Oct. 21, 1941. H. ERIKSON 2,259,626

MEANS FOR AND METHOD OF ELIMINATING SPLASH IN WASH TYPE SPRAY BOOTHS

Filed April 6, 1939 2 Sheets-Sheet 1

Fig. 1

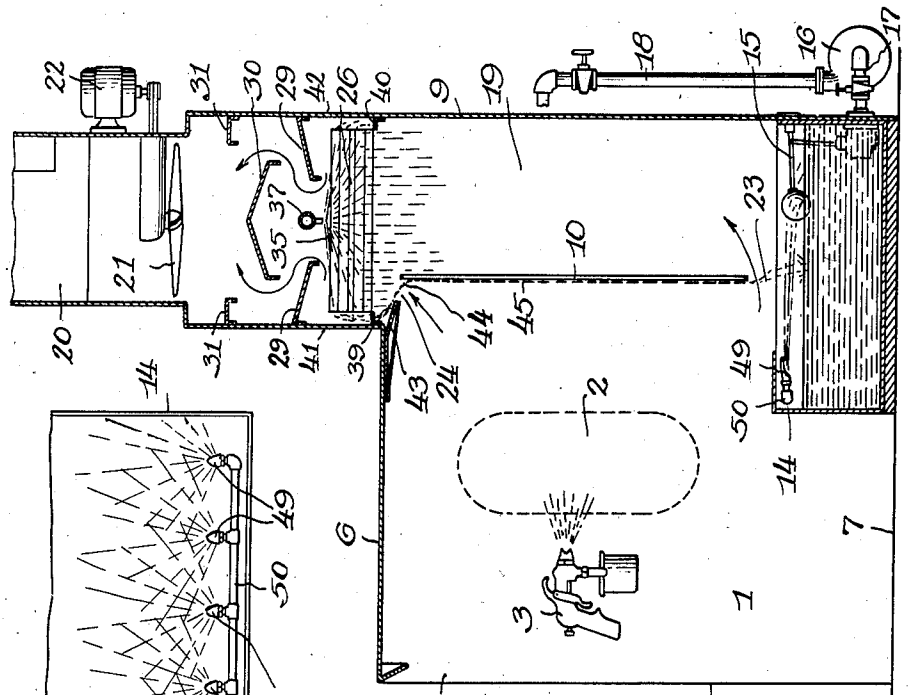
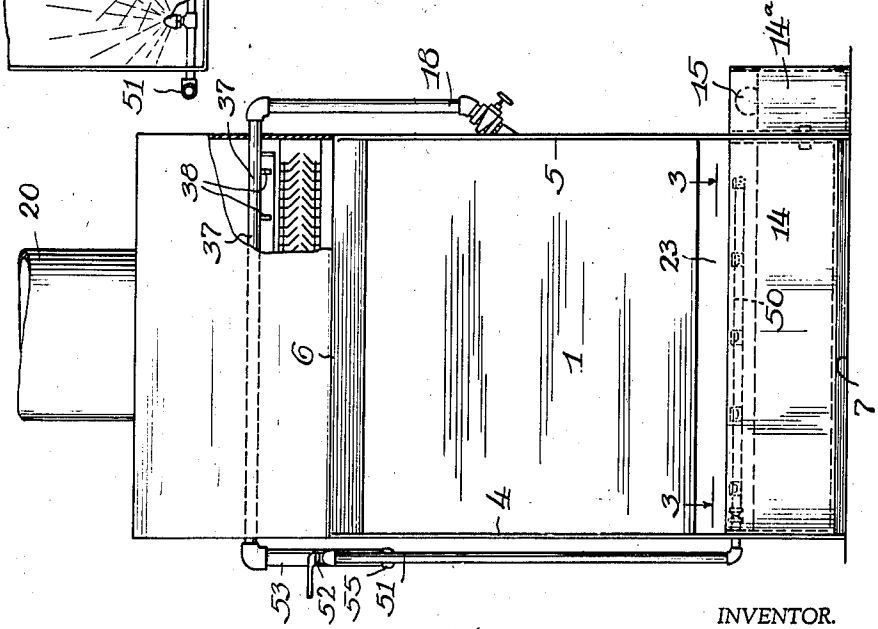


Fig. 3

Fig. 2



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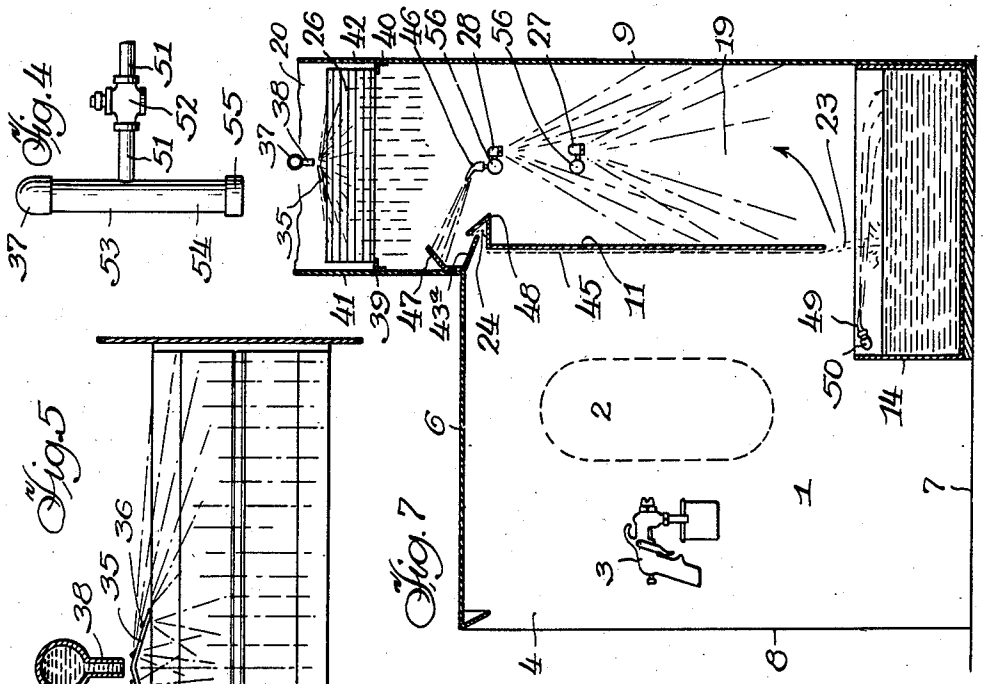


Fig. 4

Fig. 5

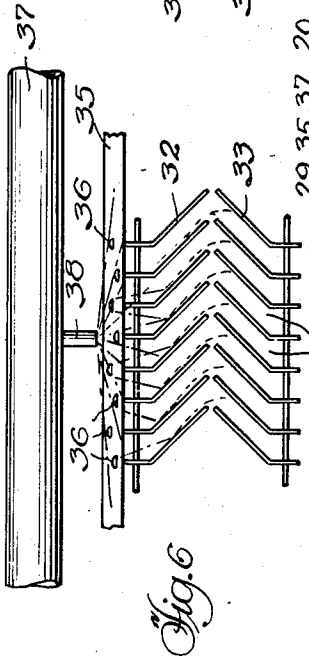


Fig. 6

Fig. 7

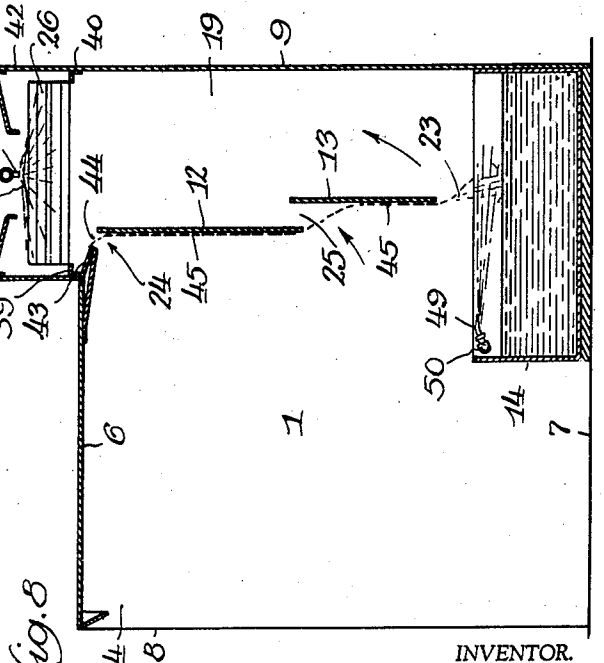


Fig. 8

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UNITED STATES PATENT OFFICE

2,259,626

MEANS FOR AND METHOD OF ELIMINATING SPLASH IN WASH TYPE SPRAY BOOTHS

Harry Erikson, Chicago, Ill., assignor to Binks Manufacturing Company, Chicago, Ill., a corporation of Delaware

Application April 6, 1939, Serial No. 266,392

7 Claims. (Cl. 91—60)

The present invention relates to gas cleaning by the wash method, and has reference preferably to a wash type of spray booth as used in the spray coating industry, wherein the strayed particles of sprayed coating material, usually termed "spray fume," is washed out of the ventilating air passing through the booth, and wherein there is present in such device splashing of the wash liquid which if it reaches the work being coated would spoil the coating, the present invention relating more particularly to the elimination of such splashing by intercepting the splash and preventing its reaching the work.

Among the objects of the invention is to provide a novel means for and method of eliminating such splash which comprises, in a gas washing means wherein there is a pouring of a curtain of wash liquid in the path of ventilating air which carries the spray fume to wash down such fume and wherein there is splash of such liquid, means for projecting a sheet of fluid, liquid or gaseous, over the locus where the splashing of the fume laden wash liquid occurs so as to intercept the upward splash thereof and prevent its reaching the work being treated. Such means, in a specific illustrative embodiment of the invention, comprises a series of nozzles so arranged over a receptacle in which the wash liquid pours and splashes as to project in the aggregate a sheet of fluid, as in a horizontal plane, over the liquid in the receptacle for intercepting upward splash therefrom and thus preventing such upward splash from being cast to the work being coated. The fluid so projected may be part of that circulated in the cleaning device for washing the air carrying particles of the spray fume.

Other objects, advantages, capabilities, features, process steps, or the like are comprehended by the invention as will later appear and as are inherently possessed by the invention.

Referring to the drawings:

Fig. 1 is a transverse sectional view taken in a vertical plane through an illustrative form of spray booth embodying the invention;

Fig. 2 is a part sectional and part elevational view taken longitudinally of the spray booth shown in Fig. 1;

Fig. 3 is a horizontal fragmentary sectional view showing part of the splash intercepting means;

Fig. 4 is a view in elevation of a detail of the means for intercepting splash;

Fig. 5 is a fragmentary part sectional and part elevational view of a gas washing eliminator;

Fig. 6 is a part transverse sectional view of the same;

Fig. 7 is a view similar to Fig. 1 and showing another illustrative form of spray booth embodying the invention; and

Fig. 8 is a like view of a still further illustrative form of spray booth embodying the invention.

Referring more in detail to the drawings, the invention is shown embodied in a cleaner of the spray booth type, preferably of the water wash type and which comprises a spraying chamber or compartment 1, in a zone or locus 2 of which an article to be coated may be sprayed by a suitable spray means 3, such as a spray gun. The booth has side or end walls 4 and 5, a ceiling 6, a floor 7, and a door or opening 8 at the forward side thereof, and a rear wall 9.

Intermediately of the spraying compartment 1 and the rear wall 9 is provided a water curtain apron device, which in Figs. 1 and 7 is shown in the form of a single upright wall 10 and 11 respectively, and which in Fig. 8 is shown as comprising upright wall sections 12 and 13 with the section 12 higher than and forwardly spaced from the section 13. In all cases the apron devices extend between the side or end walls 4.

Beneath the lower end of each apron device is located on the floor 7 at the rear of the booth a tank or receptacle 14 which has its forward part a substantial distance forwardly of the lower end of the apron device, and its rear part behind the lower end of the apron device. In all cases the tank extends between the walls 4 and 5. At an end of the tank 14 is a float chamber 14a in which may be any suitable float control valve means 15 for regulating the level of the liquid in the tank and for controlling the feed to a pump 16 by way of a valved intake 17. The pump discharges into a valved supply pipe 18.

The space between the rear wall 9 and the apron device 10, or 11 or 12—13, constitutes a wash chamber or tower 19 in which pours or is sprayed washing liquid, as water, to wash down whatever strayed spray particles of coating material may still be carried by the gas, such as air, flowing upward in the chamber 19.

At the top of the tower is connected an exhaust stack 20 in which is suitably provided an exhaust fan 21 suitably operated by a motor 22. This fan produces flow of air through the booth by way of the door 8, chamber 1, opening 23

between the lower end of the apron device and the tank 14, tower 19, thence to the stack 20. In all cases, the air is also drawn through an opening 24 at the upper end of the apron device, and in Fig. 8 the air is also further drawn through the opening 25 between the upper and lower sections 12 and 13 of the apron device.

In the upper portion of the tower is located an eliminator 26 of the wash liquid type for washing out what remaining strayed spray material may be carried up by the gas stream in the tower. The wash liquid carries down these residual particles of material and pours down through the tower to further wash the up-coming air, and finally drops or rains into the tank 14, where the material settles to form a sediment which may later be removed for treatment, as for reclaiming, as desired. In the form shown in Fig. 7, spray nozzles 27 and 28 are provided for further downwardly spraying wash liquid to further wash down the particles carried up by the up-going air.

Above the eliminator 26 is provided any suitable moisture eliminator which in the cases shown comprises a series of baffles 29, 30 and 31 so arranged as to cause an upward tortuous flow of the wet air whereby as the air contacts the baffles the moisture is extracted and drips upon and into the eliminator 26, thus permitting substantially moisture free air to be exhausted through the stack 20.

The eliminator may be of the type disclosed in the copending application of John F. Roche, Jr., and George A. Harker, Serial No. 213,174, filed June 11, 1938. In the form shown in this case, the unit comprises upper and lower sections each having horizontally spaced and uprightly disposed corrugated or zig-zag shaped plates 32 and 33 providing therebetween tortuous passages 34, for the upward flow of the air. The lower edges of the upper plates 32 and the upper edges of the lower plates 33 are slightly spaced so as to provide for a certain amount of communications between passages 34, when the wash liquid pours or floods through the unit, thereby increasing the washing effect. At the top of the unit is transversely located a deflector and distributing plate 35 of V-shape. This plate has projections 36 so located as to assist in the distribution of the wash water projected on the plate 35. Above the plate 35 is a duct 37 having discharge tubes 38 of large capacity for downwardly pouring streams of wash liquid upon the ridge portion of the plate 35. The liquid is caused to flow and spread in all directions and where it meets the projections 36 it is further scattered and distributed in diverse directions so that the liquid is caused to flow and pour into the whole lengths of the upper openings of the tortuous passages 34. In this way there is a flooding of the unit to thoroughly wash down the particles of material still being carried up by the air. The unit 26 is supported at its forward and rear ends on brackets 39 and 40 fixed to forward and rear walls 41 and 42 of the tower 19, and the unit extends across the tower between the walls 4 and 5. The supply pipe 18 is connected to the duct 36 for supplying the wash liquid to the tubes 38.

Forwardly of the upper end of each apron device is a distributing means for receiving and delivering wash liquid to the apron device so that the liquid will flow downwardly or pour over the front of the apron device. In Figs. 1 and 2 and also in Fig. 8, the distributing means comprises a slanted ledge-like plate 43 suitably attached to the upper part of the booth and beneath the forward end portion of the unit 26 so that the wash liquid pouring from the forward end portion of the eliminator 26 will fall or pour down upon the plate 43 and then flow therefrom in the form of a sheet 44 across the opening 24 which is provided between the rear lower edge of the plate 43 and the upper end of the apron 10 or apron section 12. The liquid then proceeds downward in the form of a sheet or curtain 45 on the front of the apron 10 or apron section 12. This curtain then falls or pours from the lower end of the apron 10 across the opening 23 and into the tank or receptacle 14. As it strikes the liquid in the tank 14, splashing occurs. In Fig. 8, the curtain flows or pours from the lower end or edge of the section 12 across the gap or opening 25 to the upper end of the section 13 and thence over the front of section 13 whence it falls or pours from the lower end or edge of section 13 across the gap or opening 23 into the tank 14, where it splashes. In Fig. 7, the wash liquid for forming the curtain is provided from nozzles 46 connected to and along the pipe 56 suitably connected to the supply pipe 18. These nozzles project streams or sprays of wash liquid against an inclined baffle plate 47 as shown in Fig. 7, secured to the wall 41 and above the upper end of the apron device. At the upper end of the apron 11 is provided a sort of receiving trough 48 having an angular cross-sectional form. Also secured to the wall 41 and below and beneath the baffle plate 47 is a slanted distributing plate 43a, the lower rear edge of which extends partly into the mouth of the angular plate 48 for delivering the liquid in the form of a sheet into the trough-like means 48, where the liquid is further distributed and flows therefrom and downwardly over the front of the apron 11 in the form of a sheet or curtain 45. As the liquid projected from the nozzles 46 strikes the baffle 47, it is distributed over the surface of the plate 47 and then falls or pours down onto the inclined plate 43a where it is further distributed to form a sheet of liquid which then pours from the lower edge of the plate 43a into the trough-like means 48 across the gap or opening 24.

The exhausting means, such as the fan 21, produces a draft of air through the chamber 1, entering at the door 8, through the several openings 23, 24 and 25, tower 19 and stack 20. As the air passes through the openings 23, 24 and 25 through the liquid sheet or curtain portions pouring across said openings, there is a deflecting of such curtain portions, especially in the opening 23 where the liquid pours in a rearward curved path, and also in the opening 25 where the liquid also pours in a rearward curved path so as to contact with the upper end portion of the apron section 13 (Fig. 8).

As the wash liquid falls or pours into the tank 14, there is a splashing. Some of the splash in heretofore used wash devices may reach the work being spray coated in the zone or locus 2. A single drop of the splash hitting the work will spoil the coating. It is therefore very important to prevent any splash, even a single drop of it, reaching the work.

The present invention comprehends means for intercepting the splash and preventing it from being cast to or toward the work zone or locus 2. This means, in the embodiment selected to illustrate the invention, comprises a series of nozzles 49 located in spaced relation at and along

the forward end of the tank 14 and so arranged as to project diverging sheets of fluid, as liquid but which may be a gas, rearwardly over and above the liquid in the tank. These sheets are so projected as to form collectively a single flat sheet of fluid practically extending over the whole area of the tank. As the wash liquid falls or pours into the tank, it will fall through the fluid sheet and may splash in the tank. The upward splash will meet the projected fluid sheet and be intercepted so as to be cast back and rearwardly in the tank where it will be impossible for any splashing, if any, reaching the work zone.

When liquid is used it is supplied to the nozzles 49 by way of a pipe 50, to which leads a pipe 51 connected by way of a valve 52 to an extension 53 at the outlet end of the supply pipe 37. The extension 53 has a portion 54 in which may be collected or may settle the particles of material that may be carried by the liquid passing through the pipes to the nozzles 49. From time to time the collected material in the portion 54 may be removed by disconnecting the cap 55.

In use, the liquid is circulated through the device for washing purposes in a circuit and for splash intercepting purpose in another circuit or circuit portion. The former referred to circuit is by way of the tank 14, pump 16, pipes 18 and 37, discharge tubes 38, through the eliminator 26 when the liquid pours down with a portion of it pouring in the wash tower 19 back to the tank 14, and another portion pouring to the curtain forming means and over the apron device to the tank. The other circuit is by way of the pipe 37, extension 53, pipe 51, nozzles 49, and into the tank 14.

In the case of the device shown in Fig. 7, another circuit is by way of pipe 18, pipes 56 connected to pipe 18, nozzles 20 which cast down wash sprays in tower 19, to tank 14; and also nozzles 14 which cast streams to the curtain forming means, and then by way of the pouring curtain over the apron device to the tank.

While I have herein described and upon the drawings shown selected illustrative embodiments of the invention, it is to be understood that the invention is not limited thereto but comprehends other constructions, arrangements of parts, details, features, process steps, or the like, without departing from the spirit of the invention.

Having thus disclosed the invention, I claim:

1. A device for eliminating splashing in a wash type of spray booth having a compartment, means for producing a downward flow of a curtain of wash liquid, and a receptacle for receiving said liquid and in which splashing of the liquid occurs, in combination therewith of means for projecting a sheet of liquid over said receptacle to intercept the upward splash of the liquid therein.

2. A device for eliminating splashing in a wash type of spray booth having a compartment, means for producing a downward flow of a curtain of wash liquid, and a receptacle for receiving said liquid and in which splashing of the liquid occurs, in combination therewith of nozzles for projecting substantially flat sheets of liquid over the liquid in said receptacle to intercept the upward splash of liquid therein.

3. A device for eliminating splashing in a wash type of spray booth having a compartment in which articles to be coated are sprayed, an apron device over the surface of which downwardly flows a curtain of wash liquid for receiving and carrying down strayed spray material produced in said compartment, means for producing a flow of air through said compartment and said curtain for removing strayed spray material from the air carrying said material, and a receptacle below said apron device for receiving the wash liquid and the strayed material carried thereby, in combination therewith of a liquid projecting device so located as to project a sheet of liquid over the liquid in the receptacle for intercepting upward splash of liquid therefrom.

4. A device for eliminating splashing in a wash type of spray booth having a compartment in which articles to be coated are sprayed, an apron device over the surface of which downwardly flows a curtain of wash liquid for receiving and carrying down strayed spray material produced in said compartment, means for producing a flow of air through said compartment and said curtain for removing strayed spray material from the air carrying said material, and a receptacle below said apron device for receiving the wash liquid and the strayed material carried thereby, in combination therewith of a liquid projecting device so located as to project a sheet of liquid over the liquid in the receptacle for intercepting upward splash of liquid therefrom, said liquid projecting device comprising a plurality of nozzles arranged in spaced relation at the forward portion of said receptacle and adapted to project sheets of liquid which collectively form said intercepting sheet of liquid over said liquid in the receptacle.

5. A device for eliminating splashing in a wash type of spray booth having a compartment in which articles to be coated are sprayed, an apron device at the rear of said compartment over the forward surface of which apron device downwardly flows a curtain of wash liquid for receiving and carrying down strayed spray material produced in said compartment, means for producing a flow of air through said compartment and said curtain for removing strayed spray material from the air carrying said material, a receptacle beneath said apron device and into which pours said wash liquid and the strayed material carried thereby, in combination therewith of a liquid projecting device so located as to project a sheet of liquid over the liquid in the receptacle for intercepting upward splash of liquid therefrom, and means for supplying liquid to said apron device for said curtain and to said liquid projecting device.

6. A device for eliminating splashing in a wash type of spray booth having a compartment in which articles to be coated are sprayed, an apron device at the rear of said compartment over the forward surface of which apron device downwardly flows a curtain of wash liquid for receiving and carrying down strayed spray material produced in said compartment, means for producing a flow of air through said compartment and said curtain for removing strayed spray material from the air carrying said material, a receptacle beneath said apron device and into which pours said wash liquid and the strayed material carried thereby, in combination therewith of a liquid projecting device so located as to project a sheet of liquid over the liquid in the receptacle for intercepting upward splash of liquid therefrom, and means for supplying liquid to said apron device for said curtain and to said liquid projecting device, said liquid projecting device comprising a plurality of nozzles arranged in spaced relation at the for-

ward portion of said receptacle and adapted to project sheets of liquid which collectively form said intercepting sheet of liquid over said liquid in the receptacle.

7. A method of washing paint laden air, comprising the steps of pouring a curtain of wash liquid in the path of said paint laden air to be washed, collecting said liquid in a pool, and projecting a sheet of fluid substantially horizontally over said pool of liquid whereby any upward splash is intercepted.

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