

No. 622,172.

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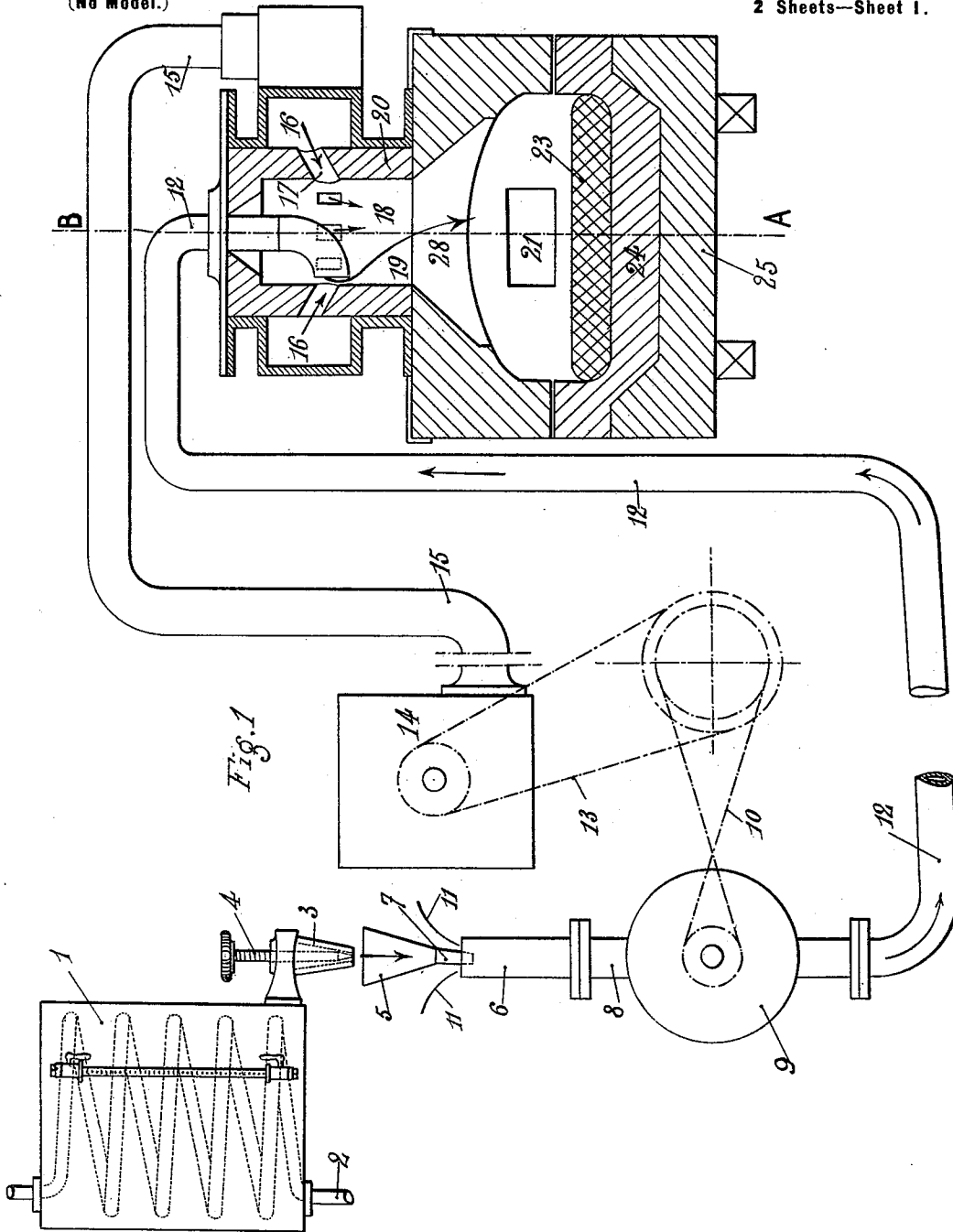
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APPARATUS FOR BURNING LIQUID FUEL AND THE APPLICATION THEREOF TO
HEATING FURNACES, &c.

(No Model.)

(Application filed Mar. 24, 1898.)

2 Sheets—Sheet 1.



Witnesses

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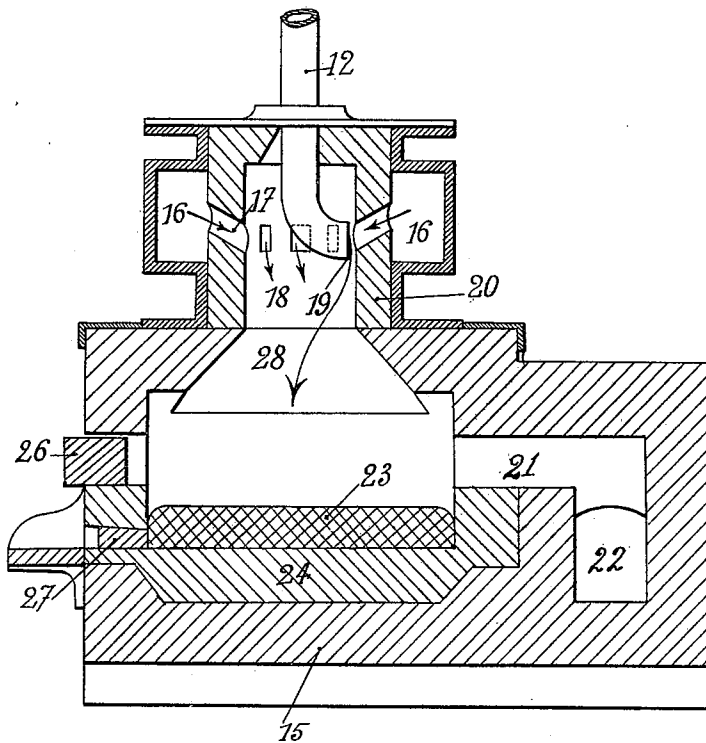
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Fig. 2



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING LIQUID FUEL AND THE APPLICATION THEREOF TO HEATING FURNACES, &c.

SPECIFICATION forming part of Letters Patent No. 622,172, dated March 28, 1899.

Application filed March 24, 1898. Serial No. 675,027. (No model.)

To all whom it may concern:

Be it known that we, GEORGES DE ROUSSY DE SALES and ANTOINE CHARBONNEL, citizens of France, residing at Lyons, in the Department of the Rhône, France, have invented certain new and useful Improvements in Apparatus for Burning Liquid Fuel and the Application Thereof to Heating Furnaces or for other Heating Purposes, of which the following is a specification.

Our invention has for its object to provide means whereby intense heat can be produced from the combustion of liquid fuel and utilized in heating furnaces or for other purposes.

An apparatus constructed according to our invention comprises an apparatus for distributing the liquid fuel (such, for example, as tar, heavy hydrocarbon oils, and the like) and an atomizing apparatus and what may be termed a "burner" for applying the heat to the furnace or the like to be heated.

We will describe our invention with reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section of an apparatus constructed according to our invention applied to the heating of a furnace. Fig. 2 is a transverse section taken on the line A B, Fig. 1.

1 represents a tank for containing the liquid fuel, which fuel may, if desired, be heated by means of a steam-coil 2, and in this tank the said liquid fuel may be freed from any water that may be therein. The liquid fuel passes at the desired rate through a tap 3, the opening of which is regulated by a screw-valve 4.

5 is a funnel which receives the liquid fuel passing out by the tap 3. The nozzle of this funnel 5 enters the mouth of a pipe 6 of greater diameter than the said nozzle. The pipe 6 is in communication with the suction-pipe 8 of a centrifugal pump 9, which is worked by any suitable motor by means of the belt 10 or otherwise. The action of the pump 9 draws air in through the space between the nozzle 7 and the mouth of the pipe 6, as indicated by the arrows 11, with sufficient force to atomize the liquid fuel passing out of the nozzle 7, so that the outlet-pipe 12 from the pump is trav-

ersed by a completely-intermixed charge of air and atomized fuel.

The fuel may be gasified in its passage through the conduits, and the speed of the pump is regulated so as to insure the mixture being ejected with sufficient speed to avoid the charring of the liquid fuel.

The motor which imparts motion to the pump 9 also actuates, through the belt 13, a blowing apparatus 14 of any suitable kind, which passes air through the pipe 15 into the annular chamber 16. This air before entering the said chamber may be passed through a heater of any suitable kind in the course of the pipe 15, so as, if required, to heat the air before it passes into the said chamber. The air passed into the chamber 16 then passes through the circular series of openings 17 into a central chamber 18, into which the nozzle 19 at the end of the tube 12 passes. We preferably bend the said nozzle 19 so as to make its end open before one of the openings 17, so that the mixed fuel and air issuing from the said nozzle 19 is opposite the jet of air projected through this opening 17, and the current of mixed fuel and air meets the air-current at the most favorable angle, the opposed currents nearly equilibrating each other.

When the mixed fuel and air is ignited in the chamber 18, the flame is projected through the chamber 18 by the powerful currents of air passing through the openings 17. The flame thus obtained is of very high temperature, the qualities of which, as well as the temperature and the pressure of the air passed in by the blowing apparatus 14, can be regulated by regulating the proportion of air and liquid fuel drawn in by the pump 9. The said flame enters the furnace, on the hearth 25 of which is the substance to be treated, as shown at 23, or on which is placed the crucible, if such be used.

24 represents the furnace-lining.

The reference-numerals 26 and 27 denote, respectively, the plugs that close the feed-orifice and tap-hole.

The products of combustion escape through the flues 21 22 to the chimney, passing on their way, if desired, through the heater for the air passing through the pipe 15.

Our invention may be readily applied to any of the various kinds of furnaces now in use, as will be apparent without further specification.

5 Our apparatus is worked as follows: The tank 1 is filled with the liquid fuel and, if necessary, steam is passed through the coil 2 to bring the fuel to a condition to flow through the tap 3, the quantity passing being regulated by raising or lowering the valve 4, and the funnel 5 being raised or lowered in the mouth of the pipe 6, so as to adjust the amount of air drawn in with the liquid fuel by the pump 9, so as to proportion them to
10 give perfect combustion. The apparatus 14 forces heated or unheated air into the chamber 16, and the mixture issuing from the end of the nozzle 19 is ignited. This may be done by any convenient means—for example, by
20 incandescent charcoal. The flame can be regulated by adjusting the valve 4 and the funnel 5, and the temperature can be modified by altering the speed of the pump 9 and by regulating, by means of dampers, the quantity and the pressure of the air sent through
25 the blowing apparatus.

The invention is applicable to all metallurgical and other operations in which the substances to be treated require to be subjected to high temperatures. The said substances may be either in a powdered or in an agglomerated condition.

We do not limit ourselves to the form of furnace which we have shown by way of example, our invention consisting more especially in the arrangements for passing atomized fuel and air to the burner, as described, and these may be combined with a furnace of any kind or other apparatus or means for
40 the utilization of the heat obtained.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

45 1. In a furnace for the combustion of liquid fuel, the combination with a central chamber which opens into said furnace, of an annular chamber surrounding the central chamber and having a series of openings thereto, an

air-forcing apparatus having a pipe that supplies air to the annular chamber, an atomizing device, a fan having a pipe by which the atomized fuel and air is drawn into the fan, and a pipe from said fan to the central chamber, the outlet end of said pipe being brought
55 near the mouth of one of the openings which connect said central chamber with the annular chamber, substantially as described.

2. In a furnace for burning liquid fuel, the combination with a combustion-chamber of a
60 central chamber opening into it, an annular chamber surrounding the central chamber and having a series of openings that enter the latter with an inclination toward the combustion-chamber, an air-forcing apparatus having a pipe supplying air to the annular chamber, an atomizing device, and a fan drawing the atomized fuel with air, from said atomizer and forcing both through a pipe into the central chamber, the exit end of the latter pipe
70 being turned toward and brought near one of the openings by which air enters from the annular chamber, substantially as described.

3. In a furnace for burning liquid fuel, the combination with a reservoir of the latter of
75 an atomizer consisting of a funnel having a nozzle entering and adjustable in a suction-pipe of larger diameter leading to a fan which communicates with a pipe carrying the atomized fuel and air, a combustion-chamber having a central chamber opening into it, an annular chamber surrounding the central chamber and communicating with the latter by a series of openings, the exit end of the pipe carrying the atomized fuel being bent to lie
85 near one of said openings and deliver the mixed current of air and fuel against the current of air passing through said opening, and an air-forcing fan delivering air to the annular chamber, substantially as described.
90

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

GEORGES DE ROUSSY DE SALES.
ANTOINE CHARBONNEL.

Witnesses:

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MARIUS VACHAY.