

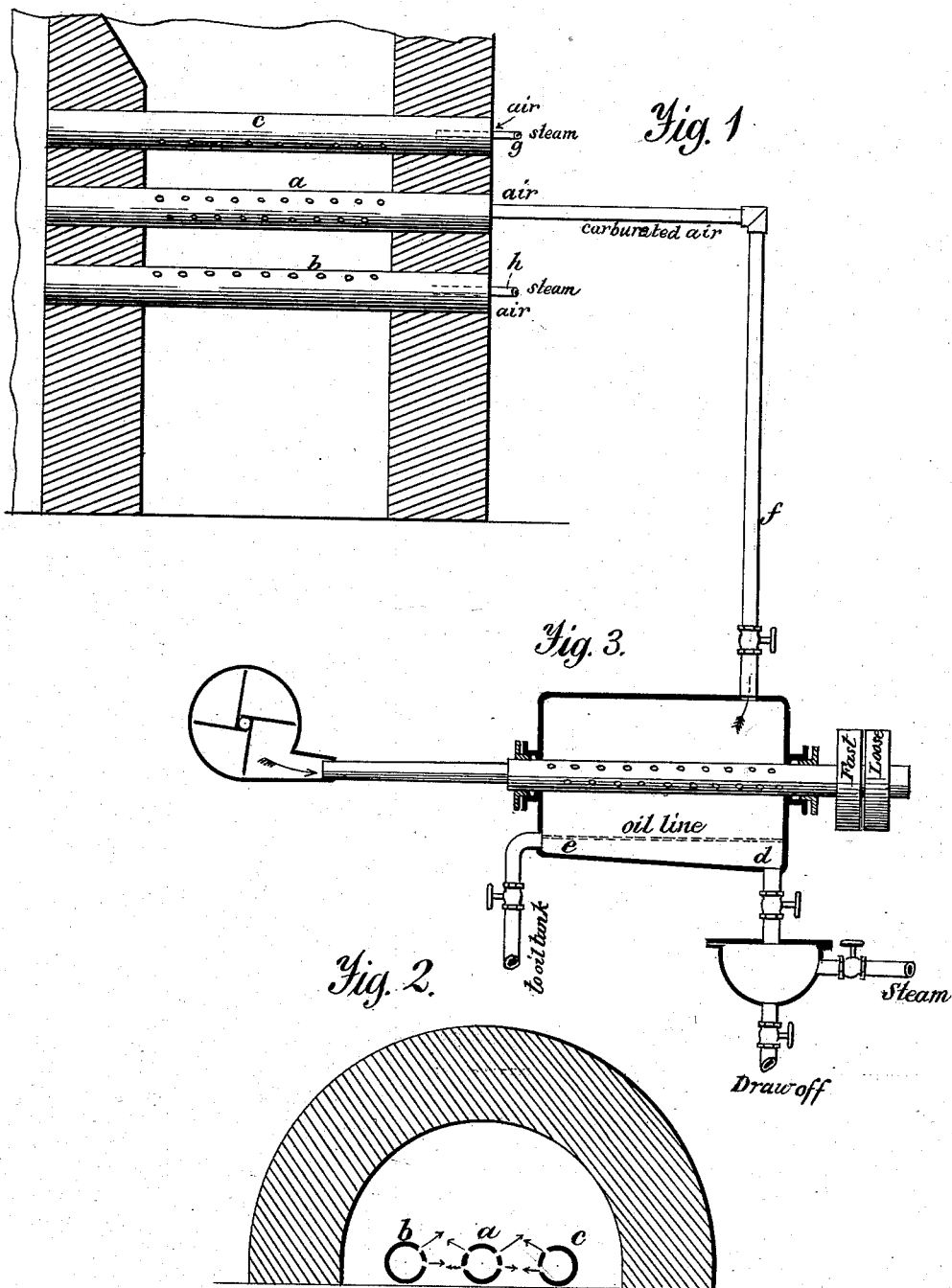
(No Model.)

H. T. LITCHFIELD & D. RENSHAW.

BURNING AND CARBURETING AIR.

No. 261,861.

Patented Aug. 1, 1882.



Witnesses.
A. Ruppert.
A. Meyers.

Inventor.
Harvey Litchfield.
David Penckew.

UNITED STATES PATENT OFFICE.

HARVEY T. LITCHFIELD, OF HULL, AND DAVID RENSHAW, OF COHASSET,
MASSACHUSETTS.

BURNING AND CARBURETING AIR.

SPECIFICATION forming part of Letters Patent No. 261,861, dated August 1, 1882.

Application filed December 28, 1881. (No model.)

To all whom it may concern:

Be it known that we, HARVEY T. LITCHFIELD and DAVID RENSHAW, of Hull and Cohasset, in the counties of Plymouth and Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Burning and Carbureting Air; and we do hereby declare that the following is a full, clear, and exact description of the invention, which 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 letters of reference marked thereon, which form a part of this specification.

This invention relates to the employment of hydrocarbons and other inflammable gases, admixed with atmospheric air or steam under pressure, as a means of producing heat; and the invention may be adapted to the generation of steam, to the smelting and refining of iron, to the heating of furnaces for houses, and other purposes for which heat is employed.

The object of our invention is to burn mineral-oils as a fuel by carbureting air in such manner as to produce an illuminating and a heating gas.

It consists therefore in gradually converting the oil into a thin vapor of mixed carbon and hydrogen, and therewith impregnating atmospheric air, so that it shall enter the furnace or burner already sufficiently combined with gaseous carbon and hydrogen to be immediately and by itself inflammable. To carburet this air for use as fuel a very thin vapor of light density only is necessary, and this can be obtained by passing a forced current of air over the surface of the oil more or less rapidly and over more or less extent of surface by means of a fan or other forcing contrivance. The air, when it is thus mechanically mixed with the right proportion of vapor so taken up, will burn with an intense heat. Very heavy oil will require a higher temperature in vaporizing it; and this may be done by artificial heat—say by heating the air after it has left the fan and while on its way to the carbureter, or by adding a jet of live or superheated steam—in order that the combined mixture may carry off a vapor sufficiently dense to mix with atmospheric air.

Referring to the accompanying drawings, Figure 1 shows a furnace adapted for our use, although any furnace may be used; Fig. 2, a cross-section of the same with the pipes somewhat differently arranged; Fig. 3, an atomizer or vaporizer for carbureting the air, or, in other words, a gas-making apparatus.

In Fig. 1 is shown a series of three perforated pipes, the central one being perforated on all sides and the other two preferably facing the middle one. The perforations are placed in this way that the jets of carbureted air from the central pipe may be met with the air and steam rushing from the outer pipes, and thus an intimate mixture and diffusion of all the elements necessary to a perfect and complete combustion takes place. These pipes are marked *a b c*, and may be increased or diminished in number and size, according to the quantity of heat required. In the present instance, in our gas generator, Fig. 3, or carburetor, we have shown a vessel horizontally arranged, the diameter of one end being greater than that of the other, one of which forms a deep end, *d*, and the other a shallow end, *e*, so that the bottom of the tank or vessel on one side has a downward inclination. We introduce the oil at the end *e*, and at the deep end we apply a trap, so that the heavy oil or residuum will naturally flow to the lower or deep end, and finally into the trap, from which it may from time to time be readily drawn off. Above the surface of the oil and about centrally through the oil vessel or tank we locate longitudinally a perforated rotating pipe having its journals fixed in the ends of the vessel. To one end of this pipe we fix a fast and loose pulley, and to the other end a fan or other blowing device, so that when the fan is put in operation air is blown with considerable pressure onto the surface of the oil and throughout the chamber. The rotation of the pipe is simultaneously started, and the air by its impingement upon the surface of the oil becomes thoroughly saturated and forms a heavy vapor or carbureted air, and in this way it is conveyed through pipes to the furnace, where it is distributed, mixed, and burned, as before described.

We may here remark it is not always ad-

visible to use very dense vapor or to saturate the air to its maximum, but it is better to limit it to the quantity necessary to obtain a gas which shall burn without any deposition of carbon on the burners. With this view, and also for a purpose hereinbefore described, we introduce a steam-jet near the upper portion of the trap. This steam-jet we can readily control, and by it control the density or richness of the vapor by diluting it, and so bring it to the consistency required. Of course the steam vaporizes the heavier oils on its passage through them, and in a measure liberates the lighter volatile gases, and thus causes the residuum to precipitate into the trap, from which it may be drawn off and used for any of the well-known purposes for which it is fit. However, should the carbureted air or gas be richer than is necessary to burn alone, then we give the proper supply of air to it through perforations in the pipes *b* and *c*, and in turn this air we control by the steam-jet pipes *g* and *h*.

It is obvious that heated air or steam, or a mixture of them, or ordinary atmospheric air, may be used for carrying out our invention. We do not therefore limit ourselves to any particular proportions or any particular mixture of carbureted air, nor to the precise means shown, as many proportions of air and gas, which constitute an inflammable mixture, may be employed, and many variations of our construction may be used without departing from the spirit of our invention.

It is evident that all the pipes, conduits, &c., may be provided with the usual stop cocks and controlling-valves without further description, and also that the journal-boxes and rotating pipe will be provided with the proper stuffing-boxes in the usual way.

Having now described and shown the nature and several arrangements of our apparatus, and the method by which it may be practically carried into effect, we would observe that we do not claim generally the employment of mixed air and gas issuing from jets under pressure for the purpose described, for

this is only one application of a general system of applying our method of burning hydrocarbon and other oils as fuel. Therefore

We claim as our present invention—

1. A furnace composed of stationary perforated pipes arranged along or across the furnace, the central one being adapted to receive carbureted air and the others to receive air or air and steam, the perforations in said pipes being arranged in directions facing each other, by which the jets issuing therefrom are made to come in violent contact with each other, by which a thorough and intimate mixture is made to take place and a thorough combustion of the same, substantially as herein described.

2. In combination with a furnace provided with stationary pipes, as set forth and shown, the carburetor having the rotating perforated pipe, said pipe being adapted to receive air under pressure, whereby air is forced against the surface of the oil, and also air is mixed with the saturated air within the chamber, in the manner set forth.

3. The combination, with a furnace substantially as described, of the carburetor provided with the rotating perforated air-pipe, the steam-pipe, and heavy-oil trap and pipe-connections, in the manner and for the purpose set forth.

4. The carburetor constructed with a downwardly-inclined bottom, the oil-trap, and the perforated rotating air-pipe passing longitudinally through said carburetor, by means of which pipe the air passing therethrough is more completely saturated with the volatile vapor of the oil, in the manner set forth and described.

In testimony that we claim the foregoing as our own act we affix our signatures in presence of two witnesses.

HARVEY T. LITCHFIELD.
DAVID RENSHAW.

Witnesses:

H. B. WYMAN,
WILLIAM BRECK.