WATER WASH BOOTH

INVENTOR.

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UNITED STATES PATENT OFFICE

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WATER WASH BOOTH
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1 Claim. (Cl. 183—26)

which is efficient in operation, simple and durable in construction, and which may be readily cleaned. An illustrative embodiment of this invention is shown in the accompanying drawings wherein:

Figure 1 is a front perspective of an improved water wash booth particularly designed for use with airpainting apparatus.

Figure 2 is an enlarged vertical cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is an enlarged transverse sectional view of the upper baffle, the view being taken on the line 3—3 of Figure 2.

Figure 4 is a perspective view of the upper baffle.

Figure 5 is an enlarged transverse sectional view of the lower baffle, the view being taken on the line 5—5 of Figure 2.

Figure 6 is a perspective view of the lower baffle.

Figure 7 is an enlarged developed view of one end of one of the baffle plates of the bottom tier of the upper baffle showing the triangular end reinforcing section.

Figure 8 is an enlarged fragmentary perspective view of the same in folded form.

Figure 9 is a fragmentary sectional detail view of the outer end of the settling tank.

In the construction herein shown, the improved water wash booth comprises a sheet metal housing having side walls 10 and 11, a rear wall 12, front wall 13 having an inlet opening 14, and a top wall 15 having an exhaust outlet 16 at the rear end thereof. A suitable exhaust fan not shown is mounted above the opening 16 for causing a flow of air through the booth.

Removably supported in the center of the booth is a vertically disposed partition 17 forming a water curtain baffle which divides the booth into a forward collecting chamber 18 and a rearward water wash chamber 19. This baffle is preferably a sheet metal plate having one or more clips 20 on its rear face for detachable engagement with the forward member 21 of a frame 22 mounted at the lower end of the chamber 18. The upper end of the baffle 17 is inserted in a slot or pocket 23 formed in the front wall of an overflow pan 24 which extends transversely across the upper part of the booth and which is supported at its ends by the side walls 10 and 11.

It will thus be apparent that the water curtain baffle may be removed for cleaning and also to permit access to the rear chamber 19 by lifting it so as to disengage the clips 20 from the frame member 21.

In the modern mass production of coated objects, the paint or other coating is usually applied by means of airpainting apparatus. In the use of airpainting apparatus, an excess of coating material is discharged into the air surrounding the objects being coated. The health of workmen using the airpainting equipment and the safety of the equipment in the vicinity of the spraying operation require that the excess coating material be effectively collected. This is usually accomplished by means of a water wash booth which is associated with the airpainting apparatus so as to convey the excess coating material by means of an air current into a water curtain and through a water spray which washes the excess coating material and other impurities into a suitable settling tank. These water wash booths are usually equipped with a baffle construction which is designed to diffuse water through the incoming air for removing the impurities and a second baffle construction designed to eliminate moisture from the air before it is discharged from the booth.

The effectiveness with which the water is mingled with the incoming air current to facilitate the removal of the impurities from the air and the effectiveness with which the moisture is eliminated from the air after it has been washed free of the impurities largely determine the reception which a particular type of water wash booth is accorded by users of airpainting apparatus.

The main objects of this invention are to provide an improved water wash booth for use in connection with airpainting equipment; to provide an improved baffle construction for use in air conditioning apparatus; to provide an improved baffle construction particularly suitable for use in booths in which air currents are washed of impurities by passage through a water spray; to provide an improved baffle construction of this kind which may be used either to diffuse the water through the air current or to eliminate moisture from the washed air; to provide an improved form of baffle construction capable of securing a high efficiency either in moisture diffusion or in moisture elimination; to provide an improved fabricated baffle construction of this kind which to the extent that it is not completely self-cleaning affords ready access to all surfaces to facilitate the removal of accumulations of impurities tending to adhere to the surfaces of the baffle plates; to provide a water wash booth having an improved overflow pan and cooperating water curtain baffle; and to provide a water wash booth of this kind.
Water is conveyed to the pan 24 by a manifold pipe 25 provided with an end cap 25.1 and having a series of depending spouts 28 extending below the normal water level. Turbulence is prevented and proper diffusion of the water effected by means of a vertically disposed baffle 27 extending across the top of the pan.

Water overflows the forward edge of the pan and cascades to form a water curtain across the entire partition 17 to collect impurities from the air and which is driven rearwardly against the water curtain from the airpainting equipment.

To collect the impurities, there is mounted in the bottom of the booth a settling tank 28 having one end projecting beyond the side wall 10 to form a reservoir 29 provided with a removable cover 30. The forward end of the settling tank has a perforated cover plate 31 which forms the floor of the collecting chamber 19. The rear edge of this cover plate 31 is spaced from the lower edge of the water curtain baffle 17 to define a throat 32 through which the water is passed.

Water enters the reservoir 29 through a supply pipe 33 having a float-controlled valve 34. Mounted in the reservoir are baffle plates 35 and 36 and a pair of removable screens 37. Water from the booth circulates around the baffles 35 and 36 and through the screens 37 and is returned to the booth by a suitable pump 38 driven by an electric motor 39.

The outlet end of the pump 38 communicates with a vertical pipe 40 connected to one end of a horizontal manifold pipe 41 extending through the center of the water wash chamber 19 and provided with a series of downwardly diverging spouts 42 for spraying water into the lower part of the chamber 19.

The other end of the manifold pipe 41 is connected to a vertical pipe 43-45 formed at the lower end of the manifold pipe 25 which supplies water to the overflow pan. The flow of water to the overflow pan, and consequently the character of the water curtain cascading over the baffle 17, is controlled by a valve 44 actuated by a rod 45 having a handle 46 adjacent to the front of the booth.

Mounted on the frame 22 at the lower end of the chamber 19 is an improved form of baffle 47 adapted to separate from the air stream any coating particles or other impurities which have not been washed into the settling tank by the cascading water curtain passing through the throat 32.

Supported on brackets 48 and 49 above the manifold pipe 41 is another baffle 50 adapted to remove moisture from the air stream before it is exhausted through the outlet 16.

The baffle 50 is disposed horizontally, whereas the baffle 47 is tilted downwardly and rearwardly so as to position its rear end slightly above the level of the water in the settling tank.

The improved baffle constructions 47 and 50 are assembled of sections 45-46 of specially-formed sheet metal angle plates. The lower baffle 47 is made up of a plurality of sections each comprising a single row of angle plates, whereas the upper baffle 50 is formed of several sections each comprising a plurality of tiers of angle plates.

The upper baffle 50 comprises three tiers of angle plates 51 each formed with one leg 53 more than twice as long as the other leg 54, as is most clearly apparent in Fig. 3. The angle plates for the lower tier of the baffle 50 have triangular extensions 55 at the ends of the longer legs 53 which are bent at right angles to abut and be bonded at the ends of the shorter leg 54 of each angle plate, as is most clearly apparent in Figs. 7 and 8. This construction ensures a greater rigidity for the series of angle plates 51 which are directly attached to end support plates 56 which rest on the brackets 48 and 49.

The angle plates 51 for the two upper tiers of the baffle 50 generally do not have these extensions 55. However, these upper tiers of angle plates 51 may be so constructed if desired.

In each tier of the baffle 50, the plates 51 are so positioned that the corresponding legs are all disposed in parallel planes at an angle of about 45° to the general plane of the baffle.

Moreover, the plates 51 of each tier are spaced apart from one another so as to provide air passage gaps 57 between the outer edges of the short legs 54 of one plate 51 and the long leg 53 of an adjacent plate.

In the upper baffle construction 58, the top and bottom rows of tiers of plates 51 are supported in spaced relationship by an intermediate row of similar plates. This intermediate row of plates is released and the legs thereof are bonded to the opposite legs of the alternate rows or tiers of plates so as to dispose the plates of alternate rows or tiers in pairs substantially in alignment normal to the general plane of the baffle.

As illustrated in Figs. 5 and 6, the lower baffle 47 comprises a single tier of plates 58 mounted on a pair of end bars 59 which rest on the frame 22 for removable supporting the baffle. These plates 58 are disposed in substantially parallel spaced relation to one another at an angle of about 45° to the general plane of the baffle. The upper and lower edges of each plate are bent at obtuse angles to form short legs 60 and 61, and the two ends of each plate have extensions 62 bent at right angles to the plate to form end walls which are bonded to the legs 60, 61, as well as to the supporting bars 59.

With either of these baffle constructions 47 or 58, the rising air current drawn upwardly through the chamber 19, by the exhaust fan is caused to travel through a tortuous path.

The lower baffle construction 47 has the additional function of breaking up and deflecting the descending particles of water and so diffusing them through and mixing them with the rising air currents as to contact and carry downwardly into the settling tank any particles of coating material not eliminated by contact of the air current with the sheet of water cascading down the partition 17 and through the opening 32.

For the upper baffle construction 58 this multiple deflection of the moisture-laden air current results in a very high degree of elimination of moisture from the air before it is drawn out through the exhaust.

These improved baffles are practically self-cleaning. Furthermore all of the surfaces of the plates 51 are easily accessible to permit the removal by scraper or brush of any accumulations of coating material that may have a tendency to adhere thereto.

In the operation of this improved water wash booth, the water in the reservoir 29 is constantly maintained at the desired level through the operation of the float-controlled valve 34. As the water in the reservoir 29 is lowered the float 33 actuates a cam mechanism 40 which operates the motor 35. The motor 35 forces water from the reservoir 29 through the pipes 38, 41, 43, and 25. The entire lower portion of the wash chamber 19 is substantially filled with water sprays from the spouts 42 and the pan 24 is con-
stantly filled with water from the spouts 26 of the pipe 25. The water in the pan 24 overflows the forward edge of the pan and cascades downwardly in the form of a curtain which completely covers the partition 17.

The air-painting equipment is operated in or directly in front of the opening 14 of the booth.

During the operation of the exhaust fan located above the outlet 16, the air is driven rearwardly through the chamber 18, then downwardly through the throat 32 and upwardly through the baffles 41 and 50 of the water wash chamber 19 from which it escapes through the outlet 16.

During the operation of the air-painting equipment the excess particles of coating and other impurities in the air stream are driven against the downwardly cascading water curtain and most of these particles are carried by the water curtain into the settling tank below the chamber 19. The water curtain has a tendency to pass inwardly around the lower edge of the partition 17 and along the bottom of the baffle 47 as shown by the arrows in Fig. 2. Any remaining particles of coating material or impurities which are not initially washed into the settling tank by the water curtain are carried upwardly by the air stream through the lower baffle 47.

The combined action of the lower baffle 47 and the water sprays in the chamber 19 separates from the upwardly moving stream of air substantially all of the remaining particles or impurities so that when the air reaches the upper baffle 50, it is laden with moisture but is substantially free of all impurities.

In passing through the upper baffle 50, substantially all moisture is removed from the air so that the air which is finally exhausted by the fan above the outlet 16 is substantially free of all moisture and impurities.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that details of the construction shown may be altered without departing from the spirit of the invention as defined by the following claim:

I claim:

An air washing booth of the class described comprising, a housing having an open front for the admission of an air stream and having an exhaust adjacent the rear top part of said housing for the discharge of said air stream, a vertical partition located in said housing intermediate the front and back thereof to form a washing chamber rearwardly of said partition communicated with said exhaust, said partition being spaced from the bottom of said housing to form an air passage around the lower end of said partition leading to said washing chamber, water spray means located in said wash chamber above said passage, a row of removable angle plates supported in spaced relationship across said wash chamber below said water spray means, said plates being positioned with the legs thereof inclined to the horizontal and with the plates facing downwardly, said plates being also spaced apart horizontally thereby providing a passage between adjacent plates wherein a rising air current is intermingled with a water spray dispersed by said plates, a plurality of horizontal tiers of angle plates arranged across said wash booth above said water spray means, said plates being spaced apart horizontally in said tiers with the corresponding legs of said plates all parallel and with the plates facing downwardly, said plates of alternate tiers being disposed in approximate vertical alignment and the intermediate tier of plates being reversed with respect to the plates of said alternate tiers and having the legs of said intermediate tier of plates overlying and bonded to the opposite legs of adjacent plates, the horizontal spacing of said plates being such that the edge of one leg of a plate is approximately in vertical alignment with the edge of the other leg of the adjacent plate, means for providing a supply of water to said spray means, an elongated overflow pan having an edge which coincides with the upper edge of said partition, a nozzle extending into said pan for supplying water thereto, a vertically disposed baffle extending longitudinally of said pan and below said nozzle in said pan, said baffle being located intermediate said nozzle and said upper edge of said partition whereby water from said pan overflows said partition and flows down the front thereof at a uniform rate.

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