(No Model.)

E. S. BLASDEL & J. R. MORSE.

HYDROCARBON BURNER.

No. 456,583. Patented July 28, 1891.

Fig. 1.

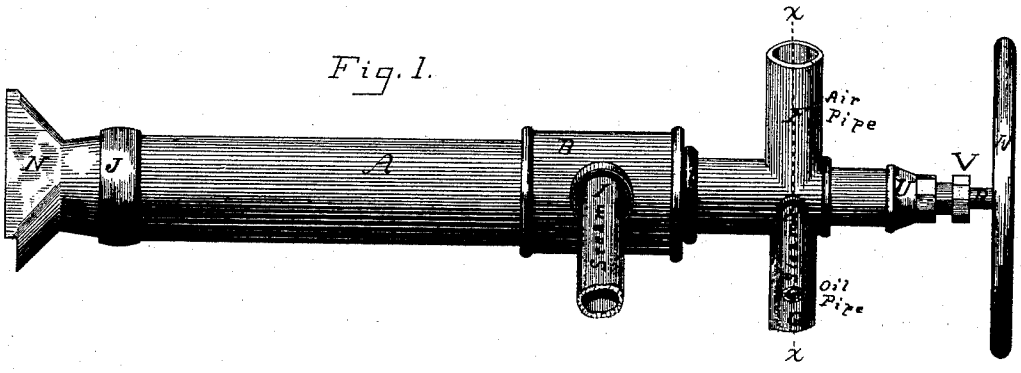


Fig. 2.

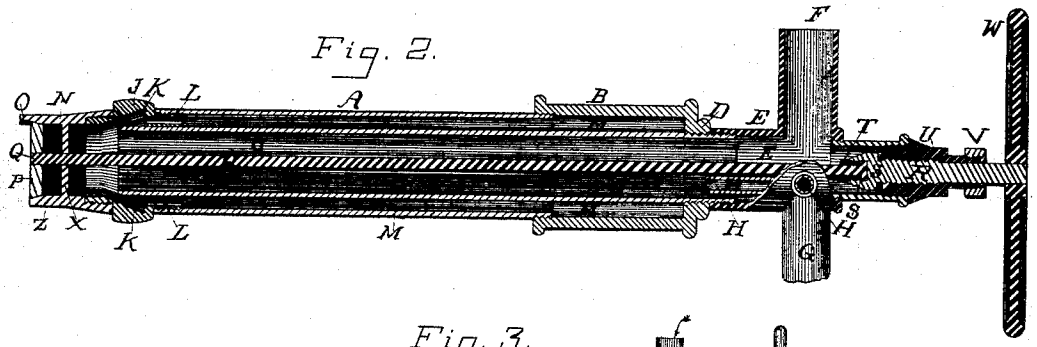


Fig. 3.

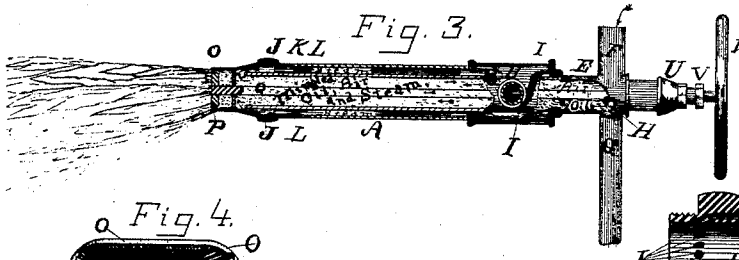


Fig. 6.

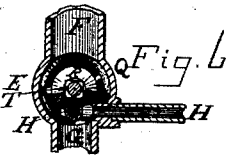


Fig. 4.

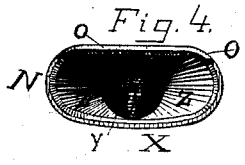


Fig. 7.

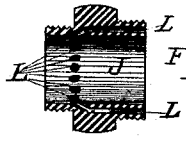
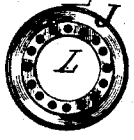


Fig. 5.



Witnesses.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ELIJAH S. BLASDEL AND JOHN R. MORSE, OF LOS ANGELES, CALIFORNIA; SAID BLASDEL ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHARLES B. GOULD, OF SAME PLACE.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 456,583, dated July 28, 1891.

Application filed November 7, 1885. Serial No. 182,105. (No model.)

To all whom it may concern:

Be it known that we, ELIJAH S. BLASDEL, and JOHN R. MORSE, citizens of the United States, and residents of Los Angeles city and county, in the State of California, have invented a new and useful Improvement in Hydrocarbon-Burners, of which the following is a specification.

Our invention relates to the formation of combustible gas from hydrocarbons and the consumption of the same for the production of heat.

The main object of our invention is to consume the heavier grades of hydrocarbon oils without waste and to construct a burner which will most effectually do this.

A further object of our invention is to so distribute the flame that it will not overheat any one portion of the steam-boiler and cause it to pocket or bulge out; also, to secure a large flow of air into the burner and to thoroughly spray the oil and mix it with the steam and air before it passes out of the burner to be consumed; also, to provide means for properly decomposing the oil and steam and forming it into gas before it issues from the burner; also, to provide means for regulating the amount of heat to be produced; also, to adapt the burner for rapid and thorough cleaning in case it should become clogged with residuum from the oil.

We attain these objects by means of the device described herein and illustrated in the accompanying drawings, in which—

Figure 1 is an isometrical view of our improved burner. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a view of one of our burners in operation, portions of the burner being broken away to show the manner in which the same operates. Fig. 4 is an end view of the burner-tip with the valve removed. Fig. 5 is an end view of the steam-collar J. Fig. 6 is a section on line x x, Fig. 1, showing the bent portion of the steam-pipe H intact. Fig. 7 is a sectional view of a modification of the collar J.

A is the steam-jacket or case-tube screwed into one end of the steam-jacket or case-fitting B. This tube and fitting constitute a single incasing tube and may be made in one piece, the only object in making them in separate parts, as shown, being convenience of construction.

C is the central air, oil, and steam mixing tube. It is inserted through the tube A and the fitting B and screwed into the case or jacket-head D in the farther end of B. A part of the treadle portion of C extends through the head D to receive the five-way fitting E, which is screwed thereon. The short upwardly-extending supply-pipe F opens into the upper side of the fitting E to supply air to the inside of the tube C.

G is a small oil-supply pipe entering the under side of the fitting E, and is connected with the oil-supply reservoir.

H is the forwardly-directed mixing-jet steam-pipe, which is smaller than the oil-supply pipe G. It enters the fitting E through the side thereof close to the bottom of the fitting and is bent toward the tube C. This pipe is connected with a steam-boiler and supplies the tube C with steam.

I is a steam-jacket steam-supply pipe, which opens into the fitting B, and is also connected with the steam-boiler to supply steam to the tube A.

J is the steam-collar, provided with the frustum-shaped chamber K and steam-jet holes L. It is fitted upon the free end of the tube C and screws into the tube A, filling the opening between the ends of the two tubes A and C. The chamber K is cut into the inside of the collar J and is in the shape of the frustum of a cone, having its base toward the rear end of the tube A. The sloping walls of this chamber extend forward beyond the end of the tube C. Small holes L connect the chamber K in the collar J with the annular chamber M between the tubes A and C. Upon the front end of the collar is screwed the laterally-flaring burner-tip N, the mouth of which flares outward horizontally from the line of the tube A. The edge or verge of the burner-tip is beveled slightly around the inner side, and a projecting lip O extends forward from the top of the burner above the beveled portion. A beveled valve P, made to fit the mouth of the burner-tip, is rigidly secured to a rod Q, which extends back through the tube C to a valve-stem R, mounted at the rear of the fitting E. A head S is turned on

the end of the valve-rod Q, and it fits into a socket in the end of the valve-stem R, and is secured therein by a collar-plug T, which fits around the rod Q and screws into the socket in the valve-stem.

The valve-stem R is provided with suitable seat and packing boxing U V, and hand-wheel W.

A cross-bar X, with an opening Y in it, is mounted upon the inside of the neck of the burner-tip to support the valve-rod Q.

The operation of the burner is as follows: The tip N is inserted into the fire-box through an opening in the front wall of the furnace, the pipes H and I are connected with the boiler, and the pipe G is connected with the oil reservoir or tank, each of such pipes being provided with suitable cut-off valves. A fire is built under the boiler, so as to raise a slight head of steam, ten or fifteen pounds being sufficient. The valve P is then opened slightly by turning the wheel W. Oil is turned on through the pipe G and steam through the pipes H and I. The steam which passes into the tube A through the pipe I blows out through the holes L in jets which impinge against the oblique walls of the chamber K, and are deflected across the end of the tube C, and the steam then passes into the chamber Z in the burner-tip, and from thence out through the opening between the valve P and the mouth of the burner-tip N. The effect of the deflected steam blowing across the open end of the pipe C is to create a vacuum in such pipe and cause the air and oil to flow through the pipes F and G into and through the tube C. The steam which blows into the tube C through the pipe H increases the vacuum and the consequent flow of air and oil. As the oil flows along the tube in front of the mouth of the pipe H it is blown by the jet of steam into a vapor and is thoroughly intermingled with the steam and air, and then passes out through the mouth of the tube C, where it is further acted upon by the deflected steam from the chamber M. Thence it passes into the chamber Z, whence it passes out through the opening between the valve P and the mouth of the burner, where it ignites. The flame soon heats the burner-tip sufficiently to decompose the vapor as it comes into contact with the walls of the chamber Z under the pressure of the steam and its own expansion. This prepares the fuel for complete combustion, which will not occur unless the vapor is decomposed and gas formed, and this is most effectually accomplished in making gas from oil by bringing the vapor of the oil into contact under pressure with a red-hot surface. This is accomplished by means of the chamber Z in the burner-tip. The opening between the beveled edge of the valve P and the mouth of the burner, being at an angle with the line of the burner-tubes, causes the flame to spread out sidewise and downward, while the lip O at the top of the mouth of the tip prevents the flame from being projected upward against the boiler. The lower side of the mouth of the burner-tip is slightly curved, so as to cause the lower portion of the flame to conform to the shape of the boiler, while the upper lip of the tip is straight. The heat of the steam around the inner tube C assists in vaporizing the oil, in conjunction with the blast from the pipe H, and prepares it for decomposition when it reaches the chamber Z.

By means of this device the heaviest grades of petroleum oils can be burned, as the jet of steam from the pipe H will cause a free flow of oil, which otherwise would not pass through the pipe without considerable pressure, and as the oil, when it flows into the tube C, is immediately sprayed and mingled with steam and air, being at the same time subjected to considerable heat and is afterward acted upon by another blast of steam which is directed across the line of the blast of vaporized oil, thus thoroughly mingling therewith, the air, steam, and vaporized oil are perfectly mingled and are in good condition for being decomposed when brought into contact under pressure with the heated walls of the chamber Z, and the gas, as it issues from the mouth of the tip, immediately ignites, and an intense flame is produced, complete combustion taking place. Should any of the residuum which occurs in crude oils cause a clogging of the valve, the valve may be thrown wide open, the oil turned off, and the steam-jets turned on to their full capacity. This will blow out all residuum and cleanse the burner.

The flame may be readily and accurately regulated by opening or closing the valve P and regulating the flow of oil and steam.

The collar J may be made as shown in Fig. 7, dispensing with the chamber K and giving an oblique direction to the vents L, the chamber being employed simply because it is a convenient form of construction, which will give the oblique direction required to throw the jets across in front of the vaporizing and mingling tube C.

We are aware that hydrocarbon-burners have heretofore been constructed with an air-and-oil-supply tube surrounded by a steam-pipe extending slightly beyond the end of such tube and surrounded in turn by another pipe for steam or gas, or both, whereby the steam from the steam-pipe immediately surrounding the oil-tube acts upon the oil immediately before it is blown out from the end of such pipe, and whereby the oil, air, and steam are then acted upon by an additional jet of steam before issuing from the burner, as shown in the patent to Parsons, dated June 5, 1877, No. 191,546, and we lay no claim to such construction.

We are also aware that a blast of air has heretofore been passed through a tube for the purpose of driving coal-tar into the furnace, as shown in patent to Brooke and Wright, No. 167,873, dated September 21, 1875; also,

that hydrocarbon-burners which mingle oil, air, and steam have heretofore been provided with a decomposing-chamber, where the vapor and oil come into contact under pressure with a red-hot surface, and we do not claim the same as new; but we are not aware that any burner has ever heretofore been constructed in such a manner as to vaporize the oil and thoroughly mingle it with air and steam, as is the case in the extended tube C, and then subject the vapor thus formed and mingled to an additional jet of steam as it enters into the decomposing-chamber.

Now, having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A hydrocarbon-burner consisting of a vaporizing and commingling tube closed at one end and provided with ingress-pipes near the closed end of the tube for air, oil, and steam, such steam-pipe opening at the bottom of the mingling-tube toward the open end thereof, an incasing tube encircling such vaporizing and mingling tube, leaving a chamber between the two and provided with an ingress-pipe for steam, such tubes being provided with openings at the front ends thereof for the egress of the steam and vapor and connected with a decomposing-chamber and burner-tip common to and combined with such tubes, all being in combination, as set forth.

2. The combination set forth of the steam-jacket tube, the steam-jacket fitting secured thereon and provided with the centrally-perforated head, the central air, oil, and steam mixing tube, the steam-collar provided with the frustum-shaped chamber and the jet-holes, the laterally-flaring burner-tip, the beveled valve fitted in the flaring mouth of the tip, the valve-rod secured to the valve and extending through the mixing-tube and screwing through the rear of the burner, the five-way fitting, the air-supply pipe, the oil-supply pipe, the forwardly-directed mixing-jet steam-pipe, and the steam-jacket supply-pipe.

3. In an oil-burner, the combination of the vaporizing and mingling tube, air-pipe F, oil-pipe G, and steam-pipe H, discharging into the said mingling-tube, the jet-tube surrounding the mingling-tube and having means for admitting steam thereto, the steam-vents K and the burner-tip N, and the valve P within the burner-tip, substantially as described.

4. In an oil-burner substantially such as described, in combination with a vaporizing apparatus, the burner-tip beveled at its mouth around the sides and bottom and provided with a movable valve fitted therein, substantially as set forth, the top of such tip above the valve being straight and parallel with the line of the burner, and the under side curved, substantially as set forth, whereby the flame is caused to conform to the shape of the boiler.

5. In an oil-burner substantially such as described, and in combination with the vaporizing mechanism, the burner-tip N and movable valve P, the tip provided with the lip O and chamber Z and beveled around the inner edge of its mouth and curved at the bottom, substantially as set forth.

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JOHN R. MORSE.

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