

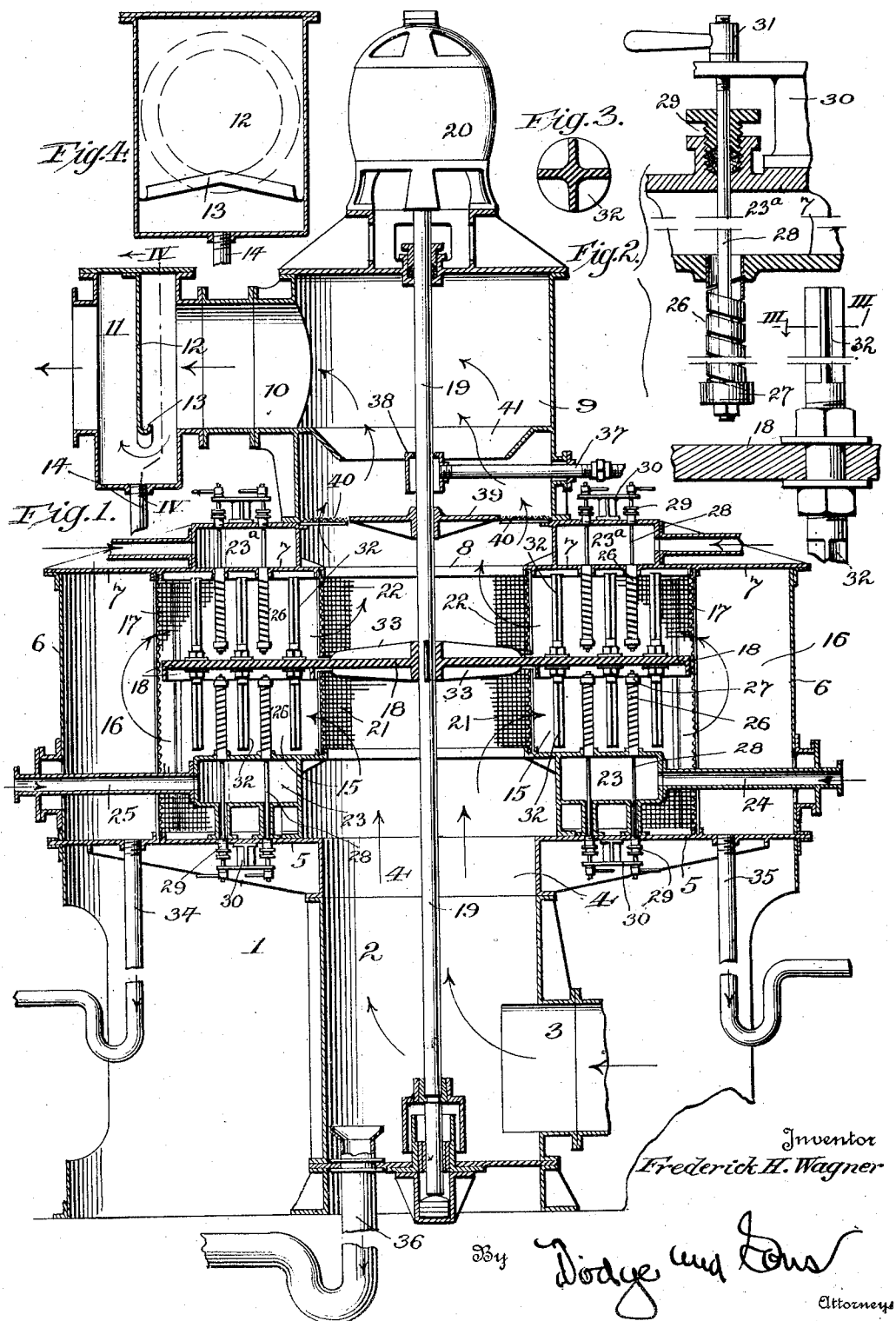
July 22, 1930.

F. H. WAGNER

1,771,364

LIQUID AND GAS CONTACT APPARATUS

Filed April 4, 1928



UNITED STATES PATENT OFFICE

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

LIQUID AND GAS CONTACT APPARATUS

Application filed April 4, 1928. Serial No. 267,392.

This invention pertains to an improved liquid and gas contact apparatus and more particularly to that type known in the art as gas disintegrating scrubbers.

5 The main object of the present invention is to produce a scrubber of the type just referred to which, while relatively simple in construction, is withal effective in operation.

10 A further object resides in providing a series of nozzles for introducing the wash liquid, which nozzles may be adjusted as to the volume of liquid introduced therethrough into the scrubber, the nozzles likewise performing the function of fixed disintegrators

15 cooperating with a series of movable disintegrator bars.

With these and other objects in view reference is had to the annexed drawings wherein:

20 Figure 1 is a vertical sectional view of the apparatus,

Figure 2 a similar detail view disclosing one of the nozzles and one of the disintegrator bars,

25 Figure 3 a cross sectional view of one of the bars taken on the line III—III of Figure 2, and

30 Figure 4 a vertical sectional view on the line IV—IV of Figure 1 disclosing the details of the eliminator located in the gas discharge flue or conduit.

35 In the drawing 1 denotes the base, preferably circular in cross section and housing a vertically disposed trunk 2 into which the gas inlet 3 opens. Trunk 2 at its upper end is attached to a depending flange 4 extending downwardly from a plate 5, which latter at its outer edge is supported upon the base 1.

40 Surmounting the plate 5 is an upstanding wall 6 circular in outline and supporting at its upper edge a second plate 7 similar to the plate 5. Plate 7 is provided with a central opening 8 in line with a duct or trunk denoted generally by 9 and from which there extends the gas discharge pipe or conduit 10, the latter terminating in an eliminator chamber 11 which has mounted therein a transversely extending plate 12. The lower edge of this plate, as will be best seen upon reference to Figures 1 and 4, is provided with a gutter

50 13 designed to collect the water which is re-

moved from the outflowing gas by impingement against the plate 12 and to conduct it toward the side walls of the chamber out of the path of the gas.

A drain pipe 14 opens into the lower part of the eliminator chamber.

The upper and lower horizontally disposed walls 5 and 7, together with the outer wall 6, form in effect a chamber which is divided into two portions 15 and 16 by a vertically disposed annular screen 17.

65 The chamber 15 is divided into upper and lower portions or chambers by a plate 18 secured to and rotatable with a vertically disposed shaft 19 which latter may be driven in any suitable manner as by a directly connected motor 20.

70 The inner wall of the chamber 15 is formed by screen elements 21 and 22 annular in outline and secured to the adjacent fixed elements of the structure. Sufficient clearance is left between the plate 18 and the adjacent edges of the screens 21 and 22 so that the plate is free to rotate without contacting the edges of said members.

75 There is thus produced within the housing a series of chambers through which the gas is forced to travel on its way to the outlet 10 and in so passing the gas is caused to go through numerous screen surfaces which tend to break it up and insure proper and intimate contact with the water or other liquid employed.

80 Mounted upon the plate 5 is a chamber 23 which is in communication with inlet pipes 24 and 25 for the introduction of liquid under pressure. Surmounting the upper wall of said chamber is a series of nozzles, said nozzles being of the form best shown in Figure 2. These nozzles may be said to comprise a spring strip 26 wound in spiral form and secured at one end in the body of the plate which they overlie (or underlie in connection with the upper series hereinafter referred to), a cup-shaped washer 27 at the outer end thereof, and a rod 28 extending therethrough and through the water chamber to the outside of the plate.

85 The rod 28 passes through a stuffing box 29 and the outer threaded end thereof passes 100

freely through a fixed bracket 30. A hand nut 31 is mounted upon the outer threaded end and by turning said nut the rod 28 may be drawn outwardly or allowed to move inwardly as the case may be and the space between the convolutions of the spiral 26 increased or diminished with a constant increase or diminishing of the spray which passes outwardly from the convolutions.

As will be appreciated, this structure admits of regulation of the flow of the liquid into the chambers and, what is more, the spray which emanates from the nozzles flows in all directions so as to fully fill the chamber with water vapors.

A chamber 23^a, similar to the chamber 23, is mounted upon the upper plate 7 and there is associated with said chamber a second series of nozzles which in this instance extend downwardly into the space above the rotatable plate 18.

Attached to and extending from opposite sides of the plate 18 are a series of beater arms 32, said arms being preferably of the cross sectional form shown in Figure 3. That is to say, the arms are ribbed, providing pockets or recesses therebetween so that they will gather the water or liquid sprayed against the same and throw it outwardly as the plate is rotated.

As will be seen upon reference to Figure 1, the beater arms stand in spaced relation to each other and to the inwardly extending nozzles so that there is present in effect a series of fixed beater elements in the nozzles and a series of movable beater arms or elements in the members 32.

Plate 18, adjacent the hub thereof, will preferably be provided with ribs 33 which may be fashioned into forward moving vanes in order to assist the flow of gas through the apparatus.

Suitable drains 34 and 35 will be provided in the lower portion of the chamber for the removal of liquid or water and a trapped drain 36 will likewise be provided in the lower portion of the trunk 2.

In addition to introducing water through the nozzles connected with the chambers 23 and 23^a water or liquid may also be introduced through a pipe 37 which terminates at its inner end in an inverted cup-shaped member 38 through which the shaft 19 extends.

Below said member 38 there is secured to the shaft a rotor 39 and outward thereof is a horizontally disposed annular foraminous surface 40. Any liquid which passes from the cup on the rotor 39 is thrown outwardly by the latter over the screen surface 40 and into direct contact with the upcoming gas which at that time is minutely subdivided into fine streams or bubbles.

Located within the trunk 9, above the cup, is an annular depending flange or element 41 extending inwardly from the wall of

the trunk and serving to arrest the upflow of the liquid or water which might otherwise be carried over by the outgoing gas stream.

It is thought that the operation of the structure will be clear from the foregoing but a brief résumé will be given.

The gas to be cleaned or otherwise treated with a liquid passes inwardly through the opening 3, up the trunk 4, through the screen surface 21 and into the chamber formed by said surface, the similar surface 17, the upper wall of the chamber 23, and the under face of the rotating plate-like member 18. In passing through this chamber the gas comes into intimate contact with the spray emanating from the nozzles and is beaten up with the spray by the beater arms 32, which, by reason of their cross sectional form, are very effective.

The gas passing outwardly of the screen surface 17 then passes upwardly and inwardly into the space or chamber formed above the plate 18 by the screen surfaces 17 and 22 and the lower wall of the chamber 23^a. Here it is again brought into intimate contact with the water spray or vapor and finally passes outwardly of the screen surface 22 and upwardly through the screen or foraminous surface 40 where it is subjected to its final washing action.

What is claimed is:

1. In a scrubber, the combination of an annular shell; upper and lower walls associated therewith, said lower wall having a centrally disposed gas inlet and said upper wall having a similarly disposed gas off-take; a screen-like element located inwardly of the wall of the shell and extending from the lower to the upper wall; a rotatable plate-like member extending transversely of the shell with its outer edge lying close to the screen-like element, said member lying in spaced relation to the upper and lower walls and thereby forming chambers above and below the plate; and means for spraying liquid into said chambers.

2. A scrubber as set forth in claim 1, wherein the rotatable plate is provided with beaters extending from the plane thereof.

3. A scrubber as set forth in claim 1, wherein the means for spraying the liquid comprises a series of nozzles.

4. In a scrubber the combination of an annular shell having a centrally disposed gas inlet at its lower side and a similarly disposed gas off-take at its upper side; a foraminous element located inwardly of the outer wall of the shell; a rotatable plate-like member extending transversely of and within the space bounded by said foraminous element, said plate dividing said space into upper and lower chambers; a screen-like element extending from the inlet to the plate; a similar element extending from the gas off-take to the plate; means for spraying a liquid into the

chambers above and below the plate; and a series of beater arms carried by the plate.

5 In a scrubber the combination of a shell having a gas inlet and a gas off-take; means located within the shell for subjecting the gas stream to a washing action; a fixed annular foraminous member located in the gas off-take; a rotary disk located adjacent said member; and means for supplying liquid to said disk.

10 6. In a scrubber the combination of a casing having a gas inlet and a gas outlet; a shaft extending centrally therethrough; a plate-like member secured to the shaft and extending transversely of the space within the casing, said member stopping short of the outer wall of the casing and likewise dividing the space into upper and lower chambers; a foraminous member extending from the upper to the lower wall of the casing, said member standing close to the periphery of the plate-like member; a screen-like element extending from the gas inlet up to the plate-like member; a similar element extending from the gas off-take to the plate; means for introducing a liquid into the chambers between the screen surfaces; and a series of beater arms carried by the plate.

7. In a scrubber the combination of a casing provided with a centrally disposed gas inlet and a centrally disposed gas outlet; an annular foraminous surface extending around within the casing and spaced from the outside wall thereof; a shaft extending centrally through the casing; a plate-like member secured to the shaft and rotatable therewith, said member extending transversely of the casing with its periphery lying adjacent the vertically disposed annular foraminous surface; an annular foraminous surface extending from the mouth of the gas inlet to the plate-like member; a third annular foraminous surface extending from the gas off-take to the plate; a series of spray nozzles extending into the various spaces formed by the plate and the foraminous surfaces; and a series of beater arms secured to the plate extending outwardly from each side thereof, said arms being spaced with relation to each other and to the nozzles.

8. A scrubber as set forth in claim 7, wherein an annular foraminous surface is located in the gas off-take and a disk-like member is secured to the shaft adjacent thereto, together with means for supplying a liquid to said disk-like member.

9. In a scrubber the combination of a casing provided with a gas inlet and a gas outlet; fixed vertical screen-like surfaces mounted within the casing and dividing the same into a plurality of chambers through which gas is caused to flow; a plate-like element extending transversely of the casing; a series of beater rods extending from the plate-like element into one of the chambers at least, said

rods being ribbed; means for rotating the plate-like element, and means for introducing a liquid into the chambers in which said rods are located.

In testimony whereof I have signed my name to this specification.

FREDERICK H. WAGNER.

75

80

85

90

95

100

105

110

115

120

125

130