustion is with this type of burner not economically obtainable without directing the jet of fuel against an obstruction prevents the use of this burner for many purposes to which it otherwise is well adapted; and the object of this invention is to provide means whereby the supply of air to the atomized oil, aside from the air used under pressure, may not only be increased in quantity, but may be incorporated with the jet under such conditions as will insure more perfect combustion and more efficient and economical operation of the burner; and the invention consists in mounting upon the burner near the nozzle end thereof a cone-shaped mouthpiece in which the end of the nozzle is located at the apex, said mouthpiece having no opening therein for the admission of air at or near its apex, all of which is fully described in the following specification and clearly summarized in the claim appended thereto, the invention being illustrated in the accompanying drawing, which shows in side elevation, partly in section, a hydrocarbon-burner of the type referred to herein with the invention applied thereto. The burner shown herein may be considered merely as typical of that class of burners in which air under pressure is used to volatilize the hydrocarbon fuel.

Referring to the drawing, *a* indicates an air-pipe in which one or more of the burners may be placed, each of which is supplied with air under pressure from this pipe. These burners—that is, the particular burner shown herein—comprise a body *b*, having a threaded tubular extension *c* communicating with the interior of the body and on which extension the cap *d* is screwed. The nozzle *e* of the burner projects through an opening in the end of this cap, said nozzle having the usual tapered form and being axially adjustable in the tubular extension *c*. Into this nozzle, at the rear end thereof, is screwed a pipe *f* of smaller diameter than the interior of the tubular extension, which pipe communicates through a boss *g* on the body with an oil-pipe *h*.

To adjust the delivery of air relative to the nozzle *e*, the cap *d* is made rotatable, and as a matter of convenience this cap is provided with a flanged end having gear-teeth *j* cut therein, with which a pinion *m* meshes, said pinion being mounted on a rotatable rod *o*, which extends back toward the oil-pipe, which permits a convenient adjustment of the burner. On the end of the cap *d* the cone-shaped mouthpice *q* is screwed or otherwise secured in such manner as will locate the

nozzle axially thereof substantially at the apex of this cone and in such manner as will practically prevent the access of air to the jet projected from the nozzle, except such as may be drawn in through the open end of the mouthpiece. Preferably the latter is lined with some non-conductor of heat, like asbestos, which will prevent the cone itself from becoming too hot. With a burner thus equipped with the cone-shaped mouthpiece when the jet of mixed combustible and air is discharged from the nozzle it is found that the jet will create more or less of a vacuum within the cone, which will result in such a widening out of the jet that the cone will be nearly filled with flame, this widening out of the jet taking place as far back as the nozzle. As a result of the establishment of this vacuum there will be an inflow of air, whose general direction is indicated by the arrows along the inner wall of the cone, these currents converging toward the apex of the latter, at which point they will be turned back upon themselves by the force of the jet. After the burner has been lighted the walls of the cone become intensely heated, and the inflowing air becomes heated and expanded and in this condition incorporates with the volatilized fuel of the jet much more freely and to such a degree that the point of ignition will run back almost to the point of the nozzle. By thus effecting the widening out of the flame from the point of its ignition and by causing the flow of air against the flame toward the apex of the cone the hydrocarbon becomes associated with oxygen in such proportion that the combustion of the carbon is carried to a high degree of perfection and the flame is clean and white. It has been found in practice that the flame projected from a burner equipped with one of these cone-shaped mouthpieces may be projected into a tube without causing the deposit of carbon on the interior thereof, which shows clearly a decided advance in this art, for it has heretofore been impossible to make use of an oil-burner within the knowledge of the applicant for this particular purpose. For example, in the heating of singeing-tubes employed in the manufacture of woolen goods it has be found impracticable to use oil fuel, for the reason that the proper degree of heat could not be obtained without an obstruction for the flame to impinge against, and this precluded the use of it in the singeing-tube, for the reason that it prevented the heating of the latter beyond the obstruction, and for the obstruction to be effective it was necessary to locate it about midway between the burner and the tip of the flame, and this would not heat a tube of sufficient length to permit the use of this fuel, whereas by means of the construction shown and described herein a tube eight inches in diameter and ten feet long may be uniformly heated for almost its entire length by introducing the fuel axially thereof at one end of the tube. Heretofore it has been necessary to use gas to heat these singeing-tubes at a much greater expense than by the use of oil. It will be of course understood to produce the air-currents in the mouthpiece *q* such as have been herein described it is quite necessary that air should be entirely excluded from the cone at or near the apex thereof, to the end that the partial vacuum created in the cone by the jet may not be neutralized.

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

A hydrocarbon-burner having an air-inlet pipe, a pipe conveying liquid fuel and extending through the air-inlet pipe, an exteriorly-threaded extension connected with the air-inlet pipe, an exteriorly-threaded cap on the extension provided with a cone-shaped outlet and having gear-teeth cut in the exterior surface thereof, a pinion engaging said teeth, a stem for rotating the pinion, a cone-shaped hood screwed onto the outer end of the cap and forming an air-tight joint therebetween, the liquid-fuel-conveying pipe having a burner-nozzle cone-shaped on the outer surface and conforming in shape to the cone-shaped inner surface of the cap whereby when the pinion is rotated the cap is rotated and adjusted longitudinally so that the space between the interior of the cap and the said cone-shaped burner-nozzle is varied, and whereby a partial vacuum is obtained near the apex of the cone-shaped hood causing the air to flow into the cone and along the inner sides of the same and be turned back upon itself by the flame in the cone as described.

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