

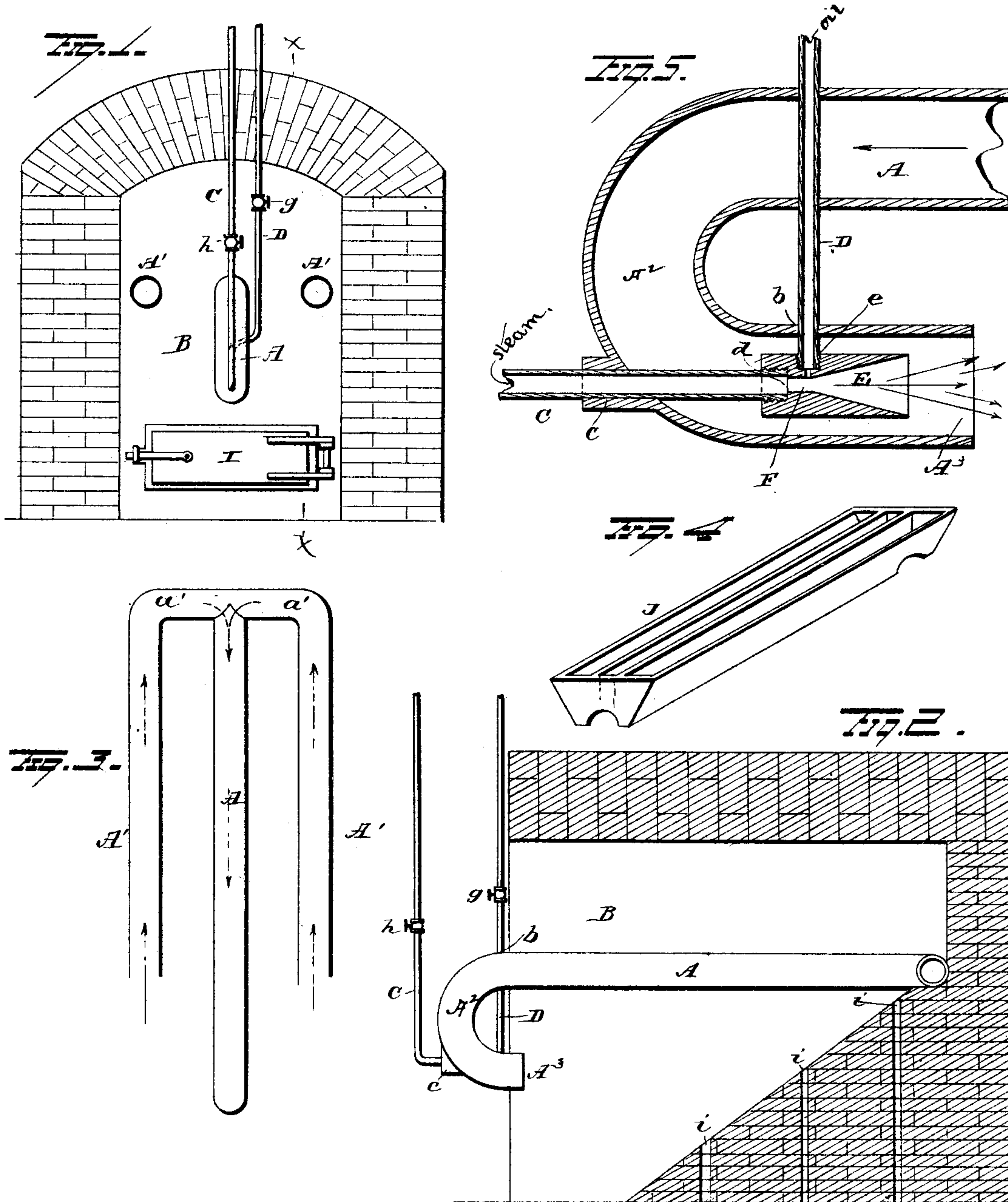
(No Model.)

A. WILKIN.

APPARATUS FOR BURNING LIQUID AS A FUEL.

No. 388,327.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING LIQUID AS A FUEL.

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To all whom it may concern:

Be it known that I, ALFRED WILKIN, of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Apparatus for Burning Liquid as a 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.

My invention relates to improvements in a device for the economical combustion of petroleum or other liquid carbonaceous fuel, and more particularly to an improved apparatus for the utilizing of such a fuel in combination with steam and hot air, applying it for generation of steam or other heating purposes.

The nature and object of my present invention is to provide a simple and comparatively inexpensive device that may be applied to any ordinary form of steam-boiler furnace to generate steam by the atomizing of carbonaceous liquid, preferably fed by gravity through the action of high-pressure steam introduced as a jet with the oil into a tubular passage, where it meets a column of heated atmospheric air that is commingled with the vaporized oil and steam to pass into a furnace or other combustion-chamber.

The uniting of the vaporized water and oil with the hot air in rarefied form produces a decomposition and simultaneous recombination of the components of the steam with the carbon atoms of the oil. The oxygen of the steam and air, combining with the carbon molecules, releases the hydrogen of the steam, which latter also has an affinity for carbon and unites with it. The whole gaseous product, being greatly expanded in the fire or combustion chamber, produces a crude oxyhydrocarbon gas, which burns with a smokeless flame of intense heating power, devoid of the waste incident to the use of coal or other hard carbon fuel, in which the carbon that is evolved is largely wasted from imperfect absorption of oxygen of the air, and in consequence passes off in the form of smoke.

With this object in view my invention consists in certain features of construction and novel combinations of parts, that will be here-

inafter described, and pointed out in the claims.

Referring to the drawings making a part of this specification, Figure 1 is a front elevation of a furnace that is provided with my improved oil-consuming device. Fig. 2 is a longitudinal section on line *x x*, Fig. 1. Fig. 3 is a plan view of the air-induction pipes. Fig. 4 is a view of an oil-trough used to start the generation of steam in a boiler. Fig. 5 is an enlarged view of the union or mixing nozzle.

B represents the combustion-chamber of a furnace. This may be built of masonry and adapted to support in position a boiler in its upper position, this boiler to receive heat developed by apparatus which will now be described.

The device for induction of air and vaporizing carbon liquid is shown detached in Figs. 3 and 5, and in position in the furnace-chamber in Figs. 1 and 2. Fig. 3 exhibits a plan view of the air-induction pipes, which latter are made of metal, preferably cast-iron, and consist of three cylindrical pipes joined at their rear ends. The center pipe, A, is curved downwardly at the front end, which projects beyond the front of the furnace B, this curved portion A² being returned to enter the front of the furnace, with its end A³ projecting inside of the front plate or wall of the same.

The two side pipes, A', have their rear ends, *a'*, bent at a right angle to approach the center pipe on each side of it and be integrally or otherwise joined to it to produce continuous lateral air-conduit pipes, which extend from the outside of the front of the furnace-chamber B to conduct atmospheric air rearwardly and thence into the pipe A to flow forwardly and downwardly through it to enter the furnace-chamber at the point A³. (See Figs. 2 and 5.)

At the point *b* outside the front plate or wall of the furnace-chamber B an oil-pipe, D, is made to penetrate the air-pipe A and be attached to the conical mixing-nozzles E at *e*. The oil-pipe D is preferably made to descend from a tank or barrel placed in an elevated position to deliver oil or other carbonaceous liquid by force of gravity, a valve, *g*, being placed in the line of pipe at a convenient

point to permit the flow of oil through it to be graduated or cut off, as may be necessary.

At *c* the steam-pipe C is made to enter the air-pipe A, and is extended in this pipe to connect to the mixing-nozzle F at *d*. An inspection of Fig. 5 will show the relative position of the adjacent ends of these pipes, and it is evident that the downward flow of oil through the pipe D will be met by the horizontal jet of steam that is projected from the pipe C. This will be more fully explained in the description which will be given of the operation of the apparatus.

Upon the pipe A a shallow oil-pan, J, (shown in Fig. 4,) is placed when it is desired to start the oil-consumer in operation. This pan is made of cast-iron or sheet metal, and is of sufficient length to hold the requisite amount of oil which is designed to produce a temporary fire with which to start the generation of steam; or a light wood or coke fire may be built on the fire-grates, which may be placed in the combustion-chamber B. These are not shown in the drawings, as their method of construction and location is that of an ordinary furnace-grate. When a fire of wood has been placed below the oil pan J, the oil in it will boil, vaporize, and mix with air that is introduced through the air-passages *i i*, these air-passages being made at convenient points in the masonry wall of the furnace-chamber to allow sufficient air to enter this chamber, preferably below the grates. A fire-door, I, is also made in the furnace front plate or wall to permit the introduction of fuel into the chamber. These details of construction as regards the ordinary features of a boiler-furnace may be changed to suit circumstances, as may be the shape of the air-pipes A A' and the direction in which the oil and steam pipes are brought to the mixing-nozzle E.

I do not therefore desire to restrict myself to follow the exact style of furnace herein shown, as it is only given to illustrate one means of utilizing my improved device for oil-combustion as a fuel. The vaporizing of oil in the pan J, together with the use of a fuel in moderate quantity, will produce steam in a boiler that is situated above the oil-pan, and when sufficient pressure of steam has been obtained in this way my oil-consuming device may be put into use by starting a light flow of oil and steam at the same time through the pipes D and C, respectively. The steam, when it strikes the oil, will vaporize it, and so subdivide it into atoms as to render the joined elements a compound vaporous fluid. This will have all the initial force of the steam, and will rapidly expand when it issues from the open flaring end of the nozzle F into pipe A, through which hot air is flowing on its way to the combustion-chamber B. This induction may be caused by the ordinary draft-passages and chimney common to furnaces of boilers, or the influx of air may be solely caused by the rapidity of flow of the semi-gaseous fluid

that issues from the nozzle F, as previously mentioned.

When the hot-air current is met by the expanded oil and steam jet, the union will make a compound vaporous gas, which is highly inflammable, and as soon as it is introduced into the combustion-chamber B will burst into a mass of flame, as it ignites by contact with the remaining fire in the oil-pan or on the grate of this furnace fire-chamber.

The operation may be continued for an indefinite period of time after it has been started if the proper supplies are furnished, and similar conditions mentioned as to the flow of the steam and oil to the mixing-nozzle F of the oil-consuming apparatus.

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

1. In an apparatus for burning liquid fuel, the combination, with a combustion-chamber, of an air-pipe starting from a point near the rear end of the chamber and terminating in a downwardly and rearwardly projecting discharge end, the latter being below the main body of the pipe, whereby the latter is subjected to the direct heat of the burning fuel, a lateral branch pipe for supplying air to said pipe, a mixing-nozzle located within the discharge end of the pipe, and steam and oil pipes discharging into said nozzle, substantially as set forth.

2. In an apparatus for burning liquid fuel, the combination, with a combustion-chamber, of a central air-induction pipe located within the combustion chamber and having branches extending parallel to the central pipe to receive air at the front end of the combustion-chamber and discharge it into this chamber hot, a mixing-nozzle located in the air-pipe near the discharge end thereof, and steam and oil pipes discharging into said nozzle, substantially as set forth.

3. In an apparatus for burning liquid fuel, an air-induction pipe having a cylindrical straight body and a lateral branch pipe that extends parallel to this main pipe, the cylindrical straight body or center pipe curving downwardly to discharge its heated contents below the main pipe and its lateral branch, a mixing-nozzle located within the discharge end of the pipe, and steam and oil pipes discharging into said nozzle, substantially as set forth.

4. In an apparatus for burning liquid fuel, an air-induction pipe having a central cylindrical body and two lateral branches resting in the same plane as the central pipe, the center pipe curving downwardly and rearwardly to enter the combustion-chamber below the three parallel portions of this air-induction pipe to discharge its contents, a mixing-nozzle located within the discharge end of the pipe, and steam and oil pipes discharging into said nozzle, substantially as set forth.

5. In a furnace for burning oil as a fuel, the

combination, with the combustion-chamber,
of the furnace and the central air-pipe having
two lateral branches, the central pipe being
curved at its discharging end, of a mixing-
5 nozzle attached to oil and steam pipes, through
which oil and steam are discharged through
the moving column of hot air into the com-
bustion-chamber.

In testimony whereof I have signed this
specification in the presence of two subscribing 10
witnesses.

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Witnesses:

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