

Feb. 4, 1941.

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2,230,646

SPRAY BOOTH

Filed March 9, 1939

3 Sheets-Sheet 1

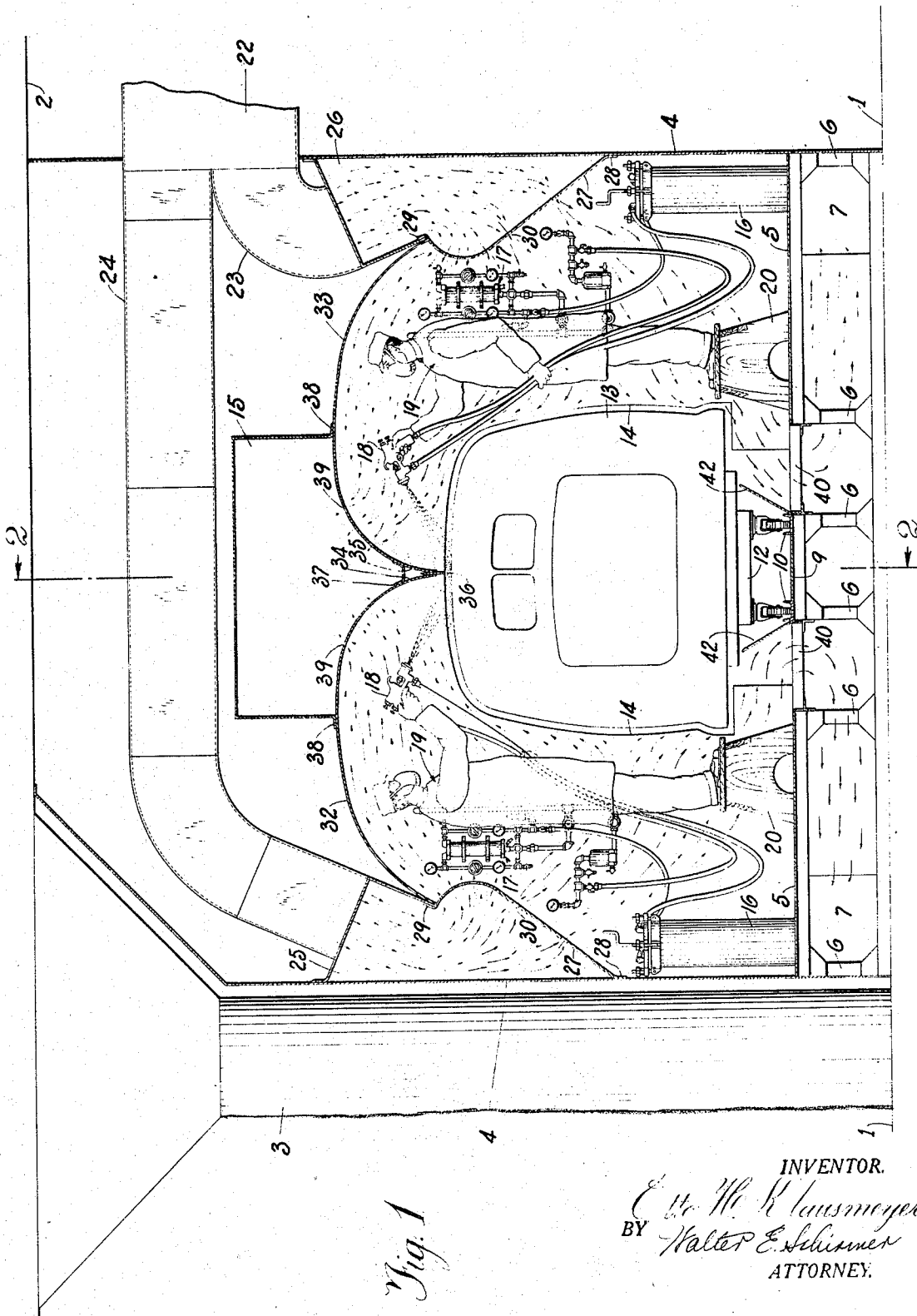


Fig. 1

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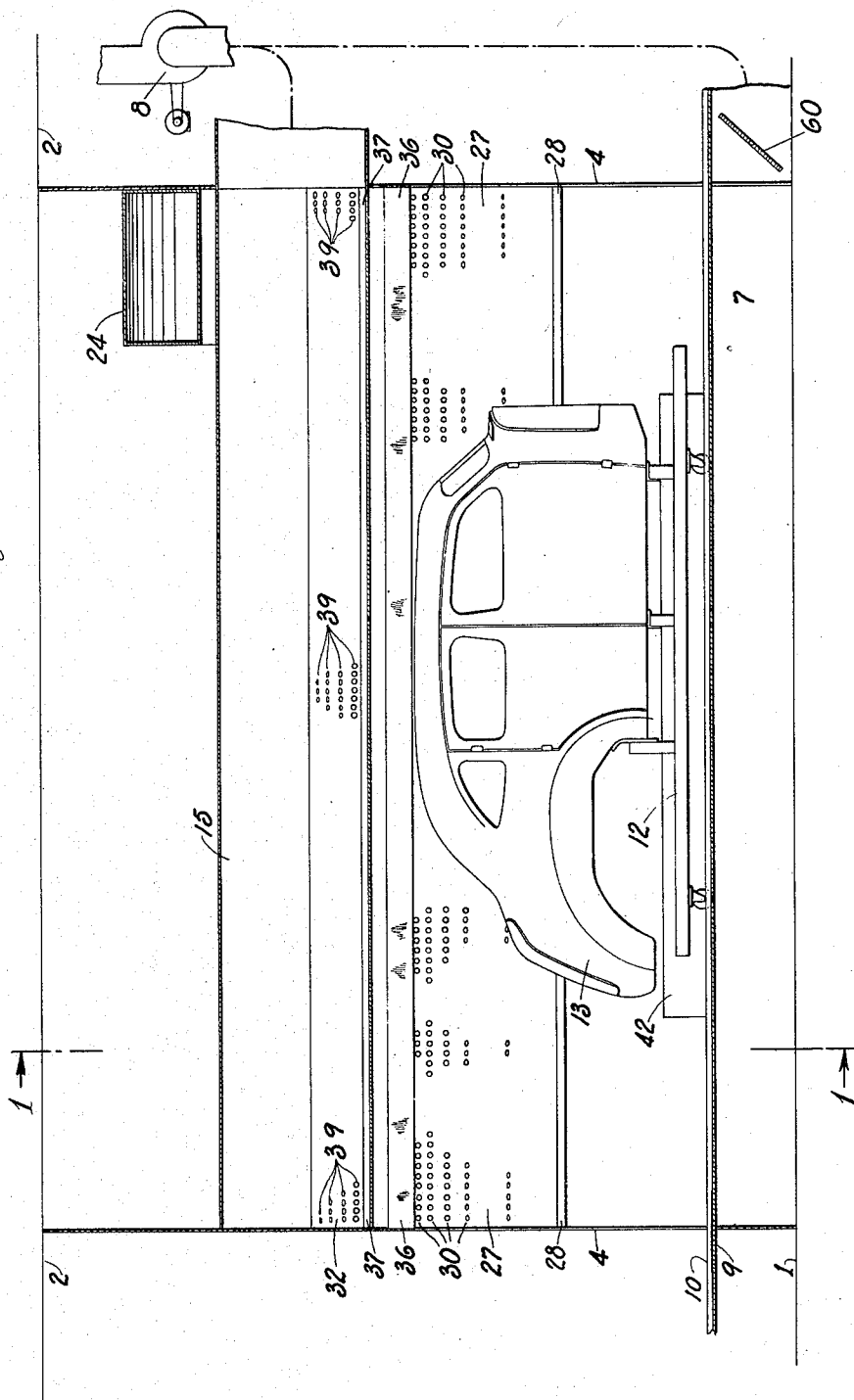
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3 Sheets-Sheet 2

Fig. 2



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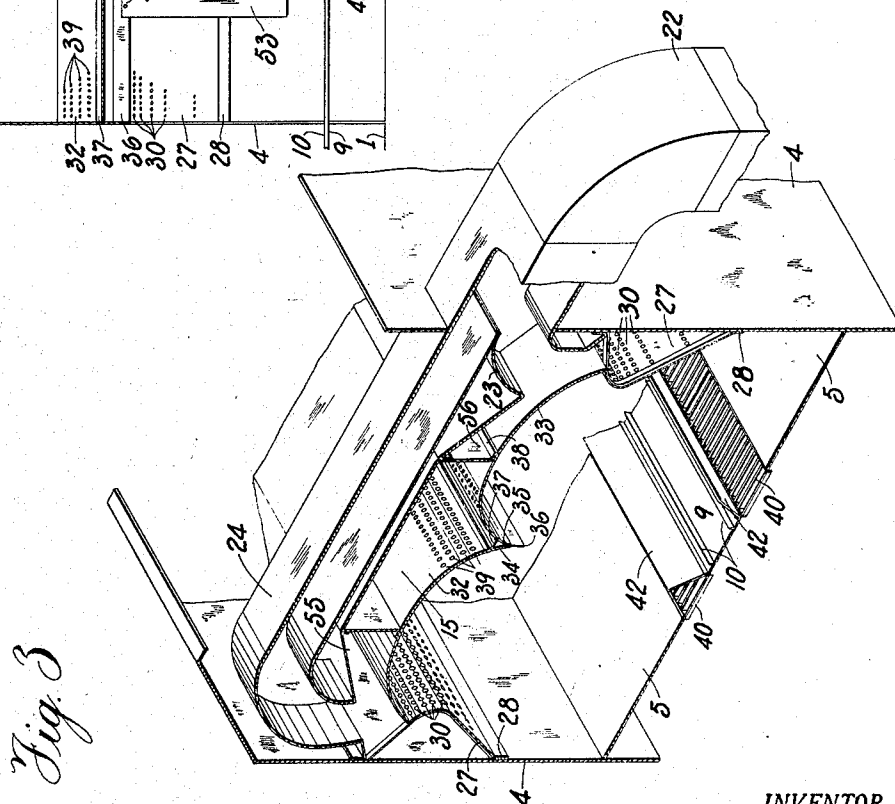
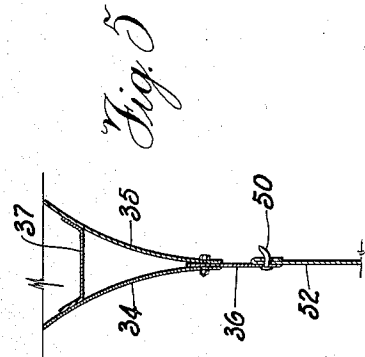
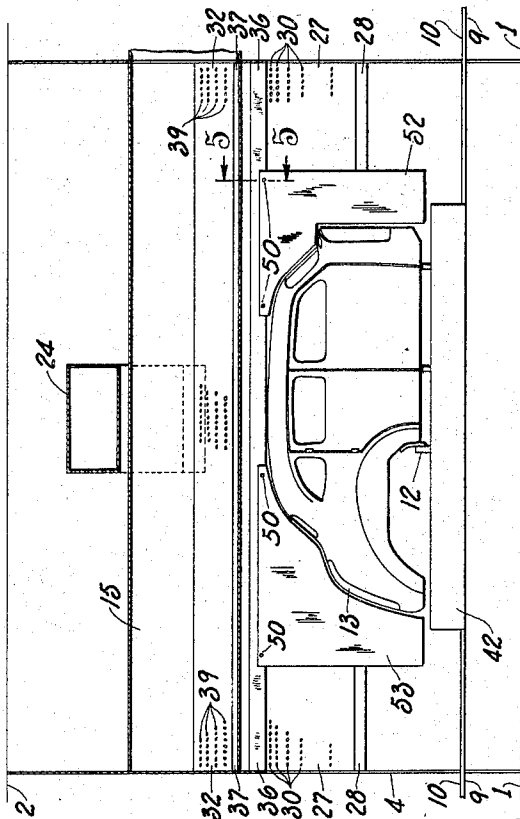
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SPRAY BOOTH

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3 Sheets-Sheet 3



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2,230,646

SPRAY BOOTH

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Application March 9, 1939, Serial No. 260,729

11 Claims. (Cl. 91—60)

This invention relates to spray booths and more particularly is directed to a novel design of spray booth for use in the spraying of vehicle bodies such as automobile bodies and the like which are moved through the booth on small trucks running in a trackway extending longitudinally of the booth.

In previous types of booths with which I am familiar it has been the practice to discharge conditioned air into the booth from the top thereof and to withdraw this air from below the floor of the booth. Such a method of circulation has been objectionable in that when the operators who are disposed on opposite sides of the vehicle body as it passes through the booth spray the upper or under surface of the vehicle there is a tendency for the spray to cross over whereby the operators in effect are spraying a portion of the paint into each other's faces. This tendency to over-spray is accentuated by the fact that air discharged down onto the roof of the car body creates numerous eddy currents which cause turbulence resulting in whirling around and fringes of the spray from the spray guns and create an undesirable condition within the booth. The same occurs when the operators are spraying the lower portions of the vehicle body and as a result there are many objections to such a booth construction.

Attempts have been made to solve this problem by utilizing a spray chamber in which the operators are placed in staggered relationship but with such an arrangement the tendency for over-spray on the body itself with the resulting lack of uniformity of the paint film produces an undesirable job so far as the body itself is concerned. This also causes overspray which requires a subsequent expensive sanding operation, as well as using additional paint.

The present invention broadly contemplates a spray booth so constructed and designed that the air introduced therein will at all times have a tendency to carry the paint spray away from the operators and there can be no possibility of such over-spray being carried into the operators' faces because of the air currents in the booth and because the two sprays are directed in opposite directions.

One of the primary features of the present invention is the provision of a spray booth in which the roof is formed of two longitudinal panel members each of virtually equal construction whereby the adjacent side edges of the panel members come together to form a longitudinally extending vertical baffle which extends down substantially to the top of the vehicle. This longitudinal baffle prevents any possibility of the oppositely disposed operators directing their spray guns in such manner as to cross-spray over the top of the car since the baffle prevents the

transmission of the spray from a gun on one side thereof crossing the top of the car to the other side.

The roof sections are disposed beneath a longitudinally extending header into portions of the roof panels immediately above and laterally outwardly of the junction which forms the dividing baffle and are perforated in such manner that air can be exhausted therefrom.

Another feature of the present invention is the provision of side panel members extending the full length of the booth and so shaped that air introduced substantially centrally thereof is discharged into the booth in a generally transverse direction with the upper end portions of the side panel members being spaced away from the side walls in such manner that a major portion of the air is discharged transversely into the booth and has an upwardly swinging movement due to the exhaust through the central roof structure.

Another feature of the invention relates to the provision of laterally spaced parallelly extending exhaust grilles in the floor of the booth disposed within the peripheral limits of the lateral surfaces of the car body. These grilles are separated by a longitudinally extending trackway upon which the trucks are guided which support the vehicle bodies during their movement through the booth. Suitable angularly extending longitudinal baffles separate the trackway from the exhaust ports and thereby prevent any possibility of spray being directed onto the wheels of the trucks, which would be highly undesirable, and also serve as means for directing a portion of the air discharged into the booth into the exhaust ports in the floor. These baffles prevent any possibility of cross-flow of paint spray beneath the car body and consequently again prevent any possibility of an operator on one side spraying across into the path of the operator on the opposite side.

Still another advantage of the present construction resides in a curved roof section for the booth which allows the air to sweep therealong so that it moves from the back of the operator past his head and forwardly and upwardly into the roof exhaust passageways. Since the gun of the operator is always held in front of him with respect to the car body, there can be no possibility with this sweep of air currents that the spray from the gun can be carried into the operator's face. Furthermore, the longitudinally extending baffle formed by the meeting edges of the roof panels allows air which sweeps over the surface of the car to pick up the fringe of over-spray from the spray gun and pull this finely atomized spray directly out through the roof exhausts thereby keeping within the booth air free of such spray at all times.

Still another feature of the present invention

is the provision of end wall sections in the booth which have openings therein of silhouette form corresponding to the cross-sectional outline of the vehicle body. As the car moves through the

5 booth, therefore, the bodies in the end wall openings form substantial end closures for each end of the booth so that there is little or no discharge of air out of the ends of the booth and consequently the circulation of the air can be accurately controlled.

10 In a preferred form of the invention the construction is so arranged that the major portion of the air which is directed transversely into the booth has a shorter path of travel to the roof outlet than to the floor outlet and consequently the major portion of air moves transversely across and upwardly in the booth, the desired arrangement being such that approximately 90% of the air introduced into the booth is discharged through the roof thereof with the remaining 10% being withdrawn through the floor. This has proved to be most desirable in protecting the operators and also in producing the desired conditions within the booth so far as elimination of over-spray and prevention of cross-spraying is concerned.

This is of decided advantage when two operators are disposed opposite each other and conjointly spray toward each other over the roof of the car which is the usual practice. The fringe or mist spray is not permitted to pass across into the face of the opposing operator, preventing discomfort and also substantially eliminating any tendency to overspray, which insures that more paint will be deposited in a uniform film on the body, and no overspray depositions need be removed by expensive sanding operations. Also, the roof exhaust at the center of the booth prevents eddying of the mist spray, and insures clean air about the operator at all times.

40 In a modified form of the invention it is contemplated that each car body as it moves into the booth will be completely baffled about a longitudinal midplane by the use of baffle members cut to conform to the shape of the body and hung from the longitudinally extending roof baffle in such manner that regardless of what portion of the vehicle body is being sprayed there can never be any possibility of cross-flow of spray mist past the longitudinal midplane of the car.

Other objects and advantages of the present invention will appear in the following detailed description which, taken in conjunction with the accompanying drawings, will disclose to those skilled in the art the particular construction, operation and method of circulation of air within the booth.

In the drawings:

60 Figure 1 is a cross sectional view through a spray booth construction in accordance with the present invention showing the path of movement of the air within the booth;

Figure 2 is an elevational view of the booth construction shown in Figure 1;

65 Figure 3 is a slightly modified sectional perspective view showing the relationship of the inlet and exhaust ports in the booth;

Figure 4 is a view corresponding to Figure 2 but showing a modified form of the construction; and

70 Figure 5 is a sectional view taken substantially on line 5-5 of Figure 4.

Referring now in detail to the drawings, the booth is shown as constructed by the roof 1 and floor 2 of a conventional building of the type

having concrete supporting columns 3. Of course it is obvious that the booth may be built in any desired location and the present showing is merely for purposes of description.

The booth itself comprises vertically formed walls 4 which rise from transversely extending floor portions 5, these floor portions being spaced above the floor 2 of the building by supporting columns such as indicated at 6. Adjacent the side walls and below the floors 5 are two longitudinally extending exhaust passages 7 which communicate with an exhaust conduit leading to the exhaust blower 8.

The central portion of the floor comprises a trackway 9 having two channel shaped members 15 10 therein which form tracks for the wheels of the supporting truck 12 upon which the car body 13 is mounted. The truck 12 may be moved through the booth by hand or may be connected to any suitable type of conveyor mechanism 20 whereby it may be mechanically moved along the trackway 10 through the booth. At each end of the booth there are provided end walls which have openings 14 formed therein, these openings corresponding generally to the silhouette outline 25 of the car body 13 so that little or no air can be exhausted through these end walls. Extending substantially centrally of the booth and longitudinally thereof above the roof is an exhaust header 15 which also has its outlet end connected 30 to the exhaust blower 8.

Within the booth are the usual paint or lacquer mixing mechanisms 16 and suitable control mechanisms indicated generally at 17 for supplying air pressure to the mixers 16 and to the spray guns 18 controlled by the operators indicated generally at 19. When spraying the top of the car the two opposing operators 19 have to employ the use of small stools or benches 20, as shown in Figure 1, in order to be in a position to observe the spraying operation on the top of the vehicle body. However, this may be optional.

The air supplied to the booth may preferably be conditioned in accordance with the teachings of the copending application of Bert F. Fowler, Serial No. 256,905, filed February 17, 1939, and may be introduced into the booth through the inlet duct 22 which is divided into two ducts 23 and 24, the duct 24 extending transversely of the booth above the header 15 and being directed down into a plenum chamber 25 supported on and having one wall thereof formed by the side wall 4 of the booth. A similar plenum chamber 26 is provided for the inlet duct 23. Closing the booth side and the chambers 25 and 26 are side panel members 27 which are similar in shape but are reversed in position on opposite sides of the booth. The panels 27 are substantially inverted J-shaped sheets with the outer longitudinal edge being secured to the side wall as indicated at 28. The arcuated portion of the panel 27 terminates in a flange portion which engages the top longitudinally extending surface of the chambers 25 and 26 as indicated at 29.

The panels 27 are perforated as indicated at 30 65 in Figure 2 and extend the full length of the booth on the opposite side walls thereof. The perforations are so arranged that the air discharged from the chambers 25 and 26 there-through flows to the booth substantially as indicated by the arrows in Figure 1 with the major portion of such air being discharged through the curved upper end portions of the panels 27. This air moves transversely into the booth and also has movement into a vertical plane with a major 75

portion of the air moving upwardly and a minor portion of the air moving downwardly about the legs of the operators. Secured to the flanges 29 by the side panels 27 and the headers for the plenum chambers 25 and 26 are the longitudinal edges of the two roof sections 32 and 33.

The roof section 32 is generally arcuate in section and extends longitudinally of the booth with the inner end thereof being curved downwardly and inwardly as indicated at 34 to form a junction with the corresponding downwardly and inwardly curved end 35 of the panel or section 33. The two roof panels 32 and 33 are substantially identical in section but arranged reversely and between the meeting edges 34 and 35 thereof there is disposed a longitudinally extending plate member 36 which forms a longitudinally extending baffle extending substantially to the top of the car body. This baffle serves as a dividing member which prevents sprays discharged from either of the guns 18 from passing therebeneath across the roof of the car into the face of the opposite operator. A suitable channel shaped spacing member 37 is provided between the curved portions 34 and 35 of the roof panels and serves as a bottom closure for the exhaust header 15, which has side walls terminating in the flange connections 38 to the roof panels 32 and 33. These roof panels are perforated as indicated at 39 in Figure 2 to form exhaust passageways into the exhaust header 15. These perforations are so arranged as to start immediately above the junction of the member 37 with the ends 34 and 35 of the panels and to extend for an appreciable distance toward the flange portions 38 of the header with the result that the air withdrawn from these exhaust portions swerves across the under surface of the roof panels 32 and 33 and from the back of the operator forwardly past his face and shoulders and past the guns 18 picking up any over-spray or mist spray, carrying such spray along and discharging the same out through the openings 39. This is clearly shown by the arrows in Figure 1.

In a preferred form of the invention approximately 90% of the air introduced into the booth through the side panels 27 is withdrawn from the booth through the roof openings 39 into the exhaust header 15. The remaining portion of the air moves downwardly in the booth as shown by the arrows in Figure 1 and is discharged outwardly through a series of ports formed by the grille sections 40 disposed on the floor of the booth between the floor sections 5 and the central trackway section 9. The gridded sections 40 are arranged in parallel relationship on opposite sides of the trackway 9 and within the peripheral limits of the car body. Protection is afforded to the truck 12 upon which the bodies are carried by means of outwardly and upwardly extending longitudinal baffles 42 which extend from the lateral edges of the trackway 9 and serve as directing means for directing the air moving transversely and downwardly in the booth out through the grille sections 40 into the exhaust passages 7. The baffles 42 prevent the possibility of cross or over-spray beneath the body of the car and protect the truck 12 against impingement of spray thereon which might result in coating of the trucks to an undesirable extent.

It will be seen from this circulation of air as illustrated in Figure 1 that the air introduced transversely of the booth from the sides thereof divides approximately at the center portion of the car body with the major portion of the air mov-

ing upwardly over the surface of the car body and outwardly through the openings 39 and the minor portion of the air moving downwardly past the lower portion of the car body and out through the grille sections 40. This division of air is extremely desirable inasmuch as the movement of air in this manner insures that all spray not deposited on the car body will be carried outwardly with the air and away from the operators into the exhaust passageways. With such a construction a considerably smaller amount of air may be used in the booth than was heretofore possible. For example, in the present booth construction a flow of from 10,000 to 12,000 cubic feet per minute has been found entirely satisfactory whereas a booth of the same interior size heretofore had air flows from 20,000 to 40,000 cubic feet per minute. The reason for the reduction in the amount of air passing through the booth is because of the improved control of the circulation which insures that no possible paint spray can be carried toward the operators and also insures that any over-spray or fringe spray will be immediately exhausted from the booth with the air currents.

In the modified construction shown in Figures 4 and 5 the same general booth structure is provided, but the depending baffle member 36 between the curved edges 34 and 35 and the roof panels 32 and 33 is provided with laterally extending hook portions 50 spaced therealong in such manner that body outlining panels 52 and 53 may be hung thereon as shown in Figure 4. These panels 52 and 53 provide a continuance of the baffle along the longitudinal midplane of the car body all the way to the lower surface of the body. Consequently, regardless of which portion of the body is being painted there will be baffle means absolutely preventing any cross-flow of paint spray beyond the midplane of the car so that there will be no possibility of an operator at any time spraying over the work done by the operator on the opposite side of the body or of directing his spray toward the face of the opposite operator.

Also, in Figure 4 it will be noted that the duct 24, and consequently the duct 23, are located substantially midway of the longitudinal extent of the booth whereby a more efficient distribution of air from the side panels 27 is provided. It is to be understood that the embodiment shown in Figures 1 and 2 can also be arranged in this manner instead of at one end of the booth as illustrated.

With the construction shown in Figures 4 and 5 the trucks 12 upon which the vehicle bodies are supported and moved into the booth will stop when the car body reaches a position whereby it will fit with the outline provided by the plates 52 and 53. When the spray operation has been completed these plates are removed and the truck can then be moved out of the booth with the completely painted body thereon.

Figure 3 gives a perspective view of the structure shown in Figure 1 and illustrates clearly how the air is introduced transversely into the booth from the side panels 27 and is withdrawn through the roof and floor openings. In addition, Figure 3 illustrates plenum chambers extending from the lateral walls of the exhaust header 15 above the roof panels 32 and 33 to the side walls 4 of the booth whereby the angle of entrance of air currents to the chambers, such as indicated at 55 and 56, is such as to insure a uniform discharge of air through the panels 27 along the en-

tire length of the booth. This is a slight modification of the construction shown in Figure 1 but insures that the quantity of air delivered at every point along the length of the panels 27 will be the same. This in turn provides for true transverse movement of the air towards the center of the booth and upwardly and downwardly to the roof and floor exhaust passageways.

In order to insure that the major portion of the air will be withdrawn through the exhaust header 15 a damper or similar controlling means 60 is pivotally supported in the exhaust ducts 7 beneath the floor of the booth and may be positioned so as to retard the withdrawal of air through these ducts by the blower 8 thereby increasing the amount of air withdrawn through the exhaust header 15. I have found that the most desirable arrangement thus far found contemplates the withdrawal of approximately 85% to 90% of the total air introduced into the booth through the exhaust header 15 with the remaining portion of the air being withdrawn below the floor.

I am aware that various changes may be made in certain phases of the side and roof panels and that rearrangement of some of the parts may be had without departing from the underlying principles of the present invention and I therefore do not intend to be limited except as defined by the scope and spirit of the appended claims.

I claim:

1. A spray booth comprising a floor, parallel rows of openings in the floor extending longitudinally of the booth and spaced apart by a trackway adapted to receive vehicle body-carrying trucks, outwardly and upwardly inclined baffle means between said trackway and each row of openings, side walls for said booth inclined inwardly and upwardly, means for discharging air into the booth through said side walls, roof closing members arched upwardly and inwardly from said side walls and having adjacent downwardly and inwardly curved edges forming a V-shaped junction substantially in the longitudinal center of the booth, and exhaust means above said V-shaped junction communicating with said booth through the portions of said roof members immediately laterally adjacent said junction.

2. The booth of claim 1 wherein said the lower extremity of the junction is disposed closely adjacent the top of the vehicle bodies as they move through the booth.

3. In combination, a spray booth having a floor, a central trackway running longitudinally of the booth, means for exhausting air from opposite sides of said trackway through the floor, a roof for the booth comprising laterally spaced upwardly arched roof members forming at their adjacent edges a central longitudinally extending junction and terminating laterally short of the vertical sides of said booth, means for exhausting air upwardly through said roof into a central longitudinally extending header, side panels extending from the lateral outer edges of the roof first diagonally downwardly and inwardly of the booth and thence diagonally downwardly and outwardly to the side walls of the booth, said panels being perforated for admitting air under pressure into the booth substantially transversely thereof.

4. In combination, in a vehicle body spray booth, a floor, vertical side walls, and a roof, said

floor having parallel rows of exhaust passageways extending longitudinally of the booth on opposite sides of a central trackway, said roof comprising longitudinally extending C-shaped panels with their adjacent edges extending into a V-shaped junction forming a longitudinal baffle substantially in the longitudinal midplane of the booth, and inclined inverted J-shaped side panels having their outer edges connected to the side walls above the floor and their inner edges connected to the outer edges of the roof panels, said side panels being perforated to discharge air transversely into said booth, the adjacent junction-forming portions of said roof panels being perforated for exhaust of air therethrough from said booth.

5. The combination of claim 4 wherein the end walls of said booth have silhouette openings conforming to the cross-sectional contour of the vehicle bodies passing through the booth.

6. The combination of claim 4 further characterized by longitudinal baffle means between said trackway and each row of floor exhaust passageways.

7. In a spray booth for spraying vehicle bodies wherein the bodies are moved longitudinally of the booth with operators on opposite sides of the body using spray guns, means for introducing air into the booth transversely thereof from the side walls, a longitudinal vertical baffle extending down substantially to the top of the body, exhaust ports in the roof of the booth on opposite sides of the baffle, and exhaust grilles beneath the body in the floor of the booth.

8. The booth of claim 7 further characterized in the provision of silhouette baffles supported on said vertical baffle and extending longitudinally about the car in the midplane thereof.

9. In a spray booth having side walls, a roof, a floor, end walls and a longitudinal central trackway, a longitudinal vertically depending baffle substantially centrally of the roof, an exhaust header above said baffle, exhaust ports in the roof on opposite sides of the baffle discharging into said header, exhaust ports in the floor on opposite sides of the trackway, inlet headers between the roof and side walls, and side panels extending into the booth from the side walls and perforated to discharge air from said inlet headers transversely into the booth from opposite sides thereof.

10. In a spray booth for vehicle bodies wherein the roof portion thereof extends downwardly adjacent the longitudinal midplane of the booth to form a longitudinally extending baffle extending to the top of the vehicle body, exhaust ports in said roof portion on opposite sides of the baffle, means comprising ports in the side walls of the booth for introducing air transversely into the booth from opposite sides thereof and so constructed and arranged that the major portion of said air sweeps upwardly across the booth into said exhaust ports on opposite sides of said baffle, said baffle preventing cross flow of air over the top of said body, and means in the floor of said booth for withdrawing the remaining portion of air through the floor of said booth beneath said vehicle body.

11. The booth of claim 10 further characterized by the provision of longitudinal baffle means beneath the vehicle body for preventing cross flow of air therebeneath.

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