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E. F. FISHER

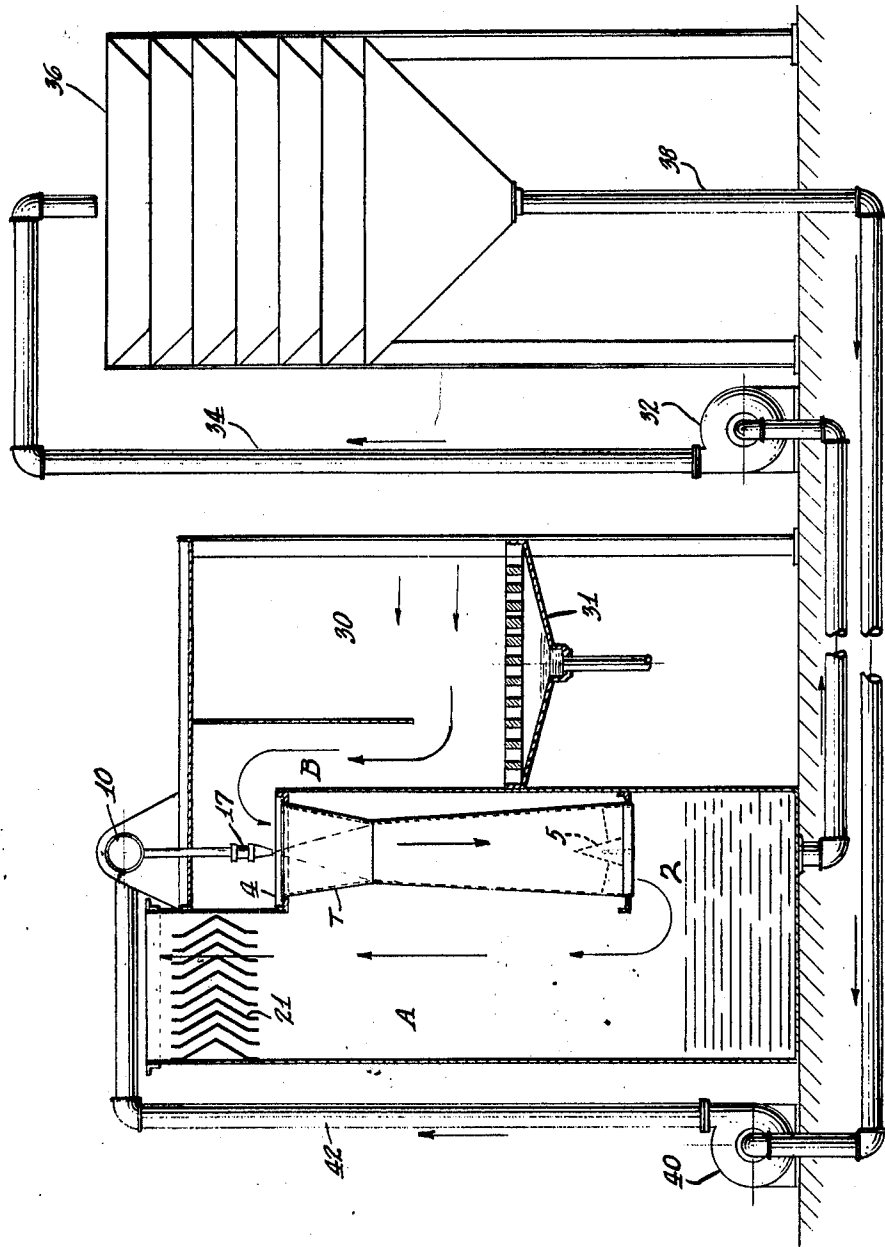
2,337,983

SPRAY BOOTH

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2 Sheets-Sheet 2

FIG. 3



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SPRAY BOOTH

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10 Claims. (Cl. 91—60)

My invention relates to improvements in spray coating and cleaning booths used in coating objects with paint, lacquers, oils and ceramic coatings or metallizing materials or for spraying parts with cleaning fluids for removing grease and dirt.

One object of my invention is to provide a booth of this character in which the fire and noxious fume hazard incident to the use of sprayed material is reduced to a minimum or entirely eliminated. A further object of my invention is to provide a booth of this character in which are incorporated improved means of removing the overspray from the both. A still further object of my invention is to incorporate in a booth of this character a means for cooling, washing and handling air as covered by my Patent Number 2,032,404, March 3, 1936.

These objects, as well as other advantages inherent in the invention, will be apparent from a detailed description of the same in connection with the accompanying drawings in which:

Figure 1 is a sectional side elevation taken on line 1—1 of Figure 2. Figure 2 is a sectional front elevation of the booth taken on line 2—2 of Figure 1. Figure 3 is a sectional side elevation showing a modification of this booth used for cleaning parts by spraying them with a liquid solvent. This modification will be referred to later.

Referring to Figures 1 and 2 for the present, 1 represents a tank divided into compartments A, B and C by partitions 2, 2¹ and 3. The partition 3 does not extend all the way to the bottom of the tank. The tube plate 4 which supports Venturi tubes T abuts the partitions 2¹ and 2 and completely separates compartments A and B and no air can pass from compartment B to A, unless it passes through the tubes T and through vaned cones 5. Likewise no air can pass from compartment C to B unless it passes underneath partition 3. The plate 6 serves to direct the flow of water from spray pipe 7 onto surface of partition 3, spray pipe 7 being connected to manifold 10 by means of pipe 8 controlled by valve 9.

The bottom portion of compartment A which serves as a water chamber is divided by baffles 11 and 12 into a clean water chamber E and a dirty water chamber D. Chamber D is provided with a cleanout hopper 13 with a cover 13^a.

The bottom portion of compartments B and C also serves as a water chamber, the water level in which is equalized with the water level in water chamber in bottom of compartment A by means of holes 15 in partition 2 and is provided with a clean-out hopper 14 similar to clean-out hopper 13. The tube plate 4^a serves merely as

a means for holding the tubes T vertical and is attached to partition 2.

The baffle 12 serves also as a wier wall and holds back sediment that collects in chamber D. Baffle 11 serves also as a skimmer wall and prevents solid matter that floats on top of water in chamber 2 from passing over wier wall 12 into clear water chamber E. Turntable 16 serves as a support for the parts to be sprayed.

10 The manifold 10 is provided with a series of spray nozzles 17 which spray liquid down tubes T. The suction pipe 19 and 19^a of pump 18 communicates with clear water chamber E and pump 18 pumps this water through pipe 20 which is connected to header pipe 10, to spray nozzles 17. Spray eliminator plates 21 prevent any water spray from passing out with the clean air through outlet 22.

15 The tubes T are preferably Venturi tubes, although other types of tubes could be used; these tubes act as aspirators, in that the concurrent downward flow of liquid and gas through these tubes create a suction in chambers B and C so that the flow of gas and liquid is from chamber C through passageway B, with a concurrent downward flow of gas and liquid through the tubes into chamber A.

20 Pipe 23 connects with suction pipe 19 of pump 18 and supplies fresh make up water or an inhibiting chemical to spray nozzles and clear water chamber E. Outlet 24 is an overflow from chambers B and C and outlet 25 is an overflow from clear water chamber E. Outlet 26 is an overflow from chamber D.

35 The operation of the spray booth is as follows:

Nozzles 17 direct a powerful spray of water down the tubes T. These sprays induce a powerful air flow downward through the tubes. This air pulls overspray and fumes arising from spraying operations in compartment C. Some of the overspray impinges on the flooded plate 3 and falls with the water into the water chamber below. The balance of the overspray and fumes with the air flows under the partition 3 into compartment B, thence down tubes T induced by the spray from nozzles 17. The mixture of overspray, fumes and air impinge on the vaned cones 5 and is ejected into chamber D where it is collected as a matte which floats on the surface of the water. The cleaned air passes out through clean air outlet 22.

45 Water flows from chamber D under skimmer wall 11 and over wier wall 12 into clear water chamber E. As a constant supply of fresh water flows into pump suction 19 through pipe 23, the

water in chambers D and E is constantly renewed leaving only a matte of gangue which floats on the surface of the water in chamber D and is removed through clean-out hopper 13. Smaller particles of solid matter in chamber D are continually drained through the overflow 25. Small floating particles that may get into clear water chamber E are drained through overflow 25. When pump 18 is stopped, fresh water continues to flow into clear water chamber E through pipe 23 and keeps the clear water chamber continually flushed. This water also flows into chamber D and keeps it flushed. Inhibiting chemical also can be supplied through pipe 23 to prevent gumming of nozzles 17. However, I find that a small quantity of fresh water continually supplied through pipe 23 keeps the pump, nozzles and clear water chamber E and chamber D clean and no trouble is experienced.

It is found that if fresh water is supplied through pipe 23, the overspray floats on top of water in chamber D and can be removed as a solid matte periodically and no fouling of pump and nozzles is experienced. The fresh water need be only a small proportion of the total volume supplied to the spray nozzles as approximately 95% is recirculated by the pump. The fresh water prevents concentration of solids in chambers D and E and aids in agglomerating the overspray into an easily removable matte which floats readily on the surface of the water. The churning action of the spray from the vaned cones 5 on the water in the chamber below aids in agglomerating the overspray into a matte very similar to the formation of butter in a churn, and a constant supply of fresh cold water aids in this process of conglomeration. In ceramic spraying, where it is desired to reclaim the overspray, no fresh water is added but the concentrate removed at suitable intervals. Also, in ceramic spraying, no noxious fumes are involved and no gumming of pump and nozzles are experienced because of the nature of the material sprayed.

Referring to Figure 3 which shows a modification of my booth for cleaning parts by means of solvent spraying, the liquid overspray from spray chamber 30 drains into pan 31 and is kept separate from the water in liquid collecting chamber 29. Thus the liquid overspray can be used over again and only the fumes are condensed in the water in liquid collecting chamber 29. This mixture of condensate and water or other absorbing liquid that may be used in place of water, is pumped from chamber 2 by pump 32 through pipe 34 into disassociating tower 36 where the fumes are evaporated out of the absorbing liquid or the water cooled to near the wet bulb temperature. The absorbing liquid is then pumped back to nozzles 17 through pipes 38, pump 40 and pipe 42 thus completing the cycle.

The tower 36 may be replaced with a settling tank in which the condensate can be separated from the absorbing liquid and the solvent reclaimed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A spray booth comprising the combination of a spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including at least one aspirator tube, and spray means for directing a liquid spray through the aspirator tube into the liquid collecting chamber, for creating a concurrent gas

flow from the spray chamber through the passageway and aspirator tube into the liquid collecting chamber.

2. A spray booth comprising the combination of a spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including a plurality of vertically positioned aspirator tubes arranged in side by side, parallel relationship, and spray means for directing a liquid spray downwardly into each aspirator tube and thence into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and tubes into the liquid collecting chamber.

3. A spray booth comprising the combination of a spray chamber, means for flooding one wall of the spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including at least one Venturi tube, and spray means for directing a liquid spray through the Venturi tube into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and Venturi tube into the liquid collecting chamber.

4. A spray booth comprising the combination of a spray chamber, means for flooding one wall of the spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including a plurality of vertically positioned Venturi tubes arranged in side by side, parallel relationship, and spray means for directing a liquid spray downwardly into each Venturi tube and thence into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and tubes into the liquid collecting chamber.

5. A spray booth comprising the combination of a spray chamber, means at the bottom of said spray chamber for collecting liquid overspray, a liquid collecting chamber, a passageway connecting said chambers, said passageway including at least one aspirator tube, and spray means for directing a liquid spray through the aspirator tube into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and aspirator tube into the liquid collecting chamber.

6. A spray booth comprising the combination of a spray chamber, means at the bottom of said spray chamber for collecting liquid overspray, a liquid collecting chamber, a passageway connecting said chambers, said passageway including a plurality of vertically positioned aspirator tubes arranged in side by side, parallel relationship, and spray means for directing a liquid spray downwardly into each aspirator tube and thence into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and tubes into the liquid collecting chamber.

7. A spray booth comprising the combination of a spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including at least one vertically positioned aspirator tube, spray means for directing a liquid spray downwardly through the aspirator tube into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and aspirator tube into the liquid collecting chamber, and cone means at the lower end of the aspirator tube for laterally spreading the concurrent flow of gas and liquid.

8. A spray booth comprising the combination of a spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including a plurality of vertically positioned Venturi tubes arranged in side by side, parallel relationship, spray means for directing a liquid spray downwardly into each Venturi tube and thence into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and tubes into the liquid collecting chamber, and cone means at the lower ends of each of the Venturi tubes for laterally spreading the concurrent downward flow of gas and liquid.

9. A spray booth comprising the combination of a spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including at least one aspirator tube, spray means for directing a liquid spray through the aspirator tube into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and aspirator tube into the liquid collecting chamber,

and means for circulating liquid from the liquid collecting chamber through said spray means, said recirculating means including means for removing from said liquid spray material collected thereby.

10. A spray booth comprising the combination of a spray chamber, a liquid collecting chamber, a passageway connecting said chambers, said passageway including a plurality of vertically positioned aspirator tubes arranged in side by side, parallel relationship, spray means for directing a liquid spray downwardly into each aspirator tube and thence into the liquid collecting chamber, for creating a concurrent gas flow from the spray chamber through the passageway and tubes into the liquid collecting chamber, and means for circulating liquid from the liquid collecting chamber through said spray means, said recirculating means including means for removing from said liquid spray material collected thereby.

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