Oct. 24, 1950 W. W. LONEY 2,527,139

SPRAY BOOTH

Filed Sept. 4, 1948

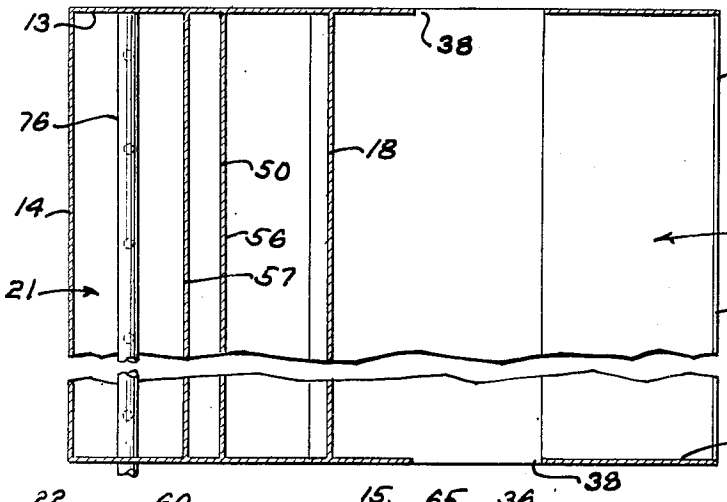


FIG. 2

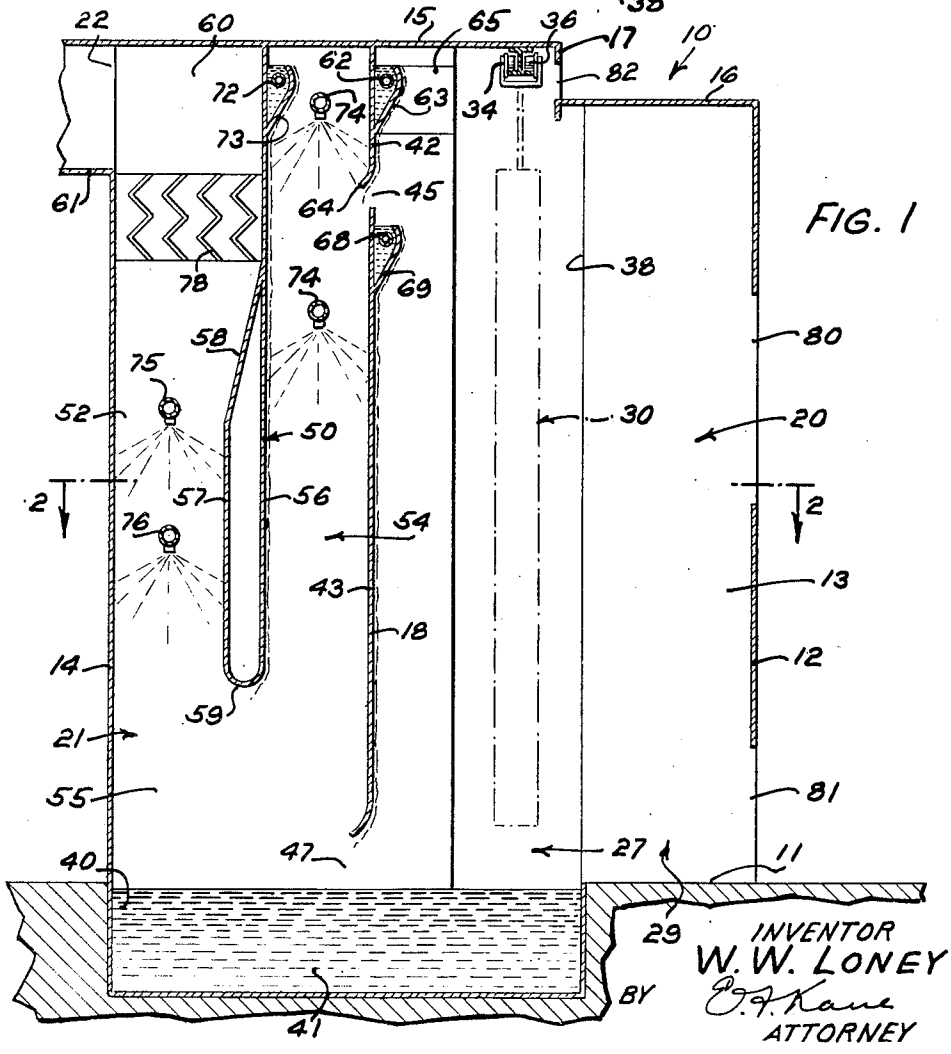


FIG. 1

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Patented Oct. 24, 1950

2,527,139

UNITED STATES PATENT OFFICE

2,527,139

SPRAY BOOTH

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Application September 4, 1948, Serial No. 47,763

2 Claims. (Cl. 91—60)

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This invention relates to spray booths and more particularly to a water type spray booth with multi-exhaust ports.

An object of the present invention is to provide a spray booth for effectively removing the overspray from the spraying compartment and for intercepting and collecting said overspray.

In one embodiment of the invention, the spray booth is divided into a spray compartment and an exhaust compartment having a common wall therebetween and a pool of water underneath the exhaust compartment and a portion of the spray compartment. The necessary walls of the compartments are water-washed and the atmosphere carrying the overspray from the spray compartment is exhausted from the upper and lower levels thereof through upper and lower exhaust ports, respectively, in the common wall into a precipitation chamber formed in the lower end of the exhaust compartment above the pool of water, where the velocity of the atmosphere passing through the ports and ladened with water and paint is reduced to allow the precipitation of the paint and water particles into the pool before the atmosphere is exhausted through a water-sprayed exhaust conduit communicating therewith.

Other objects and advantages will be apparent by reference to the following description and the accompanying drawings illustrating a preferred embodiment of the invention wherein

Fig. 1 is a vertical longitudinal sectional view through the spray booth and

Fig. 2 is a plan sectional view of the booth taken on the line 2—2 of Fig. 1.

As shown in Fig. 1, the spray both 10 is constructed on a suitable foundation or floor 11 and comprises a front wall 12, side walls 13—13, a rear wall 14, and a roof or ceiling 15, which is offset at 16 to provide a transverse or downwardly directed portion 17. An inner vertical wall 18, disposed between the front and rear walls of the booth, divides the booth into a spray compartment 20 having suitable air inlets, and an exhaust compartment 21, having an exhaust outlet 22 through which the atmosphere in the booth is exhausted.

The spray compartment encloses a spray station 27 adjacent to and in front of the wall 18 and an operator's station 29 between the spray station and the front wall of the booth. A work piece or article 30, which is to be sprayed, may be supported in any suitable manner in the spray station while being sprayed and, as illustrated herein, is supported by an overhead carrier or conveyor 34 mounted on a monorail 36. The carrier 34 and the article 30 are movable into and out of the spray compartment through openings 38—38 in the side walls of the booth.

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A water receptacle 40 is filled with water to form a pool of water 41 under the spray station 27 and the exhaust compartment 21 to collect the particles of overspray. The receptacle 40, in the form of an open tank, may be supported on the floor 11 of the booth, but preferably is recessed in the floor or foundation, as indicated in Fig. 1. The inner wall 18 is formed from a pair of sheets 42 and 43, the former engaging and extending downwardly from the roof 15 and terminating in spaced relation to the lower sheet 43 to provide an upper exhaust port 45 located adjacent the roof, and the lower edge of the sheet 43 is spaced above the floor and water level of the pool 41 to provide a lower exhaust port 47.

A vertical partition 50 extends downwardly from the roof 15 in the upper portion of the exhaust compartment 21 between and in spaced relation to the rear and inner walls 14 and 18, respectively, with its lower end spaced a substantial distance from the floor or water level of the pool 41 and divides the upper portion of the exhaust compartment into a pair of vertically extending exhaust conduits or ducts 52 and 54. The conduit 54, at its upper end, communicates with the upper exhaust port 45 in the wall 18 and directs the atmosphere and spray passing therethrough downwardly toward the pool 41. The upper end of the conduit 52 forms an exhaust hood 60, in which may be located an exhaust fan for exhausting the atmosphere from the booth, but preferably is connected through a duct 61 and the outlet 22 to means for exhausting the atmosphere from the booth. The partition 50, which is of increased width at its lower portion, is made from a straight sheet 56 and a sheet 57 spaced from and parallel to the sheet 56 and having an inclined upper portion 58 and a lower rounding portion 59 connected to the sheet 56.

The exhaust compartment below the level of the lower end of the partition 50, and above the pool of water, forms a relatively large chamber 55, designated as a precipitation chamber, which communicates with the lower exhaust port 47 and with the upper exhaust port 45 through the conduit 54. The size of the chamber 55, as determined by the vertical distance from the end 59 of the partition 50 to the water level of the pool or the horizontal distance from the rear to the middle walls is considerably larger than the combined vertical widths of the exhaust ports 45 and

47. The velocity of the atmosphere passing through the ports 45 and 47 is reduced as it enters the chamber 55 and most of the spray particles carried by the atmosphere are caused to separate from the air and settle into the pool 41 before the atmosphere is drawn from the chamber upwardly through the exhaust conduit 52.

Water from a supply pipe 62 overflows the trough 63 formed on the forward surface of the sheet 42 of the inner wall 16. The water washes the inner wall of the sheet 42 and is directed by the inturned lower edge 64 thereof across and through the port 45 onto the rear surface of the sheet 43 of the wall 16 and is collected in the pool 40. Troughs 65—65, forming continuations of the trough 63, are mounted on the end walls 13—13 between the openings 38—38 therein and the wall 18 and supply water which flows down and washes the side walls 13—13 therebelow. Water from a supply pipe 68 overflows a trough 69 mounted on the upper portion of the sheet 43 and washes the inner surface thereof as it flows downwardly on the sheet and across the port 47 into the pool 40. Thus, each of the exhaust ports 45 and 47 is supplied with a curtain of water to intercept some of the spray particles passing therethrough. The forward surface of the sheet 56 of the partition 50 is likewise washed with water supplied from a pipe 72 and overflowing a trough 73 mounted on the upper portion of the sheet 56. A pair of pipes 74—74 is provided having spray nozzles for spraying water across the conduit 54 and on the walls thereof. A plurality of spray nozzles 75 and 76 are also provided in the lower portion of the exhaust conduit 52 to spray water across the cross-sectional area of the conduit and to wash the air passing upwardly therethrough. Thus, the water spray from the spray members 74, 75 and 76 not only serves to entrap the paint particles passing through conduits 54 and 52, but also to entrap paint particles in the chamber 55 as the water spray passes therethrough into the pool 41. A series of irregularly shaped baffles 78 is positioned in the exhaust conduit 52 above the spray nozzles 75 to form a water separator for separating the water from the air passing therethrough.

Air withdrawn from the spray chamber, in addition to being supplied thereto through the openings 38—38 in side walls, is admitted into the spray chamber through air inlet openings 80 and 81 formed in the front wall 12 and through an air inlet 82 in the wall 17 adjacent the conveyor 34. The air passing through the inlet 81 and the lower exhaust port 47 serves to ventilate the lower portion of the spray booth and air passing through the inlet 80 is drawn across the operator's station, the spray station and through the upper port 45, and serves to ventilate the upper portion of the spray compartment. Air entering through inlet 82 is directed into the exhaust port 45 and acts to intercept spray particles moving upwardly toward the conveyor 34 and thus protects the conveyor from paint spray.

In spraying, an article, as, for example, the elongated article, indicated at 30, is moved into the spray compartment through the openings 38 in the side wall of the booth and positioned in front and approximately in the middle of the wall 18. The operator standing in the operator's station in front of the article, may then operate the spray gun and direct the spray toward the wall 18 onto the article 30, most of the overspray being intercepted by the water wash on the front surface of the wall 18 and carried into the pool 41. The pool 41, being located under the spray

station, will intercept and collect that portion of the overspray directed downwardly into it. The overspray and the atmosphere from the upper and lower levels of the spray compartment will be exhausted therefrom through the upper and lower exhaust ports 45 and 47, respectively, and particles of paint spray will be entrapped by the curtains of water passing thereacross. The atmosphere and the particles of spray carried thereby through the upper port 45 are directed downwardly through the conduit 54 toward the pool 41 and into the precipitating chamber 55, some of the particles, as they pass through the conduit 54, being entrapped by the water flowing on the walls and sprayed therein and carried thereby into the pool 41. The particles of spray in the atmosphere passing through the lower port 47 are directed downwardly toward the pool 41, which serves to intercept some of them. The velocity of the atmosphere passing through the upper and lower exhaust ports is reduced as it enters the relatively large chamber 55 and this reduction in velocity of the atmosphere causes the spray particles therein to precipitate into the water pool 41 before the atmosphere carrying the spray particles is carried upwardly through the conduit 52. As the atmosphere passes upwardly through the conduit 52, the remaining particles of paint contained in the atmosphere are entrapped by the water spray from the spray nozzles 75 and 76 and drop into the pool 41 and the water remaining in the atmosphere at this point is removed therefrom by the separator 78.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A spray booth comprising top, bottom, side and back walls, an intermediate wall extending between said side walls and downwardly from said top wall in spaced relation to the front and back walls and cooperating with the side, front, top and bottom walls to form a spray compartment enclosing a spray station adjacent said intermediate wall and an operator's station adjacent said front wall, said intermediate wall having a lower edge portion in spaced relation to said bottom wall to form a lower exhaust port through which the atmosphere in the lower portion of the spray compartment may be exhausted and having an upper exhaust port in the upper portion thereof in spaced relation to the top wall through which the atmosphere in the upper portion of the spray compartment may be exhausted, said upper port dividing said intermediate wall into an upper wall section and a lower wall section, air inlets in said spray compartment, a partition extending between said side walls and downwardly from said top wall with its lower edge in spaced relation to said bottom wall and at a level substantially higher than the lower edge of said intermediate wall to form a first exhaust duct between said partition and said intermediate wall and a second exhaust duct between said partition and said back wall, means including an upwardly open water trough positioned on the upper wall section adjacent the top wall in said spray compartment for supplying a curtain of water over said trough and the face of said upper wall section, said upper wall section having its lower edge portion curved into said first exhaust duct to di-

rect the water flowing on said upper wall section into said duct, means including an upwardly open trough on the lower wall section adjacent the upper exhaust port and in said spray compartment for supplying a curtain of water over said trough and on the face of said lower wall section, an open receptacle for holding a pool of water beneath said spray station, said intermediate wall and said first and second exhaust ducts, spray means in said first exhaust duct for washing the walls thereof and the air passing therethrough, spray means in said second exhaust duct for washing the walls thereof and the air passing therethrough, and baffle means in the upper portion of said second exhaust duct for separating the air and water, said second exhaust duct having an outlet in the upper end thereof connectible to an exhaust fan.

2. A spray booth comprising top, bottom, side and back walls and a spray intercepting wall extending between said side walls and downwardly from said top wall in spaced relation to the front and back walls and cooperating with the side, front, top and bottom walls to form a spray compartment enclosing a spray station adjacent said spray intercepting wall and an operator's station adjacent said front wall, an open receptacle on said bottom wall extending under said spray station and rearwardly therefrom to said rear wall for holding a pool of water, said spray intercepting wall having a lower edge portion in spaced relation to said bottom wall and said pool of water to form a lower exhaust port through which the air in the lower portion of the spray compartment may be exhausted and having an upper exhaust port in the upper portion thereof in spaced relation to the top wall through which the air in the upper portion in the spray compartment may be exhausted, said upper port dividing said spray intercepting wall into an upper wall section and a lower wall section, air inlets in said spray compartment including an upper air inlet in one of the walls of said spray compartment extending between said side walls and positioned at a level above the upper exhaust port and in spaced relation to said spray intercepting wall to cause a current of air to be drawn therethrough into

the upper exhaust port to intercept the paint overspray directed upwardly toward the top wall, a partition extending between said side walls and downwardly from said top wall with its lower edge in spaced relation to the bottom wall and to said pool of water and at a level substantially higher than the lower edge of said spray intercepting wall to form a first exhaust duct between said partition and said spray intercepting wall and a second duct between said partition and said back wall, means including an upwardly open water trough on the upper wall section adjacent the top wall in said spray compartment for supplying a curtain of water over said trough and the face of said upper wall section, said upper wall section having its lower edged portion curved into said first exhaust duct to direct the water flow on said upper wall section into said duct, means including an upwardly open water trough on said lower wall section adjacent said upper exhaust port and in said spray compartment for supplying a curtain of water over said trough and the face of said lower section, water spray means in said first exhaust duct for washing the walls thereof and the air passing therethrough, water spray means in said second duct for washing the walls thereof and the air passing therethrough, and baffle means in the upper portion of said second exhaust duct for separating the air and water passing therethrough, said second exhaust duct having an outlet in the upper portion thereof connectible to an exhaust fan.

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