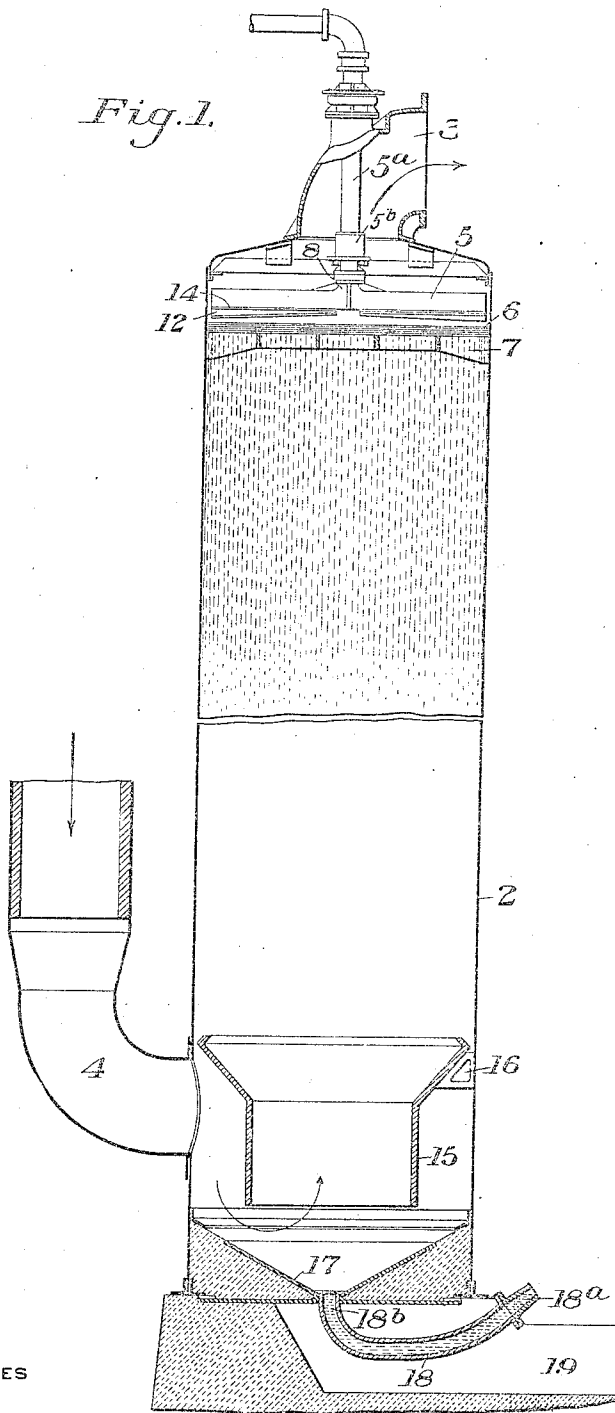


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 APPARATUS FOR CLEANING GASES.
 APPLICATION FILED APR. 7, 1909.

941,841.

Patented Nov. 30, 1909.
 3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

R. H. Balderson
Walter Samuels

INVENTORS

Wm Ahlen
H. C. Siebert
by Baker, Byrnes & Samuels,
their attys

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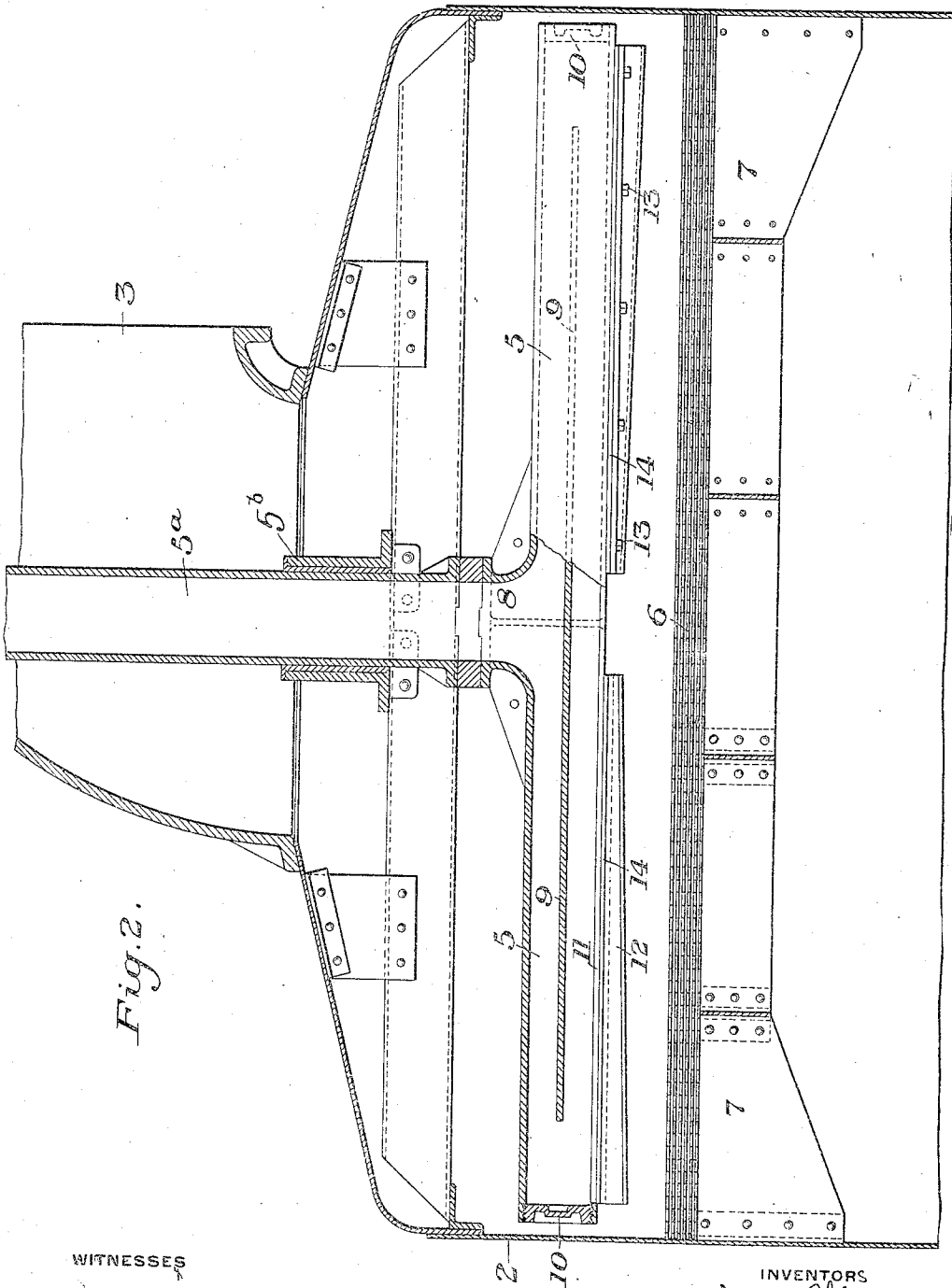


Fig. 2.

WITNESSES

R. H. Baldersey
Walter Parnass

INVENTORS

Wm Ahlen
H. C. Siebert
J. B. Kewell, Byron & Parnell
their Attys.

W. AHLEN & H. C. SIEBERT.
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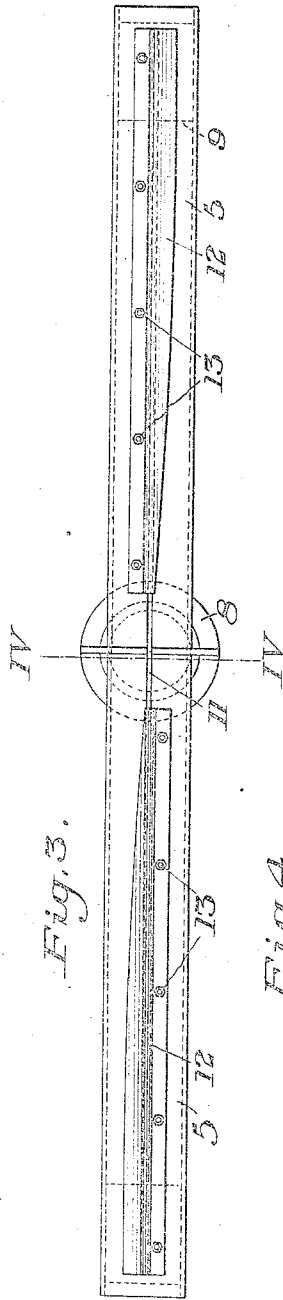


Fig. 3.

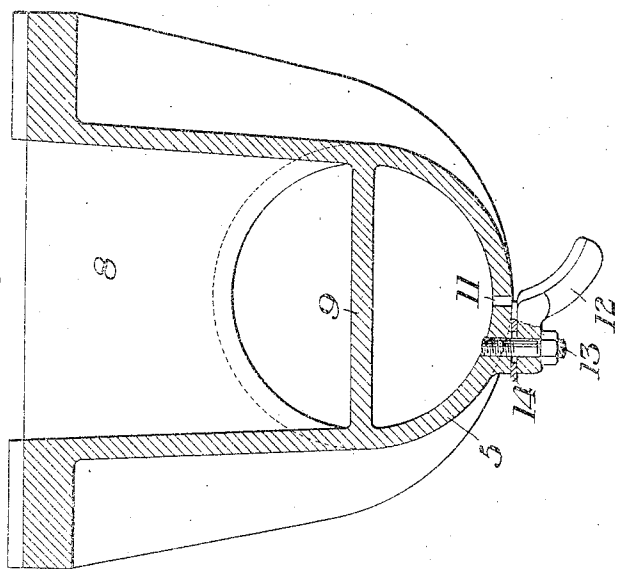


Fig. 4.

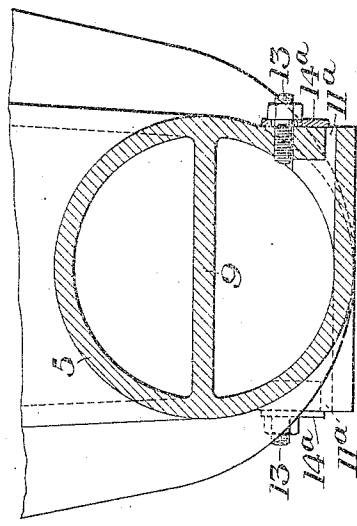


Fig. 5.

WITNESSES

R. A. Baldwin
Walter Farnsworth

INVENTORS

Wm. Ahlen
H. C. Siebert
 by *Baker & Co.,* *Patent Attorneys*

UNITED STATES PATENT OFFICE.

WILLIAM AHLEN, OF DUQUESNE, AND HERMAN C. SIEBERT, OF BRADDOCK,
PENNSYLVANIA.

APPARATUS FOR CLEANING GASES.

941,841.

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Application filed April 7, 1909. Serial No. 438,476.

To all whom it may concern:

Be it known that we, WILLIAM AHLEN, of Duquesne, and HERMAN C. SIEBERT, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Apparatus for Cleaning Gases, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional elevation showing a vertical gas washer or scrubber constructed and arranged in accordance with our invention; Fig. 2 is a detail sectional elevation on a larger scale of the top portion of the gas washer or scrubber showing the spray pipe therein forming part of our invention; Fig. 3 is an inverted plan view of the spray pipe shown in Fig. 2; Fig. 4 is a sectional end elevation on the line IV—IV of Fig. 3; Fig. 5 is a sectional end elevation showing a modified form of outlet opening for the spray pipe forming part of our invention.

Our invention relates to apparatus used for cleaning gases and more particularly relates to the construction and arrangement of apparatus used in bringing blast furnace gases into contact with the cleaning fluid to remove finely divided solids from such gases.

One object of our invention is to provide improved means for distributing and regulating the volume of water, which is the fluid usually employed in such apparatus, delivered into the washer; to provide improved means for overcoming the centrifugal force of the water delivered into the washer and for changing the direction of the flow of the water.

Another object of our invention is to provide improved means for directing and conducting the gases through the cleaning chamber.

A further object of the invention is to provide improved means for discharging the solids removed from the gases during the cleaning operation and the water used for the cleaning operation from the cleaning chamber.

In the drawings 2 represents a vertical gas washer or scrubber chamber having an outlet opening 3 in the top thereof through which the cleaned gases are discharged from the washer. The gas inlet 4 is located on the lower end portion of the chamber 2. Mounted in the top portion of the chamber

2 is a rotary pipe or hollow sleeve 5^a having on its lower end a horizontally extending spraying pipe 5 constructed and arranged in accordance with our invention. The pipe 5^a is mounted on a suitable bearing 5^b so that it can be rotated by a suitable driving motor (the motor not forming part of our invention not being shown).

Located in a chamber 2 below the spraying arm 5 is a series of grids or screens 6 carried on suitable supports 7, which are secured in place on the shell of the chamber 2 for that purpose.

The spray pipe 5 is provided with a flanged branch inlet opening 8 and extending longitudinally in the spray pipe 5 is a diaphragm or partition 9, which practically separates the pipe into two compartments, for a purpose described later. The ends of the pipe 5 are closed by suitable plugs 10 so that water cannot escape therethrough.

As shown in Figs. 2, 3 and 4, the bottom surface of the spray pipe 5 is provided with a narrow longitudinally extending slotted opening 11, through which the water is discharged from the pipe into the chamber 2 and the pipe 5 is provided with a deflector 12 having a curved surface against which the fluid strikes in issuing from the spray pipe and by which it is deflected in its course into a substantially horizontal direction from the vertical direction in which it discharges into the slotted opening 11. The deflector 12 is removably secured to the pipe 5 by means of the bolts 13.

It is important that the size of the opening through which the water is distributed can be varied to suit various conditions met with in the operation of the washers or scrubbers, variations in the volume or pressure of the water supplied at different times requiring openings of different widths. To effect such purpose the adjustable blade 14 is provided which is secured in place between the pipe 5 and the adjacent flanged surface of the deflector 12. The blade 14 is provided with oblong holes or openings through which the bolts extend, these openings being slotted to enable the blade to be adjusted toward and away from the slot 11, so as to vary the width or size of the opening through which the fluid is discharged. The vanes or deflectors 12 are provided so that the water will be delivered in a sheet or film and the outer ends of the spray pipe rotating

at a higher velocity than the parts nearer the axis of rotation, these deflectors are tapered from the outer toward their inner ends to cause the water to be distributed in a film or sheet of substantially uniform thickness and volume. The deflectors also serve to assist in the turning of the spray pipe, in this way lessening the power required to rotate the pipe. The deflectors or vanes are not absolutely necessary for the successful operation of the apparatus and need only be employed in cases where such use proves desirable.

In the modification shown in Fig. 4, the slotted outlet opening 11^a delivers the water from the pipe 5 in a horizontal plane and the blade 14^a is adjusted in a vertical plane to vary the size or width of the opening 11^a. The blade is provided with slotted openings through which the bolts 13 extend in holding the blades in the adjusted position and in this form the deflectors or vanes are omitted. The construction of the pipe otherwise is the same as that shown in Figs. 2, 3 and 4.

As shown in Fig. 1, the lower end of the chamber 2 is provided with an annular deflector 15 which is secured on brackets 16 at a point above the gas inlet opening 4 and the lower end of the washer chamber 2 is provided with an inwardly and downwardly sloping bottom 17, having a centrally located outlet. The discharge outlet is provided with a discharge pipe 18, having curved end portions 18^a and 18^b, the outer or discharge end 18^a of this pipe being arranged to discharge above the level of a pool of water in the trough 19 which is located below the chamber 2 in the pipe 18.

In the operation of our improved apparatus, the rotary pipe 5^a preferably is caused to revolve by suitable motor, provided for that purpose. Water is supplied to the supply pipe 5^a which flows into the horizontal spraying pipe 5. The water on striking the diaphragm or partition 9 in the pipe 5 is directed toward the opposite ends of the horizontal pipe 5 and the partition 9 terminating short of the ends of the pipe 5, the direction of flow of the water is changed and is directed from the ends toward the center or axis of rotation of this pipe, being discharged through the opening 11 and as the arm rotates is caused to flow in a sheet of uniform thickness on the grids or screens 6, which are located below the pipe 5 in the chamber 2.

In the construction shown in Figs. 2, 3 and 4, the water flowing from the slot 11 in the pipe 5 strikes the vanes or deflectors 12, and its direction of flow is changed from the vertical direction in which it is discharged from the pipe into a substantially horizontal direction. The arm rotates in a direction away from that in which the water

issues from the slot 11. As the most water is required at the outer portions of the washer 2 the flow of water may be regulated by adjusting one end or the other of the blades, so as to increase or decrease the width of the slots at one end relative to the opposite end of the blade and in this way increase the flow of water at different points in the length of the slots in the arms. The descending water contacts with the column of gases rising upwardly through the cleaning chamber and effectively removes the finely divided solids carried in suspension in the gases. The solid materials are deposited in the bottom of the chamber 2 and are being constantly removed therefrom by the stream of water flowing from the chamber 2 through the discharge pipe 18. The size of the pipe 18 is proportioned so that it is self-cleaning, the speed of the stream of water flowing from the washer being sufficient to carry the heaviest particles of solid materials from the washer. The discharge end 18^a of the pipe 18 is higher than its intermediate portion, in this way forming a trap which is always open for the passage of fluid and solid materials and providing a water seal which prevents the escape of gases from the cleaning chamber. The open discharge end 18^a of the pipe 18 is located above the trough 19 so as to discharge thereinto above the level of water contained in the trough.

The advantages of our invention will be apparent to those skilled in the art. The apparatus is simple and is easily kept in repair. The use of the revolving arm with the longitudinally extending slot in its side wall causes the water to descend in the washer in a sheet of uniform thickness and insures a uniform supply of water to all parts of the cleaning chamber.

By providing the open discharge outlet pipe, the water and solid materials being discharged from the apparatus are always visible and the amount of water passing from the washer can be measured if necessary, while by curving the discharge pipe so that its upper end is above the level of its intermediate portion, a seal is provided at all times which will prevent the escape of the gases, and the water and dirt removed from the gases are being constantly removed from the cleaning chamber. The screens or grids in the upper portion of the chamber break up the water into drops which fall vertically downward in the washer and in this way present a large surface of water to the rising gases. The screens or grids also prevent channels forming in the column of ascending gases, as is the case where the supply of water is not uniform.

Modifications in the construction and arrangement of the apparatus may be made without departing from our invention. The

screens or grids may be omitted, the size and shape of the slots in the rotating arms may be varied, the size of the discharge outlet pipe may be changed as if the pipe is too large it will soon fill up with solid materials to the area where the remaining opening will be self cleaning.

We claim:

1. In apparatus for cleaning gases, a cleaning chamber having a horizontally extending arm adaptable to a vertical axis and means for supplying fluid to the arm, said arm having a longitudinally slotted opening through which the fluid is discharged and having means for varying the width of said slot at different points of its length; substantially as described.

2. In apparatus for cleaning gases, a cleaning chamber having rotary arms extending horizontally in opposite directions about their axes of rotation, means for rotating said arms, and means for supplying fluid to the arms, said arms having longitudinally slotted openings through which fluid is discharged and having means for varying the width of the slotted openings at different points in their length; substantially as described.

3. In apparatus for cleaning gases, a cleaning chamber having a horizontally extending hollow arm, means for rotating said arm, and means for supplying fluid to the arm, said arm having a longitudinally slotted opening through which fluid is discharged, and means on the arm arranged to vary the width of said slotted opening at different points in its length; substantially as described.

4. In apparatus for cleaning gases, a cleaning chamber having a hollow horizontally extending arm therein, means for rotating said arm, means for supplying fluid to the arm said arm having a longitudinally extending slotted opening through which fluid is discharged and a deflector arranged to divert the flow of liquid issuing from said slot; substantially as described.

5. In apparatus for cleaning gases, a cleaning chamber having a horizontally extending arm therein, means for rotating said arm, and means for supplying fluid to the arm, said arm having a partition therein terminating short of its ends and arranged to cause fluid to flow from the center to its ends and then from its end toward the center of its length; substantially as described.

6. In apparatus for cleaning gases, a cleaning chamber having a horizontally extending hollow arm, means for rotating said arm, means for supplying fluid to the arm, a longitudinally extending slotted opening through which fluid is discharged from the arm and a partition in said arm, said partition terminating short of its ends and being arranged to cause fluid to flow from the center of its length downwardly toward its end and from its end inwardly toward its center; substantially as described.

In testimony whereof, we have hereunto set our hands.

WILLIAM AHLEN.
HERMAN C. SIEBERT.

Witnesses:

GEORGE L. NEFF,
T. E. McDOWELL.