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H. E. THEISEN.

APPARATUS FOR CLEANING, COOLING, AND WASHING GASES.

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1,042,840.

Patented Oct. 29, 1912.

Fig. 2.

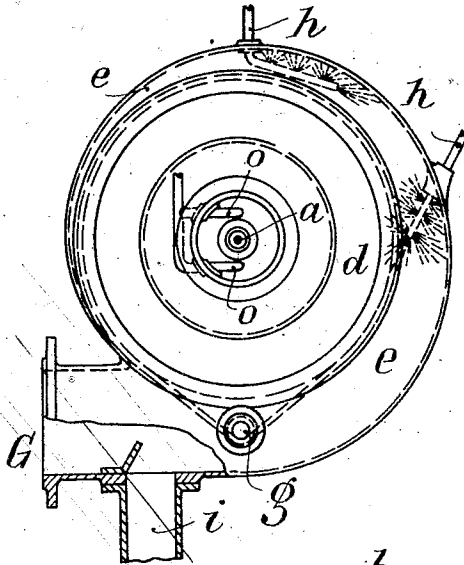


Fig. 1.

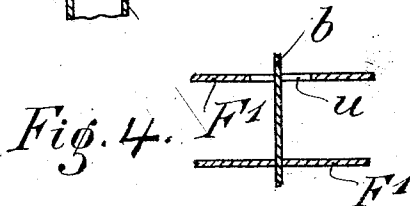
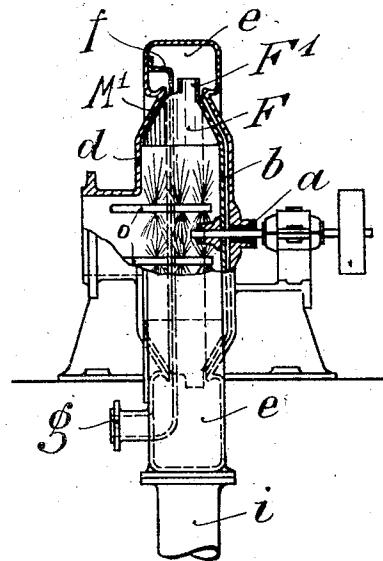
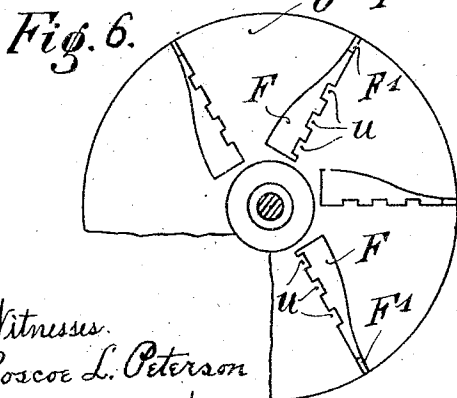
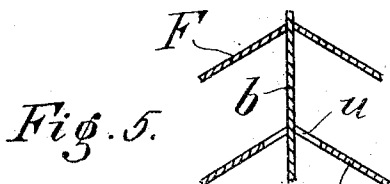
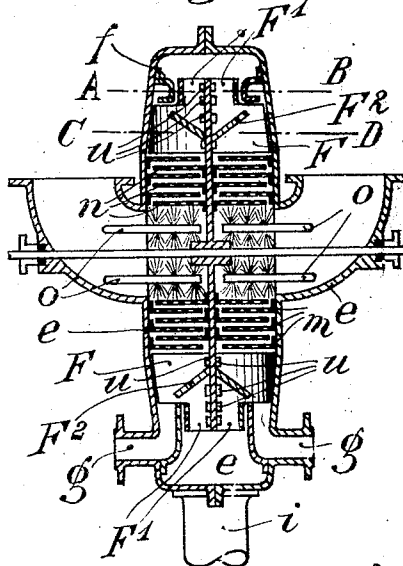


Fig. 3.



Witnesses.
Roscoe L. Peterson
Eugene W. Werning

Inventor
Hans Edward Theisen
by *Chas. M. Munn*
his Attorney

UNITED STATES PATENT OFFICE.

HANS ED. THEISEN, OF MUNICH, GERMANY.

APPARATUS FOR CLEANING, COOLING, AND WASHING GASES.

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To all whom it may concern:

Be it known that I, HANS EDUARD THEISEN, a citizen of the United States of America, residing at Elisabethstrasse 34, Munich, Germany, have invented certain new and useful Improvements in Apparatus for Cleaning, Cooling, and Washing Gases, of which the following is a specification.

The present invention relates to an apparatus of simple construction, adapted for the cleaning, cooling and washing of gas.

The essence of the invention resides, first, in the provision of lateral washing surfaces, arranged concentrically about outwardly opening fan or propeller blades, against and upon which surfaces the finely comminuted washing fluid is thrown, the gas being pressed or forced against the layer or stratum of fluid on these surfaces, whereby a thorough cleansing of the gas is accomplished. The gas passes out of the apparatus through the casing proper, which is connected with the said washing surfaces. When the apparatus is constructed in the manner above briefly outlined, the fan or propeller blades are preferably arranged at such an incline or slope, that the mixture of gas and fluid sucked into the apparatus is thrown, as nearly as may be, at right angles to and against the said washing surfaces.

It is also an important feature of my invention to give the blades substantially the form of plow shares *i. e.* of curved formation, and to intertwine the blades at their inner parts, which construction results in enhancing the effect of throwing the gas against the lateral washing surfaces. It is advisable to provide the blades with openings or perforations to prevent finely comminuted particles, tar and like incrustation from settling in the angles and corners of the blades.

The cleaning action resulting from throwing the gas against the lateral washing surfaces is materially increased by providing conduits in communication with these surfaces, whereby the solid and fluid substances are separated, the cleansed gas being thrown radially, by centrifugal action, while the cleansing fluid with its contained impurities passes into and out through the conduits. This arrangement results in a saving of power, and also makes it possible to inject water or absorption media into the cleansed gas for the purpose of cooling or absorbing

the same, this water or absorption media passing out separately from the cleansing fluid originally employed. To intensify the action of the blades, the latter may be subdivided or separated by suitable partitions.

The thoroughness of cleaning, mixing and cooling the gas may be increased, by providing in the suction chamber of the apparatus a plurality of perforated cylinders or cones, one within the other, these cylinders being rotated in reverse direction, or some of the cylinders being stationary and others thereof movable with the movable parts of the device.

Several forms of the invention are illustratively exemplified in the accompanying drawings, wherein—

Figure 1 is an end elevation, partly in section, and Fig. 2 a side elevation, partly in section, of one form of the invention; Fig. 3 is a vertical section of a modified form; Fig. 4 is a transverse section taken on the line A—B of Fig. 3; Fig. 5 is a similar view taken on the line C—D of Fig. 3; and Fig. 6 is a fragmentary view of the blade carrying disk.

Referring to the drawings, it will be noted that I provide a paddle or propeller wheel *b*, the paddles *F* of which are open laterally and at their inner portions are shaped like plow shares *i. e.* curved so that they throw the mixture out laterally with great force. To increase the force of this action the blades are preferably smaller at their outer than at their inner portions, and the walls of the casing, below the gas discharge channel *e* may be contracted, so that there is formed laterally of the paddle wheels, entirely surrounding the same and spaced a short distance away therefrom, an inclined washing surface *M'* from which the mixture thrown against the same runs off to be conducted out of the apparatus. In order that this mixture may not run back into the discharge channel *e* or into the apparatus casing, I provide, concentrically with the outer edge of the surfaces *M*, a conduit *f* into which the admixed solid and fluid enters and passes out of the apparatus at *g*. At the outer end *F'* the paddles are extended beyond the inner edge of the conduit *f* and are preferably closed laterally, and arranged parallel to the shaft *a*, so that these paddles operate in the usual manner of blades or fans to force the gas into the channel *e*.

o designates jet pipes through which absorption or cleansing media is injected into the apparatus.

E' and *E''* are the gas admission ports and *G* is the gas emission port.

In the form of invention just described, the solid and fluid constituents, such as cleaning water, tar and oil pass into the conduit *f* separate from the gas which passes out through the discharge channel *e*. If therefore it is desired to subject the cleansed gas to further treatment, additional jet pipes *h* discharging into the channel *e* may be provided, and through these pipes may be injected any substance for cooling, absorbing or further cleaning the gas, the latter being finally discharged at *G* and the material used for such additional treatment passing out of the casing at *i*. In this connection it is to be noted that the form of invention of Figs. 1 and 2 may be further so modified that the blades are double acting, that is to say, they may be arranged to act against two oppositely disposed washing surfaces each of which is provided with a conduit. When the structure is so modified the blades are carried by a central supporting disk *b*. Fig. 3 shows an apparatus wherein there are two such conduits *f*, each terminating in an outlet port *g*. Furthermore Fig. 3 differs from the structure of Figs. 1 and 2 in that suitable partitions *F'* are arranged between the blades, these partitions aiding in preventing radial, and causing lateral, discharge of the gas and fluid. There are also provided in the suction chamber of the apparatus, disintegrators *m* and *n*, which preferably consist of perforated sheet metal or wire mesh concentric cylinders or cones, one within the other, certain of these cylinders being relatively fixed and others thereof being adapted to rotate with the paddles. These cylinders or disintegrators serve to thoroughly admix the gas with the absorption or cleansing fluid admitted through the jet pipes *o*.

To prevent accumulation or incrustation of dirt, etc., in the angles where the blades are secured to the disk, which would tend to detrimentally affect the equilibrium of the rapidly rotating blades and cause noise, vibration and heating of the packing and bearings, it is advisable to form apertures or openings *u* at the base of the blades in those parts thereof which are inclined as well as those which are parallel to the shaft *a*, so that the gas and fluid at the edges of the blades may pass through these openings, keeping the angles clean and assuring a thorough circulation of fluid through the apparatus. In this manner the settling of particles of tar and other solids and the formation of incrustation is prevented and continuous operation of the device is obtained.

The form and arrangement of the open-

ings *u* is clearly shown in Figs. 3 to 6, the latter being a side elevation of the supporting disk *b* for the blades. As shown in these views the openings *u* in one blade *F'* *F''* are preferably offset in relation to those in the adjacent blade so that, during rapid rotation, there is no continuous annular passage.

The forms of invention illustrated in Figs. 1 to 3 are especially well adapted to cleanse gases issuing from blast furnaces, as well as illuminating gas; the constituent parts of greater specific gravity, especially the tar, passing through the conduits *f* and out at *g* in substantially dehydrated condition, while such substances as naphthalene or cyanogen may be absorbed by the absorption media jetted into the passage *e* through the pipes *h*, and may be caught up at the outlet *i*. These forms of the invention are also well adapted for use in the chemical industry, where it is desired to separate any constituents out of the gas by the use of expensive oils which may be used over and over again; and after the separation just referred to, the gas may be cooled or cleaned by water or any other fluid, in the same apparatus.

In connection with furnace and generator gases and especially in the cleaning of gases coming from lead and zinc smelting furnaces the invention is of great utility because in the initial cleaning step the main body of comminuted particles is carried off admixed with but little washing fluid, while during the second cleaning step any desired quantity of fluid for cooling and subsequent cleaning may be used. By this method of procedure it is possible to recover the valuable particles of zinc etc., from the concentrated sludge resulting from the initial cleaning step, as contradistinguished from the methods now employed wherein the whole body of cooling and cleaning fluid containing these particles is carried off to waste.

What I claim is:—

1. A device of the character described, embodying therein a supporting disk, a plurality of paddle blades attached to said disk, said paddle blades having openings therein adjacent the point of attachment to said disk, and washing surfaces adjacent said blades.

2. A device of the character described, embodying therein a supporting disk, a plurality of paddle blades attached to said disk, said paddle blades having openings therein adjacent the point of attachment to said disk, the openings in successive blades being offset relatively to each other, and washing surfaces adjacent said blades.

3. A device of the character described, embodying therein a casing having its inner walls formed as washing surfaces, a supporting disk and a plurality of paddle blades carried thereby, said blades being curved at 1.

their ends attached to the disk and having their opposite ends turned to extend in a direction substantially parallel to said supporting disk, a separate conduit in said casing for receiving solid particles and fluid
5 from the ends of said blades which are turned substantially parallel to the disk, and means for revolving said disk and blades.

4. A device of the character described,
10 embodying therein a supporting disk, a plurality of paddle blades on said disk, each said paddle blade having openings therein adjacent its point of attachment to said disk

and having its outer end extended and reduced as compared to the body of the blade, 15 a gas escape conduit into which the extended ends of the blades project, a casing for laterally inclosing said blades, and means for revolving said blades.

In testimony whereof I have affixed my 20 signature in presence of two witnesses.

HANS ED. THEISEN.

Witnesses:

RICHARD LEMP,
A. W. W. COTTER.