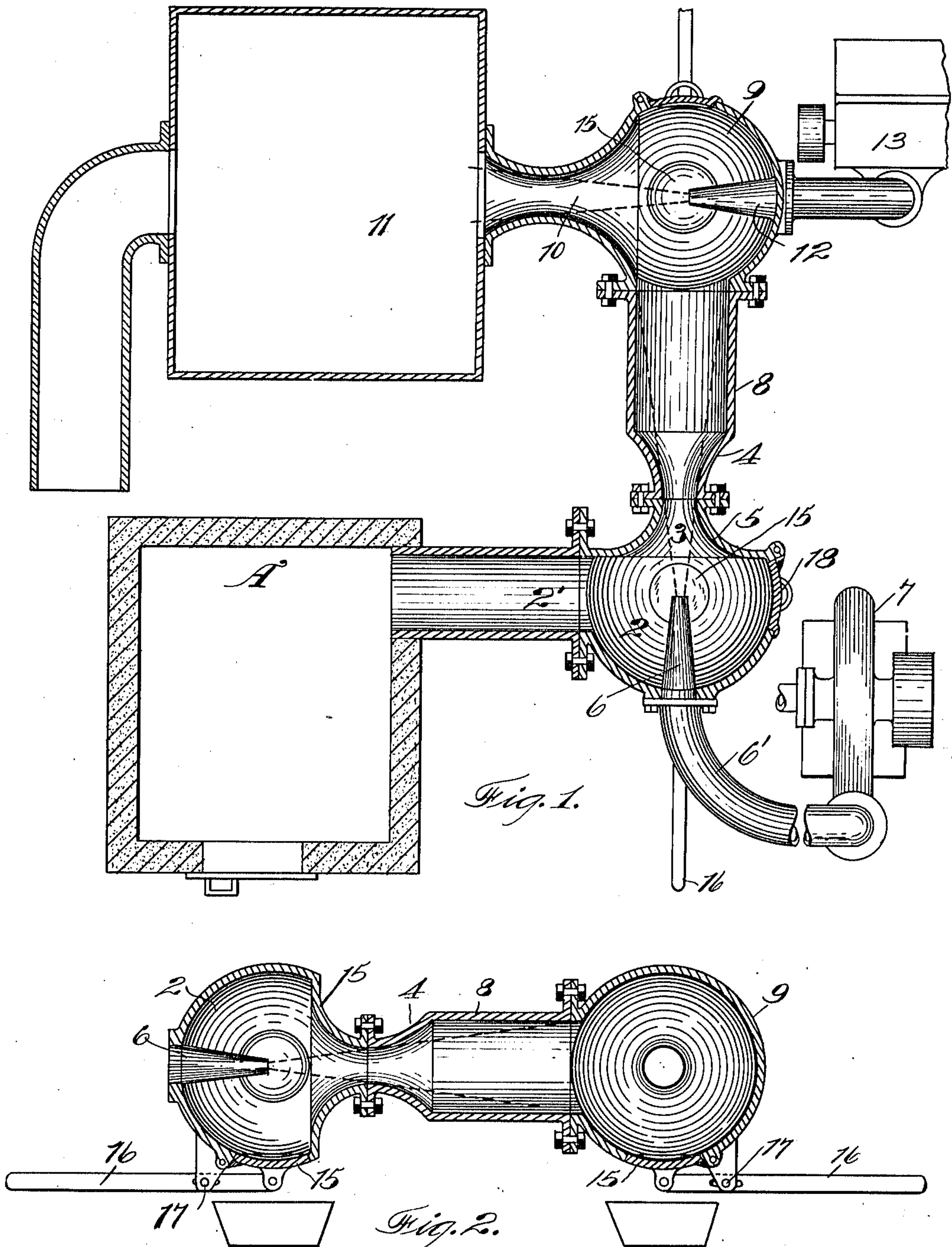


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FUME CONDENSING APPARATUS.
APPLICATION FILED MAY 23, 1910.

990,009.

Patented Apr. 18, 1911.



Witnesses,
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UNITED STATES PATENT OFFICE.

GEORGE C. RICHARDS, OF BERKELEY, CALIFORNIA.

FUME-CONDENSING APPARATUS.

990,009.

Specification of Letters Patent.

Patented Apr. 18, 1911.

Application filed May 23, 1910. Serial No. 562,916.

To all whom it may concern:

Be it known that I, GEORGE C. RICHARDS, citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Fume-Condensing Apparatus, of which the following is a specification.

This invention relates to fume condensing apparatus, and particularly to induced-draft, hydraulic condensers for use in conjunction with smelters, garbage crematories, and the like.

The object of my invention is to provide an apparatus of peculiar arrangement and design whereby a more efficient condensation of fumes arising from the smelting of ores or the reduction of organic matter is obtained; and also to provide an apparatus which shall be economical in water consumption, but which will have novel means for cooling and cleansing or aerating the water used, and which apparatus may readily and quickly be cleared of deposits accumulating in the several parts of the condenser.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of the apparatus. Fig. 2 is a vertical central section of the condenser.

It is desirable to condense the obnoxious fumes and gases produced during smelting and other reducing processes before they escape into the atmosphere, so as to remove as far as possible the deleterious substances, and I have found that by subjecting the volatile products and smoke, as they leave a furnace, to the action first of a jet of water, and then to a chilling blast of air directed more or less at an angle to the flow of the water jet and gas, practically all of the destructive or obnoxious fumes are condensed, the values recovered, and the water cooled and aerated and rendered capable of re-use indefinitely.

In the present embodiment of my invention the fumes from the furnace A, which latter may be of any variety, are drawn into a substantially globular head 2 having a contracted orifice or discharge throat 3 formed by the abutting, oppositely flared, hollow cones 4—5; cone 5 being a part of

head 2, and the cone 4 bolted to it. The throat 3 is preferably located approximately at right angles to the inlet 2' of the head 2. Axially in line with the discharge 3, and terminating practically in the center of the head 2, is a horizontally disposed nozzle 6 passing through the head and connecting by pipe 6' with a suitable pump 7, whereby water is forced out of nozzle 6 in a stream or jet which diverges and substantially fills the throat 3.

Secured to cone 4 is an expanded cylinder or section 8 into which the stream from the nozzle flows and forces the uncondensed smoke, fumes and gases drawn from the furnace; the jet from nozzle 6 inducing a powerful draft through the furnace to effect proper combustion. From section 8 the water and uncondensed and unprecipitated gases and matter which it carries are delivered into a condensing section or globular chamber 9 having a contracted discharge throat 10 which is set more or less at an angle to the middle cylinder 8, and discharges into a tank or reservoir 11.

In addition to the condensing action on the gases and fumes by contact with and partial absorption by the cool liquid jet from nozzle 6, they are chilled and mixed with a blast of air from a horizontally disposed nozzle 12 which is connected to an appropriate blower 13; the nozzle 12 being arranged to discharge in line with the throat 10.

The effect of the angular disposition of the sections 4—2—8—9—10 is to constantly break the direction of flow of the fumes so that no continuous strata are created; but on the contrary, innumerable eddies are caused which interrupt the continuity of flow and permit an intimate commingling of the fumes, first with the water jet from nozzle 6, and later with the diverting chilling air blast from nozzle 12.

The spray from nozzle 6 induces a powerful draft of the gases from the furnace A, these gases becoming partially condensed in the chambers 2—9. The resulting precipitate, in the form, usually, of a sticky tarry mass, may be removed at intervals through tap holes in the bottom of the chambers 2—9, which holes are normally closed by doors 15 operated each by a suitable lever 16. The lever is so fulcrumed, at 17, and counter-weighted, that the door will automatically

close when the lever is free, and remain closed under all ordinary conditions, except for the undue accumulation of deposits in the chamber on top of the trap-door.

5 In addition to the counterweight of the handles of levers 16 tending to maintain the doors closed, the suction created by the jet actions in the apparatus also assist in maintaining the doors normally closed. 10 While they may be opened by hand, they are enabled, by the construction shown, to open, discharge and close automatically.

The vacuum-creating effect of the air blast from nozzle 12 assists materially in the force 15 of the induced draft through the apparatus; but the main beneficial effect of the air blast seems to be due to the sudden expansion of the air as it leaves the nozzle 12 under high pressure, thereby becoming 20 suddenly chilled and imparting its cold to the hot surrounding water flow, insuring complete precipitation and condensation. It also aerates the water, so that after delivery into the tank the water is ready immediately 25 for re-use.

While it is preferred to use air, for the reason stated above, steam has been used successfully in lieu of the air blast from 12, 30 and when used, only one-third the volume of water is required. The chief objection to steam, aside from the fact that it requires water and heat to create it, is that it is found that the steam heats up the water in tank 11, necessitating this water in the tank 35 being cooled by other means.

In order to give access to the interior of the chambers 2—9 independent of the doors

15, manholes are provided which are normally closed by appropriate doors 18.

Having thus described my invention, what 40 I claim and desire to secure by Letters Patent is—

1. The combination with a furnace having an outlet for smoke and fumes, of a chamber of greater diameter than said outlet and 45 connecting with the outlet, a hydraulic ejector in said chamber and inducing a draft through the outlet from the furnace, fluid connections between the chamber and a settling tank, said connections including a sec- 50 ond enlarged chamber and an intermediate pipe section, and an air ejector in said second chamber between the hydraulic ejector and tank and operative to accelerate or assist in the induced draft and serving to cool 55 the water as it enters the tank.

2. In a fume and gas condensing apparatus, the combination with a furnace, having an outlet, of a condenser having globular 60 heads, an expanded section coupling the heads, one of said heads being connected with the outlet of the furnace and having a greater diameter than said outlet, jet nozzles in each head disposed at right angles to each other, and means whereby a jet of water 65 is discharged by one nozzle and a blast of air by the other.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE C. RICHARDS.

Witnesses:

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