(No Model.)

DR. F. McKINNEY.

HYDROCARBON BURNER.

No. 564,024. Patented July 14, 1896.

Fig. 1

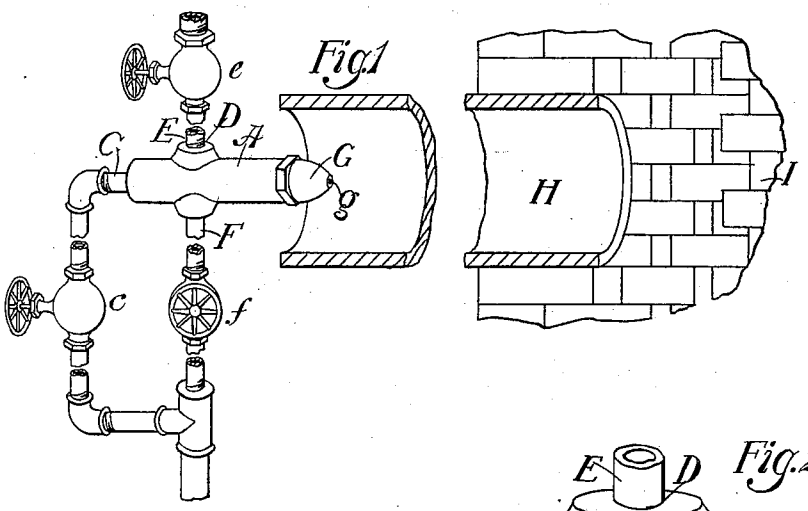


Fig. 2

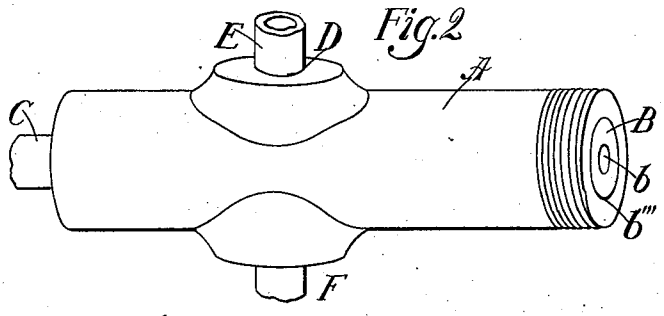


Fig. 6

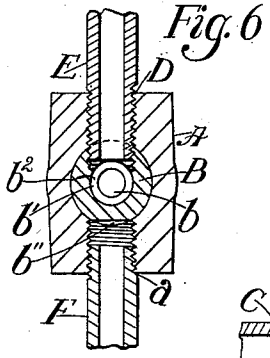


Fig. 3

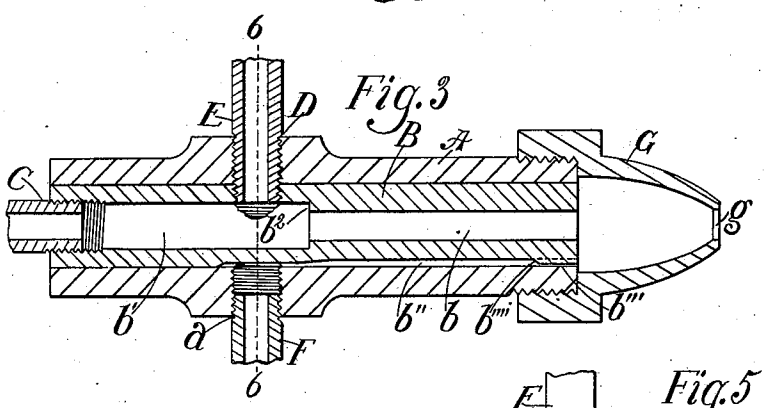


Fig. 4

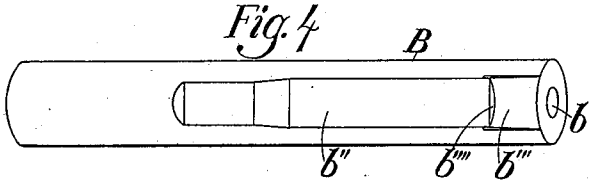
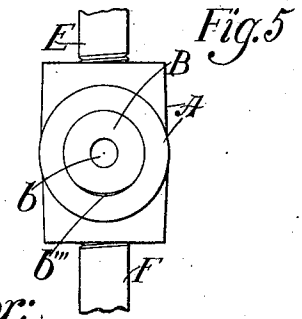


Fig. 5



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UNITED STATES PATENT OFFICE.

DR. FRANKLIN McKINNEY, OF SOUTH LOS ANGELES, CALIFORNIA.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 564,024, dated July 14, 1896.

Application filed August 7, 1895. Serial No. 558,461. (No model.)

To all whom it may concern:

Be it known that I, DR. FRANKLIN McKINNEY, a citizen of the United States, residing at South Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Hydrocarbon-Burner, of which the following is a specification.

My invention relates to hydrocarbon-burners for use with either steam or air.

My invention is adapted for use under boilers and in other places in which hydrocarbon-burners are ordinarily used, but is specially designed for use in kilns for burning brick, sewer-pipe, terra-cotta, pottery, etc.

One object of my invention is to provide a hydrocarbon-burner of extreme simplicity and of very small cost.

Another object of my invention is to provide a hydrocarbon-burner which is free from all danger of clogging with heavy oils.

Another object of my invention is to provide a burner which will give a hot fire suitable for finishing a kiln of brick, &c., and which will also give freer combustion with a slow fire than is given by burners heretofore in use, so that the burner is specially adapted for economical use with the slow fire that is necessary at the start in firing a kiln of brick or other earthenware and also for the hot fire afterward required.

Another object of my invention is to provide a hydrocarbon-burner with which I can throw the flame two or three feet away from the burner—that is to say, I have constructed a burner which the operator can so adjust as to prevent ignition of the fuel closer than two or three feet from the outlet of the burner, but with which the oil may be blown to that distance or farther and then fully consumed. This is desirable in burning kilns of brick, &c., with a hot fire for the reason that the burners for such kilns are located at the end of an arch which projects from the side of the kiln from one to three feet. This arch is customary in using oil-burners in order that there may be a hot fire applied to burn the brick, sewer-pipe, or other earthenware at the sides as well as at the interior of the kiln. With my invention I am enabled to blow the oil through this arch, and it ignites and produces a hot fire immediately it enters the kiln, but does not heat the arch like other burners.

The body of my new burner is composed of two metal parts which are shrunk together and thus virtually constitute a single part to which the pipes for supplying oil and steam or air are suitably connected and provided with valves by which they are controlled.

When my burner is to be used for a hot fire, another part is applied consisting of a nozzle which screws upon the end of the burner body.

The accompanying drawings illustrate my invention.

Figure 1 is a fragmental perspective view of my burner in position for a kiln, a fragment of which is shown. In this view the burner is shown as it is in use for a hot fire. Fig. 2 is a fragmental perspective view of the burner ready for use for a slow fire, the nozzle being removed and not shown. Fig. 3 is a longitudinal mid-section of the burner ready for use with a hot fire. Fig. 4 is a perspective view of the plug, looking at the under side. Fig. 5 is an elevation of the outlet end of the burner when the nozzle is removed. Fig. 6 is a section on line 6 6, Fig. 3, looking toward the outlet end of the burner.

A indicates the casing of the burner and B indicates the plug fitting closely within the casing and upon which the casing is shrunk. The plug B consists, substantially, of a metal cylinder provided with an axial bore b b' of two diameters, the outlet-tube b of the bore being smaller than the steam and oil inlet chamber b' of the bore. The inlet-chamber b' is screw-threaded at the inlet end thereof to receive the steam-pipe C, which is screwed thereinto. The inlet-chamber b'—that is to say, the large portion of the bore of the plug—ends abruptly, thus forming an annular shoulder b^2 at the mouth of the smaller portion b of such bore. The casing and the plug upon which it is fastened are pierced by a screw-threaded pipe-hole D on the upper side thereof for the oil-pressure pipe E, which is screwed into the pipe-hole D and is connected with a stand-pipe or other means for supplying oil under pressure. (Not shown.) The under side of the plug is cut away to form, in connection with the inner wall of the casing, the steam-pressure chamber b'' and the lunulate outlet b''' therefrom. The under side of the casing A is pierced by a steam-pipe hole a, in which is screwed a steam-

pipe F, thus to supply steam to the pressure-chamber b''. The pressure-chamber b'' increases in depth from its inlet end to within about three-fourths of an inch, more or less, of the end of the plug and there the greater portion of the plug is left to form a sloping shoulder b'''', and from this shoulder on to the front end of the plug a portion of the plug is cut away in a circle eccentric to and of greater radius than the plug, so that the cut is lunulate in cross-section and the plug where thus cut away forms, with the cylindrical bore of the casing, an outlet orifice which is in cross-section a very thin crescent. By means of this very thin crescent-shaped outlet I secure great economy of steam and a perfect combustion of oil for burning a slow fire. The crescent-shaped jet of steam, being underneath the bore through which the oil flows, will receive the oil when the same is allowed to run out through the bore b and will carry the oil into the furnace for burning. The greater portion of the oil will flow upon the thicker part of the crescent-shaped jet and the lunulate shape of the outlet causes the greatest force of steam to be directly under the outlet and there is only so much steam emitted at the edges of the jet as is necessary for carrying all the oil into the furnace or kiln in proper condition for ignition. The thin edges of the crescent-shaped jet of steam also carries the air freely into the flame in large quantities and perfect combustion with a slow fire and with a small escape of steam is thus made made possible.

When a kiln of brick or other earthenware has been properly heated by the slow fire and is ready for the hot fire, the steam and oil are turned off and the nozzle G is screwed in place on the end of the burner proper. This nozzle is provided with an outlet g in line with the outlet b of the burner, so that the oil and steam blown from the burner will pass through the outlet g freely. Then steam is turned on through the pipe C and a sufficient quantity of oil is allowed to drop through the pipe E into the chamber b', thus to be acted upon by the steam in the steam and combustion chamber b' and blown through the outlet b and through the nozzle and its outlet g. The force of the steam through the pipe C will blow the oil through the arch or pipe H, and the oil will not ignite until it reaches the kiln I, and there it will burst into flame to properly burn the kiln.

The steam is admitted into the end of the chamber b' or large portion of the bore of the plug through a pipe the inner diameter of which is less than that of the bore of the said chamber b', and a portion of the jet strikes the shoulder b^2 and the counter currents thus formed produce a mingling of oil and steam before it is emitted through the outlet b.

By combining the casing and the plug I am able to make this burner with but little labor and at low cost. All of the work is in convenient form. When the casing is shrunk onto the plug, it becomes practically one with it. The oil-hole D is bored after the two parts are shrunk together.

In practical use for a hot fire if the steam-pressure is low the steam can be admitted through both the steam-pipes C and F, thus to produce perfect combustion for a hot fire; but with a steam-pressure of sixty pounds or more it is unnecessary to use the steam through pipe F.

In the drawings I have shown two blast-pipes C and F, through which either air or steam may be blown. These blast-pipes are respectively controlled by valves c and f. I prefer to use steam in both pipes because of its convenience, but I do not wish to be limited to the use of steam for both pipes, or of air for both pipes, for if desired air can be applied through one of the pipes, such as F, and steam through the other pipe, such as C, or vice versa. No illustration has been made of connections by which both air and steam can be used with the burner at the same time—such construction being within the knowledge of ordinary mechanics—but an important feature of my burner, and one which is a distinct feature in addition to the other novel features which I have hereinbefore mentioned, is that each of the blast-pipes F and C is independently controlled by its own valve, so that I am enabled to entirely cut off either one of the blasts; and I am also enabled to partially cut off either one or both of the blasts while the burner is in operation, thus enabling me to produce many variations of the fire.

For example, to produce a slow fire close the valve C entirely and leave the valves e and f open to a greater or less degree, according to the amount of fire required. Then the oil will flow down and out through the end of the bore b and be caught by the blast or jet that issues from the blast-outlet, which is below the outlet from the bore b, and be blown into the furnace, and it will be mixed and mingled with the air which enters through the arch and with steam if the steam-blast is used; or if an air-blast is used instead of steam the oil will be mingled with the air of such blast and also with air drawn in through the arch H. If a hotter fire is desired, a heavier blast can be admitted through the pipe F, and then more oil can be turned on through the oil-pipe E, which is controlled by the valve e. If a fiercer fire is required, the valve c can be opened and the valve e be further opened to allow more oil to flow into the burner. The valve c can be opened sufficiently to cause the oil to be blown into the kiln, so that it will not ignite until it enters the kiln, and the blast can be adjusted so that the flame will burst out at the desired point within the kiln, which is a very important matter in the burning of brick, &c.

When a strong blast is admitted through the pipe C, it is not necessary (and ordinarily is not desirable) to continue the blast through the blast-pipe E, because that will use an un-

necessary amount of steam. I therefore ordinarily partially or wholly cut off the blast through F, when a strong blast is admitted through C. If the kiln draws well and the fire keeps up well and the oil does not fall, the lunulate jet may be shut off; but if the draft is not good and the oil has a tendency to fall the blast is turned on through the lunulate jet. When the kiln is well started, the nozzle G can be applied if the attendant deems it desirable.

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

1. The plug provided with a bore for fuel and fitting closely within the casing; a blast-pressure chamber being provided between the casing and the under side of the plug, with an outlet beneath the outlet of the bore of the plug; with the fuel pipe or pipes connected with the bore of the plug, and a pipe for supplying a fluid under pressure to the blast-pressure chamber.

2. The hydrocarbon-burner comprising a body having a bore of two diameters, the larger portion of which bore is at the rear of the smaller portion of the bore; a blast-pipe arranged to discharge into the rear end of the large portion of the bore; and the oil-pipe arranged to drop oil through the top of the body into the large portion of the bore between the blast-pipe and the rear end of the small portion of the bore; substantially as and for the purpose set forth.

3. A hydrocarbon-burner comprising a body provided with a longitudinal bore and a blast-outlet beneath the outlet of the bore; a blast-pipe arranged to supply a blast at the rear end of the bore; a valve to control such blast-pipe; an oil-pipe arranged to drop oil into the bore; a valve to control such oil-pipe; a blast-pipe arranged to discharge a blast through the blast-outlet beneath the outlet of the bore; and a valve arranged to control the same.

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