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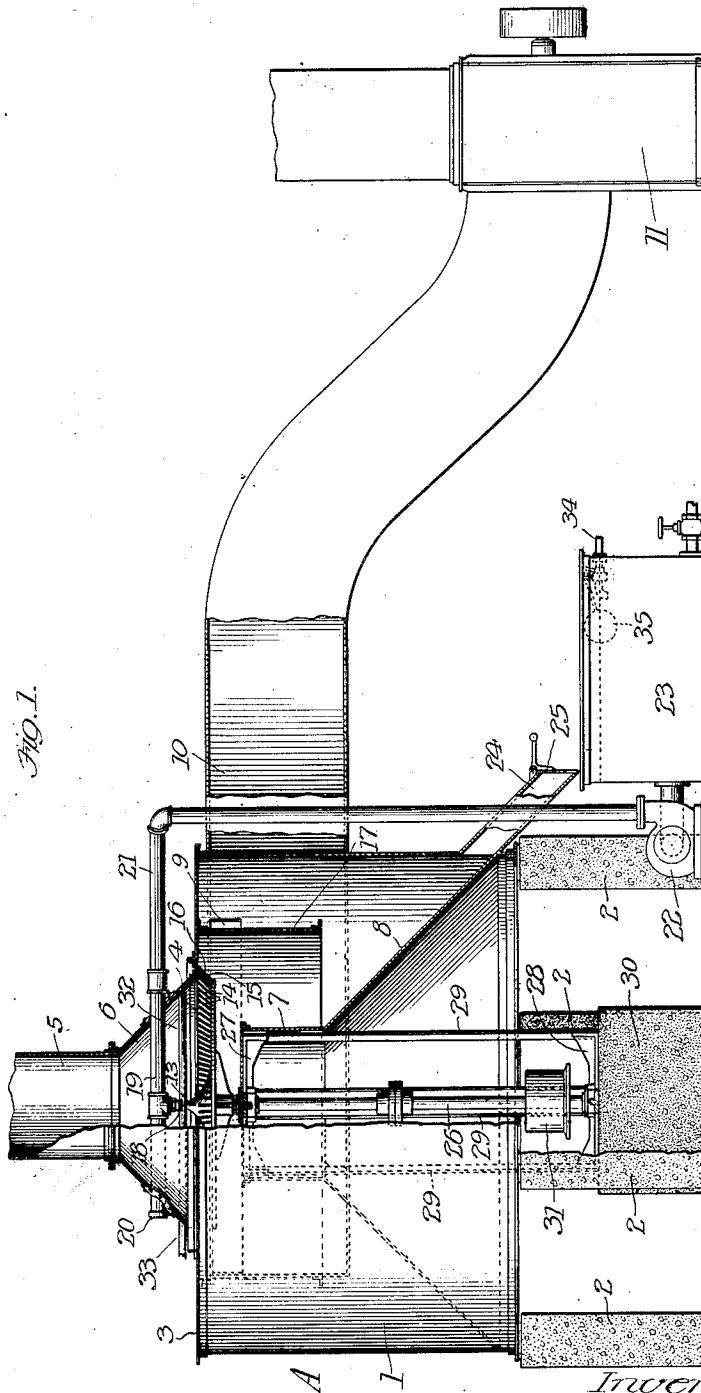
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AIR AND GAS WASHING APPARATUS

Filed Aug. 20, 1923

2 Sheets-Sheet 1



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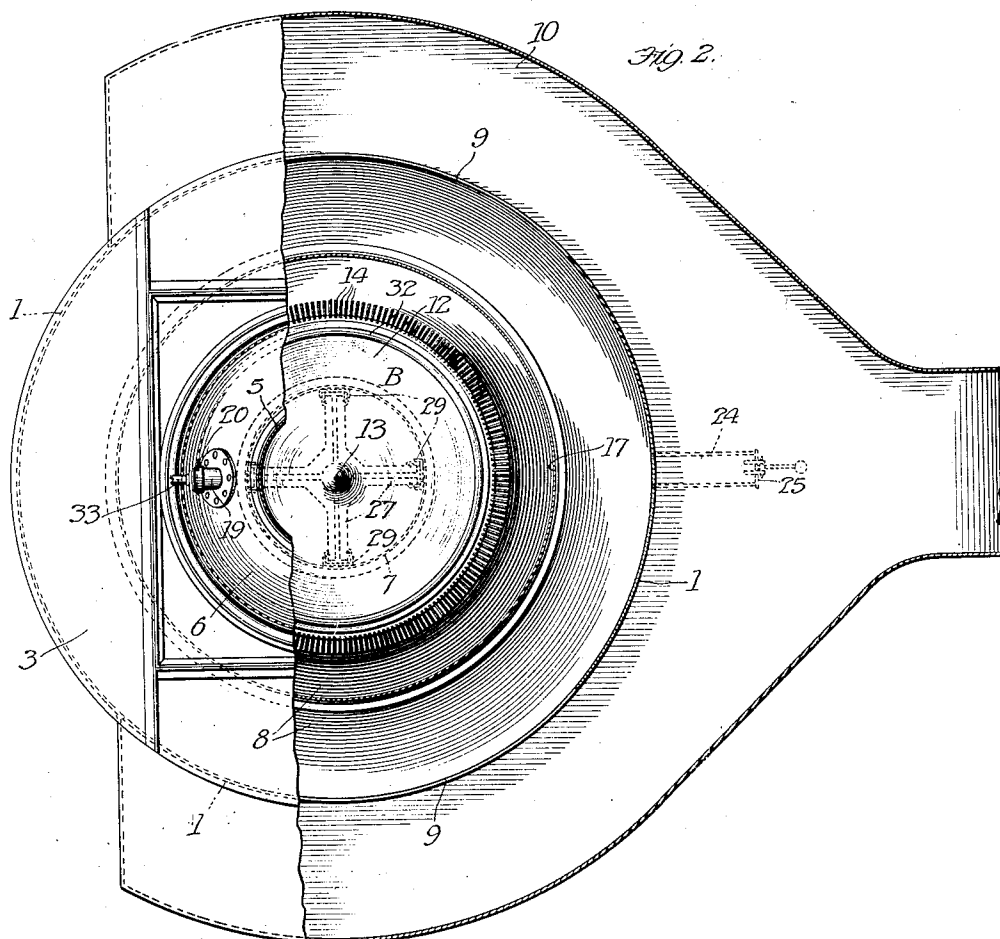
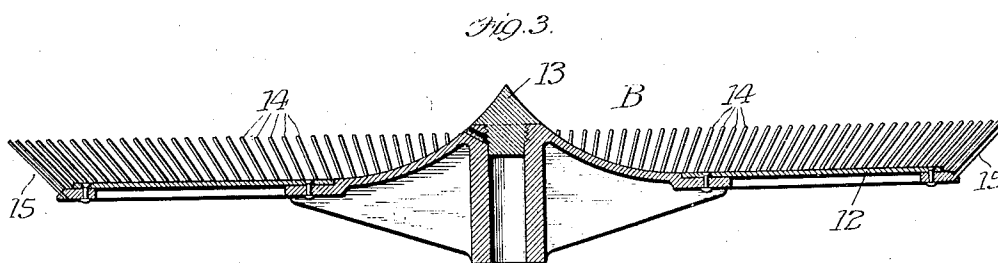
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AIR AND GAS WASHING APPARATUS

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UNITED STATES PATENT OFFICE

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AIR AND GAS WASHING APPARATUS

Application filed August 20, 1923. Serial No. 658,360.

This invention relates to air and gas washing apparatus and relates particularly to such apparatus in which washing of the air or gas is effected by means of liquid spray, usually water.

5 The object of the invention is to provide an improved apparatus for the purpose specified, which will be effective in operation and which may run continuously for an indefinite period without becoming clogged and without impairment of its effectiveness. To this end, an apparatus embodying my invention and improvement comprises the various features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which my invention is fully illustrated,

20 Figure 1 is a side elevation, partly in section, of an air and gas washing apparatus embodying my invention and improvements.

Figure 2 is a top plan view thereof, partly in section; and

25 Figure 3 is an enlarged sectional side view of the spraying wheel forming part of the apparatus.

Referring now to the drawings, my improved air or gas washing apparatus comprises a main housing made of sheet metal of suitable thickness to provide adequate strength, or other suitable material, designated as a whole A. Said housing comprises a cylindrical side wall 1, the lower end of which rests upon suitable supporting piers 35 2, which may conveniently be made of concrete. The upper end of said housing is closed by a sheet metal top wall 3, which is provided with an admission opening 4 through which the air or gas to be washed 40 enters the housing A. For reasons presently apparent, the admission opening is made relatively large and is contracted to the size of the air or gas supply pipe 5 by means of a sheet metal reducing connection 6, made 45 in the form of a truncated cone.

The lower end of the housing A is closed by means of a sheet metal bottom consisting, as shown, of an upper relatively small cylindrical portion 7, and a lower downwardly 50 flared portion or skirt 8, which connects the

lower end of said cylindrical portion 7 with the lower end of the side wall 1.

The housing A is also provided with discharge openings for the treated air or gas, consisting, as shown, of relatively long slots 55 9 formed in opposite sides of the side walls of said housing A closely adjacent to the upper edge thereof. Said discharge openings communicate with a bustle pipe 10, adapted to connect said housing with a fan or blower of usual design, indicated at 11, which is driven from any suitable source of power, not shown, and which is adapted to create a current of air or gas to be treated through the apparatus.

Rotatably mounted within the housing A immediately below the admission opening 4 thereto and in axial alignment therewith, is a spraying wheel, designated as a whole B, consisting of a disk 12 formed at the center 70 of the upper face of which is a conical projection 13 and secured in the margin of which are pins 14 which preferably form a circular series concentric with the axis of rotation of said disk. The pins 14 are arranged close together, a desirable relation being to so arrange said pins that the spaces between adjacent pins are substantially equal to the diameter of the pins. For general purposes, said pins diverge outwardly relatively to each other at angles varying from 30° to 45° to the axis of rotation of said disk, but for use with material which contains no fibrous material, said pins may be arranged substantially parallel with the axis of rotation of said disk. For convenience in drilling the holes in which the pins 14 are secured, the surface of the disk in which said pins are secured is rearwardly inclined, as shown at 15, at an angle which may be the complement of the angle of divergence of the pins 14 to the axis of the disk, with which relation said pins will extend substantially at right angles to the surface 15.

A preferable form of spraying wheel for use in my improved air and gas washing apparatus is that which forms the subject-matter of U. S. Letters Patent, heretofore issued to applicant for spraying apparatus, No. 1,560,527, dated November 10, 1925,

to which reference is herein made for a description thereof in detail.

In the preferable construction shown, the spraying wheel B is of such size that it will extend outwardly beyond the edges of the admission opening 4, and said spraying wheel is mounted at such a distance inside of the admission opening that a restricted opening 16 will be formed between the periphery of said spraying wheel and the top wall 3 of the housing A substantially equal to the distance from the face of the disk 12 to the outer ends of the pins 14 measured parallel with the axis of rotation of said disk, so that the ends of said pins will extend into close proximity to the top wall 3 of said housing and all air or gas entering the housing A, when the apparatus is in operation, will traverse said restricted opening 16 and will pass outwardly between the pins 14.

Secured to and depending from the top wall 3 of the housing A substantially concentric with the spraying wheel B, is a circular baffle 17 which encloses the spraying wheel B and the lower end of which extends a considerable distance below said spraying wheel. Thus, in order for air or gas entering the housing A through the admission opening 4 to reach the discharge openings 9, in the side walls 2 of said housing and thus pass from said housing into the bustle pipe 10 and thence to the blower 11, it will be necessary for said gases to pass downwardly around the lower end of said cylindrical baffle plate 17.

In the operation of the machine, a jet of water is adapted to be discharged axially against the apex of the conical projection 13 on the face of the spraying wheel B from a nozzle 18 which communicates with a pipe section 19 supported in the reducing connection 6 for the gas supply pipe 5, one end thereof being closed by means of a cap 20 and the opposite end thereof being connected by a pipe 21 with a source of water supply, as shown, with a centrifugal pump 22 the suction side of which is connected to a sump or settling tank 23 into which the water from the housing A is adapted to drain through a discharge spout 24, the discharge end of which is controlled by means of a balanced flap valve 25.

The nozzle 18 is made large enough—say six (6) inches in diameter—to provide an abundant water supply at relatively low pressure, and to insure against clogging of said nozzle by the deposit of dirt or sediment therein, particularly dirt which contains fibrous material.

As clearly set forth in my said prior Patent No. 1,560,527, my invention contemplates dispensing with the conical projection 13, thus leaving the face of the disk 12 flat, and in discharging the jet of water from the nozzle

18 directly against the flat face of the disk, the centrifugal action of which will cause the water to spread radially over the face of the disk in the form of a thin sheet, which will be discharged between the pins 14 and beaten into spray in the manner heretofore described.

In the preferable construction shown, the spraying wheel B is secured to the upper end of an upright shaft 26 which is rotatably mounted in bearings formed in spiders 27 and 28 rigidly connected to the upper and lower ends, respectively, of channel bars 29 the lower ends of which are rigidly secured in a concrete foundation 30. The upper cylindrical portion 7 of the bottom of the housing A encloses the upper ends of the channel bars 29 and is so proportioned that it fits said channel bars closely, while the lower downwardly flared portion 8 thereof will prevent access of water to said channel bars and also to the lower shaft bearing in the spider 28.

Rotation is adapted to be imparted to the spraying wheel shaft 26 from any suitable source of power, not shown, by means of a belt adjusted to a driving pulley 31 secured to said shaft adjacent to its lower end.

With the described construction, it is obvious that a jet of water discharged from the nozzle 18 upon the apex of the conical projection 13 on the face of the disk 12 will be deflected outwardly along the face of the disk in the form of a thin sheet, which will be discharged from said disk between the pins 14, while, as previously explained, the current of air or gas to be treated, entering the housing A through the admission opening 4, will also pass between said pins. Also, the spraying wheel B is rotated at very high speed, corresponding to a peripheral velocity of the disk 12 of from three to five thousand feet per minute, and relatively very much faster than the velocity of the water and air or gas currents traversing the same.

Should it be found in practice that, due to the large size and high peripheral velocity of the disk 12, the water supplied to the spraying wheel attains such a high outward or radial velocity when it passes between the pins, that it impairs the action of the spraying wheel—that is produces a spray which is coarser than desired—my invention contemplates discharging only a part of the water upon the center of the wheel and in providing a second water supply pipe, trough or the like, adapted for supplying such further quantity of water as may be desired to said spraying wheel, and at such a distance from its center, that it will have a desired velocity radially or outwardly when it passes the pins 14. Obviously, the inertia of the water supplied from this second source, will appreciably

reduce the velocity of the water supplied from the nozzle 18. In the drawings, 32 designates a pipe supported above the spraying disk 12 at a distance from its center substantially equal to three quarters of the length of radius of said disk, said pipe being provided with discharge holes at its under side through which water runs therefrom onto the face of said disk. Said pipe is adapted to be connected with a source of supply of water, not shown, by a pipe 33, which is preferably controlled by a suitable valve, not shown. Preferably also, the water supplied from the pipe 32 will be under slight pressure only.

Thus, as the water discharged from the disk 12 and the air or gas currents entering the housing A, traverse the space 16, they will be subjected to a violent beating action by the pins 14, which will break the water up into a fine spray, and will effect an intimate mechanical mixture of said spray and said air or gas whereby the solid particles contained in the air will become thoroughly wet and relatively heavy, so that their momentum, due to their high velocity, will project them, together with the water spray, against the sides of the baffle plate 17, running down and draining off from said baffle plate with the water which gathers thereon, into the annular space defined by the side walls 2 of the housing A and the flared portion 8 of the housing bottom, whence it runs off through the discharge opening into the settling tank 23, in which a partial separation of the solids is effected, the water from said settling tank forming the source of supply for the nozzle 18, to which it is returned under desired pressure by the pump 22.

Water is supplied to the settling tank 23 from any available source by a pipe 34, which is controlled by a usual float valve, indicated at 35, thus insuring an adequate supply of water at all times during operation of the apparatus.

I claim:

1. In a gas washing apparatus, the combination of a housing provided with admission and discharge openings for the gas to be treated and the treated gas, respectively, a spraying wheel rotatably mounted within said housing comprising a disk, a multiplicity of pins secured in said disk adjacent to its periphery, said pins being spaced short distances apart and arranged in a circular series concentric with the axis of rotation of said spraying wheel, said spraying wheel being mounted in position to define a restricted passageway in communication with the gas admission opening and formed between a wall of the housing of the apparatus and the disk portion of the spraying wheel, and across which passageway the pins of the spraying wheel extend, means for ro-

tating said spraying wheel at a high peripheral velocity, means for discharging water upon said spraying wheel, and a baffle which surrounds said spraying wheel and against which the mixed water spray, the gas undergoing treatment and solid particles entrained therewith are projected, thereby depositing the water spray and entrained solid particles upon the baffle in the form of a fluid mixture which drains therefrom into the lower end of the housing of the apparatus.

2. Gas washing apparatus as specified in claim 1, in which the restricted portion of the passageway traversed by the gas undergoing treatment is formed in part by the body portion of the spraying wheel.

3. A gas washing apparatus as specified in claim 1, in which the disk portion of the spraying wheel comprises a central conical portion.

4. A gas washing apparatus as specified in claim 1, in which the pins of the spraying wheel are flared outwardly.

5. A gas washing apparatus as specified in claim 1, in which the pins of the spraying wheel are straight, smooth and unobstructed.

6. A gas washing apparatus as specified in claim 1, in which the baffle forms a barrier between the restricted opening traversed by the gas to be treated and across which the pins of the spraying wheel extend, adapted to prevent the treated gas from passing directly from said restricted opening to the gas discharge opening of the housing.

7. A gas washing apparatus as specified in claim 1, in which the baffle consists of a plate which surrounds the spraying wheel and extends below said spraying wheel and also below the gas discharge opening from the housing of the apparatus.

8. A gas washing apparatus as specified in claim 1, in which the means for discharging water upon the disk of the spraying wheel comprises a water supply nozzle directed against the center thereof.

9. A gas washing apparatus as specified in claim 1, in which the means for discharging water upon the disk of the spraying wheel comprises a water supply nozzle directed against the center thereof, and a water supply pipe supported above said disk at a distance from its center.

10. In gas washing apparatus, the combination of a housing provided with gas admission and discharge openings, means for producing a current of gas from the admission to the discharge opening of said housing, the passageway traversed by the gas comprising a circular restricted portion, a rotatable spraying wheel comprising a multiplicity of pins which extend across the restricted portion of the passageway traversed by the gas, means for rotating said spraying wheel, means for supplying liquid to said spraying wheel, and a cylindrical baffle plate

which surrounds said spraying wheel, whereby said liquid will be converted into spray and intermixed with the gas and solid particles entrained therewith as it traverses the restricted portion of the passageway traversed by the gas, and said mixed spray, gas and entrained solid particles projected against the baffle plate, thereby depositing the liquid spray and entrained solid particles upon the baffle plate in the form of a fluid mixture which drains therefrom into the housing below said baffle plate.

10 In witness that I claim the foregoing as my invention, I affix my signature this 30th day of July, A. D. 1923.

15 EDWIN M. BASSLER.

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