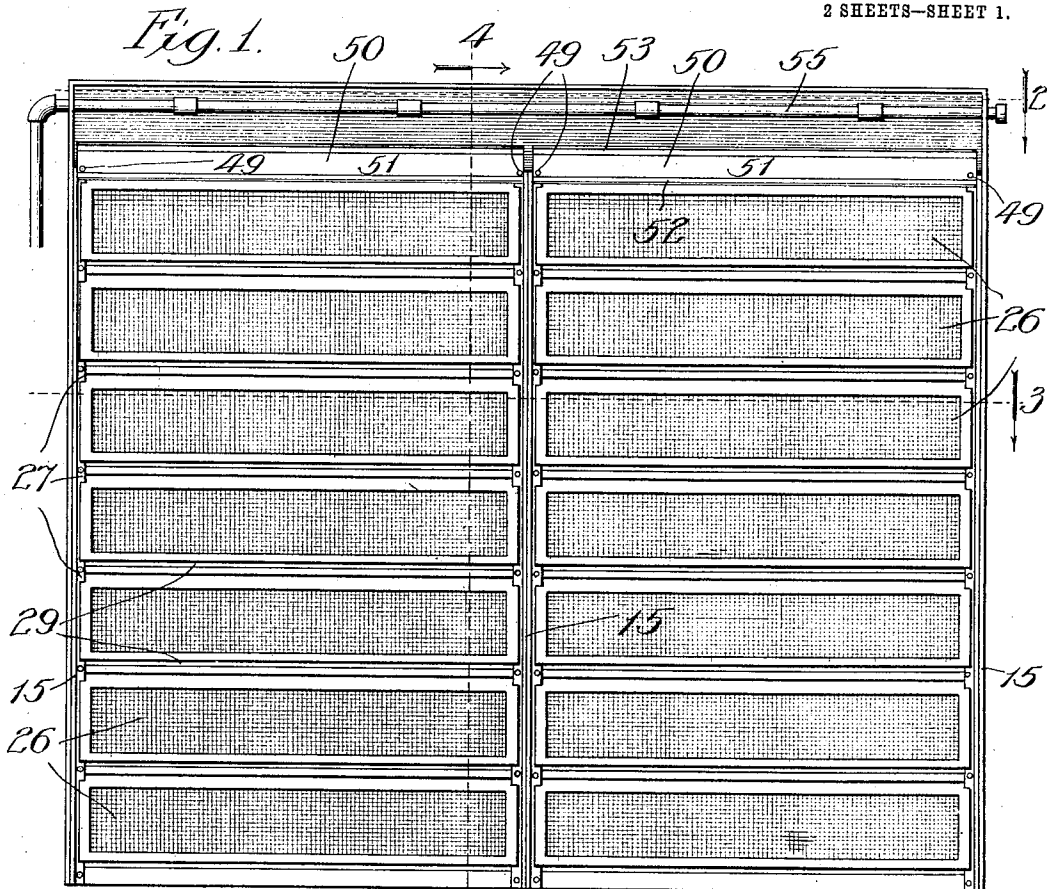
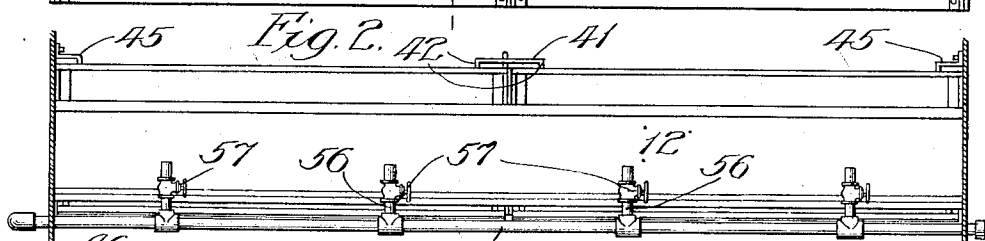
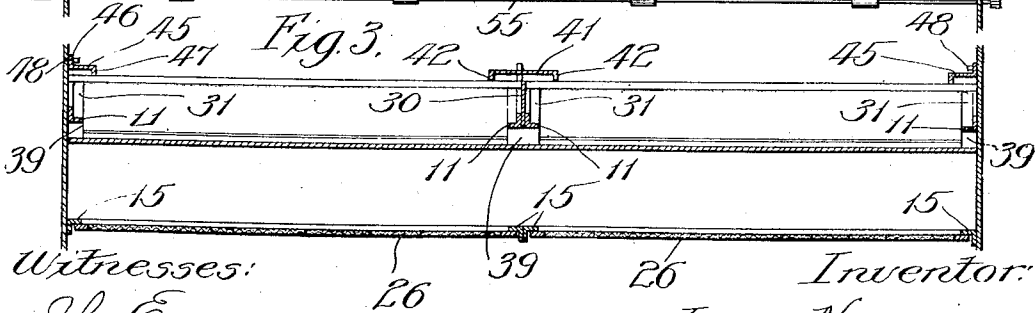


L. NAROWETZ.
AIR WASHING APPARATUS.
APPLICATION FILED JULY 18, 1908.

907,634.

Patented Dec. 22, 1908.

2 SHEETS—SHEET 1.



Witnesses:
John Enders
Chas. H. Buell.

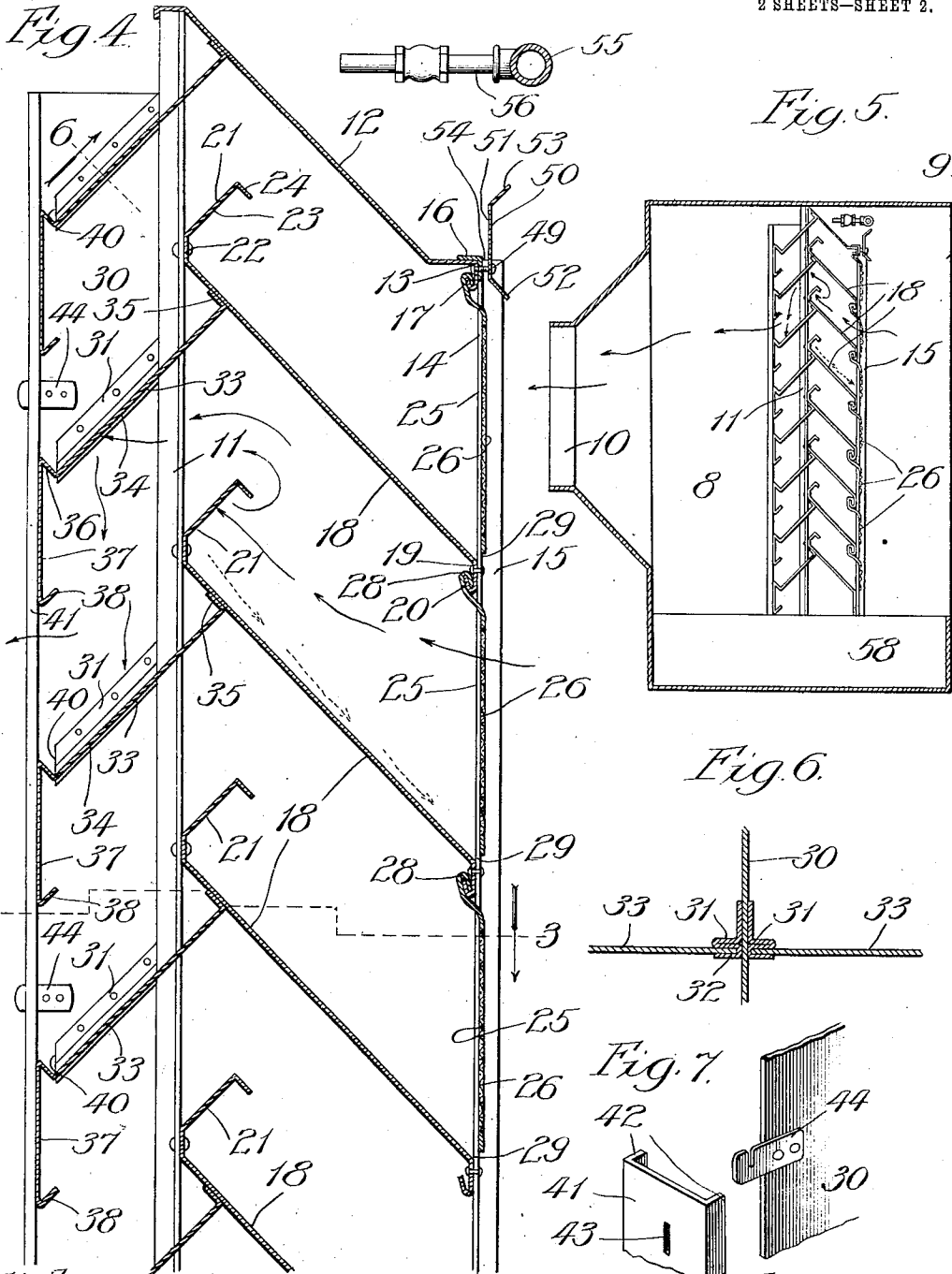
Inventor:
Louis Narowetz.
By *Bygrenforth, Lee, Chittow & Viles*
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UNITED STATES PATENT OFFICE.

LOUIS NAROWETZ, OF CHICAGO, ILLINOIS.

AIR-WASHING APPARATUS.

No. 907,634.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed July 18, 1908. Serial No. 444,157.

To all whom it may concern:

Be it known that I, LOUIS NAROWETZ, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Air-Washing Apparatus, of which the following is a specification.

My invention relates to the class of air-washing apparatus for use in cleansing air of dust and dirt preliminary to its use in connection with heating and ventilating systems by passing the air through water; and my present invention is in the nature of an improvement in the particular type of air-washer forming the subject of a pending application for Letters Patent filed by me on April 20th, 1908, and bearing Serial Number 428,262.

My primary objects are, first, to afford a construction by which all of the air drawn into the apparatus shall be subjected to the washing action of the water; and, second, to effect, as completely as possible, the elimination of the moisture taken up by the air in passing through the water, before it leaves the apparatus, with the minimum number of baffles and thus reduce, in so far as it can be reduced consistent with practically complete elimination of the moisture, the amount of resistance afforded to the passage of air through the apparatus.

Referring to the accompanying drawings: Figure 1 is a front view of an air-washing apparatus constructed in accordance with my invention, this view showing the screened end of the apparatus through which the air to be washed is drawn into it. Fig. 2 is a section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow. Fig. 3 is a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow. Fig. 4 is an enlarged view in sectional elevation of the upper end of the screen-and-baffle construction. Fig. 5 is a reduced view in sectional elevation of the complete apparatus. Fig. 6 is a section taken at the line 6 on Fig. 4, viewed in the direction of the arrow, and enlarged; and Fig. 7, a perspective view of a detail of the latch construction for holding certain of the parts of the apparatus in separable position.

The casing for housing the parts of the apparatus is represented at 8, and has its opposite ends 9 and 10 open for the passage of air through it. Its inner end 10 is restricted, as

represented, and is adapted to be connected with a conduit containing a suction-fan (not shown) as is commonly provided in structures of this kind for drawing the air to be cleansed through the apparatus.

A frame-work, preferably composed of parallel vertical angle-irons 11 spaced apart, as represented in Fig. 3, is riveted to the inner surfaces of the casing 8. Fixed to this frame-work at its upper end to extend completely across the interior of the casing 8 and inclining forwardly and downwardly, is a shelf 12 connected at its lower forward depending flange 13 to the rear flanges 14 of a vertical series of parallel angle-irons 15, which form a frame between the irons 11 and the outer air-inlet end 9 of the casing. The forward edge-portion of the shelf 12 fits against a horizontally extending angle-iron 16 which is fastened at opposite ends to the sides of the casing 8. The lower edge of the depending flange 13 of the shelf 12 is rearwardly and upwardly bent to afford an upwardly-extending flange 17 for a purpose hereinafter explained.

Below the shelf 12 is a vertical series of shelves 18 extending entirely across the interior of the casing, each vertically spaced apart from the other, as represented, and inclining downwardly and forwardly from their rear upper edge-portions, at which they are riveted at depending flanges 19 thereon to the irons 15. The flanges 19 are formed with rear upwardly extending flanges 20, as described of the shelf 12, for a purpose hereinafter set forth. The shelves 18 are preferably so inclined as to cause their upper end portions to extend in a horizontal plane above that occupied by the opposed flanges 20 as represented, for the purpose hereinafter explained.

Extending across the interior of the casing 8 at the upper extremities of the shelves 18, are baffles 21, each of which is preferably formed with a depending flange 22 at which it is preferably integrally united with the shelf 18 adjacent to it and at which it is riveted to the irons 11, a central section 23 extending at right-angles to the shelf 18, and a lip 24 at right-angles to the section 23, each baffle, by reason of its inclination to the shelves, as described, extending in a plane above that occupied by the lower edge-portion of the shelf immediately above it.

In each of the openings 25 afforded by

the intersection of the outer edge-portion of the shelves 18 and the vertical irons 15, a screen 26 is removably suspended. Each of these screens fits flatwise against the adjacent rear flanges 14 of the irons 15 and the ends of its upper edge-portion are cut away as indicated at 27, and bent rearwardly and upwardly to form a hook-edge 28 which extends rearwardly beyond the irons 15 and hooks over the adjacent flange 20, as most clearly represented in Fig. 4, the heights of the screens being such as to cause each of them to reach short of the plane in which the shelf 18 immediately below it terminates, and thus a series of spaces 29, as illustrated in Figs. 1, 4 and 5, is afforded between the bottom of each screen and the shelf immediately below it.

Secured between the closely adjacent irons 11 of the set intermediate the sides of the casing 8 is an upright plate, or partition, 30 which extends rearwardly beyond the irons 11 and approximately to the top of the casing. Secured to the opposed inner surfaces of the sides of the casing 8 and to the opposite sides of the plate, or partition, 30 in forwardly and upwardly inclined position, are vertical series of angle-guides 31, preferably shaped as illustrated in Fig. 6, to form channels 32 opening outwardly.

The channeled guides 31 are provided to receive vertical series of spaced inclined shelves 33 which, in the construction illustrated, are provided in two vertical series corresponding to the number of vertical series of the screens. Each shelf 33 is preferably formed with a main section 34, a rearwardly extending flange 35 at its upper end portion, an upwardly and rearwardly extending flange 36 at its lower edge-portion, a depending section 37, and a forwardly and upwardly extending flange 38 on the lower edge portion of the section 37 bent to extend at an acute angle to the section 37. The shelves 33 are so formed and the channeled guides 31 are so constructed as to cause the former to extend approximately at an angle of 45 degrees to the horizontal and at 90 degrees to the shelves 18, against which latter the flanges 35 on the shelves 33 abut a slight distance below the upper edge-portions of the shelves 18, as represented. It is preferred that the lower end-portions of the sections 34 terminate in substantially the same plane as that occupied by the extreme upper end of the deflector-section 23 opposite to it, and that the flanged portion 38 of each of the shelves 33 extend downward to a point approximately in the same plane as that in which the upper end of the shelf 33 below it is located.

The forward lateral edge-portions of the shelves 33 are notched, as represented at 39, to permit them to clear the angle-irons 11 in moving them into position in the guides 31,

the latter being cut away as represented at 40 for a purpose hereinafter disclosed. The shelves 33 are thus removably secured in position in the casing, and to releasably hold these shelves in position I provide a U-shaped vertical plate 41 which is applied at the flanges 42 thereon against the sections 37 of the shelves 33 and in which position it is releasably held as by its engagement at slots 43 therein with recessed rearwardly projecting lugs 44 secured to the partition 30, this plate being sufficiently wide to completely overlap the ends of the shelves 33. The ends of the shelves 33 adjacent to the casing-sides reach short of the latter and these shelves are held in place at these ends by double angle-irons 45 which rest at flanges 46 thereon against the casing-sides and at other flanges 47 against the sections 37, these irons being removably held in place by hook-devices 48, as described of the plate 41.

Any suitable means for producing a water-curtain may be employed, but as the form illustrated is highly desirable, I have chosen to illustrate it as the means which I prefer to employ for this purpose, the following being a description of this construction: Adjustably fastened in the depending flange of the iron 16 to project toward the air-inlet end of the casing are a series of horizontal studs 49, preferably in the form of screws screwing into the depending flange of the iron 16, and supported on these studs in front of the iron 16 are plates 50, each having a vertical section 51, and downwardly and upwardly, forwardly inclined flanges 52 and 53, respectively, these plates being in the nature of deflectors having their connections with the studs a slight distance above the lower edges of the sections 51. It is preferred that one of these plates 50 be provided for each vertical series of screen-sections 26, and that the adjacent ends of these plates overlap, as represented. These plates 50 thus form, in combination with the upper surface of the shelf 12, a trough extending from side to side of the casing, the purpose of this construction being that of receiving water and discharging it through the slot 54 formed between the plates 50 and the iron 16, for forming the water-curtain.

The washing water is supplied through a pipe 55 which opens into rearwardly-extending branch-pipes 56 connected therewith at intervals and adapted to discharge water upon the shelf 12 by manipulating the valves 57 provided on these branches 56, it being preferred that two branches be provided for each vertical series of screens, as represented.

The operation of the apparatus is as follows: The washing water flows from the pipes 56 and discharges upon the shelf 12 from which it flows through the slot 54, passing over the screens in the form of a continuous curtain. The air to be washed, entering

the casing at the end 9, under the action of the usual suction-fan placed beyond the restricted end 10 of the casing 8, is drawn through the water-curtain and screens 26, and the air, and the water taken up by the air, is caused to impinge against the shelves 18 and baffles 21, the water being thus precipitated on these baffles and shelves 18 from which it pours down in the course as indicated by the dotted lines in Fig. 4, falling from these shelves at the openings 29, the water running down from each shelf joining the water of the curtain. The spent-water runs into a tank 58 from which it may be drained in any suitable manner to separate it from the dirt washed from the air. The air and such of the moisture as it contains after it has passed beyond the baffles 21, impinges against the under-sides of the shelves, or baffles, 33 and the surfaces of the plates 37, the coarser drops of water being precipitated thereon and flowing into the troughs formed by the flanges 38 from which it flows at their outer ends down through the casing 8 to the tank 58. The air in continuing through the casing impinges against the upper surfaces of the shelves 33 and the remaining drops, if any, in the air are precipitated on these shelves and flows into the troughs formed by the flanges 36 and thence out of them at their ends into the tank 58. It will thus be seen that by this arrangement of shelves and baffles, the moisture in the air is very effectually removed.

As will be clearly understood, the shelves 33, by the foregoing-described construction, are rendered removable by lifting the plates 41 and 45 from engagement with the hooks 44 and 48, thereby permitting the shelves 33 to be withdrawn from the guides 31 for cleansing or repair, the screens 26 being removed by merely unhooking them from the flange 20. With the screens and plates 34 removed, the shelves 18 are rendered readily accessible for cleansing. This feature of my construction is of importance as it renders the air-washer sanitary.

It is manifest that where conditions require it, as for instance where the air to be cleansed is especially dirty, the casing may be widened over that shown in the drawings, and any number of sets of shelves and baffles, with a water-curtain therefor, may be used.

The valves 57 on the pipes 56 are provided for equalizing the flow of water upon the shelf 12 throughout the length of the pipe 55.

By so providing the studs 49 as to render their extent of profusion beyond the iron 16 controllable, the plates 50 may be adjusted back and forth relative to the iron 16 to enlarge or restrict the opening 54 as conditions require it to be varied.

It will be noted that the water in flowing down the screens is caused in part to be car-

ried through each screen, and that the water carried through the screens and precipitated on the shelves 18 is caused to run off therefrom and, in falling over the respective screens below, again is subjected to the suction action and portions of it are again drawn through the mentioned screens to again be precipitated and flow to the next screens below, this action continuing until the water reaches the tank. It will be understood that the amount of water drawn through the screens depends on the strength of the suction-action produced. A decided advantage afforded by this construction is that of causing a water-curtain of the desired density to be provided at all of the screens independent of their position relative to the water-supply pipe.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an air-washing apparatus, the combination of a casing having an air-inlet and air-outlet, a vertical series of screen-sections, a vertical series of shelves in the rear of said screens, the shelves being so constructed and arranged as to discharge the water precipitated thereon to the water-curtain below it, a second vertical series of shelves alternating with said first-named shelves, and means for producing a water-curtain between the screen and the air-inlet.

2. In an air-washing apparatus, the combination of a casing having an air-inlet and air-outlet, a vertical series of screen-sections, a vertical series of shelves in the rear of said screens, the shelves being so constructed and arranged as to discharge the water precipitated thereon to the water-curtain below it, a baffle at the rear edge-portion of each of said shelves, a second vertical series of shelves alternating with said first-named shelves, and means for producing a water-curtain between the screen and the air-inlet.

3. In an air-washing apparatus, the combination of a casing having an air-inlet and air-outlet, a vertical series of screen-sections, a vertical series of shelves in the rear of said screens, the shelves being so constructed and arranged as to discharge the water precipitated thereon to the water-curtain below it, a baffle at the rear edge-portion of each of said shelves, a second vertical series of shelves alternating with said first-named shelves and provided with depending baffle-portions, and means for producing a water-curtain between the screen and air-inlet.

4. In an air-washing apparatus, the combination of a casing having an air-inlet and air-outlet, a vertical series of screen-sections, a vertical series of rearwardly and upwardly inclined shelves in the rear of said screens, the shelves being so constructed and arranged as to discharge the water precipitated thereon to the water-curtain below it, a baffle at the rear edge-portion of said

shelves, a second vertical series of shelves alternating with said first-named shelves and inclining downwardly and rearwardly, baffle-
 5 portions on the lower rear edge-portions of said second-named shelves provided with troughs at their lower ends, and means for producing a water-curtain between the screen and air-inlet.

5. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a shelf in the rear of said screen, a baffle above the shelf against which the air is caused to impinge, a second shelf extending
 10 above said baffle and provided with a depending portion terminating in a trough, and means for producing a water-curtain between the screen and the air-inlet, for the purpose set forth.

6. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a shelf in the rear of said screen, a baffle above the shelf against which the air is caused to impinge, means for deflecting the air downward after it leaves the baffle, a second inclined shelf located below said
 20 means having its lower edge-portion of trough-shape, and means for producing a water-curtain between the screen and the air-inlet, for the purpose set forth.

7. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a vertical series of shelves in the rear of said screen, a baffle above each shelf against which the air is caused to impinge, a second series of shelves so arranged as to cause one of said last-named shelves to extend above each of said baffles, and means
 35 for producing a water-curtain between the screen and the air-inlet, for the purpose set forth.

8. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a vertical series of shelves in the rear of said screen, a baffle above each of said shelves against which the air is caused to impinge, a second series of vertical shelves provided with depending plates, the shelves being so constructed and arranged as to cause one thereof to extend above each of said baffles, and means for producing a water-curtain
 40 between the screen and the air-inlet, for the purpose set forth.

9. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a vertical series of shelves in the rear of said screen, a baffle above each shelf against which the air is caused to impinge, a second vertical series of shelves, each provided with a trough near its lower edge and
 60 with a depending plate-portion, the last-

named shelves being so constructed and arranged as to cause one to extend across each of said baffles, and means for producing a water-curtain between the screen and the air-inlet, for the purpose set forth.

10. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a vertical series of shelves in the rear of said screen, a baffle above each of said shelves against which the air is caused to impinge, a second series of vertically inclined shelves slidably confined in the casing, the last-named shelves being so constructed and arranged as to cause one of each to extend
 70 above said baffles, means in the rear of said shelves for releasably maintaining them in position, and means for forming a water-curtain between said screen and air-inlet.

11. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a shelf in the rear of said screen, a baffle above the shelf, a second shelf disposed at an angle to the first-named shelf and having
 85 its upper edge-portion extending above the upper edge of the baffle and its lower edge-portion in substantially the same plane as that occupied by the upper edge of the baffle, an imperforate member depending from the lower edge of said second-named shelf, and means for producing a water-curtain between said screen and air-inlet.

12. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, a baffle above the shelf, a second shelf disposed at an angle to said first-named shelf with its upper portion above the upper edge of the baffle, a plate-member depending
 100 from the lower end of said second-named shelf, a third shelf below said second-named shelf and said baffle and inclining downwardly from front to rear, and means for producing a water-curtain between the screen and the air-inlet, for the purpose set forth.

13. In an air-washing apparatus, the combination of a casing provided with an air-inlet and air-outlet, a screen-partition in the casing, an upwardly and rearwardly inclined shelf in the rear of said screen, a baffle connected with the upper end of said shelf against which the air is caused to impinge, a second shelf above said baffle having a depending portion, a third shelf below said second-named shelf, and means for producing a water-curtain between said screen and air-inlet.

14. In an air-washing apparatus, the combination of a casing, a screen in the casing, an upwardly and rearwardly inclined shelf at the upper edge of said screen, studs extending forward from the lower edge of said shelf, a plate carried by said studs and spaced from the lower end of said shelf to form with the
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latter a trough having a slotted bottom, and means for discharging water into the trough, for the purpose set forth.

15. In an air-washing apparatus, the combination of a casing, a partition in the casing containing screen-sections, a vertical series of rearwardly and upwardly inclined shelves in the rear of said screens, a baffle at the upper extremity of each of said shelves, each baffle positioned in a plane above that occupied by the upper edge of the screen to which it is opposed, a second vertical series of shelves in the rear of said first-named shelves and downwardly and rearwardly inclined, said last-named shelves being so disposed as to cause them to alternate with said baffles, depending plate-portions carried at the rear lower ends of said second-named shelves, and means for producing a water-curtain between said screens and the air-inlet.

16. In an air-washing apparatus, the combination of a casing, a partition in the casing, screen-sections in said partition, a vertical series of rearwardly and upwardly inclined shelves, a baffle at the upper edge-portion of each of said shelves, a second vertical series of shelves in the rear of said first-named

shelves and rearwardly and downwardly inclined, said second-named shelves alternating at their upper ends with said baffles, depending plate-portions carried by said second-named shelves and having troughs at their lower ends disposed below the opposed baffles, the upper sides of said second-named shelves having troughs formed thereon at their lower edge portions, and means for producing a water-curtain between said screens and the air-inlet.

17. In an air-washing apparatus, the combination of a casing, a screen in the casing, a baffle-means in the rear of said screen, a shelf above said baffle-means, a deflector adjacent to said shelf, and means for discharging water upon said shelf and against the deflector comprising a main pipe adapted to be connected with a source of supply and branch pipes extending therefrom and having open ends at which the water discharges upon the shelf, for the purpose set forth.

LOUIS NAROWETZ.

In presence of—

RALPH A. SCHAEFER,
W. T. JONES.