Sept. 4, 1956 L. M. OWEN 2,761,373

TRAVELING SPRAY BOOTH

Filed April 19, 1951 5 Sheets-Sheet 1

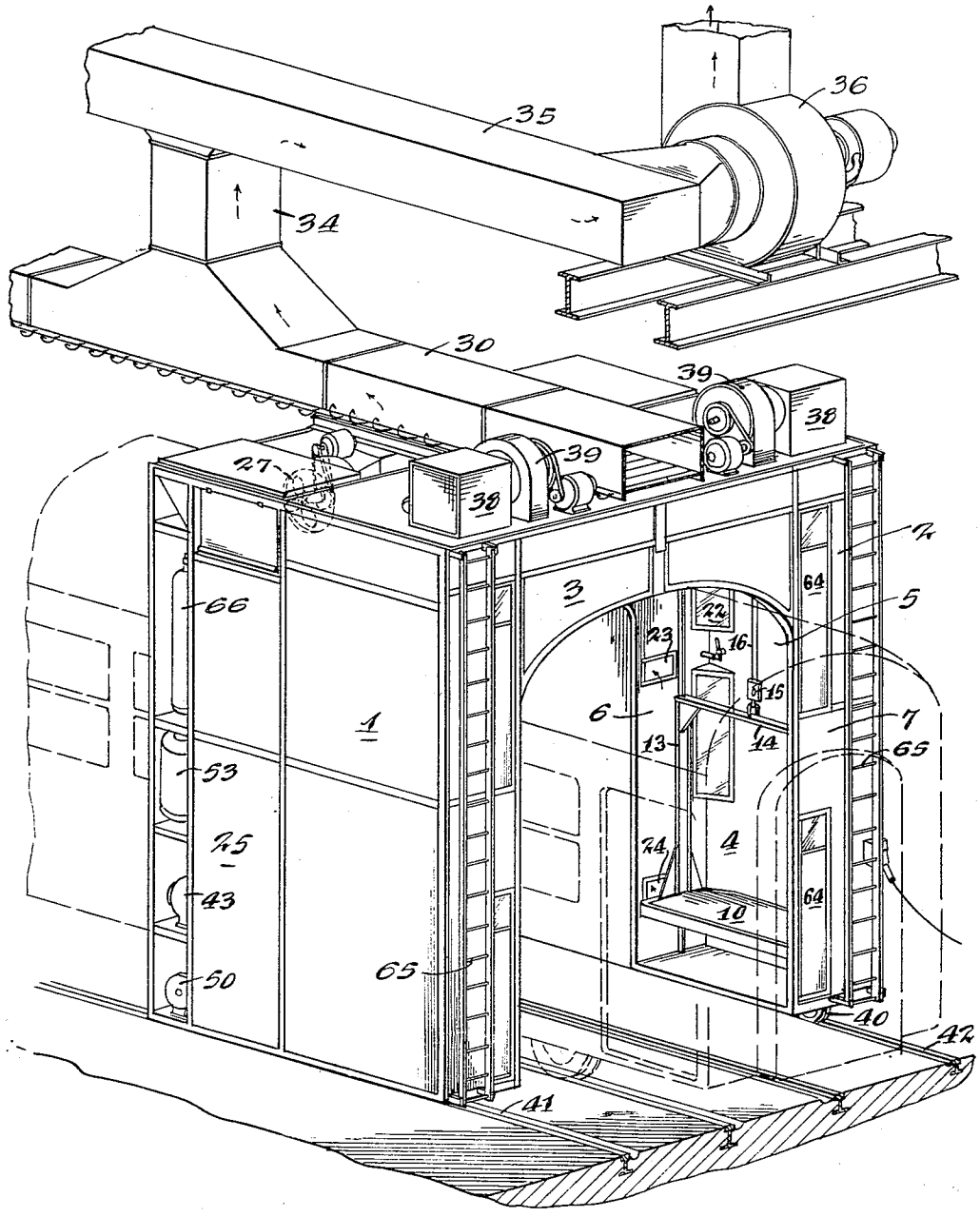

FIG- 1-

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TRAVELING SPRAY BOOTH

Filed April 19, 1951 5 Sheets-Sheet 2

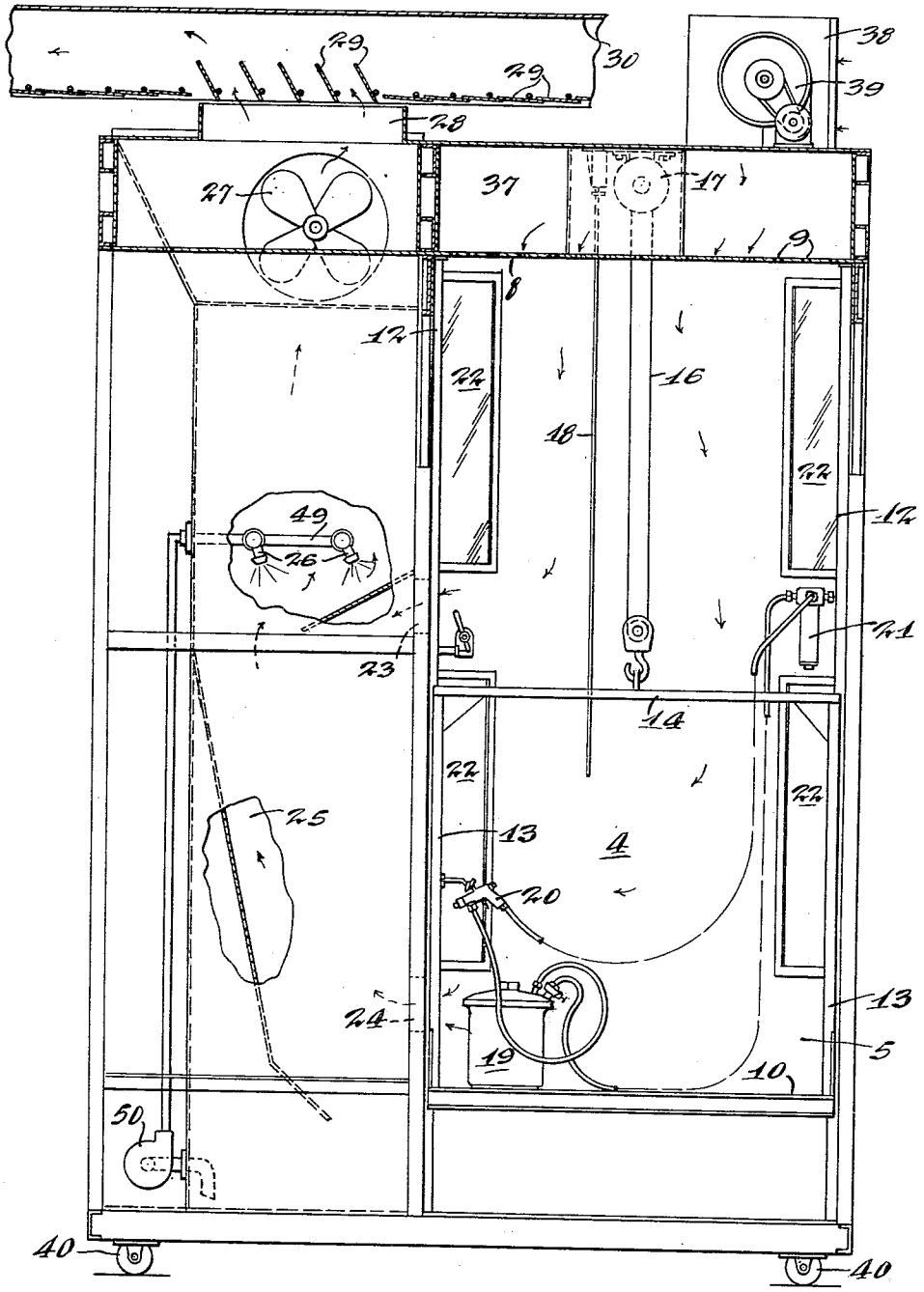

FIG-2-

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TRAVELING SPRAY BOOTH

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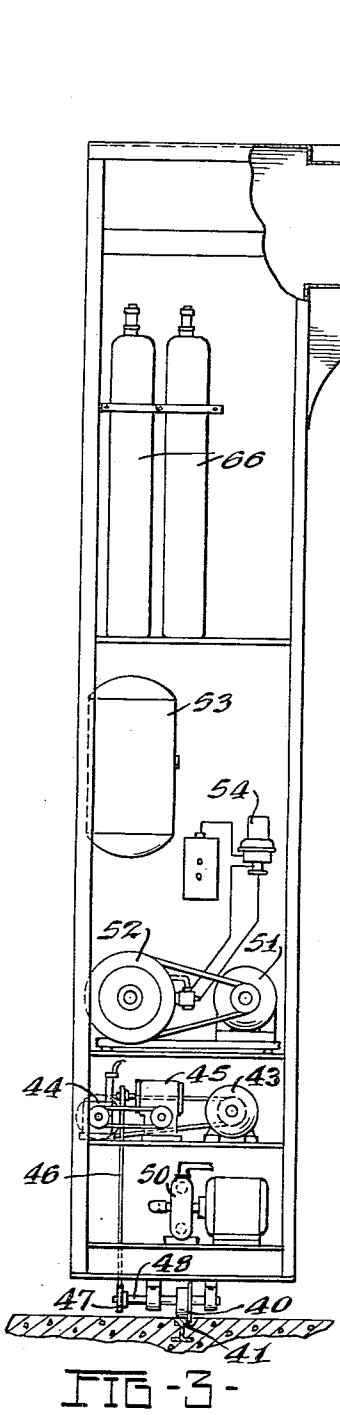

FIG-3-

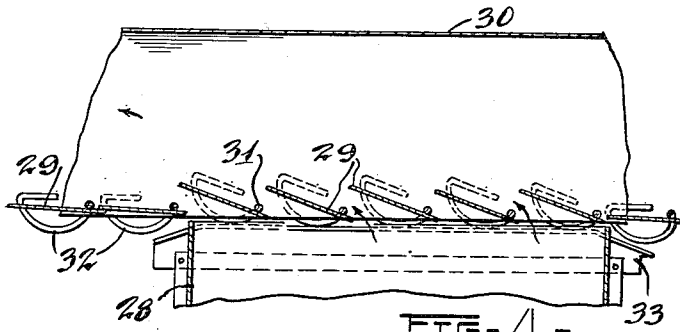

FIG-4-

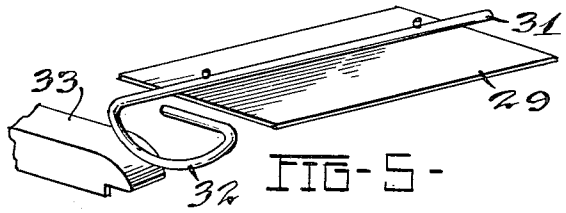

FIG-5-

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TRAVELING SPRAY BOOTH

Filed April 19, 1951 5 Sheets-Sheet 4

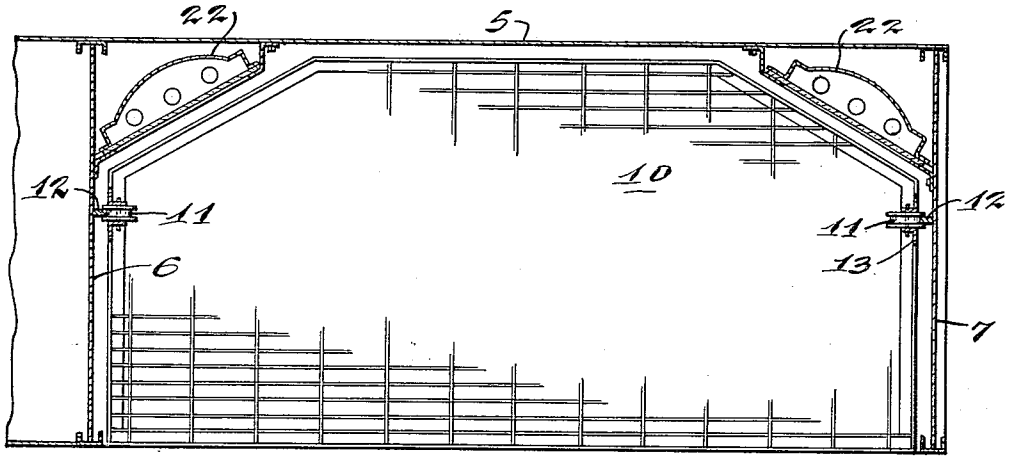

FIG-6-

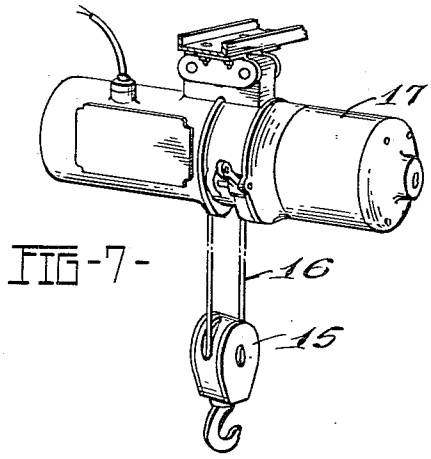

FIG-7-

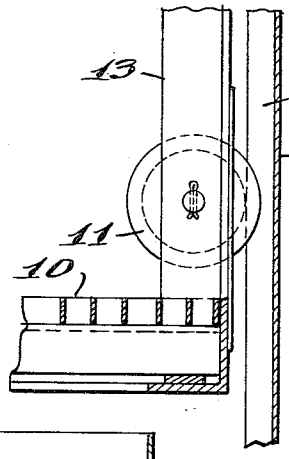

FIG-8-

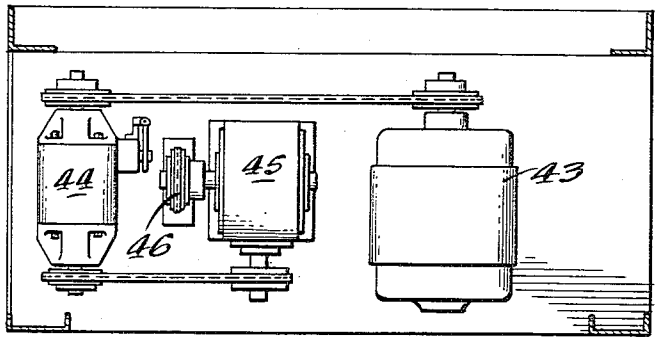

FIG-9-

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Sept. 4, 1956 L. M. OWEN 2,761,373

TRAVELING SPRAY BOOTH

Filed April 19, 1951 5 Sheets-Sheet 5

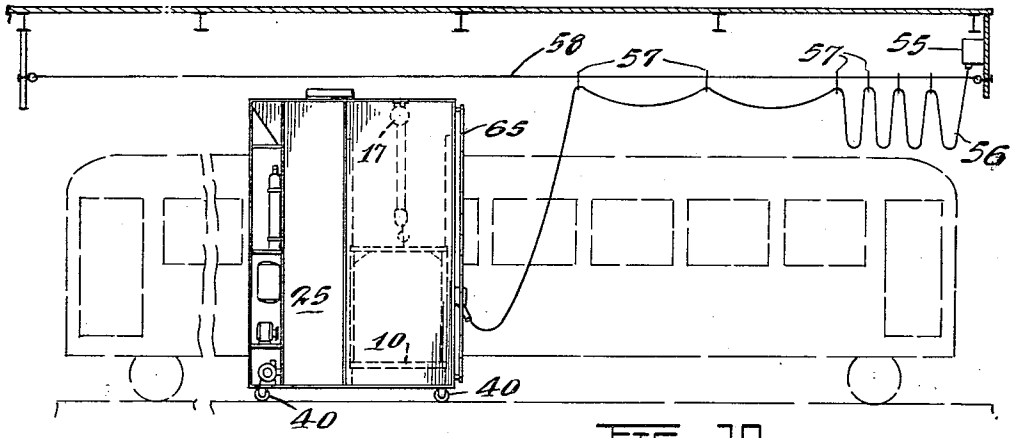

FIG-10-

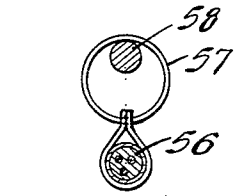

FIG-11-

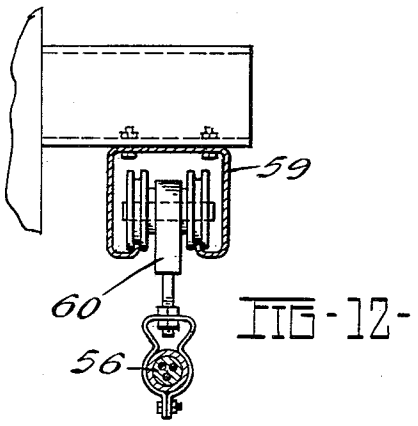

FIG-12-

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United States Patent Office

2,761,373

Patented Sept. 4, 1956

2,761,373

TRAVELING SPRAY BOOTH

Lewis M. Owen, Toledo, Ohio, assignor to The De Vilbiss Company, Toledo, Ohio, a corporation of Ohio

Application April 19, 1951, Serial No. 221,770

10 Claims. (Cl. 98—115)

This invention relates to a self-propelled spray booth designed for traveling upon a track lengthwise of and in crosswise enveloping relation to an elongated object, of a length considerably greater than that of the spray booth, permitting progressive lengthwise spray coating of said object and including air exhaust means for drawing from the relatively limited working zone fumes arising from the spraying operation.

It more specifically relates to such a spray booth having a vertically movable platform for supporting the operator and having elements closely approaching the surface to be coated to form therewith an enclosure housing the platform and operator.

Such a spray booth is adapted particularly for the expeditious coating of both exteriors and interiors of locomotives, railroad cars, busses, house trailers and the like. It is also used very advantageously for the coating of other large elongated objects such as tank trucks, truck trailers, launches, airplane fuselages and wings.

The spray booths of previous designs for such coating operations have been of a stationary type and built to encompass substantially the complete object to be coated. In fact numerous installations have been made to handle two or more of the objects at one time. For example, a leading manufacturer of locomotives over a period of ten years installed spray booths in lengths of 60, 90 and 165 feet. These all had canopies, or sides as well as illumination and exhaust devices for their full lengths. In comparison with these various sizes a spray booth built for locomotives according to this invention may be a standard length of 12 feet of which the actual working space utilizes only 7 feet.

Many older types are more or less open and do not have reliable exhaust due to the effect of cross currents of air that may arise in the surrounding area. In contrast the subject spray booth provides a substantially closed spraying chamber of greatly reduced size in which the exhaust and lighting may be most accurately controlled and directed. This improvement in working conditions encourages higher quality paint application.

A spray booth according to this invention further provides a considerable savings not only in the initial investment but also in operating expenses. Electrical power consumption may be reduced as much as 80 per cent. It also has a marked advantage in that it occupies a minimum portion of the paint shop and thereby leaves more space for other activities. In addition it interferes to a much less degree with the light and ventilation of the surrounding area. Being of small size, there is less housekeeping and fire hazard.

By including an easily controlled raisable platform for the operator time is saved over that ordinarily consumed in erecting and dismantling bulky scaffolding as well as in the ascending and descendnig of the operator. Also, increased production is assured through the preselected rate of travel of the spray booth.

Other objects and advantages of the invention will become apparent upon reading the following description

with reference given the accompanying drawings in which:

Figure 1 is a perspective view of a spray booth embodying my invention; for purposes of illustration the spray booth is shown as adapted to a railroad car;

Figure 2 is a vertical section of the spray booth shown in Figure 1 taken on the longitudinal center with parts broken away to show elements of the air washing compartment;

Figure 3 is a rear elevation showing one side of the spray booth and a fragmentary broken away portion of the upper transverse part;

Figure 4 is an enlarged longitudinal vertical section showing conecting portions of the air outlet from the booth and the stationary duct with which the outlet communicates through tiltable vanes;

Figure 5 is a perspective view of one of the vanes and the tilting element;

Figure 6 is a horizontal section of a spray chamber illustrating the shape of the platform for the operator and the lights for illuminating the surface being spray coated;

Figure 7 is a perspective of the hoist for raising and lowering the operator's platform;

Figure 8 is a fragmentary vertical section disclosing one of the vertical guide rails and a guide roller for the platform;

Figure 9 is a plan view of the motor and transmission for driving the spray booth;

Figure 10 is a somewhat diagrammatic side elevation of the spray booth showing the extendable conduit for carrying electrical current to the spray booth;

Figure 11 is a vertical section of the horizontal bar and one of the sliding rings through which the electrical conduit is supported by the bar;

Figure 12 is a vertical section illustrating an alternate means including rollers for supporting the conduit; and

Figure 13 is an end elevation of a variant form of the spray booth supported from overhead rails.

Referring to the disclosure of Figure 1 the spray booth has vertical casings **1** and **2** and a bridging section **3** joining the casings at their upper ends. The space between the casings and below the bridging section is tunnel shaped to closely envelope a limited longitudinal portion of a railroad car.

Within each vertical casing of the spray booth is a spray chamber **4** having an open front facing the railroad car surface. Each chamber has a rear wall **5** and inner and outer side walls **6** and **7**. The side walls closely approach the surface of the railroad car and extend over the top of the car to join similarly extending portions of the side walls of the oppositely positioned spray chamber. The chambers have a common ceiling panel **8** (Figure 2) stretching across the full width of the spray booth. In the ceiling panel are openings **9** for the entry into the chambers of clean replacement air. This air is delivered to plenum compartments **37**, above the ceiling panel **8**, from the surrounding atmosphere through filters **38** and blowers **39**.

Within each chamber **4** is an operator's platform **10**. This is guided for vertical movement by rollers **11** riding upon wall rails **12**. Details of a pair of the guide rails and rollers may be seen in Figure 8. The platform has side posts **13** joined at their tops by a cross bar **14** over the head of the operator. Secured to the center of the cross bar **14** through a tackle block **15** is a hoist cable **16** extending from a hoist motor **17** (see Figure 7) fixed to the underside of the roof of the spray booth. Through vertical movement of a control rod **18** positioned against the rear wall **5** of the chamber the operator motivates the hoist motor **17** to elevate or lower the platform **10** to the desired working level.

As shown in Figure 2 a pressure feed paint tank **19** for

delivery of paint to the spray gun **20** is carried upon the platform. Compressed air for atomization and for furnishing the pressure within the tank **19** travels through hose from a combination air cleaner and regulator **21** mounted on the rear wall of the spray chamber.

In the rear corners of the chamber are stationary fluorescent light casings **22** positioned to illuminate the surface being spray coated. The platform **10** has truncated rear corners as shown in Figure 6 to clear the light casings as the platform is moved.

On the inner side **6** of each chamber **4** are upper and lower exhaust outlets **23** and **24** through which the spray fumes are drawn into the water wash compartment **25**. As may be seen in Figure 2 the water wash compartment **25** has nozzles **26** in its upper portion which discharge water downwardly against the upwardly traveling air. The water reaches the nozzles from header **49** to which it is circulated from the bottom of the compartment **25** by pump **50**. From the upper portion of compartment **25** the air travels horizontally through exhaust fan **27** into the centrally located vertical outlet **28**. This outlet communicates through tiltable vanes **29** with the stationary horizontal air duct **30**. This path for the air is shown in Figures 1, 2 and 3.

As illustrated in Figures 4 and 5 each vane **29** is pivotably mounted along one longitudinal edge, on a rod **31**. The rods extend across the downwardly facing side of stationary duct **30**. At one end each rod is bent downwardly in an offset loop **32** to provide a surface for raising contact by a cam runway **33** which by thrusting the looped rod end **32** upwardly tilts each vane **29** on the axis of the rod. The cam runway **33** is fixed to the top of the spray booth along the outlet **28** and tilts the vanes successively and holds them temporarily in open position above the outlet **28** as the spray booth is moved.

The air forced into the stationary duct **30** by the exhaust fans **27** travels upwardly therefrom through stack **34** and connecting duct **35** into blower (or fan) **36** which expels the air exteriorly of the building housing the paint shop. More efficient and uniform exhaust of air from the spray chambers **4** is secured through the booster arrangement including the fans **27** in the traveling spray booth and the blower **36** in the overhead stationary ducts.

The preferred embodiment of Figure 1 is mounted on wheels **40** which ride on track rails **41** and **42** positioned along opposite sides of the railroad car being painted. The power means for propelling the spray booth along the track rails is best seen in Figures 3 and 9. It includes an electric motor **43**, a hydraulic variable speed transmission **44** and a speed reducing gear box **45**. The latter has a chain driving connection **46** with one of the wheels **40** through a sprocket **47** on the end of the wheel axle **48**. Control means between the transmission **44** and the spray chamber **4** permits the operator to adjust the speed of travel, reverse the direction of travel or stop the movement of the spray booth without leaving his spray station. This comprises a push-pull device including an operating wire within a flexible casing fastened to a hydraulic valve on the transmission.

Above the location of the propelling motor is supported an air compressing unit for furnishing air to the spray equipment. The components are shown somewhat diagrammatically as including an electric motor **51**, compressor **52**, air tank **53** and pressure responsive control mechanism **54**.

The arrangements for furnishing electrical power for operating the motors carried by the traveling spray booth are disclosed in Figures 10, 11 and 12. From a switch box **55** extends the electrical conduit **56** which between loops is secured by clamps to rings **57**. These are slidably hung on the rod **58** held rigid by tighteners at its ends. As the spray booth travels away from the location of the switch box the rings **57** are pulled along the rod **58** and the loops between the rings are drawn to a more taut horizontal position. When the spray booth moves in the opposite direction the rings are forced back into closer formation.

In Figure 12 the rod of Figures 10 and 11 is replaced by an inverted channel **59**, the legs of which are turned inwardly and upwardly to form a track for wheeled carriages **60**. The latter serve in the manner of the rings **57** as spaced movable supports for the electrical conduit **56**.

Another form of a traveling spray booth is presented in Figure 13. In this embodiment the spray booth is suspended from rollers **61** riding on ceiling I beams **62** in place of being supported upon floor rails. This booth has two driving mechanisms **63**.

Accessories shown in Figures 1 and 3 not previously referred to are the emergency doors **64** and escape ladders **65**, the latter also being useful for servicing the blowers and other equipment above the spray booth. For fire protection, automatic extinguishers are provided with tanks **66** located on the back end of the spray booth.

In the operation of this spray booth, the railroad car surface to be coated is completely prepared by whatever is needed in the way of washing, scraping, sanding, masking, etc. The spray booth is then stationed at one end of the car. The pressure feed paint tank is filled and placed on the platform where it is connected to the air supply and the spray gun. The air compressing unit, the water pump, exhaust fans and air replacement air blowers are put in operation. The spray operators raise their platforms to their top limits so that the surface of the roof may be within spraying reach.

When the operators are ready to start, the movement of the spray booth lengthwise of the car is begun. The speed of travel is adjusted to that permitting each operator to completely coat his section of the roof as the spray booth proceeds. The replacement air discharged downwardly from the ceilings of the spray chambers forces the spray fumes downwardly toward the exhaust outlets and thus prevents the mist of either spray gun from traveling across the roof toward the opposite operator.

After the booth reaches the other end of the railroad car and the roof is finished, the platforms are lowered for spray coating of the upper side surface adjacent the roof during the return trip of the spray booth. The speed of travel may be increased as this spray coating is more easily handled. The next lower section of the side of the car is subsequently coated in the following lengthwise movement of the spray booth.

For the lower edge and the underside of the railroad car the platforms are usually set at their lowermost levels. An alternate arrangement is to position the platform above the lower exhaust outlet in the far side of the spray chamber and to close off the upper outlet. This concentrates the exhaust flow from below the platform. In this case, the operator stands below the platform. Air is drawn from beneath the car past the operator to the exhaust outlet.

While the coating is drying the spray booth may be driven along the track for work on another car or may be stationed adjacent open windows of the car or at an end for providing an exhaust for car interior painting operations.

After the first exterior coating has dried any successive coats desired may be applied following the same procedure as that utilized for the primary coat.

It is believed that the many advantages of a spray booth constructed in accordance with the present invention will be readily understood, and although preferred embodiments are illustrated and described, it is to be understood that modifications may be made therein without departing from the essence of the invention as set forth in the following claims.

I claim:

1. In a traveling spray booth designed to free the spray gun operator from the necessity of taking any verti-

cal or longitudinal steps in spray coating successive sections of the exterior surface of a railroad car or the like, an inverted U shaped casing crosswise enveloping a limited longitudinal portion of the car, said casing comprising a spray chamber having a bridging section across the top of the car and a vertical section on each side of the car joined to the bridging section with full communication therebetween and extending from a level well above the roof of the car down the full extent of the side of the car to close to the floor of the building housing the spray booth, the bridging section having roof and side panels and being open toward the top of the car, the vertical sections having roof and side panels coplanar with the roof and side panels of the bridging section, said vertical sections having back panels and being open toward the sides of the car, a raisable platform within each vertical section for supporting a spray gun operator, the spray chamber being sufficiently extensive and providing sufficient space adjacent the car to permit an operator within the chamber to reach from a platform the side and top surfaces of the full crosswise contour of the car, a manually controlled hoist for raising and lowering each platform, means admitting air to the spray chamber, an air exhaust duct communicating with the spray chamber, a motor driven fan in the duct drawing air from the chamber, a track with spaced parallel sections running longitudinally of the car, wheels supporting the casing upon the track, and a manually controlled electric drive associated with the spray booth, for moving the spray booth longitudiually of the car at a predetermined uninterrupted rate of travel.

2. In a traveling spray booth designed to free the spray gun operator from the necessity of taking any vertical or longitudinal steps in spray coating successive sections of the exterior surface of a railroad car or the like, an inverted U shaped casing crosswise enveloping a limited longitudinal portion of the car, a track with spaced parallel sections running longitudinally of the car, wheels supporting the casing upon the track, said casing comprising a spray chamber extending across the top of the car and down the full extent of each side thereof, said spray chamber defined by a roof panel spaced above the top of the car with its ends projecting beyond the sides of the car, vertical back panels depending from the ends of the roof panel in spaced parallel relation to the sides of the car and side walls extending perpendicularly toward the car surfaces from the edges of the roof and back panels; a variable level platform within the spray chamber on each side of the car for supporting a spray gun operator, the spray chamber being sufficiently extensive and providing sufficient space adjacent the car to permit an operator within the chamber to reach from a platform the side and top surfaces of the full crosswise contour of the car, means admitting air to the spray chamber, and air exhaust duct in the casing communicating with the spray chamber, a motor driven fan drawing air through the duct from the complete area of the chamber, a stationary horizontal exhaust conduit running lengthwise of the track above the casing, an exhaust stack on the casing forming the outlet of the casing exhaust duct and reaching up to the lower side of the conduit, normally closed closure means on the lower side of the conduit, said closure means being temporarily openable in any section independently of other sections, and means associated with the exhaust stack opening said closure means only in the section at the time immediately above the exhaust stack whereby there is communication between the exhaust stack and the conduit at any location of the spray booth along the track.

3. A traveling spray booth as set forth in claim 2 in which there is an electric motor actuated mechanism mounted on the casing, a driving transmission between the mechanism and one of the wheels supporting the casing upon the track, and a manual control within reach of an operator and connected to the mechanism for thereby securing movement of the casing upon the track.

4. A traveling spray booth as set forth in claim 2 in which there is a hoist mounted in the casing above each platform, a cable from the hoist fastened to the platform, a vertical guide for the platform, and manually operated means for motivating the hoist for vertical movement of the platform.

5. A traveling spray booth as set forth in claim 2 in which the platform has apertures therethrough, and in which there are air exhaust outlets communicating with the spray chamber from both below and above the platform when the latter is in raised position whereby spray fumes are partially drawn downwardly through the platform.

6. A traveling spray booth as set forth in claim 2 in which the means admitting air to the chamber includes entry means in the roof panel, and the air exhaust duct communicates with the lower portion of the chamber.

7. A traveling spray booth as set forth in claim 2 in which there are electric light producing means in the corners adjacent the back panels, and the back corners of the platforms are truncated to permit vertical movement of the platforms past said means.

8. A traveling spray booth as set forth in claim 2 in which there is an air water wash compartment in the air exhaust duct spaced longitudinally of the car from the spraying chamber and the intervening side wall of the spraying chamber is ported for the passage of air therefrom into the water wash compartment.

9. A traveling spray booth as set forth in claim 2 in which the motor driven fan is in the air exhaust duct and there is an additional fan stationarily associated with the horizontal exhaust conduit increasing the air flow therethrough.

10. In a traveling spray booth designed to free the spray gun operator from the necessity of taking any vertical or longitudinal steps in spray coating successive sections of the exterior surface of a railroad car or the like, an inverted U shaped casing crosswise enveloping a limited longitudinal portion of the car, a track with spaced parallel sections running longitudinally of the car, wheels supporting the casing upon the track, said casing comprising a spray chamber extending across the top of the car and down the full extent of each side thereof, said spray chamber defined by a roof panel spaced above the top of the car with its ends projecting beyond the sides of the car, vertical back panels depending from the ends of the roof panel in spaced parallel relation to the sides of the car and side walls extending perpendicularly toward the car surfaces from the edges of the roof and back panels; a variable level platform within the spray chamber on each side of the car for supporting a spray gun operator, the spray chamber being sufficiently extensive and providing sufficient space adjacent the car to permit an operator within the chamber to reach from a platform the side and top surfaces of the full crosswise contour of the car, means admitting air to the spray chamber, an air exhaust duct in the casing communicating with the spray chamber, a motor driven fan drawing air through the duct from the complete area of the chamber, a stationary, horizontal exhaust conduit running lengthwise of the track above the casing, an exhaust stack on the casing forming the outlet of the casing exhaust duct and reaching up close to the lower side of the conduit, a continuous series of vanes extending crosswise of and forming the lower side of the conduit, said vanes individually and tiltably mounted along one longitudinal edge, the opposite edge of each vane slightly overlapping and normally resting upon the first mentioned longitudinal edge of an adjacent vane, an arm depending from an end of each vane, and a raised cam surface on the casing along the side of the exhaust stack engaging the arms and there-through tilting the vanes immediately above the stack upwardly into open position whereby

there is a constant communicating connection between the stack and the conduit.

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