

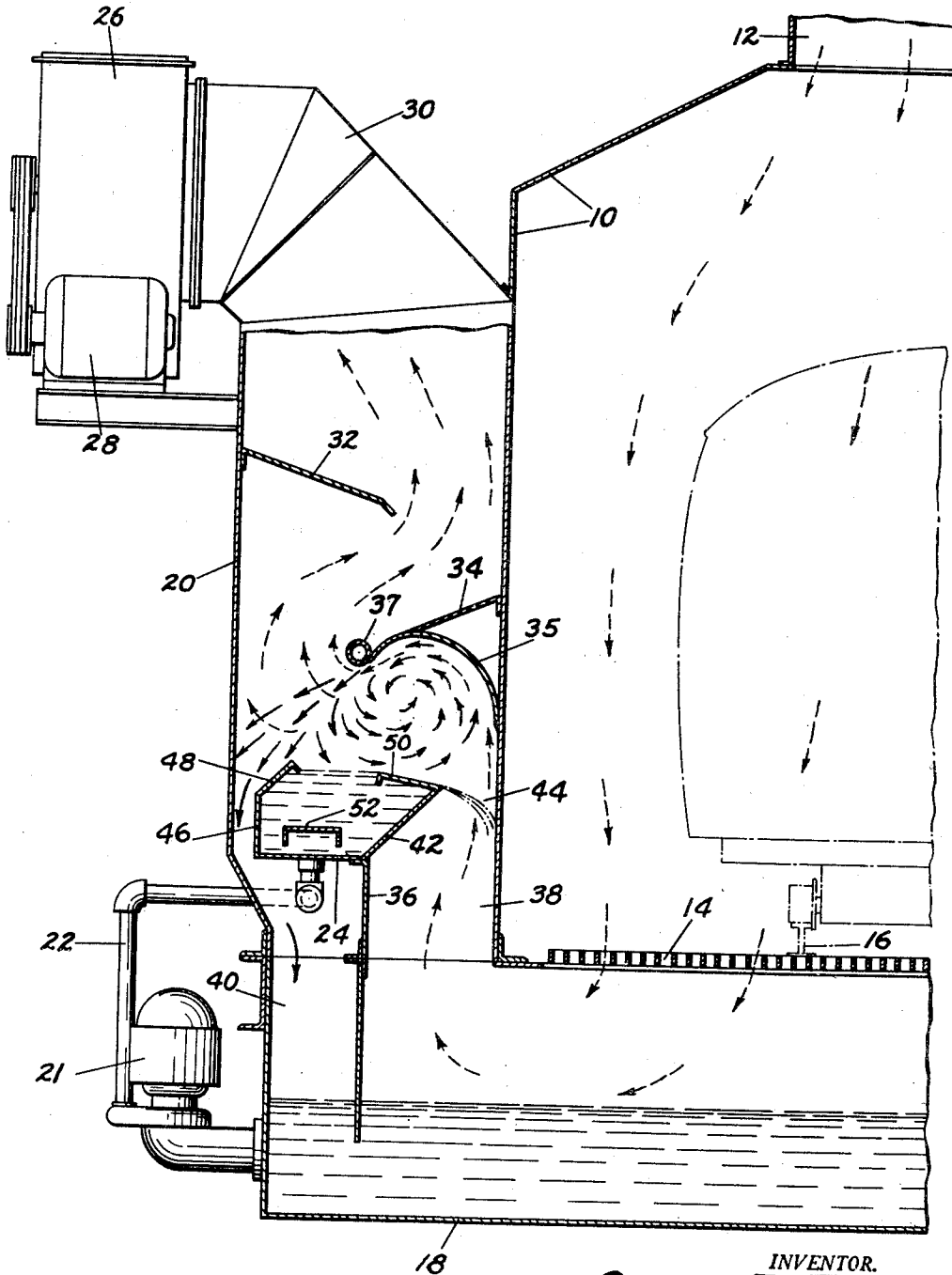
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O. E. FENN

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GAS WASHER

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INVENTOR.
ORRIN E. FENN
BY

Buntou & Parker
ATTORNEYS.

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GAS WASHER

Orrin E. Fenn, Detroit, Mich., assignor to Peters-Dalton, Inc., Detroit, Mich., a corporation of Michigan

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4 Claims. (Cl. 183—22)

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This invention relates to improvements in gas washers and particularly to gas washers employed in industrial use.

In industry gas washers are employed in many different locations to remove foul particles from air passed therethrough in order that such air may be discharged back into the building free of such foul particles or it may be discharged exteriorly of the building without carrying a large content of contaminating materials outside for distribution over adjacent property. These gas washers are used in such locations as in association with grinding or buffing operations, paint spraying or the like.

An object of this invention is to provide such a gas washer which is of simple relatively inexpensive construction and which is effective in operation and inexpensive to operate.

More particularly an object is to provide a washer of the type which employs an upright air washer casing superimposing a liquid carrying tank and in which the air stream to be cleaned is directed over the liquid surface in the tank and upwardly through the casing and a liquid spray created therein and wherein the resistance imposed on the suction fan that draws the air stream through the washer is reduced to a minimum and the cleaning is effectively carried out.

A meritorious feature of the construction is that means in the form of a water trough is provided to discharge a sheet of water across the air passageway through the casing and which water trough extends transversely across the interior of the casing spaced between the front and back walls thereof and is supplied with water from a suitable source, and wherein the water in the trough is adapted to flow over the front wall of the trough and across the air passageway between such front wall and the front wall of the air-washer casing.

The casing is provided with a pair of vertically spaced baffles which project from its front and back wall into overlapping relationship superimposing the water trough. The water trough is so shaped and positioned within the casing that the front wall of the trough forms with the front wall of the casing an upright air passageway which exhibits a restriction at the point that the sheet of water flows into the air passageway. The rear wall of the trough forms with the rear wall of the casing a downward water passageway.

The air washer is characterized by the presence of a partition which projects downwardly from the front wall of the trough into the water tank and below the water level therein. This parti-

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tion divides that part of the casing below the water trough into front and rear upright passageways. The front passageway communicates with the air inlet into the casing and serves as an updraft air passageway. The rear passageway communicates with the space above the trough and serves as a down flow passageway for water.

Various other objects, advantages and meritorious features will more fully appear from the following description, claims and accompanying drawing wherein the figure of the drawing is a vertical sectional view through a paint-spray booth embodying my invention.

In the drawing there is illustrated a paint-spray booth of the tunnel type in which is shown one-half of a horizontally extending tunnel casing 10 having an air inlet 12 through its roof. The floor of the tunnel includes a grille 14 and supports a trackway 16 upon which an automobile body may be moved along and spray-painted. Air flows downwardly through the tunnel as indicated by the arrows and through the openings in the grille. This is conventional construction.

Associated with this casing 10 is a water tank 18 which is underneath the grille and an upright air washer casing 20 which superimposes one end of the tank and stands alongside the casing 10. The water tank may be filled with liquid to the desired height by suitable pump mechanism 21 and such pump has a by-pass 22 which delivers water to a water trough 24 as hereinafter more particularly described. Suction fan mechanism 26 driven by an electric motor 28 communicates through updraft elbow 30 with the top of the casing 20 to draw air upwardly therethrough. The course of the air is indicated by the dotted line arrows.

A pair of baffles 32—34 are shown as extending inwardly from the back and front walls of the casing respectively. These baffles are spaced apart vertically and project into overlapping relationship. These baffles extend transversely across the width of the casing between its end walls. The lowermost baffle 34 is formed of two pieces of material as shown. There is the flat upper portion 34 and a curved lower portion 35. The curved portion 35 extends upwardly and inwardly and is provided with a tubular margin 37 as indicated. The flat upper portion 34 extends inwardly and downwardly to meet the curved portion and be secured thereto. The water trough 24 is disposed spaced below the lower baffle 34—35 and extends linearly the outer margin of such baffle and substantially in line therewith.

The water trough is shown as extending along the top of a partition 36 which partition extends transversely across the interior of the casing between its ends dividing the casing into an upright front passageway 38 and an upright rear passageway 40. This partition extends down into the tank and below the water level as shown. The front passageway 38 communicates directly with the air inlet through the grille and over the surface of the water.

The front wall 42 of the water trough extends upwardly and forwardly from the partition so as to form a restriction 44 in the passageway 38. The bottom of the water trough projects rearwardly from the partition 36 and the rear wall 46 of the trough is disposed spaced slightly from the rear wall of the air washer casing. The upper portion of the rear wall 36 of the trough is bent as at 48 to extend forwardly partially overhanging the trough as shown in the drawing. The trough is provided with a top wall portion 50 which extends along the margin of the front wall 42 and projects upwardly at a slight angle therefrom and rearwardly to form a flow sheet over which water flows from the trough forwardly and across the restriction 44 in the up draft passageway 38 as shown in the drawing.

This flow plate 50 and front wall of the trough does not extend upwardly to as great a height as the rear wall of the trough so that the normal flow of the water is forwardly over the flow plate. The trough is shown as having a baffle 52 over the water inlet therein to prevent surging or splashing as water is delivered into the trough. It is not necessary to control accurately the delivery of the water to the trough because the rear wall projects upwardly beyond the front wall to a very slight height and if water in excess of that required is delivered it need not all flow over the flow sheet 50 and across the air passageway but it can spill down over the rear wall of the trough. If all of the water were caused to flow over the front wall and if the delivery of water to the trough were irregular, there would be a surging and pulsating effect of the flow of air through the casing because of the variation in resistance presented by the varying thickness at different times of the water sheet flowing across the air passageway.

In the operation of the construction shown air is drawn by the suction mechanism downwardly through the grille 14 and upwardly through the air washer casing along the line indicated by the dotted line arrows. The water curtain which flows over the flow plate 50 normally travels as water curtain across the restriction in the upright passageway 38 as illustrated in the drawing. The air stream picks up this water and it is directed by the baffle 35 to form a swirl or vortex of water above the trough. The general character of such a vortex is shown in other patents issued to the assignee of this application such as Fenn No. 2,379,795, Dalton No. 2,339,982 and Dalton No. 2,438,339.

The flow of the air through this vortex as it travels upwardly through the casing washes from such air the foul particles carried in suspension in the air and these particles drop down with the water into the water tank. A part of the water picked up and thrown against the baffle 35 is thrown rearwardly and passes down between the rear wall of the trough and the rear wall of the casing. The water which strikes the back wall of the casing flows thereover down into the end of the water tank. The partition 36 sepa-

rates the air up draft passageway 38 from the down flow water passageway 40.

The baffle 34-35 is provided with a tubular margin 37 which stiffens the margin of the baffle and also inhibits the formation of eddy currents of air and water immediately above and adjacent to such margin.

It is to be noted that the curved plate 35 is not formed on the same radius throughout its entire curvature. In one type of structure wherein the distance between the front wall 10 and the rear wall 20 was 30 inches and 1000 C. F. M. of air per linear foot of front face was taken into the booth, it was found desirable to form that portion of the curved plate 35 which extends from the front wall 10 through an arc of 90° on a radius of 10 inches while the remaining portion of the curved plate terminating in the tubular edge 37 was formed on a radius of 6 inches. This increase in the downward curvature of the plate tends to throw the heavy water particles and dust particles picked up thereby downwardly along the line of the heavy arrows toward the down flow outlet between the rear wall of the casing and the rear wall of the trough. In such structure also it was found that a vertical distance of 12¼ inches from the tubular margin of the curved plate 35 to the water level in the trough was a satisfactory spacing for proper functioning.

In one satisfactory embodiment wherein the distance between the front wall 10 and the rear wall 20 of the casing was 24 inches, the distance between the rear wall of the casing and the rear wall of the trough was 2½ inches and the distance between the top of the front wall of the trough and the front wall of the casing was 6½ inches. In such construction satisfactory functioning was obtained when air was taken into the unit on the basis of 750 C. F. M. per linear foot of front face, and the velocity of the air through the restriction 44 between the front wall of the trough and the front wall of the casing was found to be in the neighborhood of 1600 to 1800 feet per minute. Higher velocities were found to set up excessive resistance, and lower velocities failed to create a satisfactory vortex. The washer functioned satisfactorily while placing a relatively low resistance on the fan. It was found that effective operation of such unit imposed no greater resistance than 2 inches on the suction fan.

Obviously many sizes of washers similarly proportioned may be, and have been used. For example, it has been found that if the distance between the front and rear walls 10 and 20 of the washer were increased from 24 inches to 30 inches and the other dimensions of the unit similarly increased, that 1000 C. F. M. of air per linear foot of front face 10 might be taken in with satisfactory functioning. In another unit, the distance between the front and rear walls 10 and 20 was increased to 36 inches, and other dimensions of the unit were similarly varied, and 1500 C. F. M. of air per linear foot of front face was taken in with satisfactory results. Units of other sizes similarly proportioned might, of course, be constructed while maintaining a low resistance on the suction fan.

What I claim is:

1. In a gas washer, a water tank, an upright casing superimposing the tank and having an air inlet at the bottom, means communicating with the upper portion of the casing to draw air therethrough, a pair of vertically spaced baffles

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projecting from opposite walls of the casing downwardly and inwardly thereof into overlapping relationship, a partition extending transversely across the interior of the casing substantially parallel to the baffle supporting sides thereof, said partition spaced below the lowermost baffle and spaced between the opposite side walls of the casing dividing the lower end of the casing adjacent to the air inlet into upright front and rear passageways, a water trough extending along the top of said partition transversely across the casing, said trough having a front wall extending upwardly and forwardly partially overhanging said front passageway and forming a restriction therein between the top of said wall and the front wall of the casing, a flow plate extending rearwardly and upwardly from the front wall of the trough, and means for delivering water to said trough to flow over said flow plate and over the front wall of the trough across the restriction between the said front wall of the trough and the front wall of the casing, said lowermost baffle including a curved plate extending upwardly and inwardly from the front wall of the casing to a point spaced above the flow plate and then curving downwardly and inwardly to the inner margin of the plate on an arc of a shorter radius.

2. In a gas washer, a water tank, an upright casing superimposing the tank and having an air inlet at the bottom, means communicating with the upper portion of the casing to draw air therethrough, a pair of vertically spaced baffles projecting from opposite side walls of the casing downwardly and inwardly thereof into overlapping relationship, a partition extending transversely across the interior of the casing substantially parallel to the baffle supporting sides thereof, said partition spaced below the lowermost baffle and spaced between the opposite side walls of the casing dividing the lower end of the casing adjacent to the said inlet into upright front and rear passageways, a water trough extending along the top of said partition transversely across the casing, said trough having a front wall extending upwardly and forwardly partially overhanging said front passageway and forming a restriction therein between the top of said wall and the front wall of the casing, said trough having a flow plate extending linearly and along the top margin of the front wall of the trough upwardly and rearwardly therefrom partially overhanging the trough and being of less height along its uppermost margin than the rear wall of the trough.

3. In a gas washer, a water tank, an upright casing superimposing the tank and having an air inlet at the bottom, means communicating with the upper portion of the casing to draw air therethrough, a pair of vertically spaced baffles projecting from opposite side walls of the casing downwardly and inwardly thereof into overlapping relationship, a partition extending transversely across the interior of the casing substantially parallel to the baffle supporting sides thereof, said partition spaced below the lowermost baffle and spaced between the opposite side walls of the casing dividing the lower end of the casing adjacent to the air inlet into upright front and rear passageways, a water trough extending along the top of said partition transversely across the casing and projecting rearwardly of the par-

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tition partially overhanging said rear passageway, said trough having a front wall extending upwardly and forwardly from the partition partially overhanging the front passageway and forming a restriction therein between the top of said wall and the front wall of the casing, said trough provided with a flow plate extending linearly along the top margin of the front wall of the trough and projecting rearwardly and upwardly therefrom and partially overhanging the trough, the rear wall of the trough extending upwardly slightly above the top of the flow plate and having its upper portion bent forwardly partially overhanging the trough, the rear wall of the trough spaced closer to the rear wall of the casing than the front wall of the trough is spaced from the front wall of the casing and means for delivering water to said trough, said lowermost baffle having its lower surface portion formed on an arc extending inwardly from the front wall of the casing and having its upper surface portion extending downwardly and inwardly from the front wall of the casing and meeting the lower portion, the inner margin of the baffle being in the form of a tube.

4. In a gas washer, a water tank, an upright casing superimposing the tank, having an air inlet at the bottom and an air outlet at the top, suction means communicating with the top casing to draw air therethrough, a pair of vertically spaced baffles projecting from opposite side walls of the casing downwardly and inwardly thereof into overlapping relationship, a partition extending across the interior of the lower end of the casing spaced between and substantially parallel to the baffle supporting walls, a trough extending along the top of the partition and having a flow plate projecting rearwardly and upwardly from the front wall of the trough partially overhanging the trough to a height less than the height of the rear wall of the trough, the lowermost baffle having a lower surface portion formed by a curved plate extending inwardly and upwardly from the front wall of the casing to a maximum height above the trough on an arc of the given radius and extending inwardly and downwardly from said maximum height toward the trough on an arc of a less radius and means for delivering water to the trough to spill over the flow plate.

ORRIN E. FENN.

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