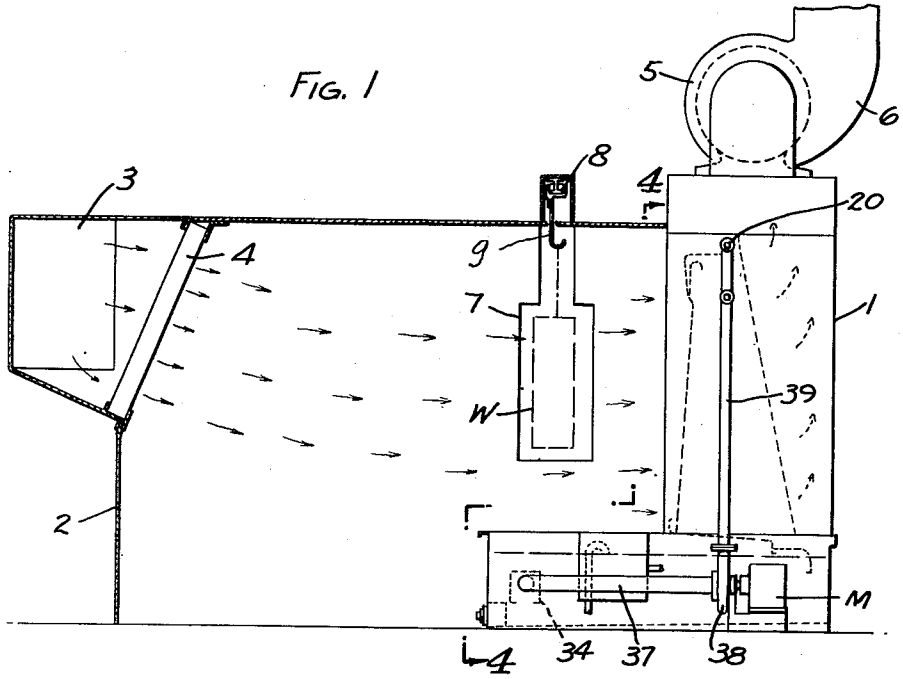
Nov. 16, 1954 F. P. BINGMAN 2,694,466

PAINT SPRAY ELIMINATOR

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FIG. 1



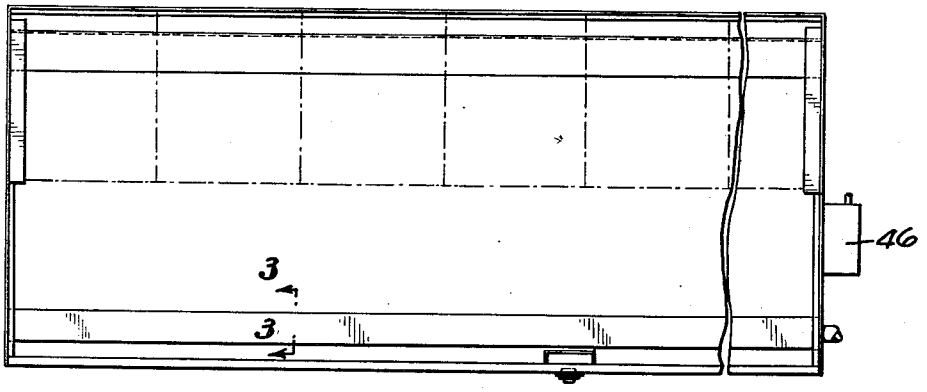


FIG. 2

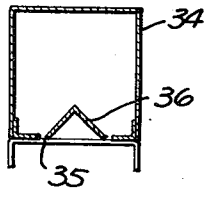


FIG. 3

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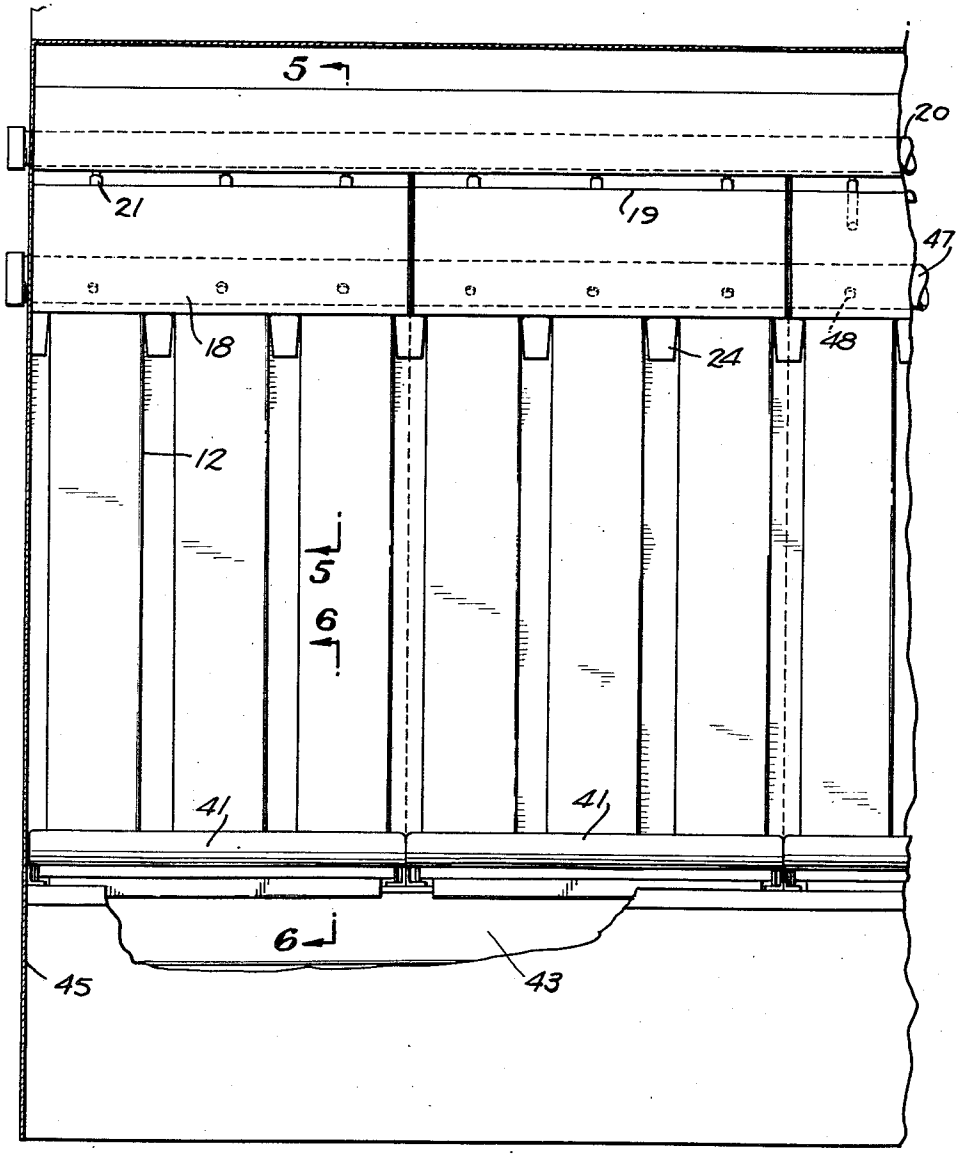


FIG. 4

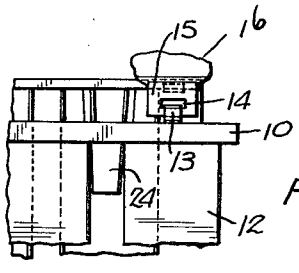


FIG. 10

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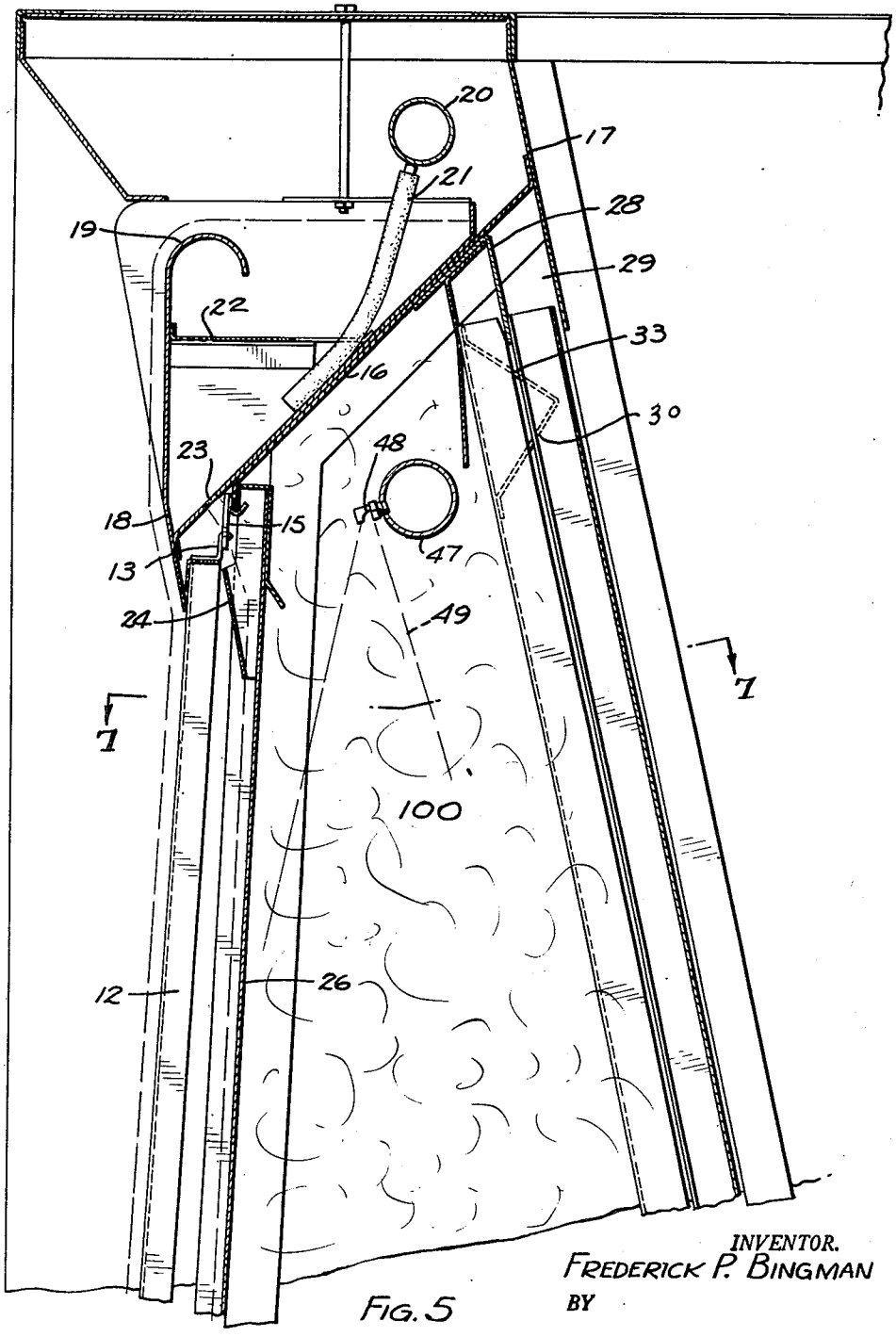


FIG. 5

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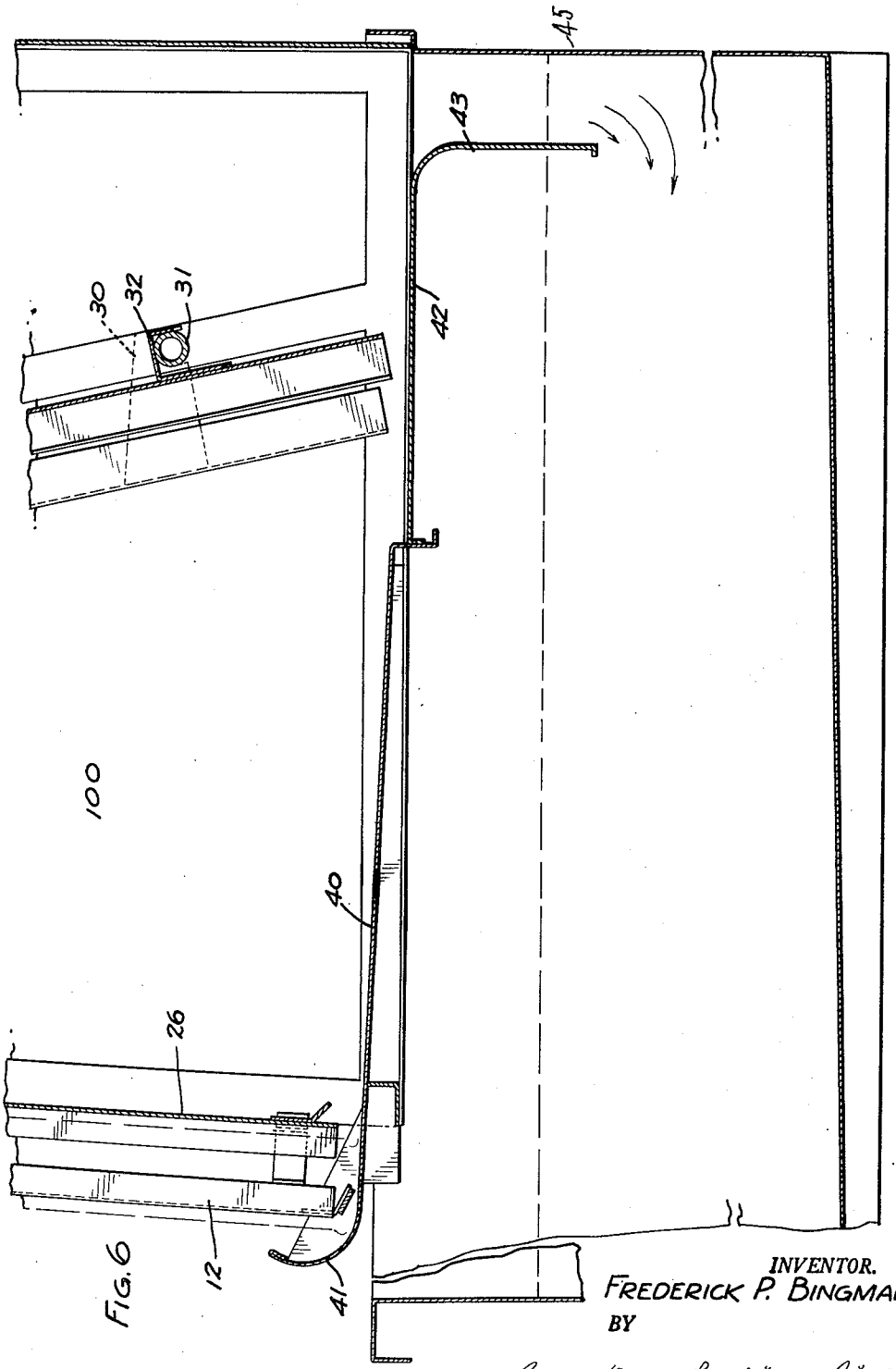


FIG. 6

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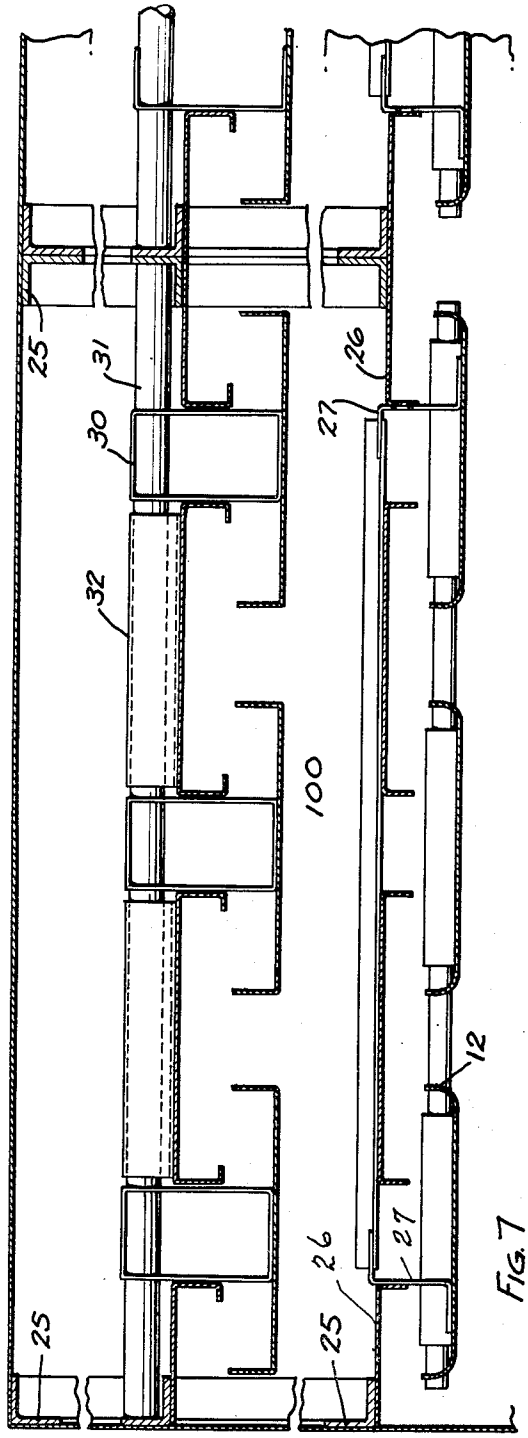


FIG. 7

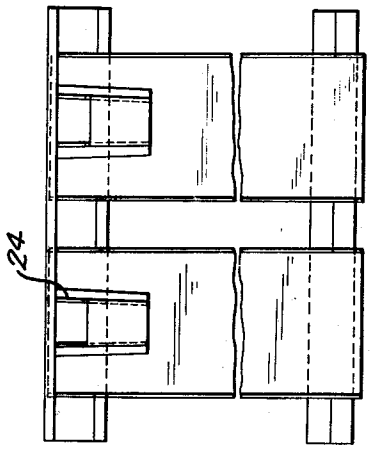


FIG. 9

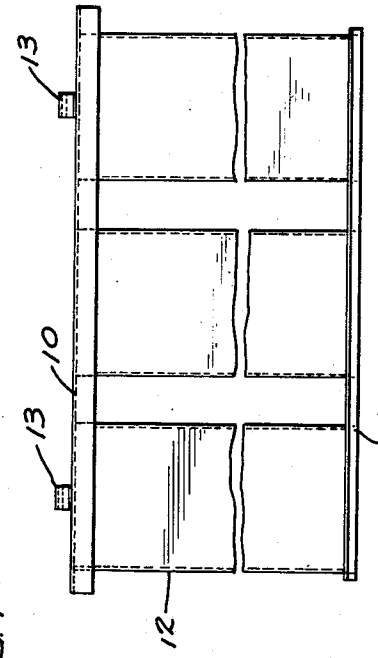


FIG. 8

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United States Patent Office 2,694,466 Patented Nov. 16, 1954

2,694,466

PAINT SPRAY ELIMINATOR

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Application February 20, 1953, Serial No. 338,116

11 Claims. (Cl. 183—22)

This invention is a continuation-in-part of my application Serial No. 114,987, filed September 10, 1949, which has been abandoned. In that application there is described and claimed a flood sheet for paint spray booths in the form of panels of two sets of upright channels or troughs with the front set of channels having their openings facing rearwardly and the rear set of channels having the openings facing forwardly. The channels of the front and rear sets are arranged in staggered relation, thereby providing tortuous passageways for the paint laden air of length substantially the height of the spray booth. This arrangement insures all the paint laden air being almost instantly drawn out of the booth so that a succession of articles or bodies can be drawn through the spray booth on a conveyor without stopping the conveyor and yet treating them with the different colored paints. With spray booths in which the paint laden air is drawn out at only one level in the booth, as, for instance, the top, middle or bottom of the flood sheet, pockets of air will accumulate in the corners of the booth and if the articles are drawn through the booth too fast, it is impossible to use different colored paint sprays on succeeding articles for the spray from the gun will get mixed with some of the residual spray in the booth and the paint colors will get mixed. Hence it is necessary to either move the conveyor very slowly or else pause between successions of articles that are to be given different colored paint. With my arrangement of the substantially vertical channels of the one set inverted with respect to the others to form the shallow tortuous passageways of length corresponding to the height of the booth, the booth is immediately cleared of all paint laden air and hence there is no residuum left to cause trouble when a different spray gun with a different color follows immediately in use.

In my prior application the paint eliminators at the opposite side of the washing chambers were large cylinders or conduits tangentially open at the bottom so that when the air is exhausted from the top of the conduit or cylinder tank the eliminator operates on the helix principle and it eliminates the water spray in the air by means of centrifugal force as the air and water spray ascends in the helix. Inasmuch as the pull of the exhausting fan is concentrated in the washing chamber at the bottom of these columns there is a tendency for the air streams being drawn through the flood sheet panels at the front more forcibly in the lower portions of the channels than the upper portions. Consequently there is not an equality of strength in the sheets of air being drawn over and through the water bearing channels.

My improved arrangement involves the use of eliminators of two sets of channels with individual channels of the two sets in staggered relation and the openings of the two sets of channels facing each other so as to provide tortuous passageways of a length corresponding substantially to the height of the cabinet. Hence the sheets or long thin air streams are drawn not only through the flood sheets but also through the eliminator in a length corresponding to the height of the cabinet and with a force that is substantially the same at all points in the air sheets. This assures maximum efficiency and the quickest possible clearing of the paint laden air from the last operation in the spray chamber.

Referring to the drawings:

Fig. 1 is a cross section of the spray booth and an elevation of the cabinet that contains the flood sheets and the eliminators, and a side elevation of the tank under

the cabinet and under the area through which the work is drawn.

Fig. 2 is a plan view of the same.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a vertical longitudinal section of the spray booth showing in front elevation the flood sheet panels.

Fig. 5 is a fragmentary vertical cross section through the upper portion of the paint-separating cabinet and the flood sheet and the eliminator panels and also of the water reservoir that feeds water over the flood sheet panels.

Fig. 6 is a fragmentary cross section through the lower portion of the cabinet and the lower portions of the flood sheets and the eliminators and also of the catch tank or basin below the flood sheets and the eliminator.

Fig. 7 is a cross section through the paint-separating cabinet and through the flood sheets and the eliminators.

Fig. 8 is an elevation of one of the front flood sheet panels removed from the paint-separating apparatus.

Fig. 9 is an elevation of one of the rear flood sheet panels.

Fig. 10 is a fragmentary elevational detail showing how one of the flood sheet panels is hooked in place by its hangers.

The paint-separating cabinet is designated 1. The paint booth is designated 2. Air is drawn into the booth through the opening 3 and passes through the air filter 4 into the spray chamber. The air is caused to travel through the spray booth and through the paint-separating cabinet by means of the blower 5 which exhausts through the duct 6. The work comes into the booth through the opening 7 drawn by a conveyor chain 8 and supported on the hangers 9. The work here shown is a small article W but it may well be automobile bodies which would be supported on a conveyor and drawn through a large tunnel. In such a case the spraying chamber will be a tunnel located above the booth 2. The tunnel (not shown) will have a grating-like floor and the paint laden air will be drawn down into the chamber 2 and then through the paint-separating cabinet 1. Hence when calling for the spray booth in the claims, let it be considered either as the room where articles are sprayed or the room through which the paint bearing vapor from another spraying area is drawn to the paint separators.

Refer to Figs. 7 and 8. The flood sheet of any desired width can be made up of several panels. Such a front panel is shown in Fig. 8 and comprises an upper cross bar 10 and a lower cross bar 11 to which the rearwardly opening channels 12 are spot welded. The upper bar is provided with a pair of hangers 13 which hook into openings 14 (see Fig. 10) on the brackets 15 which are spot welded to the apron 16 (see Fig. 5) which extends from the back wall 17 to the front wall 18 of the header. This apron and the wall 18 which is looped over inwardly at the top to form a weir 19 of a trough forms a water reservoir extending above the front sets of channels. The water is fed into this trough from the main 20 and thence through the hose 21. A perforated shelf 22 forms a baffle to control water surging due to the air that is drawn through the cabinet and the pressure from the water source. These channels are set at an angle of approximately 3° so as to be approximately vertical, but to lean back at the top sufficiently so the water that is fed to the top of the channels will not drop off by gravity but flow easily down the backs of the channels. The water from the reservoir also passes through the port 23 and flows in a stream down into the guide 24 which catches it and spreads it on the inside of the rear channels.

Refer to Fig. 7. It will be seen that the paint-separating cabinet is held up and reinforced by the angle iron stanchions 25. The stanchions which are at the sides of each set of flood sheet panels have vertical wings 26 which in turn have welded thereto Z strips 27. These wings 26 and the Z strips 27 form frames for the end panels so as, in connection with the angle iron stanchions, to seal the panels so as to make sure that all the paint laden air is drawn through the tortuous passageways formed by the upright channels strips.

The apron 16 has welded to its underside a sheet metal channel cross strip 28. The rear wall of the cabinet

header **17** drops down and forms with the rear wall of channel **28** a pocket **29**. Channel **28** and pocket **29** form header recesses to engage the upper ends of the eliminator panels. The front and rear eliminator panels may be lifted and the upper ends received in the sockets **29**. The front eliminator panels and the channels are provided with boxes **30** that are adapted to reach between the individual channels of the rear eliminator panels and hook over the cross rod **31** as shown in Fig. 7 and also shown in the dotted lines in Fig. 6. The rear channels have welded thereto the hook like retainers **32** which also hook over the cross rod **31** and thereby retain the rear eliminator panels in place. The upper portions of the front eliminator panels are provided with V strips **33** which form spacers between the front and rear panels of the eliminator.

Fig. 3 shows the submerged box like trough **34** which has opening **35** at the bottom of the trough but is partially covered by a V strip **36** which is so supported over the opening as to leave only small narrow slots through which the water can be drawn. As this water has a large amount of paint sludge this arrangement forms a convenient and effective sludge separator and tends to keep the paint sludge out of the submerged water trough. The water is drawn through this trough by means of the duct **37** which is connected with a pump **38** driven by a motor M. The pump discharges through pipe **39** which leads to the main **20** that runs lengthwise of the header.

Refer to Fig. 6. It will be seen that below the flood sheet panels and the eliminator panels are the pans **40** which comprise a sheet metal strip turned up at the front end to catch the water and turn it rearwardly. The rear of the pan is formed from a separate sheet **42** which has a turned down apron **43** that has its lower edge well below the water level. This seals the rear of the tank so that the air cannot be drawn under the drain pans instead of going through the floor sheet baffles. Note that the submerged induction trough **44** is located at the front of the water tank **45** and that the water flowing from the flood sheets and dripping from the eliminator panels drains into the rear of the tank, consequently there is constant current of water forward in the tank. A float **46** keeps the water at a given level in the tank. When the water falls below a given level this float lets additional water into the tank automatically. The deep current from front to back causes the flow of the water to be under the sludge and paint which floats on the surface of the water in the tank. This sludge is drawn off by a suction and venturi arrangement which is shown in Figs. 3 and 4 of the parent application, Serial No. 114,987. But inasmuch as the claims to this sludge separating apparatus were reserved for the subject matter of the divisional application, this is not shown and described in the present application.

The operation is as follows: Air comes through the opening **3**, the air filter **4**, being drawn in by the powerful blower **5**. The work is fed through the cabinet by the conveyor **9** or is fed through a tunnel (not shown) above the room by a conveyor and the paint laden air drawn down through the floor grating to the chamber **2**. Thence the powerful blower pulls the air through the two sets of flood sheet panels having the channel baffles. The air is thereby given to sharp twists in the Z like passages between the baffles. This brings the paint particles in the air in contact with the water films flowing down the back of the front channels and in contact with the water flowing down the inside of the rear channels of the flood sheet. The particles are thus trapped and flow with the water onto the pans below the flood sheet and thence into the rear of the tank below.

As already explained, the air sheets or streams are substantially the same height as the spray booth **2** and consequently the air is simultaneously pulled horizontally out of the chamber **2** with equal pull at all levels thereby minimizing any chance of residuum of paint laden air remaining. The air laden with some of the paint particles passes into the washing chamber **100** between the flood sheet panels and the eliminator panels. And it is subjected to the spray from the pipe **47**. This water pipe is provided with a plurality of small nozzles **48** which screw into the pipe and these provide many water jets **49** in the washing chamber. These jets pick up what paint is left in the paint laden air and the spray is then drawn violently through the eliminators and caused to take sharp turns by reason of the inverted channels of the front and rear sets facing each other. What little paint is left is caught with the water vapor on the eliminator surfaces and separated from the air. The water is substantially completely separated in the eliminators and returned to the tank beneath.

The advantage of the panels with the narrow full booth length Z section passages is equal pull at all levels both through the flood sheet and eliminators. The pivoting of the front panels makes access to the washing chamber very easy and the easy removability of all panels both flood sheet and eliminators makes cleaning easy. These can be lifted out and placed in tanks containing paint removing liquids.

What I claim is:

1. In a paint spray booth, a flood sheet defining the front of a washing chamber, eliminators defining the rear of a washing chamber, means in the washing chamber for providing jets of water to wash paint-laden air drawn into the washing chamber through the flood sheet, a reservoir above the flood sheet for flowing films of water down the flood sheet, said flood sheet having a plurality of up and down running narrow tortuous passageways of approximately a length corresponding to the height of the booth to pull the air contents of the booth horizontally and rearwardly at substantially all levels in the booth, a blower for pulling the air out of the eliminators and through the flood sheet and washing chamber, a tank under the washing chamber and flood sheet, conduit and a pump for taking water from the tank and returning it to the jet means and the said reservoir.

2. The combination claimed in claim 1 in which the flood sheet is made up of vertically disposed but slightly inclined sets of channel strips, the forward set facing rearwardly and the rear set facing forwardly, but the individual channels of the two sets in staggered relation to provide the tortuous passageways.

3. In a paint spray booth, a flood sheet defining the front of a washing chamber, eliminators defining the rear of a washing chamber, a plurality of spray nozzles located in the washing chamber, means for flowing films of water over the forwardly facing surfaces of the flood sheet, the flood sheet and eliminators made of panels of up and down running baffle strips in spaced but staggered relation to provide thin tortuous passages of a length substantially equal to the height of the spray booth to provide a substantially equal pull at all levels.

4. In a paint spray booth, a flood sheet defining the front of a washing chamber, eliminators defining the rear of a washing chamber, a plurality of spray nozzles located in the washing chamber, means for flowing films of water over the forwardly facing surfaces of the flood sheet, the flood sheet and eliminators made of panels of up and down running alternately forwardly and rearwardly facing channel members in spaced but staggered relation to provide thin tortuous passages of a length substantially equal to the height of the spray booth to provide a substantially equal pull at all levels.

5. In a paint spray booth, the combination of a wall structure forming an enclosure including an air washing chamber, a flood sheet having upwardly and downwardly extending strip like baffles forming part of the wall structure defining the air washing chamber and in two sets with the baffles spaced one from another in a set and the baffles of the two sets in staggered relation to provide wide tortuous passageways for the paint laden air, the washing chamber and the baffle passages being arranged in succession in the travel of the air in the booth, eliminators for taking the air after it has left the succession of travel through said air washing chamber and said baffles, a catch basin tank under the baffles and washing chamber, and means for pumping the water from said tank up above said flood sheet and washing chamber and flowing it down the baffles and discharging it into the wash chamber in jets to form a spray therein.

6. The combination claimed in claim 5 in which the baffles are shallow channel strips with the open sides of the channel facing each other in the two sets.

7. The combination claimed in claim 5 in which each set of baffles has a cross bar support at the top and the cross bar has a trunnion support in the spray booth wall structure to allow turning a set of baffles for access to the washing chamber.

8. A paint spray booth apparatus having a spray chamber and comprising a tank, a frame extending above said

tank, a flood sheet mounted on said frame to provide a wall portion of said spray chamber and co-operating with said frame to define a washing chamber, said flood sheet comprising a first set of parallel channel shaped elements interconnected and laterally spaced relative to each other, co-operating means on said frame and said first set removably mounting said first set on said frame disposed with the channel shaped elements thereof disposed intermediate said chambers and opening toward said spray chamber, said flood sheet also including a second set of parallel, interconnected and laterally spaced channel shaped elements, and co-operating means on said second set and said frame removably mounting said second set on said frame at the spray chamber side of said first set and with the channel shaped elements of said second set opening toward said first set and disposed in offset relation to, and overlying the spaces between, the elements of said first set, means mounted on said frame for providing a continuous layer of liquid flowing over surfaces of each of said elements, eliminator means mounted on said frame adjacent said washing chamber for removing excessive liquid and other impurities from air received from said washing chamber, and means for moving air from said spray chamber through said flood sheet and thence through said washing chamber and said eliminator means.

9. A paint spray booth as defined in claim 8 wherein said means for providing a continuous layer of liquid flowing over surfaces of each of said elements includes means for directing a jet of liquid at the side of each of said elements co-operating to define said washing chamber, said jets of liquid impinging upon said elements at an angle such that a substantial part of the liquid of said jets is deflected off said flood sheet and broken into a spray substantially filling said washing chamber.

10. A paint spray booth apparatus having a spray chamber and comprising a tank, a frame extending above said tank, a flood sheet mounted on said frame to provide a wall portion of said spray chamber, said flood sheet comprising a first set of parallel channel shaped elements interconnected and laterally spaced relative to each other, co-operating means on said frame and said first set removably mounting said first set on said frame disposed with the channel shaped elements thereof disposed intermediate said chambers and opening toward said spray chamber, said flood sheet also including a second set of parallel, interconnected and laterally spaced channel shaped elements, and co-operating means on said second set and said frame removably mounting said second set on said frame at the spray chamber side of said first set and with the channel shaped elements of said second set opening toward said first set and disposed in offset relation to and overlying the spaces between the elements of said first set, means mounted on said frame for providing a continuous layer of liquid flowing over surfaces of each of said elements, said last named means including means disposed at the opposite side of said flood sheet from said spray chamber and adapted to direct a jet of liquid against the adjacent surface of each of said elements, eliminator means mounted on said frame at the opposite side of said flood sheet from said spray chamber for removing excessive liquid and other impurities from air received from said spray chamber through said flood sheet, and means for moving air from said spray chamber through said flood sheet and thence through said eliminator means.

11. A paint spray booth as defined in claim 10 wherein said channel shaped elements of said second set have gradually curved corners to facilitate the flooding of all surfaces thereof by liquid flowing downwardly thereover.

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