A. M. GOW.

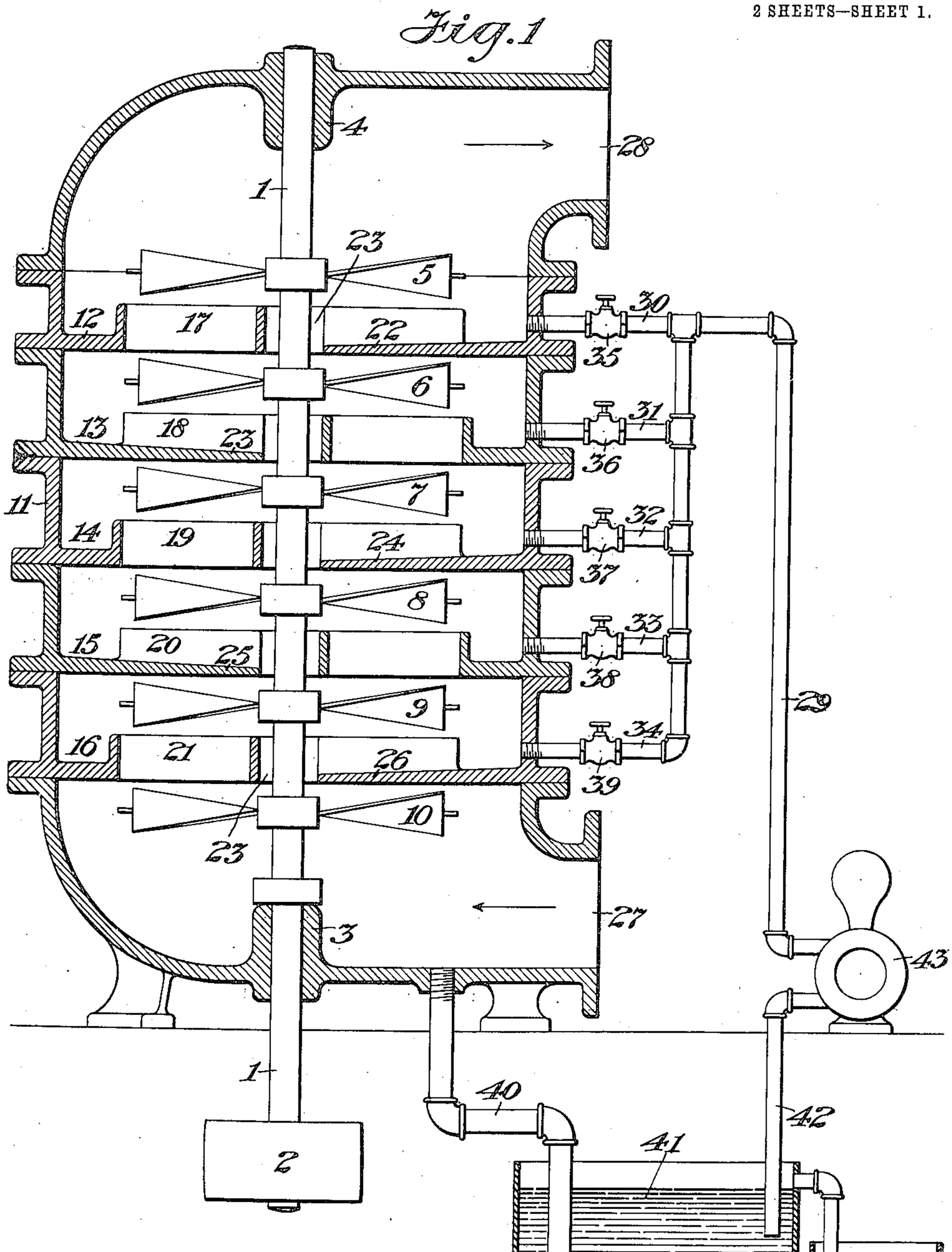
GAS SCRUBBER APPARATUS.

APPLICATION FILED AUG. 29, 1903.

945,936. Patented Jan. 11, 1910.

2 SHEETS—SHEET 1.

Fig. 1



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2 SHEETS—SHEET 2.

Fig. 2

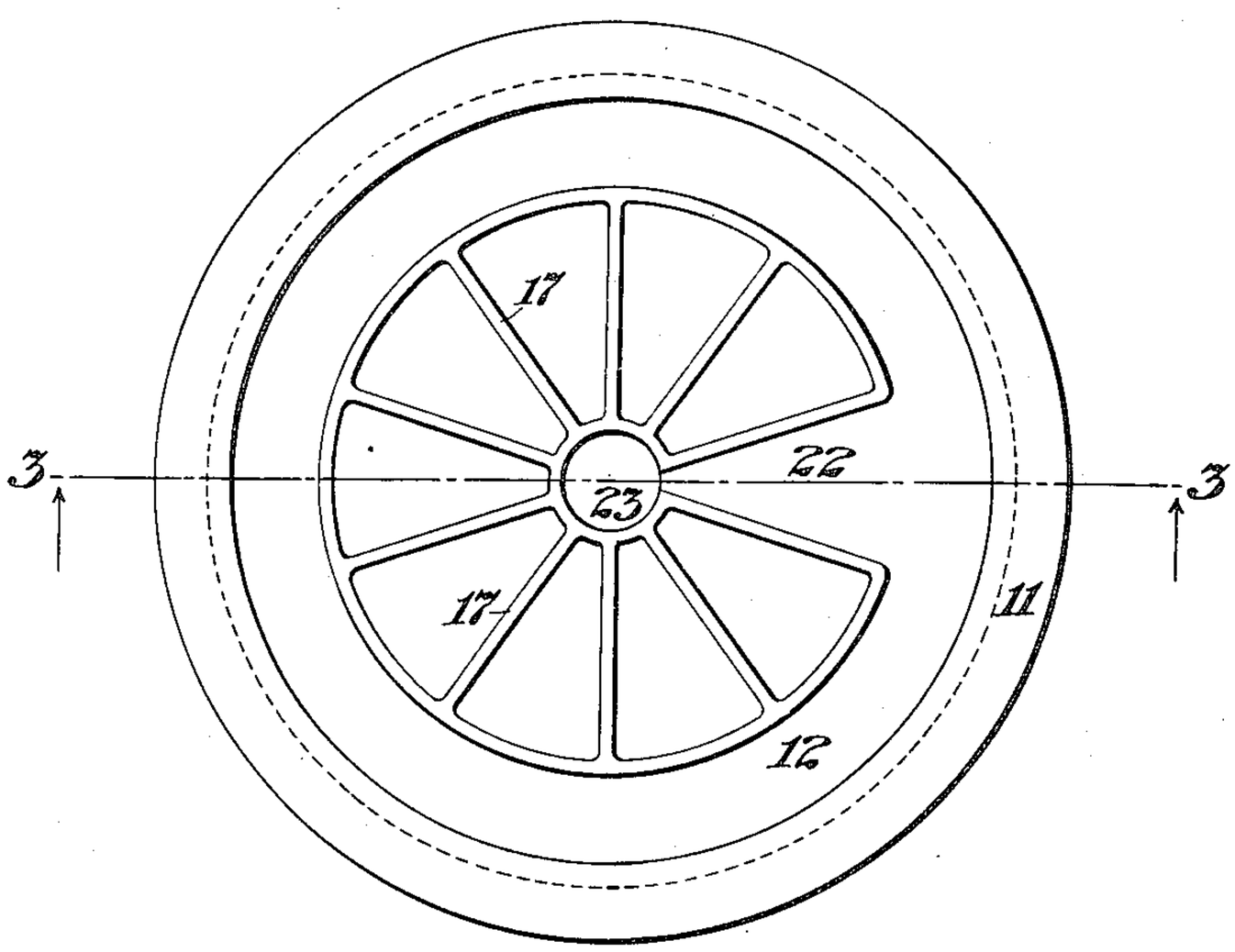
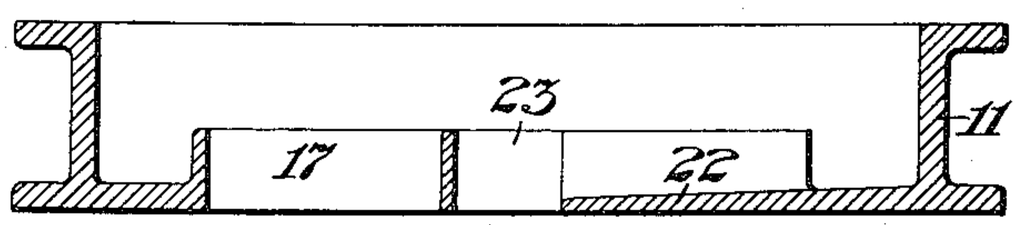


Fig. 3



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UNITED STATES PATENT OFFICE.

ALEXANDER M. GOW, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE WESTINGHOUSE MACHINE COMPANY, A CORPORATION OF PENNSYLVANIA.

GAS-SCRUBBER APPARATUS.

945,936. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed August 29, 1903. Serial No. 171,170.

To all whom it may concern:

Be it known that I, ALEXANDER M. GOW, a citizen of the United States, and resident of Edgewood Park, county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Gas-Scrubber Apparatus, of which the following is a specification.

My invention consists of a device for removing impurities from gas, such as fine particles of coal, dust and heavy hydro-carbon vapors condensed in the form of tar. The apparatus is also adapted to the removal of ammonia by causing the ammonia to be absorbed by water and is so arranged that the water can be used again and again until it reaches any desired ammoniacal strength. Furthermore the apparatus may be so designed as to draw the gas away from the source of supply and force it ahead along a pipe to any desired point. Consequently the apparatus may serve the functions of both exhauster and scrubber. These purposes are accomplished by subjecting the gas to the action of a series of disk fans, each fan having a plurality of vanes, in such manner that the centrifugal force imparted by the rapidly revolving fans, throws the impurities, such as the heavy particles and the globules of tar, beyond the periphery of each fan, and into receptacles provided for their retention. Furthermore provision is made whereby water may be admitted to the surface of each disk fan, near its center, and by the centrifugal action be thrown at right angles to the place of rotation across the vanes of the fans, serving to keep them constantly wet and at the same time wash from them any particles that may adhere to them. In addition the water after it has been used on one fan may be discharged onto the next and so on, until it leaves the apparatus and is caught in a suitable receptacle. In this receptacle the tar and heavy particles may be removed from the water and the water used over again. The repeated violent agitation of the water and the gas, together, serves to permit the ammonia to enter into solution in the water; and by using the water again and again it becomes possible to concentrate the ammonia into a comparatively small volume of water. The centrifugal action is such that the gas leaves the apparatus at the opposite end from which it entered practically free from tar and other impurities. It has been found that a convenient way of manufacturing the fans is to stamp them out of a circular sheet of steel and then bend the vanes to the desired angle. At the same time I do not limit myself to this method of construction for the fans may be made in any convenient manner and the vanes may be rough, corrugated or perforated, as may be desired.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of the apparatus; Fig. 2 is a plan view with the top piece of the casing removed; and Fig. 3 is a section along the line 3, 3, in Fig. 2.

Referring now to the first figure of the drawing, 1 is a shaft which may be driven by any convenient means, as for instance pulley 2, and 3 and 4 are bearings in which the shaft revolves. Upon the shaft are mounted disk fans 5, 6, 7, 8, 9 and 10. A casing 11, incloses the shaft and fans. Beyond the peripheries of the fans are located receptacles 12, 13, 14, 15 and 16 for the retention of particles thrown out by the fans. These receptacles form part of the casing 11. From the receptacles 12, 13, 14, 15 and 16 extend stationary blades, 17, 18, 19, 20 and 21 respectively. From each receptacle there extends a plurality of these stationary blades as clearly shown in Fig. 2. The space between these blades is open at the bottom except that between two of them is a flooring 22 that serves to connect the receptacle 12 with the central opening 23. Between the members of one pair of stationary blades extending from each receptacle there is a similar flooring while the spaces between the other blades remain open. These floorings are shown at 22, 23, 24, 25 and 26. An inlet 27 and an outlet 28 for gas are provided.

29 is a water supply pipe by means of which water may be supplied through pipes 30, 31, 32, 33, 34 to the receptacles 12, 13, 14, 15 and 16, and the amount supplied to each receptacle may be controlled by valves 35, 36, 37, 38 and 39. In practice it is not necessary to supply more than one receptacle with water but it is found convenient to have the piping arranged as shown. A drain pipe 40 from the apparatus is provided discharging into tank 41.

43 is a pump taking its supply by means

of pipe 42 from tank 41 and delivering it to supply pipe 29 and thence into the apparatus.

The operation is as follows: Shaft 1 and pump 43 are started. The action of the fans draws gas in at inlet 27 and discharges it at outlet 28. At the same time water is admitted through valve 30 and flows across partition 22 and falls on to the fan below. The centrifugal action of fan 6 throws the water violently outward into the receptacle 13. It flows across partition 23 and falls onto that fan 7 below. Again it is thrown outward and falls into the receptacle 14 and flows across the partition 24 onto the fan 8 immediately below, and so on until it is discharged from pipe 40 into tank 41. It will be seen, then, that the current of gas, moved by the fans is subjected to a series of violent centrifugal agitations and that at the same time water washes across the faces of the fans. Once the particles of impurities in the gas become thoroughly wet and taken up by the volume of water they cannot be again taken up by the gas. This applies as well to the globules of tar as to the heavy particles of fine coal and dust. The centrifugal action is also sufficient to throw out globules of water so that the gas on leaving the apparatus is practically free from moisture except the moisture of saturation at the temperature of the gas.

It will be understood that the purpose of the stationary blades, interposed between the revolving blades is to bring the direction of motion of the gas into a line at right angles to the plane of rotation. For if this were not done the gas, after passing the first fan would be whirled around in the casing and the blades of the succeeding fans would have no opportunity to impinge on the particles of impurity which it is desired to remove. If the gas upon entering the scrubber is already driven at the desired velocity, or if it is sucked into the scrubber by means of a fan located at any convenient point on the discharge pipe, it is not necessary that the vanes on the successive fans have any pitch. In other words if a stream of gas is maintained through the scrubber by other means than that of the fans in the scrubber, then the vanes may be set at right angles to the plane of revolution and in line with the line of flow. The action remains the same, for the gas stream is successively subjected to a violent centrifugal action and the impurities thrown out.

I claim as my invention:

1. In a gas purifying apparatus, a casing, a rotatable shaft mounted therein, gas impelling and scrubbing blades mounted on said shaft within said casing, stationary scrubber vanes disposed in said casing adjacent to said blades adapted to check the rotary velocity of the gas delivered from said blades and means for conducting water into said casing and delivering it adjacent to said shaft.

2. In a gas purifying apparatus, a plurality of individually-formed and successive chambers, each provided with stationary deflecting blades, recrement collecting receptacles, means for wetting and means for impelling the gas passing therethrough.

3. In a gas purifying apparatus, a plurality of successive chambers, each provided with stationary deflecting blades, recrement collecting receptacles, means for wetting and means for impelling the gas passing therethrough.

4. In a gas purifying apparatus, comprising a plurality of superimposed, individually formed chambers, a vertically disposed rotatable shaft, gas propelling blades carried by said shaft and operating in each of said chambers, stationary scrubber blades and recrement receptacles formed integrally with the walls of each chamber, means for introducing water into each chamber and means for discharging the water from one chamber onto the propeller blades of the chamber next below.

5. In a gas purifying apparatus comprising a plurality of individually formed chambers, a plurality of rotatable gas propelling blades carried by said shaft and operating in each of said chambers, a plurality of radially disposed scrubber blades and an annular recrement receptacle surrounding said blades formed integrally within the walls of each chamber, means for supplying water to each receptacle and means for discharging water from one receptacle onto the propeller blades of the next adjacent chamber.

6. In a gas purifying apparatus comprising a plurality of individually formed chambers, a plurality of rotatable gas propelling blades carried by said shaft and operating in each of said chambers, and a plurality of radially disposed scrubber blades formed integrally within the walls of each chamber.

7. In a gas purifying apparatus, a casing, a rotatable shaft mounted therein, a plurality of sets of gas impelling and scrubbing blades mounted on said shaft, stationary scrubber vanes disposed in said casing and adapted to check the rotary velocity of the gas delivered from one of said sets of blades and means for conducting water into said casing and delivering it adjacent to said shaft.

8. In a gas purifying apparatus, a casing comprising a plurality of like and connecting chambers, each of which is provided with a gas inlet port, a gas outlet port and a recrement collecting receptacle, means for wetting the gas passing through said chambers and rotatable means located within each

chamber for impelling the gas through said apparatus and for scrubbing it in its passage through said chamber.

9. A gas purifier embodying a plurality of connecting chambers through which the gas successively passes, each chamber being provided with a gas inlet port, a gas outlet port, a plurality of stationary scrubbing vanes, means for wetting and means for scrubbing the gas passing therethrough.

10. A gas purifying apparatus comprising a plurality of like and connecting chambers, each of which is provided with a gas inlet port, a gas outlet port, a recrement collecting receptacle and a plurality of impeller blades for scrubbing the gas in said chamber and delivering it through said apparatus.

11. A gas purifying apparatus comprising a plurality of like connecting chambers, each of which is provided with a gas inlet port, a gas outlet port, a recrement collecting receptacle, means for wetting the gas passing through the chamber, impeller blades for scrubbing the gas and delivering it through said apparatus and stationary scrubbing vanes for checking the rotary velocity of the gas received from said impeller blades.

Signed at New York, in the county of New York and State of New York, this 25th day of August, A. D. 1903.

ALEXANDER M. GOW.

Witnesses:

WM. H. CAPEL,

GEORGE H. STOCKBRIDGE.