

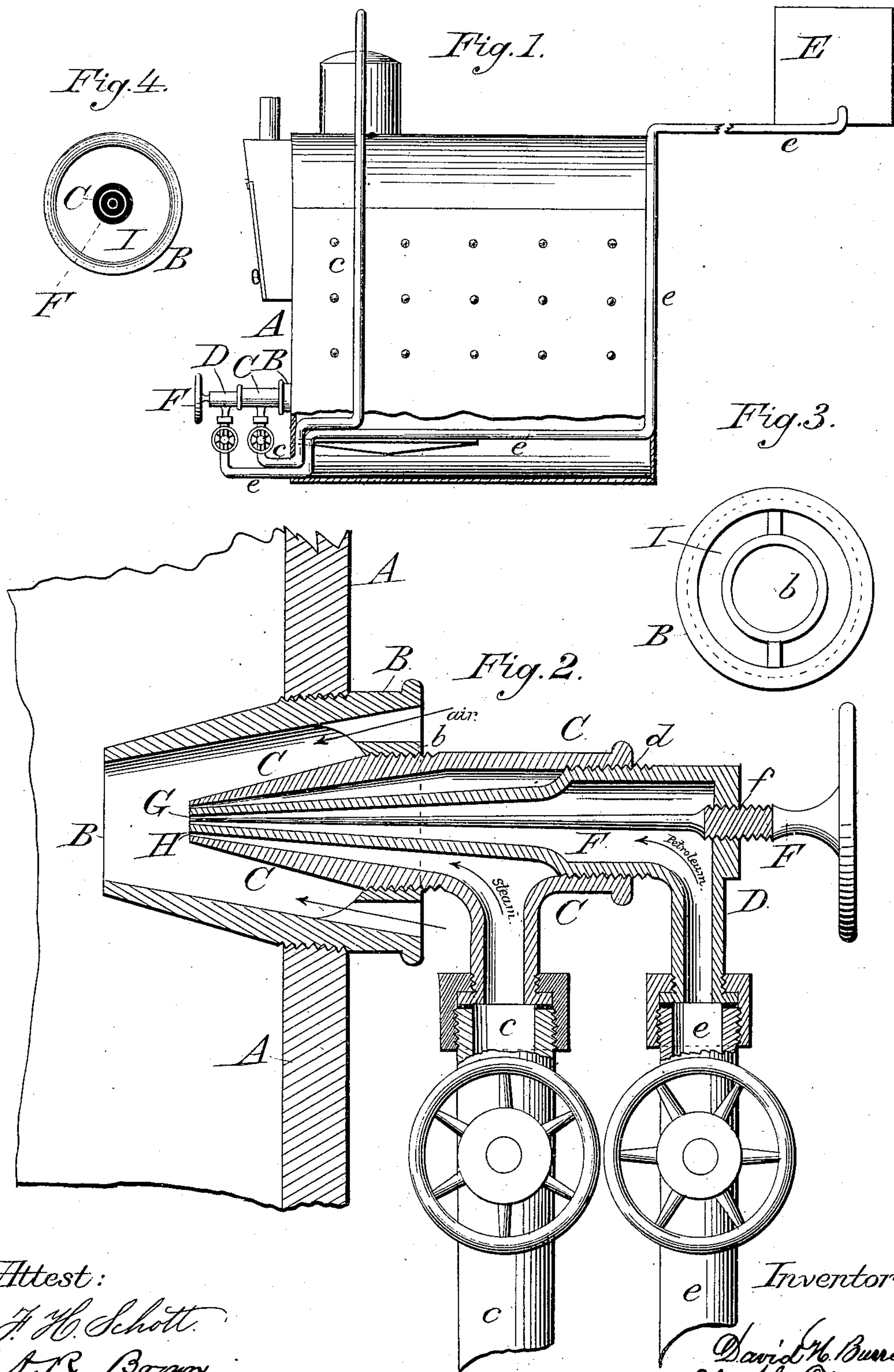
(No Model.)

D. H. BURRELL.

FURNACE FOR BURNING LIQUID AND GASEOUS FUEL.

No. 324,005.

Patented Aug. 11, 1885.



Attest:

J. H. Schott.  
A. R. Brown

Inventor:

David H. Burrell  
per J. C. Tashewsky



# UNITED STATES PATENT OFFICE.

DAVID H. BURRELL, OF LITTLE FALLS, NEW YORK.

## FURNACE FOR BURNING LIQUID AND GASEOUS FUEL.

SPECIFICATION forming part of Letters Patent No. 324,005, dated August 11, 1885.

Application filed November 6, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID H. BURRELL, a citizen of the United States, residing at Little Falls, in the county of Herkimer and State of New York, have invented certain new and useful Improvements in Furnaces for Burning Liquid and Gaseous Fuel; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 or figures of reference marked thereon, which form a part of this specification.

This invention relates to an improved apparatus for combining and utilizing oleaginous matters—such as petroleum, its products, oils, or other fatty substances, steam, and air—as fuel in furnaces of steam-boilers or other places where an intense heat is required, whereby a perfect combustion of said substances is secured, and they may be burned alone or used for promoting the combustion of inferior fuels in the same furnace.

In the accompanying drawings, Figure 1 is a side elevation of a steam-boiler provided with my improvements. Fig. 2 is an enlarged longitudinal section of my invention. Fig. 3 is a view of the outer end of the air-duct, and Fig. 4 a view of the opposite or discharge end of same.

Similar letters of reference indicate corresponding parts.

A denotes the front plate of the fire-box of a steam-boiler. Through an aperture in the aforesaid plate, and at a proper distance above the grate, is inserted a short tube, B, the interior of which is conical and made to terminate inside of the fire-box. The outer end of the tube B is provided with a rigid concentric ring, *b*, forming an annular air-passage between it and the body of the tube. The inner surface or smaller periphery of the ring *b* is screw-threaded, and into this is screwed a steam-pipe, C, which projects part way toward the nozzle or discharge end of the air-tube B, and likewise terminates with a convergent or gradually-contracted mouth, H, axially central in the air-tube B. Longitudinally through the steam-pipe C is extended a convergent or

tapered oil pipe or conduit, D, of sufficiently reduced diameter to admit of the passage of steam all around between it and the steam-pipe. This pipe D has a screw-threaded cylindrical portion, *d*, by which said pipe is screwed into a correspondingly-threaded cylindrical end of the steam-pipe C. The inner extremity of the oil-pipe terminates at the mouth of the steam-pipe, and is concentric therewith. Longitudinally through the center of the pipe D is arranged a valve-stem, F, having a screw-threaded portion, *f*, passing through a correspondingly-threaded aperture in a cap or plate on the outer end of the oil-pipe. By means of a suitable handle on the outer end of the stem F said stem can be rotated, and thus by its screw-connection with the oil-pipe can be carried endwise toward or from the discharge end or mouth of said pipe.

The introduction of the stem F in the mouth of the pipe D diffuses the issuing oil, and thus throws the same more intimately in contact with the steam issuing from the annular mouth of the pipe C, surrounding the discharge end of the pipe D. By giving sufficient head to the flow of the oil it will be caused to issue in a spray and become more thoroughly commingled with the steam and air before the combined substances escape through the mouth of the air-tube B.

The steam-pipe C and oil-pipe D have each an elbow or branch provided with a suitable coupling for the connection of the conduit or pipe by which the respective substances are conveyed to the pipes C and D.

By means of valves applied to the branch pipes or conduits, the flow of steam and oil is regulated. The steam is conveyed directly from the boiler to the pipe C, as represented by the pipes *c* in Fig. 1 of the drawings.

The conduit for the oil is indicated by the letter *e* in the same figure, wherein E denotes the reservoir for the supply of oil.

The operation of my invention is as follows: A fire is first built in the ordinary way in the fire-box of the boiler. After ten pounds or more of steam-pressure has been attained in the boiler the valves in the conduits *c* and *e* are opened to allow the steam and oil to flow toward and through the pipes C and D, respectively. As the said substances issue from



the mouth of their respective pipes and become diffused in the throat of the air-tube B, in the manner before described, they meet and unite with the current of air induced through said tube by the natural draft of the furnace or fire-box. The petroleum or other oleaginous matter, steam, and air thus thoroughly commingled and assimilated are readily ignited at the nozzle or mouth of the air-tube B, and produce a flame of intense heat, which may be either used alone or to promote the combustion of inferior fuel placed upon the fire-grate. The tube B, communicating directly with the air circulating about the exterior of the boiler, admits said air at ordinary temperature, and by the constant influx of the same the tube B is protected from the destructive effects of the heat within the furnace or fire-box. The extension of said tube over the ends of the pipes C and D shields said pipes and protects the same also from the fire.

I am aware that concentric oil, air, and steam pipes have hitherto been employed in

furnaces; also, that concentric steam and fuel pipes have been supported within an air-nozzle by means of a threaded collar into which the outer pipe is secured; and, further, that a stem arranged centrally within a fuel-pipe is old; but these features I do not claim, broadly, or independent of each other.

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

In an apparatus for burning liquid or gaseous fuel, the combination of the conical nozzle B, having internal screw-threaded ring *b*, the steam-pipe C, and oil-pipe D, arranged concentrically within said nozzle, and the stem F, passed longitudinally through the oil-pipe, all substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID H. BURRELL.

Witnesses:

WATTS T. LOOMIS,  
MERRICK FREEMAN.