

May 17, 1949.

O. E. FENN

2,470,345

AIR WASHER

Filed June 28, 1943

2 Sheets-Sheet 1

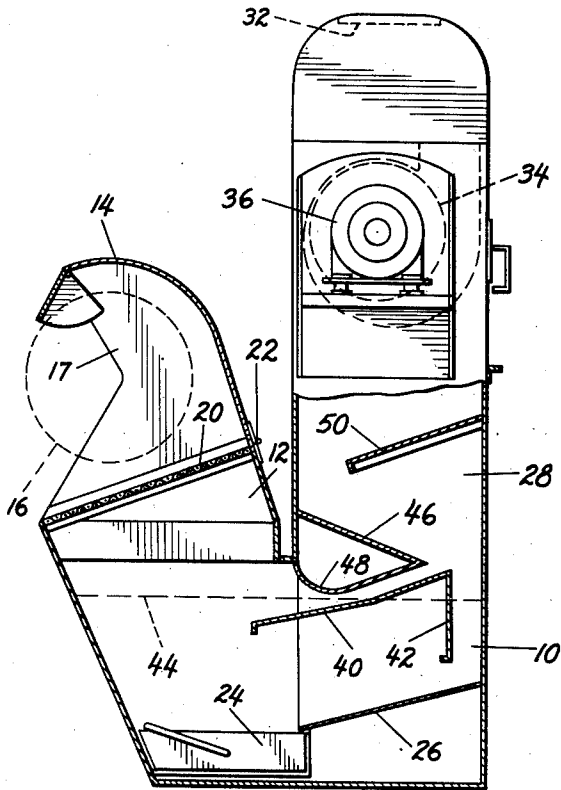


FIG. 1.

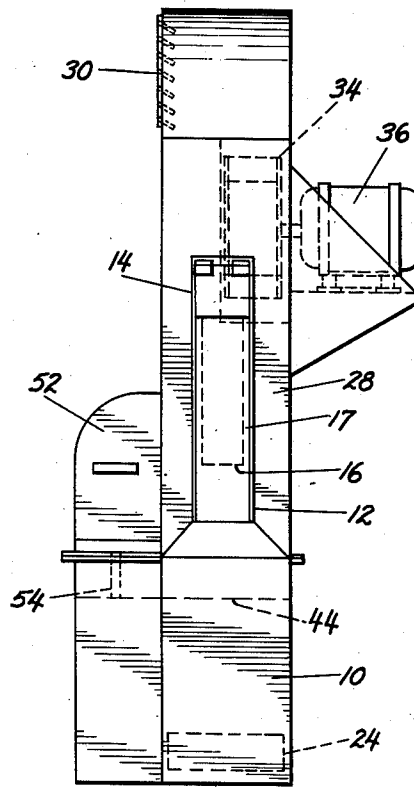


FIG. 2.

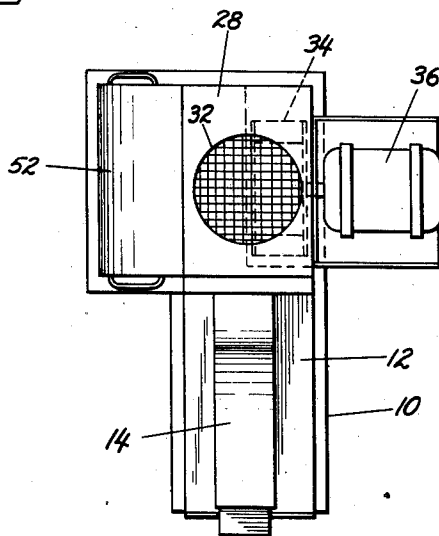


FIG. 3.

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2 Sheets-Sheet 2

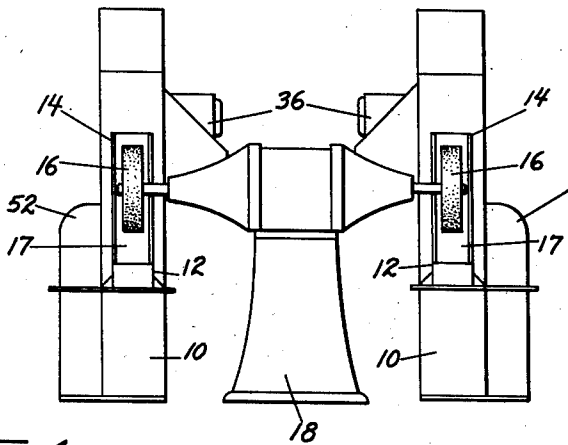


FIG. 4.

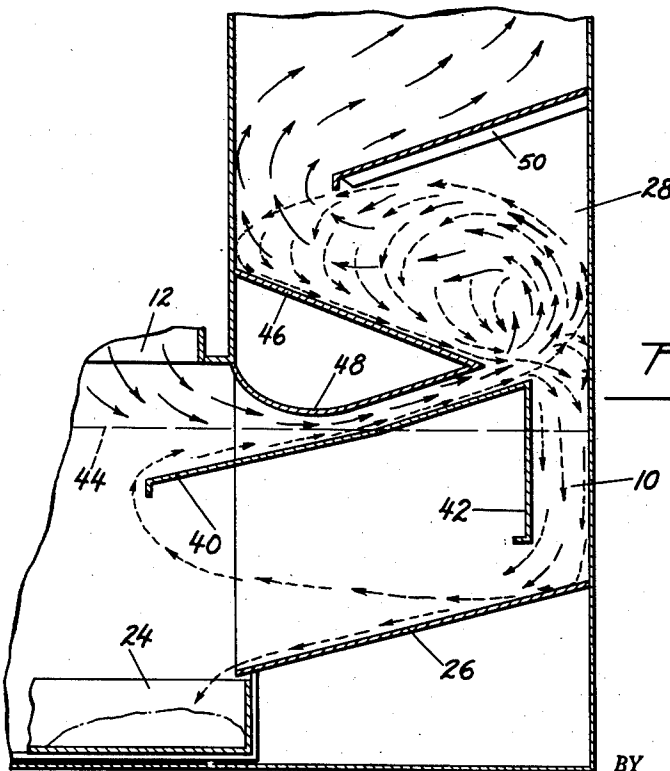


FIG. 5.

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# UNITED STATES PATENT OFFICE

2,470,345

## AIR WASHER

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Application June 28, 1943, Serial No. 492,511

3 Claims. (Cl. 183-24)

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This invention relates to an improved air washer designed particularly to be used to collect the foul material produced by a grinding wheel during its operation and to prevent such material from passing into the atmosphere.

The object is to provide a relatively small, inexpensive, portable unit specifically constructed to be used with a grinding, polishing or burnishing wheel to collect the dust arising from such operation.

Heretofore it has been the practice to provide dust collecting apparatus in relatively large installations which receive air for cleaning from a system of pipe work or ducts leading from a plurality of grinding machines. A hood is provided over each machine. These hoods are connected by air conveying pipes with a main duct which leads to a large air washer. Considerable power is required to draw the air through the several ducts for cleaning but a major disadvantage of such a system is that any change in the location of machines or the utilization thereof requires a reconstruction or rearrangement of the entire air washing system.

The object of this invention is to provide an air washer which may be associated with a grinding wheel without any installation cost. All that is required is to place the air washer in position. It may be moved from one machine to another. It is particularly advantageous in small plants and where one machine may be used at one time and another machine at another time.

A further object is to provide a machine of the character described which is so constructed as to furnish a hood for the grinding wheel and where a substantial portion of the dust collected by the grinding operation, particularly the heavier particles, is drawn directly into a collector basin.

Another object is to provide wet washing apparatus of the character described which does not employ nozzles or water wheels to create the shower of water whereby the air is washed but wherein the air passing through the machine lifts up the water and creates its own shower. The machine is so constructed that air drawn thereinto is adapted to lift up sufficient water to produce a washing shower without the use of an excessive amount of power. The machine has been found economic and efficient.

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A meritorious feature resides in the production of novel means for controlling the water level which should be maintained within relatively close limits and which means functions automatically and effectively and is of a simple, inexpensive character.

Other objects, advantages and meritorious features of this invention will more fully appear from the following description, appended claims and accompanying drawings, wherein:

Fig. 1 is a side elevation partly broken away and showing in section an apparatus embodying the invention.

Fig. 2 is a front elevation of the structure shown in Fig. 1.

Fig. 3 is a plan view of the structure shown in Fig. 1.

Fig. 4 is a front elevation showing a pair of devices embodying this invention associated with a machine employing two grinding wheels.

Fig. 5 is an enlarged fragmentary view taken on the same section line as Fig. 1.

This apparatus embodies the washing action illustrated in my co-pending application Ser. No. 492,510 filed June 28, 1943 which has since matured into Pat. No. 2,379,795, dated July 3, 1945. The washing action is more fully set forth in such application.

In the instant apparatus there is a water containing tank 10. Superposing the forward end of the tank is a down draft casing 12 terminating at its upper end in a wheel enclosing hood 14. A grinding wheel 16 is shown in dotted outline in Fig. 1 and a pair of such grinding wheels 16 are shown in solid line in Fig. 4 mounted on opposite ends of a driving shaft carried by a grinding machine indicated generally in Fig. 4 as 18. This hood portion is adapted to receive the grinding wheel as shown. The front margin of the two side walls are angularly shaped as shown in Fig. 1 to shroud a substantial portion of the grinding wheels so that the dust created in the grinding operation is directed downwardly within this down draft casing 12. A removable screen or grill may extend across the down draft casing and is indicated as 20. The hood portion of this down draft casing may hinge at 22 to the lower portion of the casing.

A collector pan 24 is shown as seated within the forward end of the bottom of the tank. This

pan may be provided with a bail or other handle structure whereby it may be lifted from the tank. The tank is shown as having a floor 26 which slopes from its rear wall to the upper edge of the pan so that foul material falling down the rear wall with the wash water will roll down the floor into the pan.

Surmounting the rear end of the tank is an upright air washer casing 28 which has an air outlet at the top. In Fig. 2 this outlet is shown at the side as at 30. In Fig. 3 the outlet is shown at the top as at 32. At 30 louvers are provided across the outlet. At 32 a screen is provided across the air outlet.

A fan 34 is mounted in the upper end of this casing driven directly by an electric motor 36. The fan is adapted to draw air through the casing from the air inlet 17 at the hood.

Within the tank there is provided what might be termed a flow sheet 40 which extends transversely across the tank from one side wall to the other and it terminates spaced from the rear wall in a downwardly turned lip or partition-like element 42. This flow plate extends forwardly within the tank toward the front wall thereof but terminates spaced therefrom as illustrated in Fig. 1. The water level is maintained within the tank at the point indicated by the dotted line 44 and the forward portion of the flow plate is submerged. Within the casing above the flow plate is a baffle 46 extending from the front wall of the casing toward the rear wall and terminating as shown spaced from the rear upper end of the flow plate. An air directing plate 48 is shown as extending from the rear margin of the baffle 46 downwardly and forwardly as illustrated in Fig. 1. This air directing plate extends for a portion of its distance substantially parallel to the flow plate 40 as shown. This air directing plate and the baffle to which it is attached extend across from one end wall of the casing to the opposite end wall.

Spaced above the lowermost baffle 46 is a baffle 50 which extends from the rear wall of the casing downwardly and forwardly as shown in Fig. 1 but terminates spaced from front wall of the casing and spaced above the lowermost baffle 46.

In a machine wherein the air washing casing has a dimension between the front and rear wall of 18 inches and a dimension between the side walls of 12 inches and an over-all height including the tank of 6 feet and which is adapted to handle 750 cu. ft. of air per minute, a suitable dimension for the air passageway between the flow plate 40 and the air directing plate 48 is two inches. The lowermost portion of the plate 48 might terminate 1' to 1.5' distance above the water level which partially submerges the flow plate.

This machine is adapted to be moved into position to cooperate with a suitable grinding wheel received within the hood portion of the down draft casing. When the fan is turned on air is drawn through the hood portion downwardly toward the water level of the tank. The heavier particles are carried down into the water within the pan and settle in the pan 24. The air itself and the lighter particles of foul material carried in suspension in the air stream are swept over the water surface into the restricted passageway between the flow plate 40 and the air directing plate 48 toward the converging space between the baffles 46 and 50 and toward the rear wall of the casing.

If a machine of the size herein set forth as illustrative handles 750 cu. ft. per minute, the air velocity through the restricted orifice space

between the flow plate 40 and the air deflecting plate 48 would reach a velocity of 4500 feet per minute. Such a velocity will sweep water up the inclined face of the flow plate toward the rear wall of the casing. A substantial portion of this water so swept up such inclined face is lifted up into the space below the baffle 50 and swirled about in such space between baffles 46 and 50. A substantial portion of the water is thrown against the rear wall of the casing and foul particles carried thereby flow down the rear wall with the water. Another substantial portion of the water is thrown upwardly toward the baffle 50 and as the water falls down and out of the air stream the foul material which has been wetted thereby travels with the water down and out of the air stream. The air continues forwardly toward the front wall of the casing and upwardly through the casing. The water which falls down on baffle 46 flows downwardly thereover with the foul material wetted thereby and the shower water carrying foul material is returned to the tank through the space between the rear wall of the tank and the downwardly turned lip 42 of the flow plate.

A water circulation is therefore set up through the tank. Water is swept up the flow plate by the air stream as herein above described and pursues the water cycle described. Water is returned to the tank through the passageway between the vertical partition wall 42 and the rear wall of the tank and moves forwardly through the tank toward the front wall and the foul particles are deposited in the pan 24. It is apparent that a construction of this type may be moved from one abrasive wheel to another where it is desired for use. Such an apparatus does not require any installation cost such as is necessary where extensive duct work is necessary. When the pan becomes full it may be removed and emptied.

In a device of this character it is necessary to maintain a water level within relatively close limits. To accomplish this I have provided a water reservoir 52 which is in the form of a water container having an outlet pipe 54 that is open at the lower end. This water container is hermetically sealed except for the outlet pipe 54. The water container is removable from its position as shown in Fig. 2 superposing a portion of the tank 10. For filling it may be filled through the outlet pipe 54 and then placed in inverted position superposing the tank 10 as shown in Figs. 2 and 3. The outlet pipe terminates at the desired water level within the tank 10. As long as the water in the tank 10 is sufficiently high to submerge the end of the outlet pipe 54 the water will not flow from the container 52 into the tank 10. During use of the machine a certain amount of water loss occurs due to evaporation and the like and when the water level of the tank 10 falls below the end of pipe 54 water flows from the container 52 to reestablish such level. A container of the relative approximate size shown will maintain the water level within a machine of the character shown for normal working shift.

What I claim is:

1. An air washer comprising, in combination, a tank adapted to contain a body of liquid, a pair of upright casings surmounting said tank and opening thereinto above the level of the liquid body, one of said upright casing serving as an air washing chamber, the other of said upright casing serving as a collector of dust laden air in the vicinity of a machine; a fan in the upper part of said air washing casing for drawing air down-

wardly through said collector casing and thence across the surface of the liquid body and up through the air washing casing, an inclined flow plate in said tank extending from below the level of the liquid body in the tank under said collector casing to a point above the level of the liquid body under said air washing casing and up which liquid is swept by the air movement produced by said fan, the upper margin of said flow plate being spaced from the wall of the air washing casing opposite to said collector casing, a substantially vertical baffle member extending downwardly from said upper margin of the flow plate into the body of liquid but terminating spaced above the bottom of the tank, a removable dust collecting pan in the bottom of said tank occupying substantially the area below said collector casing and into which the heavier dust particles fall directly, and an inclined floor member in the bottom of said tank occupying substantially the area below said air washing casing sloping downwardly to the adjacent edge of said pan and down which the lighter dust particles washed out of the air in the air washing casing flow into the pan.

2. An air washer comprising, in combination, a tank adapted to hold a body of liquid at a predetermined level, a pair of upright juxtaposed casings surmounting said tank and opening thereinto above the level of the liquid body, one of said casings serving as an air washing chamber and the other as a collector of dust laden air, a dust collecting pan in the bottom of said tank below said dust collecting casing into which the heavier dust particles entering the liquid body fall directly, an inclined flow plate in said tank sloping upwardly from below the level of the liquid under said dust collecting casing to a point a slight distance above the level of the liquid body under said air washing casing and terminating spaced from the wall of the latter opposite to the dust collecting casing, an inclined floor section in said tank under said air washing casing sloping upwardly from the inner edge of said pan to the wall of the tank opposite thereto down which lighter dust particles removed from the air washing casing are conveyed to the pan, a substantially vertical baffle member in said tank positioned between the upper margin of said flow plate and said floor section and terminating spaced above the latter to form in combination therewith and said wall of the tank a vertical passage opening out into the bottom of the tank in the direction of said pan for the downward and lateral movement of liquid in the tank, and means for causing dust laden air to enter and flow down into said dust collecting casing and across the surface of the liquid body and up through the air washing casing at such a velocity as to sweep liquid up said flow plate and over the upper margin thereof for return of the liquid to the liquid body above said vertical passage thereby creating a circula-

tion of liquid in the tank aiding the flow of lighter dust particles down the sloping floor section into the dust collecting pan.

3. A portable air washing unit comprising, in combination, a tank adapted to hold a body of liquid at a predetermined level, a pair of juxtaposed upright casings surmounting said tank and opening thereinto above the level of the liquid body, one of said casings serving as a dust collector and provided with an air intake hood adapted to partially enclose a machine from which dust arises in operation, the other of said casings serving as an air washing chamber and provided with baffle means therein for swirling a mixed fluid mass of air and liquid, an inclined flow plate in said tank sloping downward from a point above the level of the liquid body under said air washing casing toward the dust collecting casing and entering the body of liquid, the upper margin of said flow plate being spaced from the wall of the tank opposite to said dust collecting casing, the area in the bottom of said tank under said dust collecting casing defining a deposit for dust particles entering the liquid body, an inclined floor section in said tank under said air washing casing sloping downwardly toward said dust deposit area, and means for causing dust laden air to enter said hood and flow down into said collecting casing and thence across the surface of the liquid body and over said flow plate and up through said air washing casing at such a velocity that it sweeps the surface portion of the liquid body up the flow plate and over the upper margin thereof where it is returned to the liquid body adjacent to said wall of the tank whereby a circulatory movement of liquid in the liquid body is established which carries the dust particles removed from the air down the floor section to said dust depositing area in the tank.

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