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(54) **PAINT BOOTH EQUIPPED WITH PURIFICATION DEVICE**

MIT EINER REINIGUNGSVORRICHTUNG AUSGESTATTETE LACKIERKABINE

CABINE DE PEINTURE ÉQUIPÉE DE DISPOSITIF DE PURIFICATION

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Description

Technical Field

[0001] This invention relates to a paint booth with a purifier for removing paint mist contained in air in a spray chamber.

Background Art

[0002] A paint booth is used for painting operation by means of a paint sprayer such as a spray nozzle in a spray chamber. The paint booth is used to prevent a working environment in the spray chamber from getting worse or prevent paint mist from being discharged to the outside.

[0003] A paint booth of the Venturi booth type is disclosed in, for example, Jpn. Pat. Appln. KOKAI Publication No. 2002-273292 (Patent Document 1). In the paint booth of the Venturi booth type, air containing paint mist is drawn into an eddy chamber by an exhaust fan. The paint mist is separated from airflow by means of centrifugal force of the air produced in the eddy chamber, and the paint mist is collected as it impinges on a water film. The water containing the collected paint mist is returned from a submerged duct to a water tank and reused. The moist air discharged from the eddy chamber is discharged through an exhaust port after it is dehydrated by an eliminator.

[0004] On the other hand, a paint booth of the water booth type is disclosed in Japanese Patent No. 3704084 (Patent Document 2). In the paint booth of this type, a water curtain is formed by pouring water drawn up by a pump in the form of a film along a water flow plate. The paint mist is washed away when it contacts the water curtain. Further, shower water is sprayed from shower nozzles arranged on the back side of the water flow plate. By this shower water, the paint mist having failed to be collected by the water curtain is dropped into water.

Prior Art Document

Patent Document

[0005]

Patent Document 1: Jpn. Pat. Appln. KOKAI Publication No. 2002-273292

Patent Document 2: Japanese Patent No. 3704084

Disclosure of Invention

Problem to be solved by the Invention

[0006] In either of the paint booths disclosed in Patent Document 1 and Patent Document 2, collected paint mist drops together with water into the water tank and condenses. Therefore, paint sludge (paint residue) is pro-

duced in the water tank. This paint sludge collects in the water tank, floating on the water surface or settling in the water tank. Since the conventional paint booths do not comprise a mechanism for purifying water in the water tank, an operator or operators periodically manually remove the paint sludge. However, the periodic cleaning cannot purify contaminated water unless the water is changed. Accordingly, the paint sludge gradually collects in the water tank and solidifies at the bottom of the water tank or near the water surface. Thus, the paint sludge cannot be easily removed and causes contamination of the paint booth.

[0007] In the conventional Venturi booth type (Patent Document 1), moreover, a strong negative pressure must be produced to draw up water into the eddy chamber. A large-capacity exhaust fan is needed to attain this, resulting in problems of loud noise, high energy consumption, etc. In the conventional water booth type (Patent Document 2), in contrast, the paint mist contacts only one surface of the water curtain. Therefore, the surface area of the water curtain that can collect the paint mist is small. Thus, the conventional water booth type has a small capacity to collect the paint mist. To increase the collection capacity, a wider water curtain is required, so that the paint booth is enlarged, and a problem of necessity of a large-capacity pump or the like occurs.

[0008] Accordingly, the object of the present invention is to provide a paint booth with a high-capacity purifier, capable of efficiently collecting paint mist despite its compactness compared with that of a conventional paint booth.

Means for solving the Problem

[0009] A paint booth with a purifier according to the present invention comprises a spray chamber accommodating an object to be painted and a purifier for removing paint mist contained in air in the spray chamber. The purifier comprises a water tank disposed in the spray chamber, a pump which draws up water in the water tank, and a water cord formation mechanism. The water cord formation mechanism comprises a water case for accommodating the water drawn up by the pump. The water case comprises a bottom wall formed with a plurality of nozzles, each of the nozzles comprising an inlet, a tubular portion protruding downward from the bottom wall in such a manner that the inside diameter of the tubular portion is reduced downward from the inlet, and a circular outlet opening at the lower end of the tubular portion. The water which drops in straight lines from the outlets forms a plurality of parallel water cords.

[0010] The purifier comprises a barrier member, splashguard member, exhaust chamber separated from the spray chamber by the barrier member, exhaust mechanism, and sludge removal mechanism. The barrier member comprises a vertically extending wall portion. The splashguard member is located above a water surface of the water tank and opposite and just below the

nozzles and comprises a water receiving surface which declines from an upper end portion in front of the water cords toward a lower end portion near the barrier member. The exhaust mechanism comprises an exhaust fan for discharging the air in the spray chamber to the outside through the exhaust chamber and produces airflow such that the air containing the paint mist in the spray chamber contacts the water cords. The sludge removal mechanism comprises a conveyor disposed in the water tank and discharges paint sludge in the water tank to the outside of the water tank.

[0011] According to one aspect of the present invention, the nozzles of the water cord formation mechanism are formed in, for example, positions corresponding to vertices of equilateral triangles such that distances between the nozzles are equal to one another as viewed from above the water case. However, the nozzles may be arranged in a different way.

[0012] According to another aspect of the present invention, moreover, the paint booth comprises a water shedder which is located above the conveyor positioned below the splashguard member and extends along the conveyor. The water shedder comprises a top portion located below a gap between the barrier member and the splashguard member, a first guide surface which declines from the top portion toward one chain of the conveyor, and a second guide surface which declines from the top portion toward the other chain of the conveyor.

[0013] An example of the conveyor comprises an upper portion movable near the water surface of the water tank and a lower portion movable near a bottom portion of the water tank. Paint sludge near the water surface is conveyed to a sludge discharge portion outside the water tank by means of the upper portion. An example of the conveyor is movable in a first direction and a second direction opposite to the first direction. When the conveyor moves in the first direction, the paint sludge near the water surface is conveyed toward the sludge discharge portion by the upper portion. When the conveyor moves in the second direction, the paint sludge at the bottom portion of the water tank is conveyed toward the sludge discharge portion by the lower portion. In this case, water surface height maintenance means should preferably be provided for locating the water surface of the water tank at the upper portion of the conveyor.

[0014] The sludge removal mechanism comprises, for example, a filter drum, scraping member, and cleaned-fluid tank. The filter drum is disposed for rotation in the water tank and causes the water in the water tank to flow in from the outer peripheral side to the inner peripheral side of the drum, thereby filtering the water in the water tank. The scraping member prevents clogging of the filter drum by contacting the peripheral surfaces of the filter drum. The cleaned-fluid tank introduces the water filtered by the filter drum into the pump.

[0015] In some cases, the paint booth may comprise water curtain forming means. The water curtain forming means causes the water to flow along the barrier mem-

ber, thereby forming a water curtain behind the water cords. Some of the paint mist can be captured by means of the water curtain in a state where the air with the paint mist is contacting with the water curtain.

Effect of the Invention

[0016] According to the present invention, the surface area of the water that can be contacted by the paint mist can be made larger than in a conventional paint booth. Thus, the paint mist can be efficiently collected even if the capacity of the pump is small. Further, the capacity of the exhaust fan can be smaller than in the case of the conventional paint booth of the Venturi booth type or water booth type. This leads to advantages of energy conservation and reduced noise.

[0017] The water cord formation mechanism according to the present invention is configured so that a large number of water cords are formed by water continuously dropping in straight lines individually from a large number of nozzles formed in the bottom wall of the water case. These water cords drop straight along the vertical wall portion of the barrier member toward the splashguard member. Even when an operator in the spray chamber is working near the water cords, therefore, an environment can be maintained such that he/she cannot be easily wetted by water. Thus, there is an advantage that the space in the spray chamber can be used effectively. Since the water dropping from the nozzles is received by the splashguard member, moreover, the water surface in the water tank can be prevented from positively undulating. In this purifier, therefore, the paint sludge can easily float on the water surface, and the paint sludge floating on the water surface can be efficiently carried out by the conveyor.

Brief Description of Drawings

[0018]

FIG. 1 is a sectional view of a paint booth with a purifier according to one embodiment of the present invention;

FIG. 2 is a sectional view of the paint booth taken along line F2-F2 in FIG. 1;

FIG. 3 is a perspective view showing nozzles of a water case used in the paint booth shown in FIG. 1; FIG. 4 is a partial plan view of the water case with the nozzles shown in FIG. 3;

FIG. 5 is a sectional view of the water case with the nozzles taken along line F5-F5 in FIG. 4; and FIG. 6 is a partial plan view of a filter drum used in a sludge removal mechanism of the paint booth shown in FIG. 1.

Best Mode for Carrying Out the Invention

[0019] One embodiment of the present invention will

now be described with reference to FIGS. 1 to 6.

[0020] FIG. 1 is a vertical sectional view of a paint booth 10. FIG. 2 is a sectional view of the paint booth 10 taken in the direction of arrow F2-F2 in FIG. 1. The paint booth 10 comprises a spray chamber 11, in which painting operation is performed, and a purifier 12. The purifier 12 has the function of removing paint mist M (schematically shown in FIG. 1) produced in the spray chamber 11. The spray chamber 11 is isolated from the external environment by a wall member 13, ceiling member, etc., which are substantially sealed.

[0021] When painting operation is performed in the spray chamber 11, a paint sprayer with a spray nozzle 15 and an object 16 to be painted are accommodated in the spray chamber 11. An atomized paint sprayed from the spray nozzle 15 forms the paint mist M. The purifier 12 has the function of removing the paint mist M contained in air in the spray chamber 11. The following is a description of the purifier 12.

[0022] The purifier 12 comprises a water tank 20, pump 21, water cord formation mechanism 22, sludge removal mechanism 26 comprising a conveyor 25, exhaust mechanism 28, etc. The water tank 20 is located in a lower part of the spray chamber 11. The pump 21 draws up water W in the water tank 20. The water cord formation mechanism 22, sludge removal mechanism 26, and exhaust mechanism 28 will be described in detail later.

[0023] The water tank 20 comprises a tank body 30 accommodating the conveyor 25 and cleaned-fluid tank 31 accommodating filtered water. The cleaned-fluid tank 31 is provided with the pump 21. As shown in FIG. 1, the tank body 30 and cleaned-fluid tank 31 communicate with each other through a flow passage 32.

[0024] The water cord formation mechanism 22 comprises a gutter-like water case 40 located above the water tank 20 and a cushion tank 41 located along the water case 40. A water flow suppression member 43 (FIG. 2) formed of a porous plate of, for example, a punching metal is interposed between the water case 40 and cushion tank 41.

[0025] The water W drawn up by the pump 21 is introduced into the cushion tank 41 through a piping system 42a, which comprises a valve 42 (FIG. 2), and a cushion tank inlet portion 41a. The water W introduced into the cushion tank 41 flows into the water case 40 through the water flow suppression member 43. The water case 40 and cushion tank 41 is each formed of a metal plate of stainless steel or the like. As shown in FIG. 2, the water case 40 and cushion tank 41 horizontally extend substantially throughout the entire transverse length of the spray chamber 11.

[0026] FIG. 3 shows a part of the water case 40. The water case 40 comprises a horizontally extending bottom wall 45 and sidewalls 46. The sidewalls 46 extend upward from the side edges of the bottom wall 45. A horizontally extending slit 47 is formed in the sidewall 46. The bottom wall 45 and sidewalls 46 are formed substantially throughout the entire transverse length of the spray

chamber 11. A large number of nozzles 50 are formed at regular intervals in the bottom wall 45 of the water case 40.

[0027] FIG. 4 is a top plan view of the bottom wall 45 of the water case 40 comprising the nozzles 50. The nozzles 50 in the bottom wall 45 of the water case 40 are formed in, for example, positions corresponding to vertices (FIG. 4) of equilateral triangles 51 as viewed from above, such that the distances between them are all equal. Thus, distances S between the nozzles 50 are all equal.

[0028] The nozzles 50 may be arranged in a way different from that in the embodiment shown in FIG. 4. In short, the nozzles 50 should only be arranged at regular intervals. Although the nozzles 50 are arranged in three rows in the embodiment shown in FIG. 4, they may alternatively be arranged in, for example, two rows or three or more rows. In short, the nozzles 50 should only be arranged in one or more rows.

[0029] FIG. 5 shows a vertical cross-section of the nozzles 50. As shown in FIG. 5, each nozzle 50 comprises an inlet 55, tubular portion 56 protruding downward from the bottom wall 45, and outlet 57. The inlet 55 opens in the upper surface of the bottom wall 45 of the water case 40. The tubular portion 56 has its inside diameter D reduced downward from the inlet 55 as it extends downward. The outlet 57 opens at the lower end of the tubular portion 56. The inlet 55 and outlet 57 are circular as viewed from above. The inlet 55 and outlet 57 are formed in such a manner that the outlet 57 forms a concentric circle within the inlet 55 as viewed from above.

[0030] On the vertical cross-section shown in FIG. 5, an inner peripheral surface 56a of the tubular portion 56 is a smoothly continuously curved surface extending in a circular arc from the inlet 55 to the outlet 57. That part in which the inlet 55 connects with the inner peripheral surface 56a of the tubular portion 56 has a smooth round shape such that flowing water does not cause turbulence. The lower end surface of the tubular portion 56 is finished horizontally flat such that it is free from cracks, distortion, etc., and does not cause turbulence. The nozzles 50 thus shaped can be formed by combining burring, which is a kind of plastic working using a die, with finishing.

[0031] As shown in FIG. 5, the water W is introduced onto the bottom wall 45 of the water case 40 with the nozzles 50. The water W flows into the tubular portions 56 through the inlets 55 and further freely drops down through the outlets 57. The water that drops through the respective outlets 57 of the nozzles 50 falls straight downward without causing turbulence. Thus, the water can flow in substantially continuous linear streams, thereby forming cord-like water columns, at least when it is on the way to reach the water tank 20 through the outlets 57. This is the source of the term "water cord (water rope) 60" used herein.

[0032] Since the dropping speed increases as the water goes down, the water cords 60 are gradually tapered downward. The tubular portion 56 of each nozzle 50 has

a curved surface such that the water flowing therein cannot easily cause turbulence. Accordingly, the water can flow in substantially continuous linear streams until just before it reaches the water tank 20. Thus, the water cords 60 dropping through the respective outlets 57 of the nozzles 50 are kept parallel to one another, and the distances between the dropping water cords 60 are equal to one another. Consequently, a group of water columns, comprising a large number of water cords 60, is formed between the water case 40 and water tank 20 without allowing the water cords 60 to join one another.

[0033] A vertically extending barrier member 70 of sheet metal is located in the rear part of the spray chamber 11 (or behind the water cords 60). As shown in FIG. 1, the interior of the paint booth 10 is divided between the spray chamber 11 and an exhaust chamber 71 by the barrier member 70. The barrier member 70 is formed of a metal plate such as stainless steel. The barrier member 70 comprises a wall portion 70a and bent portion 70b. The wall portion 70a vertically extends along the water cords 60. The bent portion 70b is curved from the lower part of the wall portion 70a toward the exhaust chamber 71. As shown in FIG. 2, the barrier member 70 is disposed substantially covering the entire transverse length of the spray chamber 11.

[0034] The water drawn up by the pump 21 is introduced into the water case 40. Some of the water introduced into the water case 40 flows out through the slit 47 toward the barrier member 70. The slit 47 is formed in the sidewall 46 of the water case 40. The water having reached the barrier member 70 flows down along the front surface of the wall portion 70a of the barrier member 70. Thereupon, a water curtain 75 of flowing water is formed behind the water cords 60. The slit 47 and wall portion 70a function as water curtain forming means.

[0035] A splashguard member 80 of sheet metal is located above a water surface W1 of the water tank 20 and opposite and just below the nozzles 50. The splashguard member 80 is also disposed substantially covering the entire transverse length of the spray chamber 11. As shown in FIG. 1, the splashguard member 80 comprises an upper end portion 80a located in front of the water cords 60, lower end portion 80b located near the barrier member 70, and water receiving surface 81. The water receiving surface 81 is inclined at angle θ such that it declines from the upper end portion 80a of the splashguard member 80 toward the lower end portion 80b.

[0036] A slit-like gap 82 is formed between the lower end portion 80b of the splashguard member 80 and the bent portion 70b of the barrier member 70. The gap 82 extends horizontally and is formed substantially throughout the entire transverse length of the spray chamber 11.

[0037] A water shedder 90 is located below the splashguard member 80. The water shedder 90 is disposed above the conveyor 25 such that it extends in the moving direction of the conveyor 25. The water shedder 90 is also formed of a metal plate such as stainless steel and disposed substantially covering the entire transverse

length of the spray chamber 11.

[0038] The water shedder 90 has an upwardly convex shape, and a ridge-like top portion 91 is formed in its highest position. The top portion 91 is located below the gap 82 between the barrier member 70 and splashguard member 80.

[0039] As shown in FIG. 1, the water shedder 90 comprises a first guide surface 92 and second guide surface 93. The first guide surface 92 declines from the top portion 91 toward one chain 25a of the conveyor 25. The second guide surface 93 declines from the top portion 91 toward the other chain 25b of the conveyor 25. Thus, the water that drops onto a region near the top portion 91 of the water shedder 90 through the gap 82 is distributed to the first guide surface 92 and second guide surface 93 and introduced to the vicinity of the chains 25a and 25b of the conveyor 25.

[0040] A gap 95 is formed between the lower end of the bent portion 70b of the barrier member 70 and the water shedder 90. The gap 95, like the aforementioned gap 82, extends continuously and horizontally and is formed substantially throughout the entire transverse length of the spray chamber 11. The spray chamber 11 and exhaust chamber 71 communicate with each other through the gaps 82 and 95.

[0041] The exhaust mechanism 28 comprises the exhaust chamber 71, an exhaust fan 100 located in the upper part of the exhaust chamber 71, eliminators 101 arranged in a plurality of positions in the exhaust chamber 71, etc. The exhaust fan 100 is driven by a motor 102 and discharges air in the spray chamber 11 to the outside through the exhaust chamber 71. This exhaust mechanism 28 has the function of producing an airflow in the spray chamber 11 such that air containing the paint mist in the spray chamber 11 can contact the water cords 60 and water curtain 75.

[0042] The following is a description of the sludge removal mechanism 26 with the conveyor 25.

[0043] The sludge removal mechanism 26 comprises the conveyor 25 accommodated in the water tank 20, a filter drum 110 located below the water surface W1 of the water tank 20, and the like.

[0044] As shown in FIG. 2, a lift portion 115 extending obliquely upward is formed on a side portion of the water tank 20. A sludge discharge portion 116 and motor 117 for driving the conveyor 25 are arranged at the upper part of the lift portion 115. The sludge discharge portion 116 and motor 117 are located higher than the water surface W1 of the water tank 20. A sludge collection box 120 is placed below the sludge discharge portion 116.

[0045] The conveyor 25 comprises the chains 25a and 25b (FIG. 1) as an example of wrapped-around transmission members and a plurality of scrapers 125. The scrapers 125 are mounted at predetermined intervals longitudinally relative to the chains 25a and 25b. The conveyor 25 endlessly travels between an upper sprocket 121 and lower sprocket 122. The conveyor 25 that travels between these sprockets 121 and 122 comprises

an upper portion (forward-path portion) 130 and lower portion (return-path portion) 131. The upper portion 130 moves along the water surface W1 of the water tank 20. The lower portion 131 moves along a bottom portion 20a of the water tank 20.

[0046] The conveyor 25 can be moved in a first direction indicated by arrow F in FIG. 2 and second direction indicated by arrow R, depending on the direction of rotation of the motor 117. The motor 117 is configured so that its direction of rotation is changed for each predetermined time by a control unit (not shown) comprising a timer that functions as switching means. The timing (interval) of the timer for changing the direction is set so that the time for the movement in the first direction F is longer than that for the movement in the second direction R. If necessary, moreover, the motor 117 can change the moving direction by means of a manually operable switch.

[0047] As shown in FIG. 2, a first guide plate 135 and second guide plate 136 are arranged in the lift portion 115. The first guide plate 135 extends obliquely upward from the tank body 30 toward the sludge discharge portion 116 along the upper portion 130 of the conveyor 25. The second guide plate 136 extends obliquely upward from the bottom portion 20a of the water tank 20 toward the sludge discharge portion 116.

[0048] The scrapers 125 of the conveyor 25 are individually in contact with the respective upper surfaces of the guide plates 135 and 136. If the conveyor 25 moves in the first direction F, therefore, paint sludge floating near the water surface W1, along with the scraper 125 at the upper portion 130 of the conveyor 25, moves along the first guide plate 135 toward the sludge discharge portion 116.

[0049] When the conveyor 25 moves in the second direction R, paint sludge settled on the bottom portion 20a of the water tank 20 is scraped off by the scraper 125 at the lower portion 131 of the conveyor 25. Accordingly, the paint sludge settled on the bottom portion 20a moves along the second guide plate 136 toward the sludge discharge portion 116.

[0050] As shown in FIG. 1, a water level maintenance plate 140 is disposed between the tank body 30 and cleaned-fluid tank 31. The water level maintenance plate 140 functions as water surface height maintenance means for maintaining the water surface height in the water tank 20. The filtered water W filtered through the filter drum 110 flows into the cleaned-fluid tank 31 by overflowing the water level maintenance plate 140. In this way, the position of the water surface W1 of the water tank 20 can be kept at a height such that it can contact the scraper 125 at the upper portion 130 of the conveyor 25.

[0051] The filter drum 110 disposed in the water tank 20 is formed of a porous plate 150 (part of which is shown in FIG. 6) that functions as a filter element and is formed cylindrical. This filter drum 110 can rotate about a horizontal axis. In the tank body 30, the filter drum 110 is

located between the upper portion 130 and lower portion 131 of the conveyor 25.

[0052] The filter drum 110 is rotated in the direction of arrow A shown in FIG. 2 by a filter rotation mechanism 156 that uses a motor 155 as its drive source. As shown in FIG. 6, the porous plate 150 comprises a large number of passage holes 160 formed at a predetermined pitch. The passage holes 160 are formed by, for example, etching.

[0053] A scraping member 161 (only part of which is shown in FIG. 2) for preventing clogging of the filter drum 110 is in contact with the inner and outer peripheral surfaces of the filter drum 110. Paint sludge scraped off by the scraping member 161 is dropped onto the lower portion 131 of the conveyor 25.

[0054] The following is a description of the function of the paint booth 10 with the purifier 12 constructed in this manner.

[0055] Water drawn up from the water tank 20 by the pump 21 is introduced into the water case 40 through the cushion tank 41 and water flow suppression member 43. A large number of the water cords 60 are formed as the water in the water case 40 flows out downwardly through the respective outlets 57 of the nozzles 50.

[0056] As described before, the water of the water cords 60 hardly diffuses before the water cords having flowed out from the nozzles 50 reach the splashguard member 80. In addition, the dropped water is relatively quietly guided onto the upper surface of the water shedder 90 by the splashguard member 80. Therefore, the water does not splash into the spray chamber 11, so that an operator can avoid being wetted by the water even if he/she is located near the water cords 60. Thus, the space in the spray chamber 11 can be used effectively.

[0057] Some of the water W introduced into the water case 40 flows out toward the barrier member 70 through the slit 47 in the sidewall 46 of the water case 40. As this water W flows out downwardly along the barrier member 70, the water curtain 75, a layer of water, is formed on the front side of the barrier member 70. The water dropped on the splashguard member 80 is guided onto the upper surface of the water shedder 90 through the gap 82.

[0058] When the exhaust fan 100 is powered, air in the spray chamber 11 is drawn into the exhaust chamber 71 through the gaps 82 and 95, etc., and discharged to the outside of the spray chamber 11. As the air flows in this manner, the paint mist M in the air moves toward the water cords 60 and water curtain 75. The paint mist M in the air is involved and collected by the water cords 60. The paint mist M having failed to be collected is washed away by the water curtain 75. The paint mist M thus washed away flows into the water tank 20 via the splashguard member 80 and the guide surfaces 92 and 93 of the water shedder 90.

[0059] In electrodeposition painting, the object 16 to be painted and paint mist M are electrostatically charged with opposite polarities. The paint used is, for example,

a water-based cationic electrodeposition paint. In this case, the paint mist M is charged with positive ions. The water cords 60 formed by the purifier 12 of the present embodiment, like waterfalls or showers, produce a large number of negative ions. Accordingly, the paint mist M charged with positive ions can be easily caused to adhere to the water cords 60, so that the paint mist M can be easily collected. Since a large number of negative ions can be produced in the spray chamber 11, moreover, an increase of positive ions due to a causative agent (paint mist M) of air pollution can be suppressed. By the Lenard effect of the negative ions produced in the spray chamber 11, an environment in the spray chamber 11 can be improved to favorably influence the work efficiency, comfort, etc., of the operator who works in the spray chamber 11.

[0060] Air that is lifted in the exhaust chamber 71 by the exhaust fan 100 moves in zigzag, impinging on the eliminators 101, for example, as indicated by arrow Y in FIG. 1. In the middle of this lift, water in the air, for example, adheres to the eliminators 101 and drops.

[0061] As described above, the paint mist contained in the air in the spray chamber 11 is collected by the water cords 60. The paint mist having failed to be collected is collected by the water curtain 75 behind the water cords 60. The paint mist thus collected drops together with water onto the water receiving surface 81 of the splashguard member 80. The paint mist dropped on the water receiving surface 81 flows into the water tank 20 via the first guide surface 92 and second guide surface 93 of the water shedder 90. The water dropped from the first guide surface 92 and second guide surface 93 is introduced to the vicinity of the chains 25a and 25b of the conveyor 25. Paint sludge adhering to the chains 25a and 25b can be washed away with the water. Thus, the paint sludge can be prevented from undesired adhesion and solidification on the chains 25a and 25b.

[0062] Most of the paint sludge introduced into the water tank 20 floats on the water surface W1 of the water tank 20. The paint sludge near the water surface W1 is conveyed to the sludge discharge portion 116 by the scrapers 125 as the conveyor 25 moves in the first direction F. The paint sludge settled on the bottom portion 20a of the water tank 20 is conveyed from the bottom portion 20a of the water tank 20 to the sludge discharge portion 116 by the scrapers 125 as the conveyor 25 moves in the second direction R. Thus, the paint sludge having reached the sludge discharge portion 116 is dropped into the sludge collection box 120.

[0063] The water in the water tank 20 is filtered by the filter drum 110. The filtered water W flows into the cleaned-fluid tank 31 through the flow passage 32. The water W in the cleaned-fluid tank 31 is drawn up by the pump 21 and introduced again into the water case 40.

[0064] As the filter drum 110 rotates, the paint sludge attracted to the peripheral surface of the filter drum 110 is scraped off by the scraping member 161. The scraped-off sludge is dropped toward the lower portion 131 of the

conveyor 25.

[0065] According to the paint booth 10 with the purifier 12 of the present embodiment, the water continuously dropping in straight lines from a large number of the nozzles 50 of the water case 40 form a large number of the water cords 60. Thus, the surface area of the water can be larger than that of a conventional simple water curtain. The paint mist is collected by the water cords 60, while the paint mist having failed to be collected is collected by the water curtain 75 behind the water cords 60. Accordingly, the surface area of the water that can be contacted by the paint mist can be made much larger than in a conventional paint booth. Thus, the paint mist can be efficiently collected even if the capacity of the pump 21 is small. Further, the capacity of the exhaust fan 100 can be smaller than in the case of a conventional paint booth of the Venturi booth type or water booth type. The small capacity of the exhaust fan 100 leads to advantages of energy conservation and reduced noise.

[0066] Since the water (water cords 60) dropping from the nozzles 50 is received by the water receiving surface 81 of the splashguard member 80, moreover, the water surface W1 in the water tank 20 can be prevented from positively undulating. Thus, the paint sludge can easily float on the water surface W1, and the paint sludge floating on the water surface W1 can be efficiently carried out by the conveyor 25.

[0067] The movement of the conveyor 25 can be switched between the first direction F and second direction R. The paint sludge floating on the water surface W1 can be removed by the upper portion 130 of the conveyor 25 while the conveyor 25 is moving in the first direction F. The paint sludge settled on the bottom portion 20a of the water tank 20 can be removed by the lower portion 131 of the conveyor 25 while the conveyor 25 is moving in the second direction R. Thus, the paint sludge in the water tank 20 can be removed at an early stage, so that solidification of the paint sludge in the water tank 20 can be prevented. Thereupon, clean water purified by the filter drum 110 can be recycled by means of the pump 21.

Industrial Applicability

[0068] This invention is applicable to a paint booth in which paint mist is produced. It is to be understood, in carrying out the present invention, that the constituent elements of the paint booth with the purifier, including the barrier member, splashguard member, pump, exhaust mechanism, sludge removal mechanism, etc., as well as the water cord formation mechanism, may be embodied in various forms without departing from the spirit of the invention. Further, specific forms, such as the shape and layout of the nozzles, are not limited to the embodiment described above.

Explanation of Reference Numbers

[0069]

10: Paint booth
 11: Spray chamber
 12: Purifier
 20: Water tank
 21: Pump
 22: Water cord formation mechanism
 25: Conveyor
 26: Sludge removal mechanism
 28: Exhaust mechanism
 40: Water case
 50: Nozzle
 55: Inlet
 56: Tubular portion
 57: Outlet
 70: Barrier member
 80: Splashguard member
 90: Water shedder
 110: Filter drum

Claims

1. A paint booth (10) which comprises a spray chamber (11) accommodating an object to be painted and a purifier (12) for removing paint mist contained in air in the spray chamber (11), the purifier (12) comprising:
 - a water tank (20) disposed in the spray chamber (11); and
 - a pump (21) which draws up water in the water tank (20);
 - a water cord formation mechanism (22) configured to form water cords (60) comprising a water case (40) for accommodating the water drawn up by the pump (21), the water case (40) comprising a bottom wall (45) formed with a plurality of nozzles (50),
 - a barrier member (70) comprising a vertically extending wall portion (70a);
 - an exhaust chamber (71) separated from the spray chamber (11) by the barrier member (70);
 - an exhaust mechanism (28) comprising an exhaust fan (100) for discharging the air in the spray chamber (11) to the outside through the exhaust chamber (71), the exhaust mechanism (28) being configured to produce airflow such that the air containing the paint mist in the spray chamber (11) contacts the water cords (60);
 - the purifier **characterized in that** each of the nozzles (50) comprising an inlet (55), a tubular portion (56) protruding downward from the bottom wall (45) in such a manner that the inside diameter of the tubular portion (56) is reduced downward from the inlet (55), and a circular outlet opening (57) at the lower end of the tubular portion (56), the water which drops in straight lines from the outlets (57) forming a plu-
2. The paint booth (10) with the spray chamber (11) and the purifier (12) of claim 1, wherein the nozzles (50) of the water cord formation mechanism (22) are arranged so that distances between the nozzles (50) are equal to one another as viewed from above the water case (40).
3. The paint booth (10) with the spray chamber (11) and the purifier (12) of claim 1, comprising a water shedder (90) which is located above the conveyor (25) positioned below the splashguard member (80) and extends along the conveyor (25), the water shedder (90) comprising a top portion (91) located below a gap (82) between the barrier member (70) and the splashguard member (80), a first guide surface (92) which declines from the top portion (91) toward one chain (25a) of the conveyor (25), and a second guide surface (93) which declines from the top portion (91) toward the other chain (25b) of the conveyor (25).
4. The paint booth (10) with the spray chamber (11) and the purifier (12) of claim 1, wherein the conveyor (25) comprises an upper portion (130) movable near the water surface (W1) of the water tank (20) and a lower portion (131) movable near a bottom portion (20a) of the water tank (20) and conveys paint sludge near the water surface (W1) to a sludge discharge portion (116) outside the water tank (20) by means of the upper portion (130).
5. The paint booth (10) with the spray chamber (11) and the purifier (12) of claim 2, wherein the conveyor (25) comprises an upper portion (130) movable near the water surface (W1) of the water tank (20) and a lower portion (131) movable near a bottom portion (20a) of the water tank (20) and conveys paint sludge near the water surface (W1) to a sludge discharge portion (116) outside the water tank (20) by means of the upper portion (130).
6. The paint booth (10) with the spray chamber (11) and the purifier of claim 3, wherein the conveyor (25)

ality of parallel water cords (60);
 and it comprises a splashguard member (80) located above a water surface (W1) of the water tank (20) and opposite and just below the nozzles (50) and comprising a water receiving surface (81) which declines from an upper end portion (80a) in front of the water cords (60) toward a lower end portion (80b) near the barrier member (70);
 and a sludge removal mechanism (26) comprising a conveyor (25) disposed in the water tank (20) and configured to discharge paint sludge in the water tank (20) to the outside of the water tank (20).

comprises an upper portion (130) movable near the water surface (W1) of the water tank (20) and a lower portion (131) movable near a bottom portion (20a) of the water tank (20) and conveys paint sludge near the water surface (W1) to a sludge discharge portion (116) outside the water tank (20) by means of the upper portion (130).

7. The paint booth (10) with the spray chamber (11) and the purifier (12) of claim 4, wherein the conveyor (25) is movable in a first direction (F) and a second direction (R) opposite to the first direction (F) such that the paint sludge near the water surface (W1) is conveyed toward the sludge discharge portion (116) by the upper portion (130) of the conveyor (25) when the conveyor (25) moves in the first direction (F) and that the paint sludge at the bottom portion (20a) of the water tank (20) is conveyed toward the sludge discharge portion (116) by the lower portion (131) of the conveyor (25) when the conveyor (25) moves in the second direction (R).
8. The paint booth (10) with the spray chamber (11) and the purifier (12) of claim 5, wherein the conveyor (25) is movable in a first direction (F) and a second direction (R) opposite to the first direction (F) such that the paint sludge near the water surface (W1) is conveyed toward the sludge discharge portion (116) by the upper portion (130) of the conveyor (25) when the conveyor (25) moves in the first direction (F) and that the paint sludge at the bottom portion (20a) of the water tank (20) is conveyed toward the sludge discharge portion (116) by the lower portion (131) of the conveyor (25) when the conveyor (25) moves in the second direction (R).
9. The paint booth (10) with the spray chamber (11) and the purifier of claim 6, wherein the conveyor (25) is movable in a first direction (F) and a second direction (R) opposite to the first direction (F) such that the paint sludge near the water surface (W1) is conveyed toward the sludge discharge portion (116) by the upper portion (130) of the conveyor (25) when the conveyor (25) moves in the first direction (F) and that the paint sludge at the bottom portion (20a) of the water tank (20) is conveyed toward the sludge discharge portion (116) by the lower portion (131) of the conveyor (25) when the conveyor (25) moves in the second direction (R).
10. The paint booth (10) with the spray chamber (11) and the purifier (12) of anyone of claims 4 to 9, comprising water surface height maintenance means (140) for locating the water surface (W1) of the water tank (20) at the upper portion (130) of the conveyor (25).
11. The paint booth (10) with the spray chamber (11)

and the purifier (12) of claim 1, wherein the sludge removal mechanism (26) comprises a filter drum (110) disposed for rotation in the water tank (20) and configured to cause the water in the water tank (20) to flow in from the outer peripheral side to the inner peripheral side, thereby filtering the water in the water tank (20), a scraping member (161) configured to prevent clogging of the filter drum (110) by contacting the peripheral surfaces of the filter drum (110), and a cleaned-fluid tank (31) which introduces the water filtered by the filter drum (110) into the pump (21).

12. The paint booth (10) with the spray chamber (11) and the purifier (12) of claim 1, comprising water curtain forming means (47, 70a) which causes the water drawn up by the pump (21) to flow down along the front surface of the wall portion (70a) of the barrier member (70), thereby forming a water curtain (75) behind the water cords (60).

Patentansprüche

1. Lackierkabine (10), die eine einen zu lackierenden Gegenstand aufnehmende Sprühkammer (11) und eine Reinigungseinrichtung (12) zum Entfernen von in der Luft in der Sprühkammer (11) enthaltenem Farbnebel aufweist, wobei die Reinigungseinrichtung (12) Folgendes aufweist:
 - einen Wassertank (20), der in der Sprühkammer (11) angeordnet ist; und
 - eine Pumpe (21) die Wasser in den Wassertank (20) hochzieht;
 - einen Wasserschnur-Bildungsmechanismus (22), der dafür vorgesehen ist, Wasserschnüre (60) zu bilden, und einen Wasserbehälter (40) zum Aufnehmen von durch die Pumpe (21) hochgezogenem Wasser aufweist, wobei der Wasserbehälter (40) eine untere Wand (45) aufweist, die mit einer Vielzahl von Düsen (50) ausgebildet ist;
 - ein Trennelement (70), das einen sich in vertikaler Richtung erstreckenden Wandabschnitt (70a) aufweist;
 - eine Auslasskammer (71), die mittels des Trennelements (70) von der Sprühkammer (11) getrennt ist;
 - einen Auslassmechanismus (28), der einen Auslassventilator (100) zum Ausgeben der Luft in die Sprühkammer (11) nach außen durch die Auslasskammer (71) aufweist, wobei der Auslassmechanismus (28) dafür vorgesehen ist, eine derartige Luftströmung zu erzeugen, dass die den Farbnebel aufweisende Luft in der Sprühkammer (11) die Wasserschnüre (60) be-

- rührt;
wobei die Reinigungsvorrichtung **dadurch gekennzeichnet ist, dass**
jede der Düsen (50) einen Einlass (55), einen
sich von der unteren Wand (45) auf eine solche
Art und Weise nach unten erstreckenden rohr-
förmigen Abschnitt (56), dass der innere Durch-
messer des rohrförmigen Abschnitts (56) sich
von dem Einlass (55) verringert, und eine kreis-
förmige Auslassöffnung (57) an dem unteren
Ende des rohrförmigen Abschnitts (56) aufweist,
wobei das Wasser, das in geraden Linien von
den Auslassöffnungen (57) tropft, eine Vielzahl
von parallelen Wasserschnüren (60) bildet;
und es ein Spritzschutzelement (80) aufweist,
das oberhalb einer Wasseroberfläche (W1) des
Wassertanks (20) und gegenüberliegend und
direkt unterhalb der Düsen (50) angeordnet ist
und eine Wasseraufnahmefläche (81) aufweist,
welche sich von einem oberen Endabschnitt
(80a) vor den Wasserleitungen (60) zu einem
unteren Endabschnitt (80b) in der Nähe des
Trennelements (70) neigt;
und einen Schlammfernungsmechanismus
(26), der eine in dem Wasserbehälter (20) an-
geordnete Fördereinrichtung (25) aufweist, die
dafür vorgesehen ist, Farbschlamm in dem
Wasserbehälter (20) nach außerhalb des Was-
serbehälters (20) abzuführen.
2. Lackierkabine (10) mit der Sprühkammer (11) und
der Reinigungseinrichtung (12) nach Anspruch 1,
wobei die Düsen (50) des Wasserleitungs-Bildungs-
mechanismus (22) so angeordnet sind, dass Ab-
stände zwischen den Düsen (50) von oberhalb des
Wasserbehälters (40) betrachtet gleich zueinander
sind.
 3. Lackierkabine (10) mit der Sprühkammer (11) und
der Reinigungseinrichtung (12) nach Anspruch 1,
welche eine Wasserabschirmung (90) aufweist, die
oberhalb der unterhalb dem Spritzschutzelement
(80) positionierten Fördereinrichtung (25) angeord-
net ist und sich entlang der Fördereinrichtung (25)
erstreckt, wobei die Wasserabschirmung (90) einen
oberen Abschnitt (91), der unterhalb eines Spalts
(82) zwischen dem Trennelement (70) und dem
Spritzschutzelement (80) angeordnet ist, eine erste
Führungsfläche (92), die sich von dem oberen Ab-
schnitt (91) in Richtung einer Kette (25a) der Förder-
einrichtung (25) neigt, und eine zweite Führungsflä-
che (93) aufweist, die sich von dem oberen Abschnitt
(91) in Richtung der anderen Kette (25b) der Förder-
einrichtung (25) neigt.
 4. Lackierkabine (10) mit der Sprühkammer (11) und
der Reinigungseinrichtung (12) nach Anspruch 1,
wobei die Fördereinrichtung (25) einen oberen Ab-

- schnitt (130), der in der Nähe der Wasseroberfläche
(W1) des Wasserbehälters (20) beweglich ist, und
einen unteren Abschnitt (131) aufweist, der in die
Nähe eines unteren Abschnitts (20a) des Wasser-
behälters (20) beweglich ist und mittels des oberen
Abschnitts (130) Lackschlamm in die Nähe der Was-
seroberfläche (W1) zu einem Schlammabführab-
schnitt (116) außerhalb des Wassertanks (20) för-
dert.
5. Lackierkabine (10) mit der Sprühkammer (11) und
der Reinigungseinrichtung (12) nach Anspruch 2,
wobei die Fördereinrichtung (25) einen oberen Ab-
schnitt (130), der in der Nähe der Wasseroberfläche
(W1) des Wasserbehälters (20) beweglich ist, und
einen unteren Abschnitt (131) aufweist, der in die
Nähe eines unteren Abschnitts (20a) des Wasser-
behälters (20) beweglich ist und mittels des oberen
Abschnitts (130) Lackschlamm in die Nähe der Was-
seroberfläche (W1) zu einem Schlammabführab-
schnitt (116) außerhalb des Wassertanks (20) för-
dert.
 6. Lackierkabine (10) mit der Sprühkammer (11) und
der Reinigungseinrichtung (12) nach Anspruch 3,
wobei die Fördereinrichtung (25) einen oberen Ab-
schnitt (130), der in der Nähe der Wasseroberfläche
(W1) des Wasserbehälters (20) beweglich ist, und
einen unteren Abschnitt (131) aufweist, der in die
Nähe eines unteren Abschnitts (20a) des Wasser-
behälters (20) beweglich ist und mittels des oberen
Abschnitts (130) Lackschlamm in die Nähe der Was-
seroberfläche (W1) zu einem Schlammabführab-
schnitt (116) außerhalb des Wassertanks (20) för-
dert.
 7. Lackierkabine (10) mit der Sprühkammer (11) und
der Reinigungseinrichtung (12) nach Anspruch 4,
wobei die Fördereinrichtung (25) derart in einer ers-
ten Richtung (F) und einer zweiten Richtung (R) ent-
gegengesetzt zu der ersten Richtung (F) beweglich
ist, dass der Lackschlamm in der Nähe der Wassero-
berfläche (W1) in Richtung des Schlammabführab-
schnitts (116) durch den oberen Abschnitt (130) der
Fördereinrichtung (25) gefördert wird, wenn die För-
dereinrichtung (25) sich in der ersten Richtung (F)
bewegt, und dass der Lackschlamm an dem unteren
Abschnitt (20a) des Wasserbehälters (20) in Rich-
tung des Schlammabführabschnitts (116) durch den
unteren Abschnitt (131) der Fördereinrichtung (25)
gefördert wird, wenn die Fördereinrichtung (25) sich
in der zweiten Richtung (R) bewegt.
 8. Lackierkabine (10) mit der Sprühkammer (11) und
der Reinigungseinrichtung (12) nach Anspruch 5,
wobei die Fördereinrichtung (25) derart in einer ers-
ten Richtung (F) und einer zweiten Richtung (R) ent-
gegengesetzt zu der ersten Richtung (F) beweglich

ist, dass der Lackschlamm in der Nähe der Wasseroberfläche (W1) in Richtung des Schlammabführabschnitts (116) durch den oberen Abschnitt (130) der Fördereinrichtung (25) gefördert wird, wenn die Fördereinrichtung (25) sich in der ersten Richtung (F) bewegt, und dass der Lackschlamm an dem unteren Abschnitt (20a) des Wasserbehälters (20) in Richtung des Schlammabführabschnitts (116) durch den unteren Abschnitt (131) der Fördereinrichtung (25) gefördert wird, wenn die Fördereinrichtung (25) sich in der zweiten Richtung (R) bewegt.

9. Lackierkabine (10) mit der Sprühkammer (11) und der Reinigungseinrichtung (12) nach Anspruch 6, wobei die Fördereinrichtung (25) derart in einer ersten Richtung (F) und einer zweiten Richtung (R) entgegengesetzt zu der ersten Richtung (F) beweglich ist, dass der Lackschlamm in der Nähe der Wasseroberfläche (W1) in Richtung des Schlammabführabschnitts (116) durch den oberen Abschnitt (130) der Fördereinrichtung (25) gefördert wird, wenn die Fördereinrichtung (25) sich in der ersten Richtung (F) bewegt, und dass der Lackschlamm an dem unteren Abschnitt (20a) des Wasserbehälters (20) in Richtung des Schlammabführabschnitts (116) durch den unteren Abschnitt (131) der Fördereinrichtung (25) gefördert wird, wenn die Fördereinrichtung (25) sich in der zweiten Richtung (R) bewegt.
10. Lackierkabine (10) mit der Sprühkammer (11) und der Reinigungseinrichtung (12) nach einem der Ansprüche 4 bis 9, welche eine Wasseroberflächen-Höhenbeibehaltungseinrichtung (140) zum Anordnen der Wasseroberfläche (W1) des Wasserbehälters (20) an dem oberen Abschnitt (130) der Fördereinrichtung (25) aufweist.
11. Lackierkabine (10) mit der Sprühkammer (11) und der Reinigungseinrichtung (12) nach Anspruch 1, wobei der Schlammmentfernungsmechanismus (26) eine Filtertrommel (110), die zur Drehung in dem Wasserbehälter (20) angeordnet und dafür vorgesehen ist, zu bewirken, dass das Wasser in dem Wasserbehälter (20) von der äußeren Umfangsseite zu der inneren Umfangsseite strömt, wodurch das Wasser in dem Wasserbehälter (20) gefiltert wird, ein Schabelement (161), das dafür vorgesehen ist, ein Verstopfen der Filtertrommel (110) durch Kontaktieren der Umfangsflächen der Filtertrommel (110) zu verhindern, und einen Behälter (31) für gereinigte Flüssigkeit aufweist, der das durch die Filtertrommel (110) gefilterte Wasser in die Pumpe (21) einführt.
12. Lackierkabine (10) mit der Sprühkammer (11) und der Reinigungseinrichtung (12) nach Anspruch 1, welche eine Wasservorhangbildungseinrichtung (47,70a) aufweist, welche bewirkt, dass das durch die Pumpe (21) hochgezogene Wasser entlang der

vorderen Fläche des Wandabschnitts (70a) des Trennelements (70) nach unten strömt, wodurch sie einen Wasservorhang (75) hinter den Wasserschnüren (60) bildet.

Revendications

1. Cabine de peinture (10) qui comprend une chambre de peinture (11) accommodant un objet qui doit être peint et un dispositif de purification (12) pour enlever le brouillard de peinture contenu dans l'air dans la chambre de pulvérisation (11),
le dispositif de purification (12) comprenant :
un réservoir d'eau (20) disposé dans la chambre de peinture (11) ; et
une pompe (21) qui aspire l'eau dans le réservoir d'eau (20) ;
un mécanisme de formation de tige d'eau (22) configuré pour former des tiges d'eau (60) comprenant un réservoir d'eau (40) pour accommoder l'eau aspirée par la pompe (21), le réservoir d'eau (40) comprenant une paroi inférieure (45) formée avec un grand nombre de buses (50), un élément de barrière (70) comprenant une partie de paroi s'étendant verticalement (70a) ; une chambre d'évacuation (71) séparée de la chambre de peinture (11) par l'élément de barrière (70) ;
un mécanisme d'évacuation (28) comprenant un ventilateur d'extraction (100) pour décharger l'air dans la chambre de peinture (11) vers l'extérieur à travers l'élément de barrière (71), le mécanisme d'évacuation (28) étant configuré pour produire une circulation d'air de sorte que l'air contenant le brouillard de peinture dans la chambre de peinture (11) entre en contact avec les tiges d'eau (60) ;
le dispositif de purification **caractérisé en ce que** chacune des buses (50) comprenant une entrée (55), une partie tubulaire (56) ressortant vers le bas à partir de la paroi inférieure (45) d'une façon telle que le diamètre intérieur de la partie tubulaire (56) diminue vers le bas à partir de l'entrée (55), et une sortie circulaire (57) à la partie basse de la partie tubulaire (56), l'eau qui tombe de façon linéaire à partir des sorties (57) formant un grand nombre de tiges d'eau (60) qui sont parallèles entre elles ;
et il comprend un élément anti-projection (80) situé au-dessus d'une surface d'eau (W1) du réservoir d'eau (20) et à l'opposé et juste en dessous des buses (50) et comprenant une surface recevant l'eau (81) qui accuse une baisse à partir d'une partie d'extrémité supérieure (80a) en face des tiges d'eau (60) en direction d'une partie d'extrémité supérieure (80b) près de l'élé-

- ment de barrière (70) ;
 et un mécanisme d'élimination de boues (26) comprenant un transporteur (25) déposé dans le réservoir d'eau (20) et configuré pour décharger la boue de peinture dans le réservoir d'eau (20) vers l'extérieur du réservoir d'eau (20).
2. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 1, dans laquelle les buses (50) du mécanisme de formation de tige d'eau (22) sont arrangées de sorte que les distances entre les buses (50) sont égales entre elles telles que vues à partir du dessus du réservoir d'eau (40).
 3. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 1, comprenant un délesteur d'eau (90) qui est situé au-dessus du transporteur (25) positionné en dessous de l'élément anti-projection (80) et s'étend le long du transporteur (25), le délesteur d'eau (90) comprenant une partie supérieure (91) située en dessous d'un espace (82) entre l'élément de barrière (70) et l'élément anti-projection (80), une première surface de guide (92) qui accuse une baisse à partir de la partie supérieure (91) en direction d'une chaîne (25a) du transporteur (25), et une seconde surface de guide (93) qui accuse une baisse à partir de la partie supérieure (91) en direction de l'autre chaîne (25b) du transporteur (25).
 4. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 1, dans laquelle le transporteur (25) comprend une partie supérieure (130) déplaçable près de la surface d'eau (W1) du réservoir d'eau (20) et une partie inférieure (131) déplaçable près d'une partie inférieure (20a) du réservoir d'eau (20) et transporte de la boue de peinture près de la surface d'eau (W1) à une partie de décharge de boues (116) à l'extérieur du réservoir d'eau (20) au moyen de la partie supérieure (130).
 5. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 2, dans laquelle le transporteur (25) comprend une partie supérieure (130) déplaçable près de la surface d'eau (W1) du réservoir d'eau (20) et une partie inférieure (131) déplaçable près d'une partie inférieure (20a) du réservoir d'eau (20) et transporte de la boue de peinture près de la surface d'eau (W1) à une partie de décharge de boues (116) à l'extérieur du réservoir d'eau (20) au moyen de la partie supérieure (130).
 6. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 3, dans laquelle le transporteur (25) comprend une partie supérieure (130) déplaçable près de la surface d'eau (W1) du réservoir d'eau (20) et une partie inférieure (131) déplaçable près d'une partie inférieure (20a) du réservoir d'eau (20) et transporte de la boue de peinture près de la surface d'eau (W1) à une partie de décharge de boues (116) à l'extérieur du réservoir d'eau (20) au moyen de la partie supérieure (130).
 7. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 4, dans laquelle le transporteur (25) est déplaçable dans une première direction (F) et une seconde direction (R) opposée à la première direction (F) de sorte que la boue de peinture près de la surface d'eau (W1) est transportée en direction de la partie de décharge de boue (116) par la partie supérieure (130) du transporteur (25) lorsque le transporteur (25) bouge dans la première direction (F) et que la boue de peinture à la partie inférieure (20a) du réservoir d'eau (20) est transportée en direction de la partie de décharge de boues (116) par la partie inférieure (131) du transporteur (25) lorsque le transporteur (25) bouge dans la seconde direction (R).
 8. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 5, dans laquelle le transporteur (25) est déplaçable dans une première direction (F) et une seconde direction (R) opposée à la première direction (F) de sorte que la boue de peinture près de la surface d'eau (W1) est transportée en direction de la partie de décharge de boue (116) par la partie supérieure (130) du transporteur (25) lorsque le transporteur (25) bouge dans la première direction (F) et que la boue de peinture à la partie inférieure (20a) du réservoir d'eau (20) est transportée en direction de la partie de décharge de boues (116) par la partie inférieure (131) du transporteur (25) lorsque le transporteur (25) bouge dans la seconde direction (R).
 9. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 6, dans laquelle le transporteur (25) est déplaçable dans une première direction (F) et une seconde direction (R) opposée à la première direction (F) de sorte que la boue de peinture près de la surface d'eau (W1) est transportée en direction de la partie de décharge de boue (116) par la partie supérieure (130) du transporteur (25) lorsque le transporteur (25) bouge dans la première direction (F) et que la boue de peinture à la partie inférieure (20a) du réservoir d'eau (20) est transportée en direction de la partie de décharge de boues (116) par la partie inférieure (131) du transporteur (25) lorsque le transporteur (25) bouge dans la seconde direction (R).

(R).

10. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon l'une quelconque des revendications 4 à 9, comprenant des moyens de maintenance de hauteur de surface d'eau (140) pour localiser la surface d'eau (W1) du réservoir d'eau (20) à la partie supérieure (130) du transporteur (25). 5
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11. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 1, dans laquelle le mécanisme d'élimination de boues (26) comprend un tambour de filtration (110) déposé pour tourner dans le réservoir d'eau (20) et configuré pour causer l'écoulement de l'eau dans le réservoir d'eau (20) à partir du côté périphérique externe vers le côté périphérique interne, filtrant ainsi l'eau dans le réservoir d'eau (20), un élément de raclage (161) configuré pour éviter l'obstruction du tambour de filtration (110) en mettant en contact les surfaces périphériques du tambour de filtration (110), et un réservoir de fluide épuré (31) qui introduit l'eau filtrée par le tambour de filtration (110) au sein de la pompe (21). 15 20 25
12. Cabine de peinture (10) avec la chambre de peinture (11) et le dispositif de purification (12) selon la revendication 1, comprenant des moyens de formation de rideau d'eau (47, 70a) ce qui cause l'eau aspirée par la pompe (21) de s'écouler vers le bas le long de la surface avant de la partie de paroi (70a) de l'élément de barrière (70), formant ainsi un rideau d'eau (75) derrière les tiges d'eau (60). 30 35

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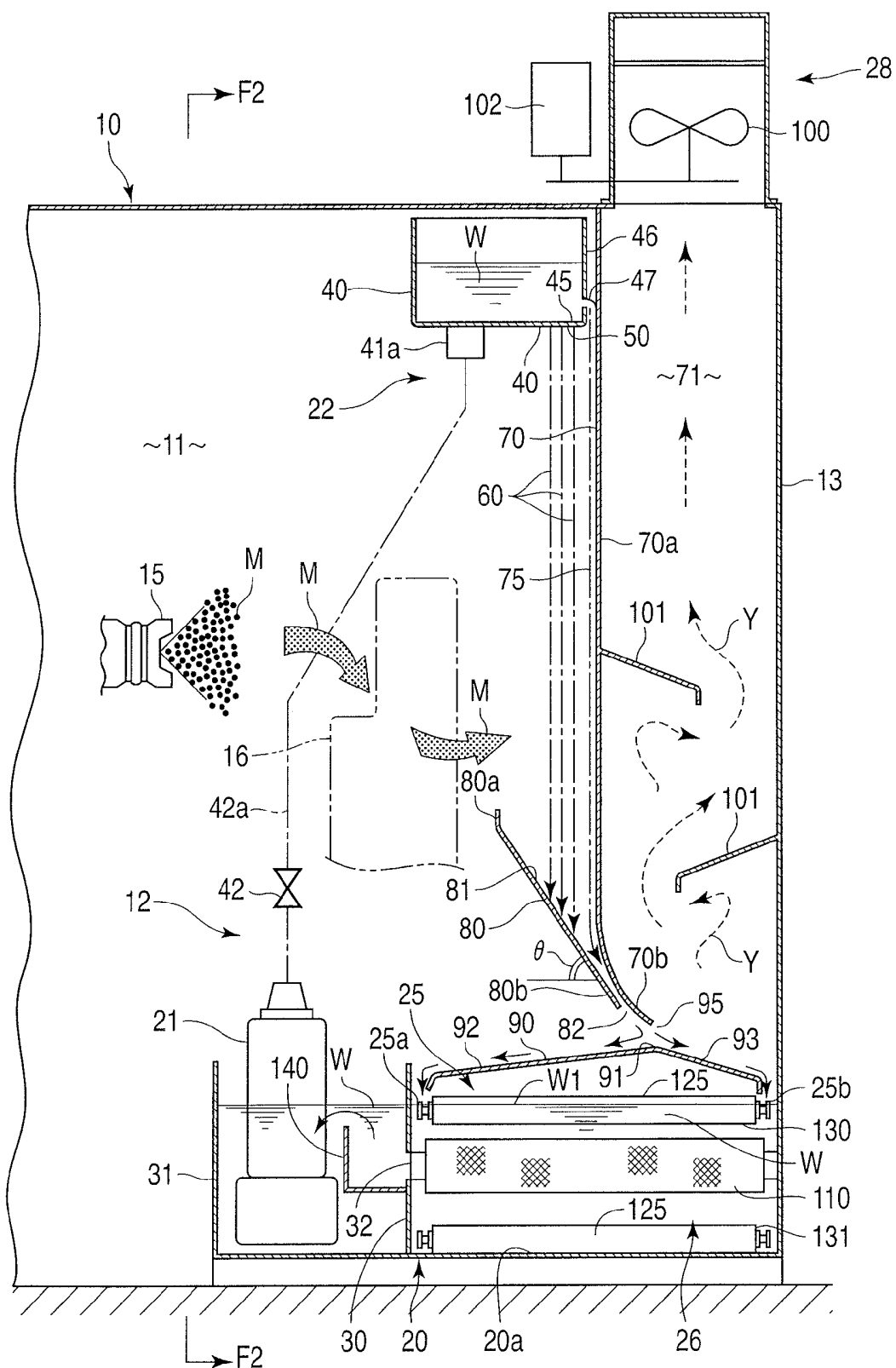


FIG. 1

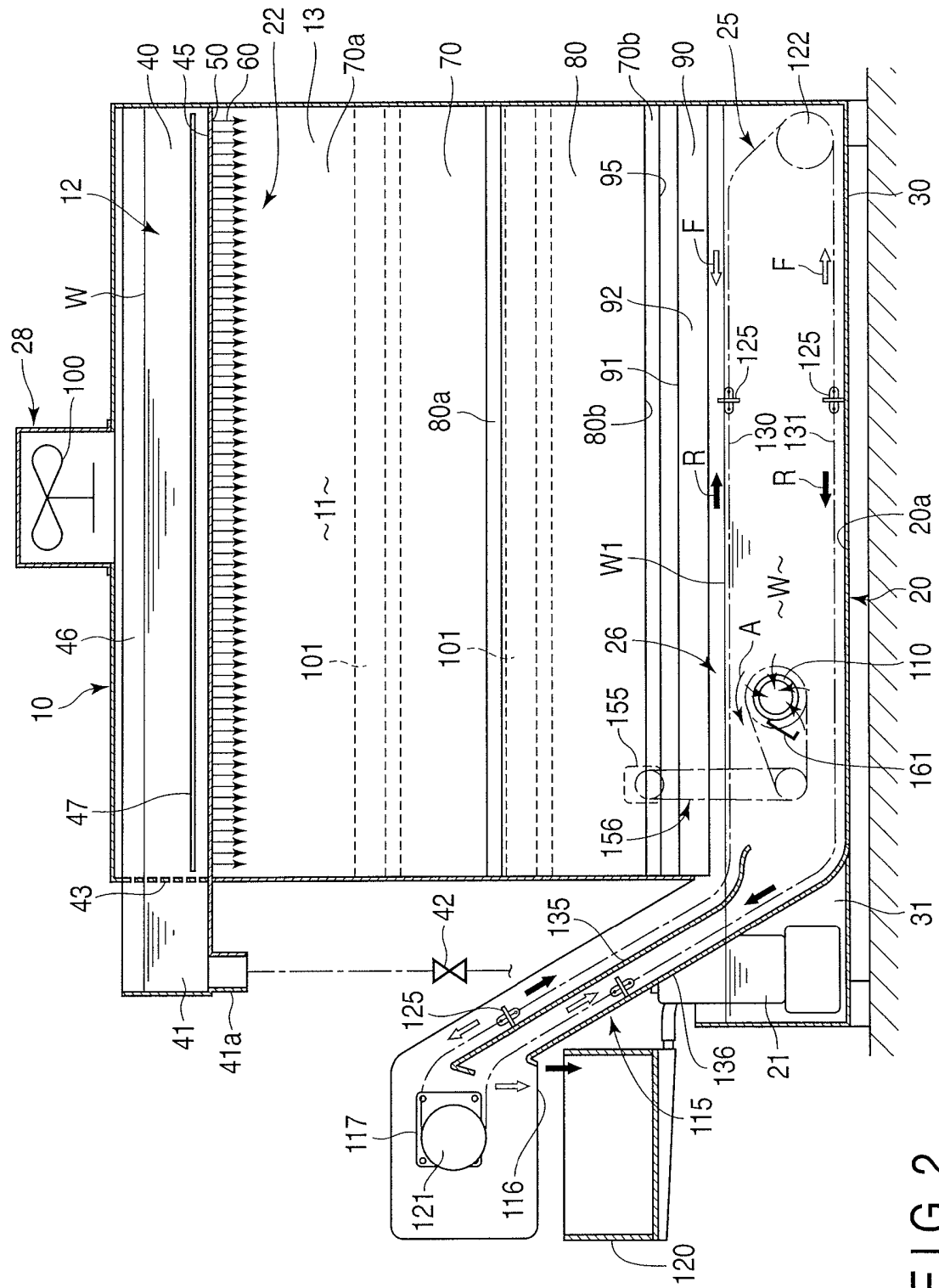


FIG. 2

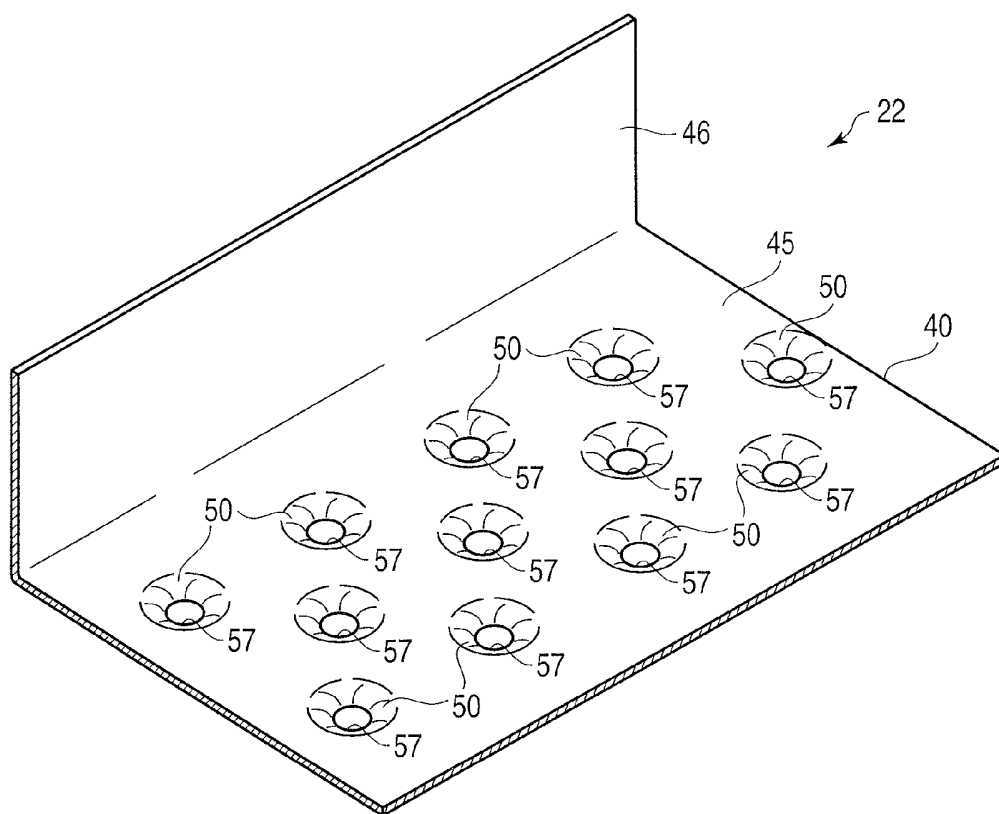


FIG. 3

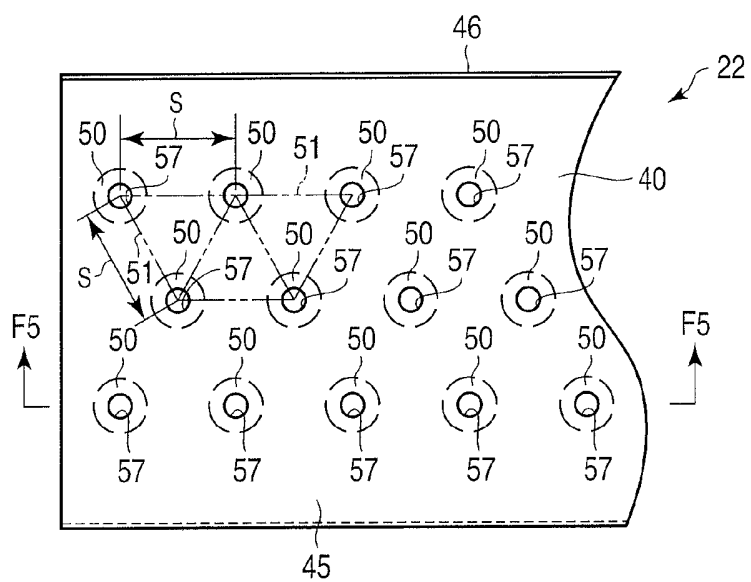


FIG. 4

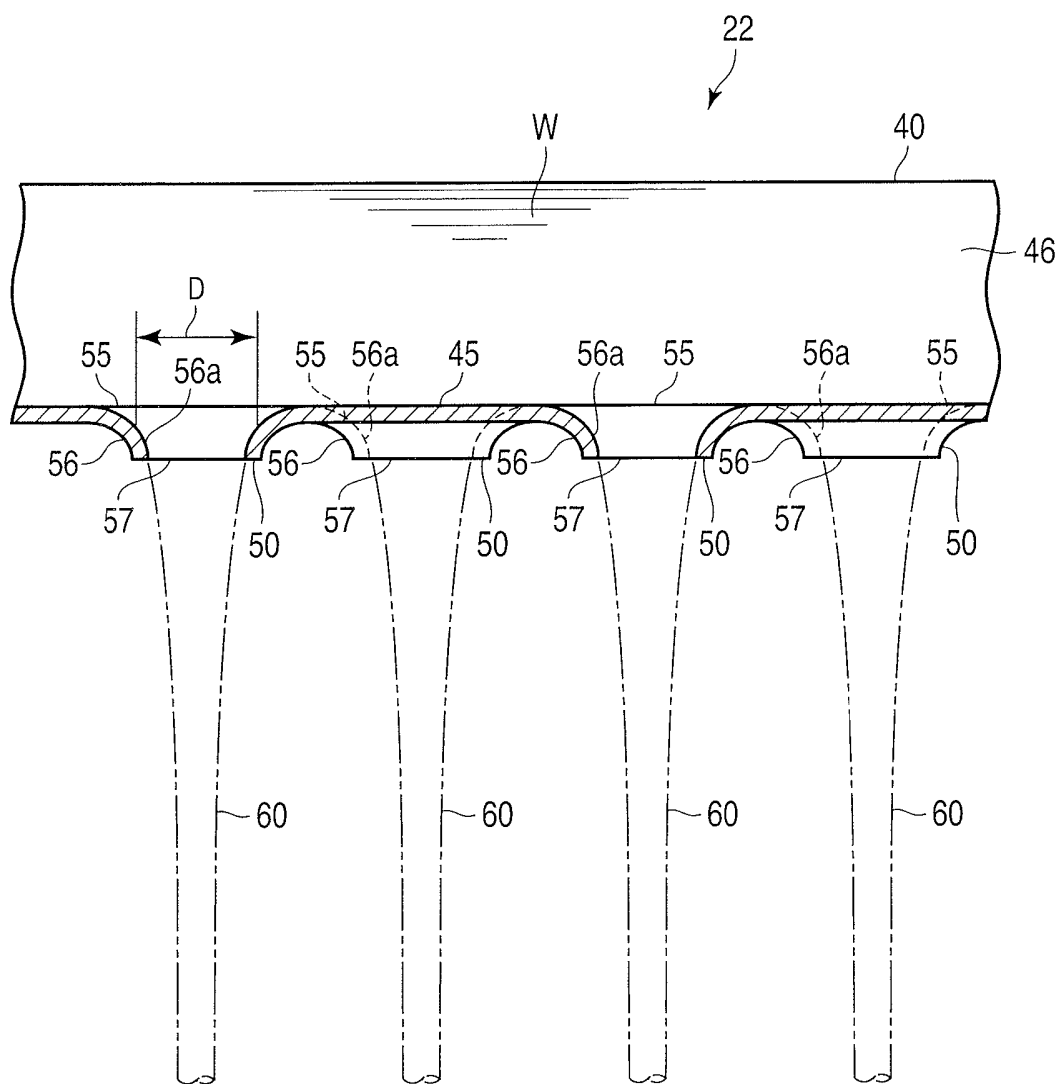


FIG. 5

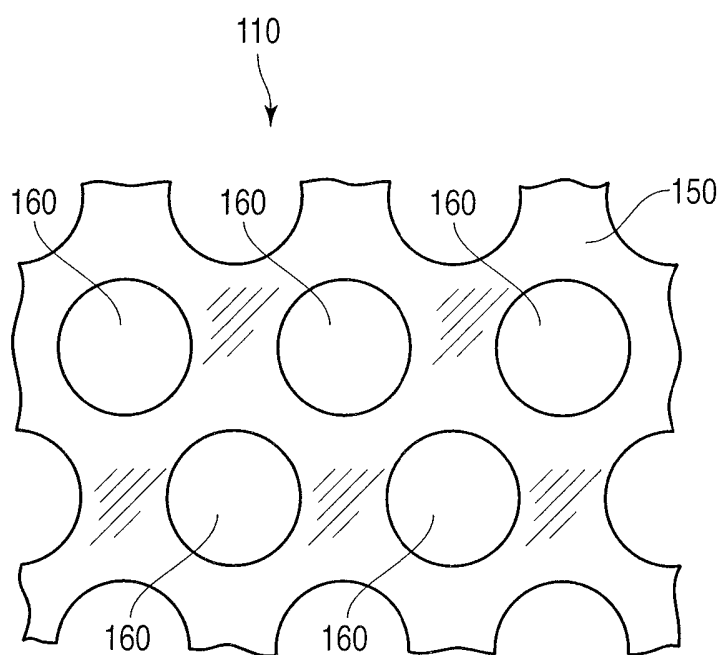


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2002273292 A [0003] [0005]
- JP 3704084 B [0004] [0005]

FESTŐFÜLKE TISZTÍTÓ BERENDEZÉSSSEL FELSZERELVE

SZABADALMI IGÉNYPONTOK

1. Festőfülke (10) amely tartalmaz egy festendő tárgy befogadására alkalmas festékszóró kamrát (11) és egy tisztítóberendezést (12) a festékszóró kamra (11) levegőjében található festékköd eltávolítására,

ahol a tisztítóberendezés (12) tartalmaz:

egy medencét (20) a festékszóró kamrán (11) belül; és

egy szivattyút (21) amely felszívja a vizet a medencéből (20);

egy vízsugarakat kialakító szerkezetet (22) amely vízsugarakat (60) állít elő, és amely tartalmaz a szivattyú (21) által felszívott víz tárolására alkalmas víztartót (40), amelynek nyílásokat (50) tartalmazó fenéklapja (45) van;

egy válaszfalat (70) amely tartalmaz egy függőleges falrész (70a);

egy a festékszóró kamrától (11) a válaszfallal (70) elválasztott elszívó kamrát (71);

egy elszívó berendezést (28), amely tartalmaz egy elszívó ventilátort (100) a levegő kiszívására a festékszóró kamrából (11) az elszívó kamrán (71) keresztül a külső térbe, ahol az elszívó berendezés (28) úgy van kialakítva, hogy az általa előállított légáramban, a festékszóró kamrában (11) található festékködet tartalmazó levegő érintkezzen a vízsugarakkal (60);

és ahol a tisztítóberendezés azzal jellemezhető, hogy

a nyílások (50) mindegyike, tartalmaz egy bemeneti részt (55) egy csőszerű részt (56), amely a fenéklapból (45) úgy áll ki, hogy a csőszerű rész (56) belső átmérője a bemeneti résztől (55) lefele szűkül, és egy körkörös kimeneti részt (57) a csőszerű rész (56) alsó végén, ahol a kimeneti részek (57) egyenes vonalban távozó víz egymással párhuzamos vízsugarat (60) alkot;

és tartalmaz egy vízterelőt (80) a medence (20) vízfelülete (W1) fölött a nyílásokkal (50) szemben és azok alatt, ahol a vízterelő vízfelfogó felülete (81) egy felső végrésztől (80a) ferdén húzódik a válaszfalhoz (70) közeli alsó végrészig (80b) a vízsugarak alatt;

és egy iszapmentesítő berendezést (26) a medencében (20) elhelyezett szállítószalaggal (25) amely a festékiszapot eltávolítja a medencéből (20) a medencén (20) kívülre.

2. Az 1. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben a nyílások (50) a vízsugarakat kialakító

szerkezetben (22) úgy vannak elhelyezve, hogy a távolságok a nyílások (50) közt egyenlők, a víztartót (40) felülről nézve.

3. Az 1. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amely tartalmaz egy vízvisszavezető lemezt (90) amely a szállítószalag (25) fölött és a vízterelő (80) alatt van elhelyezve a szállítószalag (25) teljes hosszán, ahol a vízvisszavezető lemez (90) felső része (91) a válaszfal (70) és a vízterelő (80) közötti hézag (82) alatt található, egy, a felső résztől (91) a szállítószalag (25) egyik lánc (25a) felé lejtő első vezető felületet (92), és egy, a szállítószalag (25) másik lánc (25b) felé lejtő második vezető felületet (93).

4. Az 1. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben a szállítószalagnak (25) a medence (20) vízfelületének (W1) közelében mozgó felső része (130) a medence (20) fenék része (20a) közelében mozgó alsó része (131) van, és elszállítja a vízfelület (W1) közelében a festékiszapot a medencén (20) kívüli iszaplerakó részhez (116) a felső rész (130) segítségével.

5. Az 2. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben a szállítószalagnak (25) a medence (20) vízfelületének (W1) közelében mozgó felső része (130) a medence (20) fenék része (20a) közelében mozgó alsó része (131) van, és elszállítja a vízfelület (W1) közelében a festékiszapot a medencén (20) kívüli iszaplerakó részhez (116) a felső rész (130) segítségével.

6. Az 3. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben a szállítószalagnak (25) a medence (20) vízfelületének (W1) közelében mozgó felső része (130) a medence (20) fenék része (20a) közelében mozgó alsó része (131) van, és elszállítja a vízfelület (W1) közelében a festékiszapot a medencén (20) kívüli iszaplerakó részhez (116) a felső rész (130) segítségével.

7. A 4. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben a szállítószalag (25) első irányba (F) és az első iránnyal (F) ellentétes második irányba (R) mozgatható úgy, hogy a szállítószalag (25) felső része (130) a vízfelületről (W1) a festékiszapot az iszaplerakó egység (116) felé továbbítja, amikor a szállítószalag (25) az első irányba (F) mozog, és hogy a szállítószalag (25) alsó része (131) a fenék részről (20a) a festékiszapot az iszaplerakó egység (116) felé továbbítja, amikor a szállítószalag (25) a második irányba (R) mozog.

8. A 5. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben a szállítószalag (25) első irányba (F) és az első iránnyal (F) ellentétes második irányba (R) mozgatható úgy, hogy a szállítószalag (25) felső része (130) a vízfelületről (W1) a festékiszapot az iszaplerakó egység (116) felé

továbbítja, amikor a szállítószalag (25) az első irányba (F) mozog, és hogy a szállítószalag (25) alsó része (131) a fenék részről (20a) a festékiszapot az iszaplerakó egység (116) felé továbbítja, amikor a szállítószalag (25) a második irányba (R) mozog.

9. A 6. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben a szállítószalag (25) első irányba (F) és az első iránnyal (F) ellentétes második irányba (R) mozgatható úgy, hogy a szállítószalag (25) felső része (130) a vízfelületről (W1) a festékiszapot az iszaplerakó egység (116) felé továbbítja, amikor a szállítószalag (25) az első irányba (F) mozog, és hogy a szállítószalag (25) alsó része (131) a fenék részről (20a) a festékiszapot az iszaplerakó egység (116) felé továbbítja, amikor a szállítószalag (25) a második irányba (R) mozog.

10. A 4.-9. igénypontok bármelyike szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amely tartalmaz egy vízszintszabályozó egységet (140), amely a medence (20) a vízfületét (W1) a futószalag (25) felső részénél (130) tartja.

11. Az 1. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amelyben az iszapmentesítő berendezés (26) tartalmaz egy szűrődobot (110) amely a medencében (20) forgathatóan van rögzítve, és úgy van kialakítva, hogy a vizet a külső felülete és a belső felülete között áramoltatja, ezáltal szűrve a vizet a medencében (20), egy lehúzó elemet (161) amely megakadályozza a szűrődob (110) eltömődését a szűrődob (110) külső felületének érintésével, és egy tisztított vizes tartályt (31) amely bevezeti a szűrődob (110) által megszűrt vizet a szivattyúba (21).

12. Az 1. igénypont szerinti festőfülke (10) festékszóró kamrával (11) és tisztítóberendezéssel (12), amely tartalmaz egy vízfüggöny előállító elemet (47,70a) amely a szivattyú (21) által felszívott vizet a válaszfal (70) falrészének (70a) belső oldala mentén folytatja, ezáltal egy vízfüggönnyt (75) alkotva a vízugarak (60) mögött.

A meghatalmazott:

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