No. 704,593. Patented July 15, 1902.

E. THEISEN.

APPARATUS FOR WASHING GASES.

(Application filed Oct. 25, 1899.)

(No Model.)

Fig. 1.

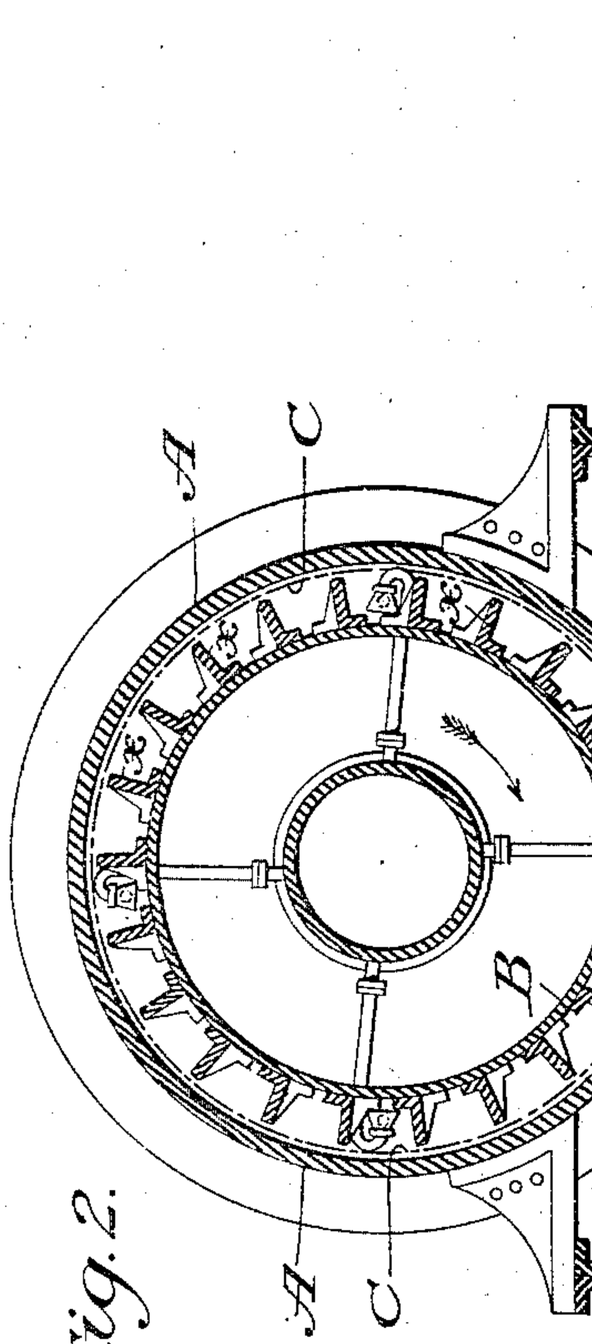

Fig. 2.

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UNITED STATES PATENT OFFICE.

EDWARD THEISEN, OF BADEN, GERMANY.

APPARATUS FOR WASHING GASES.

SPECIFICATION forming part of Letters Patent No. 704,593, dated July 15, 1902.

Application filed October 25, 1899. Serial No. 734,725. (No model.)

To all whom it may concern:

Be it known that I, EDWARD THEISEN, mechanical engineer, residing at Baden, in the Grand Duchy of Baden, Germany, have invented new and useful Improvements in Apparatus for Washing Gases, of which the following is a full, clear, and exact description.

My present invention relates to apparatus for washing gases to remove the impurities and to separate the by-products therefrom.

The apparatus forming the subject-matter of the present invention is particularly adapted to carry out efficiently and economically the process described in my application, Serial No. 702,947, filed January 21, 1899.

The object of my present invention is to provide an efficient device of the character specified wherein a complete vaporization of the liquid in the space occupied by the gases is attained and danger of explosion is guarded against.

To these ends my invention consists in the novel arrangement and combination of parts to be hereinafter described and claimed.

In the accompanying drawings, forming part hereof, Figure 1 is a longitudinal vertical sectional view of an apparatus embodying my invention. Fig. 2 is a transverse vertical sectional view of the same.

Referring to the drawings, it will be observed that the outer stationary cylindrical casing A is provided with a gas-inlet opening *a* and a gas-outlet *b*. This casing is provided upon the inner walls thereof with a wire-netting or other suitable covering *c*, as is well understood, to present an extensive surface for the liquid. The lower portion of the casing is submerged in a liquid contained within trough-like containers D, into which extend partitions E, that do not reach to the bottoms of said containers D, but extend up to the casing A and between the openings *d e* therein. The opening *d* permits water or other liquid within the container to pass into the casing, and it is then taken up and flows out again through the opening *e*, as will hereinafter more clearly appear.

Within the casing A is contained a rotary cylinder B, which is provided on the exterior thereof with oblique or spiral blades *x*, by means of which the water or other absorbing liquid is being continually carried around the interior surface of the casing. While liquid is being supplied in this manner by the rotating cylinder another supply of liquid is being conveyed from the interior of the cylinder. Thus the rotary cylinder B likewise carries pipes G' G^2 G^3, one end of each of which communicates with a separate chamber contained within the cylinder, as indicated at f' f^2 f^3, while the opposite end of each of these pipes is provided with a ball-nozzle of the ordinary or any preferred construction, as indicated at h' h^2. From an examination of Fig. 1 of the drawings it will be observed that the mouths of these nozzles open toward the cylinder B, so that centrifugal force will tend to maintain the balls in place upon their seats. Communicating with each of the chambers f', f^2, and f^3 is a fixed supply-pipe F', F^2, and F^3, respectively.

The water or other liquid which enters the opening *d* in the casing is conveyed up by the blades *x* of the cylinder and by them is distributed and vaporized during the rotation of the cylinder, and the products of condensation pass out through the outlet *e*, from whence they may pass to the opening for the admission of water. The washing or absorbing liquid may be passed through the supply-pipes F' F^2 F^3 and passing into the separate chambers within the cylinder is conveyed by the pipes G', G^2, and G^3 through the nozzles h' and h^2, the force of the liquid upon the balls in the nozzles being slightly greater than the centrifugal force which tends to maintain them upon their seats. The liquid from the pipes F', &c., is in this manner thrown inward within the space between the outer casing and the rotary cylinder B.

The outer casing A is enlarged near the gas-outlet opening *b*, so as to form a chamber M, which is divided from the main space between the cylinder B and the casing by the wire-netting *c*, so that the chamber M will serve as a drying-chamber—that is to say, the liquid will be collected behind the screen at this point and the whirling mass of gas will have no opportunity to agitate the liquid. It will be observed that by my invention small quantities of liquids can be injected through some of the nozzles h', &c., which small quantities of liquids can be readily volatilized by the heat of the gas, while larger quantities of

cool water can be conveyed through other of the nozzles h', &c., to condense the vapors, together with the materials they carry.

In operation the hot gases to be purified enter at a and pass lengthwise between the cylinder B and the casing A, being at the same time whirled by the blades x. The water or other absorbing liquid contained in the receptacles D and in the lower part of the casing A is continuously picked up and carried over the cylinder B by the blades x from the opening d on one side of the partition E and is then conveyed back into said receptacle or container through the opening e on the other side of the partition. During this movement the water is thrown out against the netting or equivalent covering c, which atomizes the water or breaks it up into minute particles, and thus gives the liquid a large surface, so that it can more readily absorb impurities contained in the gas. These impurities are held in suspension while the liquid is in violent motion; but upon the return of the liquid to the receptacle D the impurities settle at the bottom thereof and the clear liquid passes under the partition E to the opening d. The liquid or liquids supplied through the nozzles h' h^2 h^3 are also thrown outward and atomized by centrifugal force and by the covering c and assist in purifying the gas. At the same time the hot gases vaporize the atomized liquid. For instance, small quantities of a washing or absorbing liquid may be injected through the nozzles h' h^2, so that the heat of the gases will be sufficient to vaporize said liquid, and then the gases as they approach the outlet b will be subjected to the action of a larger amount of cooling-water issuing from the nozzles h^3, so as to cause a condensation of the vapors formed from the liquids, together with the impurities absorbed by said vapors. Finally, the liquid will be thrown into the chamber M, so that the covering c will intervene between the body of liquid and the gases, thus freeing the latter of liquid or drying them. The dried and purified gases escape through the outlet b.

By reason of the fact that the openings in the casing A are sealed by the water contained within the containers D there is little liability of explosion taking place in the treatment of the gases, as an undue pressure of gas will cause the gas to be driven through the water seal or will cause the water to be temporarily displaced to permit the free escape of surplus gas.

By the horizontal disposition of the apparatus instead of a vertical arrangement it has been found that the apparatus is more efficient.

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

1. In an apparatus for washing gases and removing impurities therefrom, the combination of a horizontally-arranged stationary casing having liquid receiving and discharge openings therein, a liquid-container over which the casing rests, said casing and container being so arranged with relation to each other that the mouths of the openings in the former will be submerged in the liquid in the container, a rotary horizontally-arranged externally-bladed cylinder contained within said casing for conveying liquid from the liquid-receiving opening in the casing to the discharge-opening therein and means carried by said cylinder for continually supplying to the apparatus a washing or absorbing liquid other than that taken from the container.

2. In an apparatus for washing gases and removing impurities therefrom, the combination of a horizontally-arranged casing having liquid receiving and discharge openings therein, a liquid-container over which the casing rests, said casing and container being so arranged with relation to each other that the mouths of the openings in the former will be submerged in the liquid in the container, a rotary horizontally-arranged bladed cylinder contained within said casing for conveying liquid from the liquid-receiving opening in the casing to the discharge-opening therein, one or more supply-pipes carried by said rotary cyliuder and each carrying a spraying-nozzle, one or more chambers within the cylinder in communication with the supply-pipes and means for supplying said chamber or chambers with liquid.

3. The combination of a stationary casing with a rotary cylinder having obliquely-disposed exterior blades, means for causing gases to pass between the casing and the cylinder, and means for spraying liquid in said space between the rotary cylinder and the stationary casing, to cause said liquid to pass outwardly from the cylinder to the casing and to come in close contact with the gases.

4. The combination of a stationary casing, a rotary cylinder located within the casing and provided with external oblique blades, means for passing a current of gas between the casing and the cylinder, and spraying devices located at different points lengthwise of the cylinder for discharging a liquid into the space between the cylinder and the casing, causing said liquid to be thrown outward against the casing and to pass through the current of gas.

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

EDWARD THEISEN.

Witnesses:
MAX ADLER,
MAX J. BAEHR.