N. LATTA.

GAS WASHER.

APPLICATION FILED MAY 16, 1910.

1,002,810.

Patented Sept. 5, 1911.

2 SHEETS—SHEET 1.

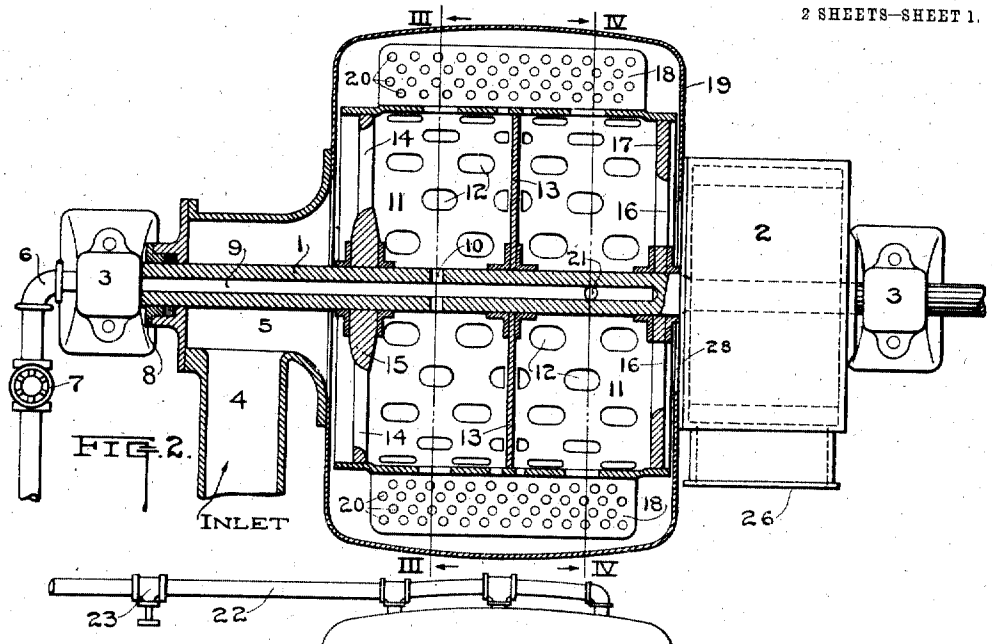

FIG. 2.

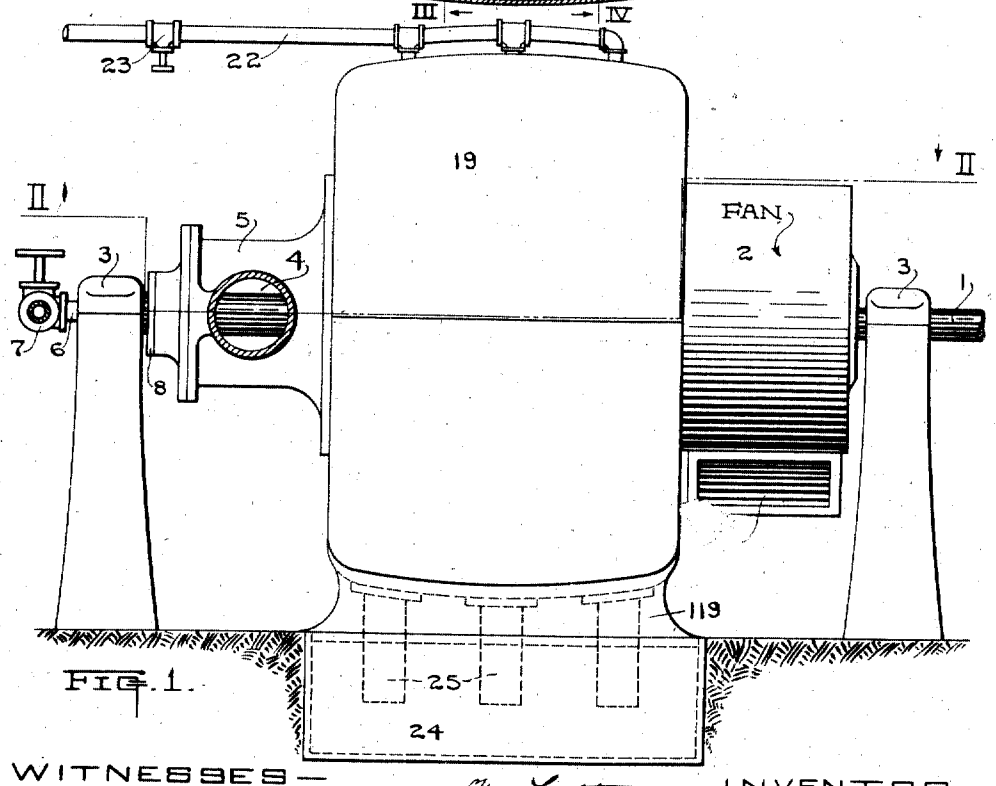

FIG. 1.

WITNESSES—

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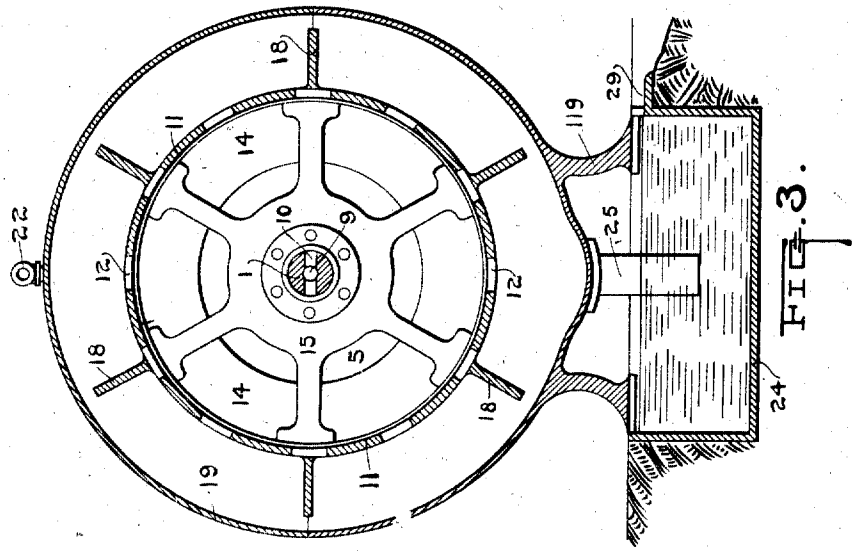

FIG. 3.

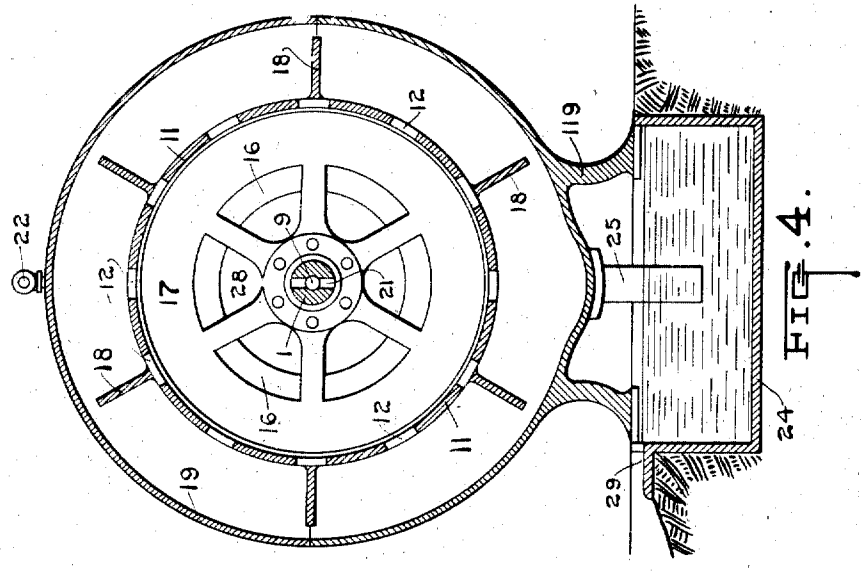

FIG. 4.

WITNESSES —

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UNITED STATES PATENT OFFICE.

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GAS-WASHER.

1,002,810. Specification of Letters Patent. **Patented Sept. 5, 1911.**

Application filed May 16, 1910. Serial No. 561,656.

To all whom it may concern:

Be it known that I, NISBET LATTA, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Gas-Washers, of which the following is a specification.

This invention relates to improvements in the construction of gas washers, and in particular to that type of gas washers in which the gas under treatment is thoroughly mixed with the cleansing medium, after which the mixture is subjected to the action of centrifugal force, the cleansed gas being withdrawn by a force acting on the mixture in opposition to the action of the centrifugal force.

An object of the invention is to provide a gas washer which is simple in its construction and in which a maximum portion of the impurities contained in the gas are removed automatically by centrifugal force. In gas washers of the type in which the gas under treatment is mixed with the cleansing agent and the mixture subjected to the action of centrifugal force prior to the separation of the cleansed gas therefrom, it is essential,—first, to have a thorough mixing of the gas and cleansing medium; second, to have the mixture subjected to a combined centrifugal and disintegrating action; and third, to have the gas withdrawn from the mixture during its subjection to the centrifugal and disintegrating actions, by a force acting in opposition to the centrifugal force and sufficient to completely remove the suspended gas particles but insufficient to overbalance the force acting on the impurities and cleansing medium of the mixture.

Another object of the invention is to provide a gas washer in which all of these desirable features are embodied and in which the gas is removed from the mixture by the action of suction in opposition to the centrifugal force acting on the mixture. By this opposition of forces an intensified stratification is obtained, that is to say, the opposition is such that the light gases can be withdrawn by the suction action, while the relatively heavy impurities and cleansing medium are held in suspension until after removal of the gases, when the heavy particles are thrown in a film upon the casing of the washer. After separation, the impurities thus thrown upon the casing are removed by the admission of wash-water as well as by their own gravity, through the bottom of the washer casing.

A clear conception of one embodiment of the invention can be obtained by referring to the accompanying drawings in which like reference characters designate the same or similar parts in like or different views.

Figure 1 is an elevation of a gas washer built according to the invention. Fig. 2 is a transverse longitudinal section through the gas washer shown in Fig. 1 the section being taken on the line II—II of Fig. 1, looking in the direction of the arrows. Fig. 3 is a transverse vertical section through the gas washer, the section being taken on the line III—III of Fig. 2, looking in the direction of the arrows. Fig. 4 is a transverse, vertical section through the gas washer, the section being taken on the line IV—IV of Fig. 2, looking in the direction of the arrows.

The driving shaft 1 of the gas washer is supported in end bearings 3 and has an overhanging end connected to any suitable driving means, not shown. The main casing 19 is formed around and concentric with the shaft 1, between the supporting bearings 3, the casing 19 being supported from below by legs or braces 119. The inlet casing 5, see Figs. 1 and 2, is also formed concentric with the shaft 1, and is fastened to one end of the main casing 19, the chambers within the casings 5, 19, being connected by an aperture in the wall of the main casing 19. The closed end of the casing 5 which is nearest the bearing 3, is provided with a stuffing box 8 which coacts with the shaft 1 and prevents leakage from within the casing 5 to the atmosphere. An inlet 4 leads to the interior of the casing 5 from a source of gas supply, not shown, the source being any suitable one, as a producer, a storage reservoir, natural gas or similar supply. The fan 2 at the opposite end of the casing 19 has a discharge opening 26, and a suction opening registering with an opening 28 in the main casing 19, being thus adapted to withdraw fluid from within the casing 19. This fan 2 may be of any desirable type, the runner of the fan 2 being mounted on the shaft 1 and operable thereby.

The shaft 1 has a concentric conduit 9 formed therein, the conduit 9 extending

through that portion of the shaft 1 within the main casing 19, inlet casing 5, and the adjacent bearing 3. The wash-water inlet pipe 6, having the controlling valve 7 therein, connects with the conduit 9 at the end of the shaft 1. Ports 10, 21, which may be provided with spray nozzles or similar device, extend through the walls of the shaft 1, within the casing 19, thus forming connections between the conduit 9 and the interior of the casing 19.

The cylindrical drum or shell 11, having numerous perforations 12 formed through its walls, is mounted on the shaft 1 concentric therewith and within the casing 19. This shell 11 extends throughout the length of the casing 19, there being a minimum allowable amount of clearance space between the ends of the shell 11 and the end walls of the casing 19. The shell 11 is supported on the shaft 1 by spiders 15, 17, and a baffle wall 13 which is between the spiders 15, 17. The spider 15 at the inlet end of the valve has comparatively large inlet openings 14 passing therethrough, and is fastened to the shaft 1 and shell 11 in any suitable manner, as by shrinking or brazing the members together. The baffle wall 13 is imperforate, being fastened to the shaft 1 and shell 11 in any suitable manner, as by circular angles or by brazing. The spider 17 at the discharge end of the washer has discharge openings 16 formed therethrough and is fastened to the shaft 1 and shell 11 in any suitable manner, as by shrinking or brazing the members together. The ports 10 enter the interior of the casing 19 at points between the spider 14 and the wall 13, while the ports 21 enter the interior of the casing 19 between the wall 13 and the spider 17. There may be any desired number of these ports 10, 21, instead of two of each as shown, depending upon the amount of cleansing water which it is desired to inject into the washer. The openings of the ports 10, 21, may also be made adjustable, thereby giving an adjustable control for the amount of cleansing medium admitted.

Beaters 18 project outwardly from the shell 11 and are substantially radial to the shaft 1, being formed in one with or securely fastened to the periphery shell 11. The beaters 18 project to within a short distance from the interior surface of the casing 19, and are penetrated by a plurality of relatively small perforations 20. It may also be noted that the clearance between the beaters 18 and the casing 19 is slightly greater near the central portion than near the ends of the beaters 18, but such a construction is not essential.

The pipe 22, having the controlling valve 23 therein, enters the top of the casing 19 at a series of points, the openings being directed toward the lower portion of the casing 19. A series of discharge pipes 25 lead from the lower portion of the casing 19 and are directed into a liquid contained in the basin 24. The basin 24 is below the main casing 19 and has an overflow 29 at one side thereof, see Figs. 3, 4.

During the operation of the device, the shaft 1 is given a relatively rapid, rotary motion carrying with it the runner of the fan 2 and the shell 11. The valve 7 is opened, permitting wash-water to enter the conduit 9, from which conduit it is passed through the ports 10, 21, to the interior of the cylindrical shell 11. The rapid rotation of the shaft 1 causes the wash-water leaving the ports 10, 21, to be dashed or sprayed within the shell 11 and finally to impinge against the inner wall of the shell 11. The gas to be cleansed is admitted to the chamber 5 through the inlet 4 and passes from the chamber 5 to the interior of the shell 11 through the openings 14. Upon reaching the interior of the shell 11, the gas is caught up by and thoroughly mixed with the wash-water entering through the ports 10, and is carried in suspension with the wash-water to the inner wall of the shell 11. From the inner wall of the shell 11, the mixture of gas and wash-water is eventually forced through the openings 12 into the circular path of the rapidly moving beaters 18. The beaters 18 continue to mix the gas and wash-water, tending to throw the mixture of water and gas toward the casing 19 and to disintegrate the mixture by separating the heavier particles therefrom. The suction produced within the shell 11 on the fan side of the partition 13, prevents the mixture from being lodged at once against the casing 19, and tends to draw the suspended mass toward the fan 2. The centrifugal force exerted by the rapidly rotating shell 11 and beaters 18, however, is of sufficient magnitude to eventually throw the particles of the mass other than gas, toward the casing 19, but this is not done until the gas particles have been withdrawn from the mixture by the suction action of the fan 2, thereby permitting the solid and semi-solid particles of the mixture to become more compact and heavier per unit volume. The gas is withdrawn from the path of the beaters 18 through the perforations 12 in the shell 11 on the fan side of the partition 13. Upon reaching the interior of the shell 11, the gas thus withdrawn through the perforations 12, is drawn through the second spray of wash-water emerging from the ports 21. This second spray of wash-water produces an additional cleansing action and serves to completely remove any impurities which may have been only partially removed from the gas during the first washing thereof. The clean gas is then withdrawn by means of the fan 2

from within the shell 11, through the discharge openings 16, 28, and is finally discharged from the fan 2 through the discharge 26 thereof. As the heavy particles from which the gas has been removed are thrown in a continual film against the interior of the casing 19, they are washed toward the discharge pipes 25 by water or other liquid admitted into the top of the casing 19 through the pipe 22. From the pipes 25 the wash-water and suspended gas impurities are discharged into the basin 24, from which they can be easily removed.

By constructing the beaters 18 parallel to the shaft 1, as shown, the gases under treatment have their horizontal travel toward the discharge end of the washer retarded by the repeated beating action to which they are subjected, this action tending to carry them around the shaft 1 in a circumferential path and sustaining the mixture in suspension for a longer period of time, thus intensifying the relative opposition of the forces. The beaters 18 might also be placed at a slight angle to the axis of the shaft 1, so as to produce a slight conveying action tending to convey the mixture toward the inlet end of the washer and thus still more intensify the opposition of the forces.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,—

1. In a gas washer, a casing, a perforated shell within said casing, a beater projecting from said shell, means for rotating said shell thereby causing said beater to traverse a circular path, a gas inlet to said shell, a gas outlet from said shell, means for spraying liquid within said shell near said inlet, and means for producing a suction at said outlet, whereby gas admitted through said inlet is forced through said shell to said beater path and from said path through said shell to said outlet.

2. In a gas washer, a casing, a perforated shell within said casing, a transverse wall within said shell dividing same into two compartments, means for admitting a liquid to the interior of said shell on either side of said wall, and means for causing a flow of gas through said shell from one compartment and through said shell to the other compartment.

3. In a gas washer, a casing, a perforated, rotatable shell within said casing, a wall within said shell, a beater projecting from said shell, a gas inlet to said shell on one side of said wall, a gas outlet from said shell on another side of said wall, means for admitting a liquid to said shell near said inlet, whereby gas admitted through said inlet is forced through said shell into the path of said beater, and means for withdrawing said gas from said path on the outlet side of said wall.

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

NISBET LATTA.

Witnesses:
H. C. Case,
W. H. Lieber.