

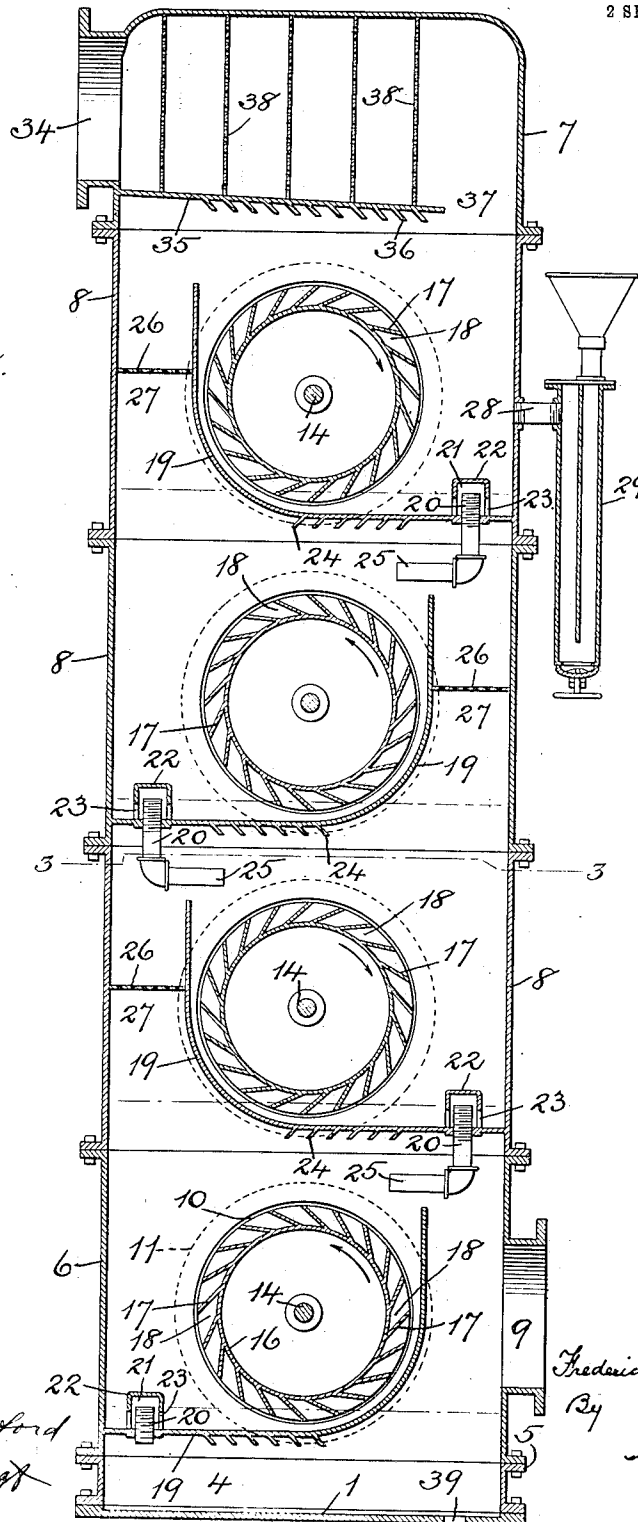
F. H. WAGNER.
 APPARATUS FOR SUBJECTING GASES TO THE ACTION OF LIQUIDS.
 APPLICATION FILED JAN. 11, 1911.

1,091,464.

Patented Mar. 24, 1914.

2 SHEETS-SHEET 1.

Fig. 1.



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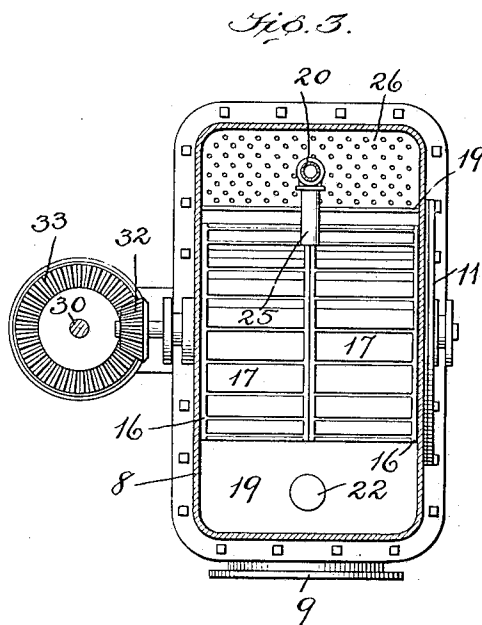
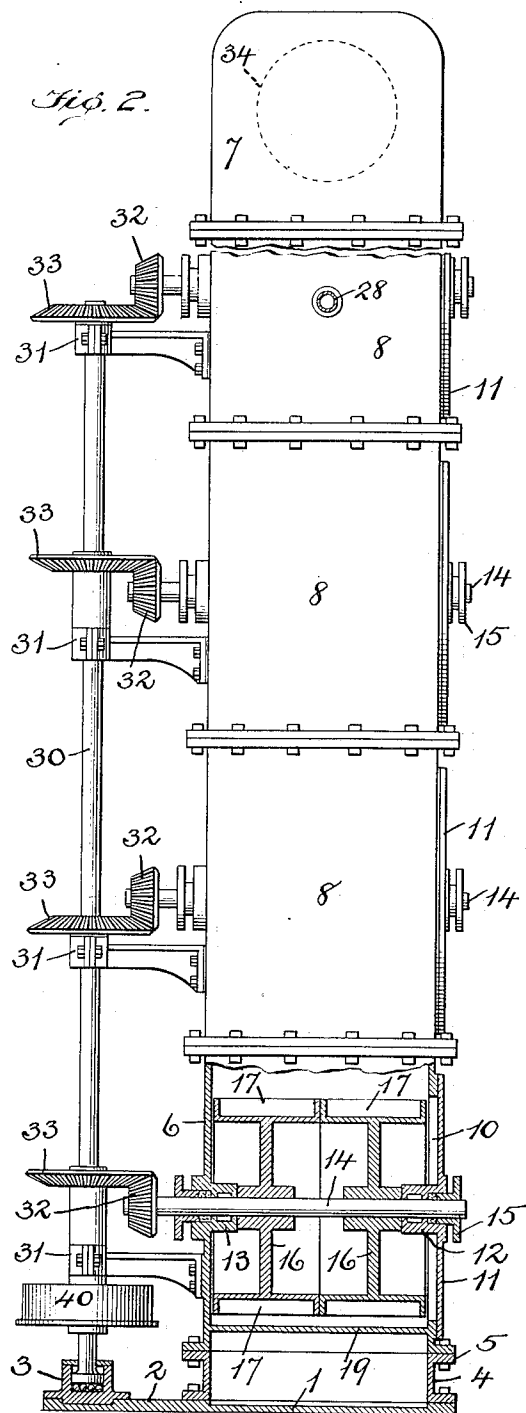
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UNITED STATES PATENT OFFICE.

FREDERICK H. WAGNER, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE BARTLETT HAYWARD COMPANY, OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

APPARATUS FOR SUBJECTING GASES TO THE ACTION OF LIQUIDS.

1,091,464.

Specification of Letters Patent.

Patented Mar. 24, 1914.

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To all whom it may concern:

Be it known that I, FREDERICK H. WAGNER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Apparatus for Subjecting Gases to the Action of Liquids, of which the following is a specification.

This invention relates to an improved apparatus for subjecting heating and illuminating gases to the action of liquids, and while it may be utilized to do this for any purpose whatever, it is particularly designed for washing gases to free the latter of impurities by passing the gases through and bringing them into intimate contact with the liquids.

The object of the invention is to provide an improved apparatus for effectively bringing the heating and illuminating gases and liquid into intimate contact and at the same time by means of constructions, arrangements and combinations of elements that will be extremely simple; comparatively cheap and accessible without dismantling the greater part of the apparatus.

Other objects and advantages will be apparent to those skilled in the art to which the invention relates upon an inspection of the accompanying drawings, wherein,

Figure 1, shows the improved apparatus in vertical sectional elevation. Fig. 2, is another view of the same,—partly in section, and Fig. 3, is a horizontal or sectional plan through the apparatus,—the section being taken on the line 3—3 of Fig. 1.

Referring to the drawings, the numeral, 1, designates a base which in the present instance has an extension, 2, at one side thereof forming a support on which a suitable bearing, 3, is sustained for a purpose presently to be described. A hollow casting, 4, of substantially a rectangular shape is sustained in the base and has flanges, 5, by means of which it may be bolted to the parts of the apparatus both below and above it.

The apparatus is formed of a plurality of sections for the purposes of simplifying the

construction; rendering the various parts accessible; reduction in costs of manufacture and to enable the number of sections employed to be readily varied to suit the particular work to be accomplished.

In the form shown in the accompanying drawings the apparatus comprises a main lower section, 6; an upper section, 7, and three intermediate sections, 8. It is to be understood that the number of intermediate sections may be varied, and more or less than those shown in the drawings may be employed.

By referring to Fig. 1, of the drawing it will be seen that the main lower section, 6, is provided at one side with an opening, 9, by means of which the gases to be treated may be admitted to the apparatus. Another side of this lower section, 6, is provided with an opening, 10—in the present instance circular in form which is covered by a suitable plate, 11, as shown in Fig. 2, which is secured to the exterior of the section in such manner as to form a gas-tight joint. This plate, 11, is provided with a central horizontal bearing, 12, of desirable construction, and at a diametrically-opposite point, the wall of the said section has another horizontal bearing, 13, which, together with the bearing, 12, sustains a horizontal shaft, 14. Suitable glands, 15, are provided in connection with the bearings to enable a tight joint to be made about the shaft and thus prevent the escape of gas at that point. The horizontal shaft, 14, carries one or more rotatable devices, 16, which revolve with the shaft and consequently turn in a vertical plane within the section, for a purpose presently to be explained. In the present instance I have preferred to provide the said shaft, 14, with two rotatable devices of a wheel-like form and each of which has a plurality of circumferential blades, 17. In the form illustrated, the blades extend from the exterior of the rotatable devices substantially in a tangential direction thus producing a series of scoops or pockets, 18, around the circumference. The section, 6,

is also provided with a partition, 19, which extends horizontally from the wall at a point diametrically opposite the inlet opening, 9, and said partition curves upward from the under side of the rotatable device and has position between said rotatable device and the said inlet,—thus serving as a baffle between the inlet opening and said rotatable device. This partition is provided with a suitable opening through which a short overflow pipe, 20, extends and the upper end of the pipe enters a sealing chamber, 21, which is formed by a cap-like structure, 22, having openings, 23, in its side wall below the open upper end of the pipe. By this means the liquid (the purpose of which will be presently explained) will accumulate at the upper side of the partition until it reaches a depth flush with the upper open end of the pipe, 20, whereupon it will flow off through said pipe. This depth of liquid, it will be noted, will be sufficient to cause the blades, 17, of the rotatable device to pass through, scoop up the liquid and lift and throw it upwardly and laterally thus keeping up a continuous shower in the said lower section, for a purpose which will also presently be explained. It is obvious that if the depth of liquid in the section is maintained by means of the overflow pipe, 20, that liquid will form a seal in the small chamber, 21, around the pipe because the openings, 23, to the chamber are below the liquid level and consequently gas cannot pass downwardly through the overflow pipe and thus circulate around the partition. It will thus be seen that the gas upon entering the lower section, 6, by means of the opening, 9, will be deflected by the up-turned portion of the partition, 19, and will then pass over the top of said partition and through the shower of liquid seeking an outlet thereby subjecting the gas to the action of the liquid by bringing them into intimate contact. From the lower main section the gas will pass upwardly through the several intermediate sections, 8, each of which has a rotatable device; a partition and a sealed overflow pipe substantially as described in connection with the lower section, 6. The partitions however in the intermediate sections are preferably provided on their under surfaces with a plurality of crosswise fins or ribs, 24, so that the liquid thrown up against the under side of said partitions by the rotatable devices below will be compelled to drip back into those rotatable devices instead of flowing toward and down the vertical walls of the section. It will also be noted that the overflow pipes of the intermediate sections have lateral extensions, 25, that project over the upwardly-projecting end of the partition in the section below and will direct any liquid flowing from said ex-

tensions onto the rotatable devices in the section next below. Another feature to which attention is directed is the reversal of the partitions in the various sections,—the partition for example in the lower section extends from left to right whereas the partition in the next section above extends from right to left. By this arrangement of partitions the gas is compelled to take a tortuous path in traveling from the lower to the upper part of the apparatus and while passing from one section to another is subjected to the shower of liquid maintained by the rotatable devices in the section through which it is passing.

In each of the intermediate sections there is provided a screen, 26, which extends across the passage, 27, from the upwardly-projecting portion of the partitions to the wall of the section. By means of these screens the spray or showers of liquid thrown up by the rotatable devices below will be caught and will then drip back through the up-flowing gases.

The uppermost of the intermediate sections is provided with a liquid inlet pipe, 28, which leads from a trapped or liquid-sealed vessel, 29,—the liquid being continuously supplied to the latter in any suitable manner.

In order to rotate the several spraying or shower-producing devices a vertical shaft, 30, is provided on the exterior of the sections. The lower end of this shaft is seated in the bearing, 3, at the base of the apparatus, and a plurality of horizontal bracket bearings, 31, are provided between said lower bearing and the upper end of the shaft. The horizontal shafts which sustain the rotatable devices in the several sections carry beveled pinions, 32, on their outer ends and the vertical shaft, 30, is provided with a plurality of beveled gears, 33. These latter gears are so disposed on the vertical shaft as to mesh with the pinions on the horizontal shafts and it will be noted that in transmitting motion from the vertical to the horizontal shafts the gears are so arranged with respect to the pinions that the shaft in one section will be revolved in one direction while that in the next section will be revolved in a reverse direction,—thus the rotatable devices in alternate sections will be revolved in the same direction. In the present instance a pulley, 40, is provided on the vertical shaft, 30, by means of which the latter may be driven.

The uppermost section, 7, of the apparatus is provided with a gas outlet, 34, at one side and has a baffle plate or partition, 35, extending from the opening at one side toward the diametrically opposite side. This baffle extends over the uppermost series or set of revoluble devices and is provided on its

under side with a plurality of crosswise fins or ribs, 36, which cause the liquid that is thrown by the revoluble devices beneath to drip back instead of flowing along the bottom side of the partition and dripping from the end thereof. A passage, 37, is provided between the end of the partition, 35, and the adjacent upright walls of said section, 7, whereby the gas may pass around the end of the partition and to the upper side of the latter.

A plurality of screens, 38, are interposed in the upper section between the outlet, 34, at one side and the passage, 37, at the other side, and the gases during their passage through said screens will be materially freed of the moisture collected so as to enable it to pass through the outlet in a comparatively dry condition.

It will be noted that partition, 35, in the section, 7, is slightly inclined,—that is, it extends slightly downward as it recedes from the outlet, 34, consequently any liquid or moisture collected by the several screens, 38, will drain toward the passage, 37, and will drip into the section, 8, beneath it.

Briefly stated the operation of the apparatus is as follows: The liquid which is to be brought into contact with the gases, is admitted continuously in a small stream to the liquid-sealed vessel, 29, from which it passes by pipe, 28, into the uppermost section, 8. The overflow in this latter section is so adjusted that sufficient liquid will be retained therein to enable the blades, 17, on the rotatable devices to scoop up the liquid and by centrifugal action throw it in the form of a shower or a spray across the passage through which the gases pass. The overflow carries off the surplus liquid and directs it over the rotatable devices in the section next below where the action is repeated, and this is continued until the lowermost section is reached at which point the gases enter. After passing from the lowermost section the liquid then enters the hollow base member, 4, from which it passes off by means of an outlet, 39, and is conveyed to any suitable apparatus for treatment to extract such substances as may be of commercial value.

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

1. The combination with a vertical casing, of a plurality of rotatable devices in the casing one above another; a partition for each rotatable device and each partition extending under and upwardly at one side of the rotatable device with which it coacts with its up-turned portion located between the rotatable device and the wall of the casing to form a gas passage between it and the casing-wall and an overflow means extending through the partition below the upturned

portion thereof and at the opposite side of the rotatable device whereby the gas may pass up at one side of the rotatable device and the overflow take place from the opposite side thereof.

2. The combination with a casing, of a plurality of rotatable devices in said casing one above another; a partition extending under and partly around each rotatable device and one partition extending from one side wall and turning upwardly in front of the opposite side wall of the casing while the partition next below extends from said opposite side wall and turns upwardly in front of said one side wall whereby to form a zig-zag gas passage between the opposite walls of and through the casing and a series of liquid overflow means between the upper end and lower ends of the casing said overflow means being separate and independent of the zig-zag gas passage and each overflow means extending through a partition at the side opposite to the up-turned portion of said partition whereby the gas will pass up at one side of each rotatable device and the overflow pass down at the opposite side.

3. The combination with a vertical casing having a series of rotary devices each with liquid-projecting means around its periphery said devices being arranged one above another; of a liquid retaining partition for each rotary device and one end of each partition extending up at one side of the rotary device with which it coacts said up-turned end being spaced from the vertical wall of the casing to form a gas passage; means for supplying liquid to the upper side of each partition and means below the up-turned end of each partition and at the other side of each rotary device to prevent the liquid level from rising to the up-turned end of the partition.

4. The combination with a series of shells one above another, of a partition in each shell and each partition extending crosswise from a side wall of the shell and above the lower edge of the shell said partitions each having one end turned upwardly and spaced from the opposite side wall to form a gas passage; means for supplying liquid to an upper shell; a rotary liquid projecting device in each shell and a pipe from each partition below the up-turned end thereof and the discharge-end of the pipe from an upper shell terminating between the up-turned end of the partition and the rotary projector in the shell next below to direct the overflow liquid behind said up-turned end.

5. In an apparatus of the character described the combination with a plurality of shells each shell being open at the top and bottom and between said open top and bottom each shell having a rotary liquid projecting device; a partition in the shell be-

tween the open top and bottom which partition extends from one side wall of the shell crosswise, and turns upwardly around the rotary device and in front of and spaced
5 from the opposite side wall of said shell to form a gas passage in the shell between said up-turned end of the partition and said opposite side wall said up-turned end of the partition extending above the axis of the ro-

tary device and an overflow in the partition below the liquid-projecting device.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK H. WAGNER.

Witnesses:

G. FERD. VOGT,
CHAS. B. MANN.