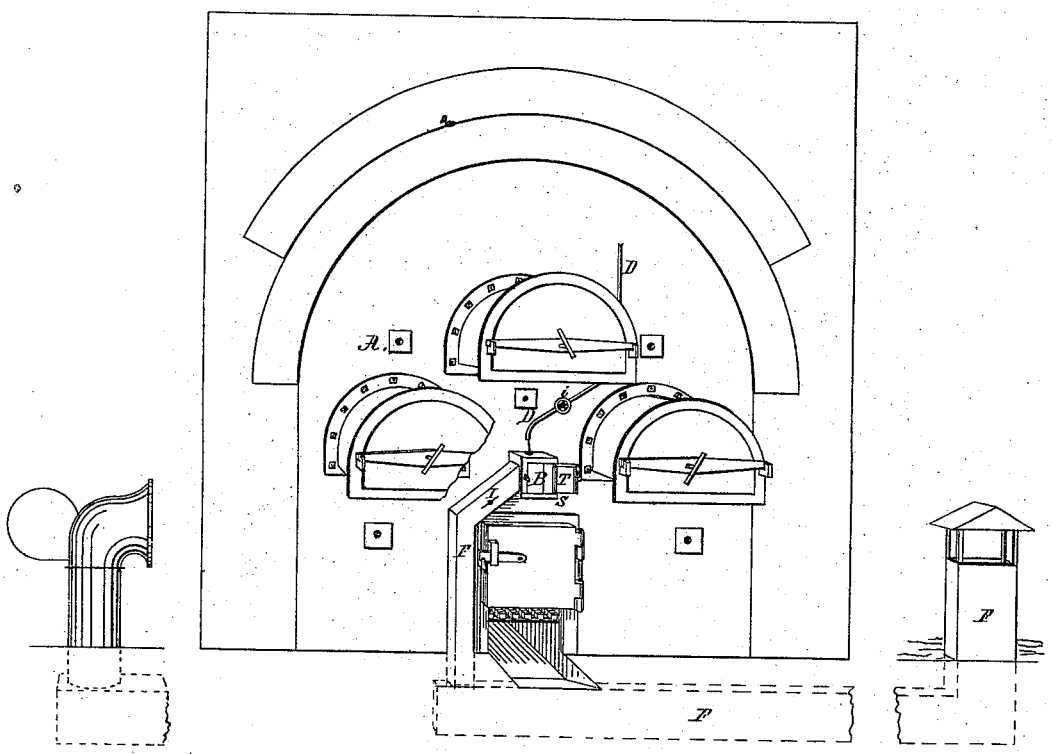
H. A. BRANCH.

FURNACE FOR BURNING FLUID FUEL.

No. 184,953. Patented Dec. 5, 1876.



Witnesses.

Mason. H. Mathur.

W. E. Dayton.

Inventor.

Henry A. Branch

UNITED STATES PATENT OFFICE.

HENRY A. BRANCH, OF HILLSDALE, MICHIGAN.

IMPROVEMENT IN FURNACES FOR BURNING FLUID FUEL.

Specification forming part of Letters Patent No. **184,953**, dated December 5, 1876; application filed October 29, 1875.

To all whom it may concern:

Be it known that I, H. A. BRANCH, of Hillsdale, State of Michigan, have made an invention for the Combustion of Fluid Fuel for Heating Furnaces, &c., of which the following is a specification:

The object of my invention is to secure a more rapid and complete combustion of coal-tar or other fluid fuel, when employed in a gas-retort bench or other furnace, by introducing the fluid fuel to the furnace-chamber in conjunction with a strong induced current of air, in the manner hereinafter set forth, by which the oxygen required for complete combustion is supplied abundantly at the point of ignition.

This specification and the accompanying drawing more particularly describe the application of my invention to the consumption of coal-tar, oil, &c., as fuel in heating retort-benches of gas-works; but it can be successfully applied to other furnaces.

The usual mode of burning tar in gas-works is to drip the tar from a pipe upon a tile or cast-iron shelf inserted in the furnace-wall immediately over the furnace-door, which shelf, inclining downward and inward, and projecting a few inches at both ends beyond the wall, conducts the tar into the furnace through an opening left in the wall above the shelf. There will be some draft through this opening even with the regular furnace-draft open, and a stronger draft with the furnace-draft closed.

In neither case, however, is combustion complete or satisfactory; but if a tube or flue be connected with this orifice, and extended to receive the air from some point outside the retort-room where it may freely enter, (due regard being had, in constructing such flue, to its proportions,) the velocity and volume of air supplied to the flame will be greatly increased, and the combustion of the fuel be much more completely effected.

The arrangement of such flue in connection with the tar-supply pipe, most simple and practicable in gas-works, is set forth as follows: Let A represent a bench-front. The shelf S is inserted therein, substantially as already described. B is a box or chamber over the shelf, receiving the discharge of the air-flue F and the drip-pipe D, and closed in front by a door or removable stopper, T. This chamber is substantially an extension, and the termination, of the flue F. I is a damper or cock in the flue F, and *i* a cock in the drip-pipe D, for the regulation, respectively, of the air and tar supply.

A fire having been kindled in the furnace, and the usual air-supply from below cut off, a small stream or drip of tar is allowed to flow from the pipe D into the chamber B, where it encounters the air-current from the flue F. Some portion of the tar body will be separated and borne in minute particles, by the air-current, directly into the flame, and the remainder falls upon the shelf S, and passes downward into the furnace. This portion ignites upon the shelf in the presence of the strong air-current, and in both cases an abundance of oxygen is present at the point of initial ignition, and in the upper flame, to secure very rapid and complete combustion.

By properly adjusting the air and tar supplies to each other, and both to the requirements of the furnace, as may easily be done by means of the cocks I and *i*, very little or no smoke is emitted, a very high and uniform heat is maintained, and, in consequence, a larger and more regular yield of gas is obtained from a given amount of coal.

The flue F may be extended beneath the floor of the retort-room, to emerge at a point without the building—preferably at a point in the yard, where it will take the air equally well with the wind in any direction; or two or more branches may be conducted to emerge on different sides of the building, as shown in the drawing. The draft induced through a properly-constructed flue opening without the building is found to work with perfect success. The emerging end of the flue may be provided with any appliance for catching an abundance of air.

The chamber B is provided with a door or stopper in front, to give access to the shelf, for the purpose of removing any residuum that may accumulate thereon.

The drip-pipe D may enter the chamber B, or may terminate a short distance above it, and drip into the chamber through a hole in the top. An advantage of the last arrange-

ment is, that being always readily visible, the stream may be better regulated and any stoppage promptly discovered. By making the flue flexible, and shaped to fill the orifice or chamber B, it can be inserted and withdrawn at pleasure, and the door or stopper dispensed with, a slit or hole being provided in the flue to admit the pipe or drip D or its discharge.

The foregoing descriptions apply to the adaptation of my invention to benches already constructed for coke or coal burning. In building new benches the flue F, and the chamber B also, may be built in the wall, and either a door or stopper employed to close the chamber in front. In this case the drip-pipe D will need, of course, to be arranged to discharge within the chamber when closed. By the method of tar-burning above described, the use of coke or coal as fuel may be entirely dispensed with.

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

In a furnace for burning fluid fuel, the combination of the air-flue F, having its induction or air-receiving port or mouth arranged in the open air, and externally to the chamber in which the furnace is arranged, bench A, shelf S, box or chamber B, entered by the flue F, drip-pipe D, terminating over the said shelf, door or stopper T, and cock *i*, all arranged substantially as shown and described with relation to each other, and for the purposes set forth.

HENRY A. BRANCH.

Witnesses:
H. PIERCE,
E. J. MARCH.