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(54) Rotating spray apparatus

(57) Apparatus for supplying the product to be sprayed to spraying machines of the rotating type, having guns mounted on a carousel or on a transfer device, in which the ends of the pipes (4) supplying the spray guns (G) are connected to a header (3) provided with a vertical supply tube (1) which is made to rotate by suitable means (2) in a synchronised manner and in the same direction as the gun assembly of the said carousel or transfer device and the top end of this supply tube (1) is connected to at least one flexible pipe (14) which, after a short curved and upward trajectory (414), is arranged horizontally with a middle section (314) rotatably supported by special means (15) and which with the other end of the curved

and downward section (214, 114) is connected to a hollow and vertical hub (7) in turn connected to the delivery outlet of a pump (9) of any suitable type, arranged vertically on a vertical support (8) integral and coaxial with the said hub (7) which is made to rotate by special means at the same speed as the said supply tube (1), but in the opposite direction, while with its bottom axial draw-off the said pump (9) is immersed inside the container of paint (10) which is fixed, all of which in such a way that the said flexible pipe (14) rotates freely and without twisting about its longitudinal axis and is able to supply the paint or other product to the guns of the spraying machine, without the intervening arrangement of rotating joints and without the problems associated with them.

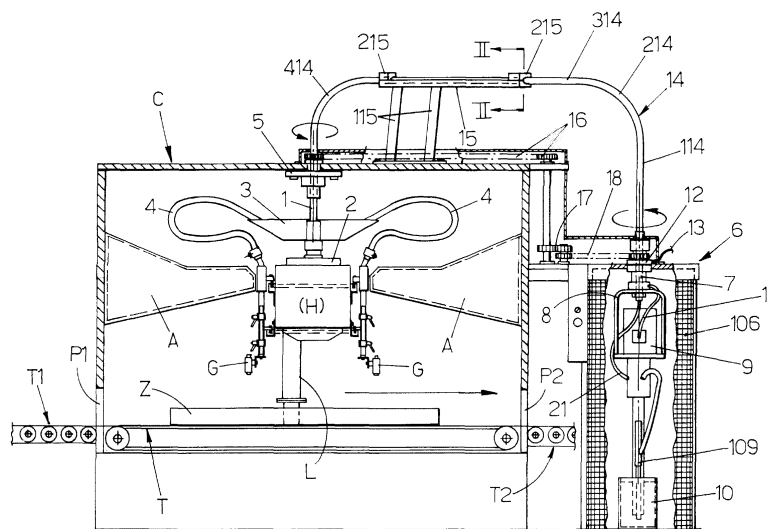


Fig.1

Description

[0001] The invention refers to machines for spraying paint or other treatment product onto articles made of wood or other material with a mainly flat extension, such as panels for example, which move along resting on a horizontal conveyor which transports the said panels so that they pass through a booth which is usually at a lower pressure than the exterior and inside which a carousel or a transfer device operates with vertical axes of rotation, said carousel or transfer device causing a succession of guns delivering the treatment product to pass over the panels. The spray guns of these types of machines are connected to a pumping circuit which draws the paint from a fixed supply station and which at present is provided on the delivery circuit with a rotating distributor which has costly seals able to withstand the particularly aggressive chemical attack of the components of the product to be distributed. When these same types of machines are required to perform intermittent processing operations, during which the carousel or the transfer device with the guns remain rotating or when those machines are used to perform continuous processing operations which are prolonged over time, the rotating joint of the paint supply circuit, which is situated downstream of the pump and therefore along the high-pressure branch of the said supply circuit, may be subject, as a result of friction and pressure, to the small increases in temperature which trigger a catalysis process in the paint used, with rapid deterioration of the said rotating joint which for this reason must undergo frequent maintenance, with stoppage of the machine and with all the cost-related drawbacks which arise from this condition. The invention intends to overcome these and other drawbacks with the following proposed solution. The ends of the supply pipes of the spray guns are connected to a header provided with a vertical supply tube which is made to rotate in a synchronised manner and in the same direction as the gun assembly mounted on the carousel or the transfer device and this supply tube is connected to a flexible pipe which, after a short curved and upward trajectory, is arranged horizontally and with this section is supported rotatably by special means and which with the other end of its curved and downward section is connected to a hollow and vertical hub in turn connected to the delivery of a pump arranged vertically and on a vertical support integral and coaxial with the said hub which is made to rotate by special means at the same speed of rotation as the supply tube, but in the opposite direction, while with its bottom draw-off the said pump is immersed inside the container of paint which is fixed. With this solution the rotating joint is completely eliminated and all the problems associated with it are eliminated and the paint is continuously mixed and kept fluid by the draw-off of the pump. Further characteristic features of the invention and the advantages arising from it will emerge more clearly from the following description of some preferred embodiments thereof illustrated purely by way of

a non-limiting example in the figures of the accompanying illustrative plate in which:

- Fig. 1 is a schematic view of a machine with the guns mounted on a transfer device, improved according to the invention and cross-sectioned in the direction of feeding of the panels;
- Fig. 2 shows details as shown along the cross-section II-II of Figure 1;
- Fig. 3 shows a constructional variant of the paint supply circuit.

[0002] In Figure 1, C denotes the booth of the spraying machine provided at its ends with gates P1 and P2 which are aligned with each other and which have, connected in the vicinity thereof, the ends of a horizontal conveyor T inside the said booth and external conveyors T1 and T2 which perform feeding of the panels Z which must be painted by an assembly of spray guns G mounted on a carousel or a transfer device H inside the booth C, which is supported for example by a gantry structure L and which by suitable means, not shown, is made to rotate on its vertical axis or axes, so that the said guns are made to perform transverse movements in opposite directions over the panels Z which move along the conveyor T such that, as a result of the combination of these movements, there is a correct distribution of the paint or other product sprayed by the said guns on the said panels. Outlets connected to a suction circuit via special filters for eliminating the haze and gases resulting from the painting stage are usually arranged on the sides of the conveyor T, while, inside the booth C, clean outside air is supplied into the said booth via false ceiling structures A. The suction created by means of the said circuit is usually such that air enters from the outside via said gates P1 and P2. According to the invention, the top of the booth C has, emerging rotatably from it, a vertical delivery tube 1 which, inside the transfer machine, as can be seen in the example of Figure 1, is situated inside the central part of the said transfer device, in a position equidistant from the end pinions for driving the parallel chains of the said transfer device and with its bottom closed end is connected to means 2 which cause it to rotate in the same direction and at the same speed as the axis of the said pinions. On the bottom part the tube 1 supports integrally and communicates with a small hollow header 3 inside which the ends of the flexible paint delivery pipes 4 are connected to the guns G. If the guns of the spraying machine were mounted differently on a vertical-axis rotating carousel, the said tube 1 would be arranged coaxially inside the said carousel and could coincide with the rotational shaft of the latter, while the header 3 in this case could be arranged on the bottom end of the carousel shaft and the supply pipes 4 of the guns could depart from the latter. 5 denotes an optional support which is fixed, for example, to the booth C and helps rotatably support the supply tube 1. Laterally with respect to the booth C, a fixed protection chamber 6 is provided outside

the latter, said chamber having a height which is slightly less than that of the said booth C and being provided with a door 106 which has a meshwork screening, and the upper wall of this chamber has, rotatably mounted thereon, a vertical hub 7 which supports inside the said chamber 6 a cage 8 arranged so as to circumscribe and carry fixed and coaxially a pump 9, for example of the volumetric and pneumatic type, which is oriented downwards and with its own draw-off 109, which can be adjusted in terms of its heightwise position using a control device and using means not shown in that they may be easily realized by a person skilled in the art, is immersed inside the container 10 with the paint to be sprayed, situated in a fixed and sufficiently central position on the bottom of the chamber 6. The delivery of the pump 9 is connected by means of the pipe 21 to the bottom end of the said hub 7 which is axially hollow and which, on the outside of the axial cavity occupied by the paint, has another cavity which with the bottom end is connected to a pipe 11 for supplying to the pump compressed air necessary for operation thereof, while with the top end it is connected to the fixed part 12 of a rotating joint to which the end of the pipe 13 supplying the compressed air is connected. The top end of the hub 7 is fixed to the ends of at least one flexible high-pressure tube, not shown, preferably housed inside a tubular protection sheath 14, which is also flexible and for example of the corrugated type, and this sheath and tube assembly follows a path with a first upward section 114, then a first curve 214 substantially at 90°, then a straight and substantially horizontal section 314 (see below) and finally a second downward curve 414 at 90°, at the end of which the said sheath and tube assembly 14 is fixed to the top end of the supply tube 1. The horizontal section 314 of the sheath 14 is rotatably supported by a channeled guide 15 which is open upwards and fixed by means of brackets 115 onto the booth C and provided at the ends with retaining bridge-pieces 215, as can be seen from the example according to Figure 2. The hub 7 and the tube 1 are connected together by means of any kinematic chain of the positive type which causes the rotation of these components at the same speed and in opposite directions. Purely by way of a non-limiting example, the said kinematic chain may comprise a first positive drive 16 for the movement which is connected to the top end of the supply tube 1 and which with the other end is connected to a movement reversal device 17 connected to a second positive movement drive 18 which actuates the hub 7. It is understood that other suitable parts may be used to connect kinematically the supply pipe 1 to the hub 7, for example angular type movement transmission systems. If necessary, an electric motor may be provided at any point of the said kinematic chain, said motor operating the carousel or the transfer device with the guns or having its shaft connected electrically to the motor of the spraying machine. It is clear how, following rotation at the same speed and in the opposite direction of the vertical ends of the flexible sheath 14 with the associated internal tubes, owing to

the synchronised rotation of the supply tube 1 in one direction and the rotation of the pump 9 in the opposite direction, the said sheath 14 and the associated inner tubes are made to rotate without any twisting about their longitudinal axis and are able to supply the paint or other product to the guns of the spraying machine, without the intervening arrangement of rotating joints and without the problems associated with them. This solution also offers the advantage that the draw-off 109 of the pump rotates inside the paint container 10 and keeps the paint itself suitably mixed and fluid. Figure 3 shows a constructional variant of the invention according to which the draw-off 109 of the pump does not have any heightwise adjustments and draws from the paint container 10 which may be situated outside the chamber 6, via a rotating coaxial joint 19 and by means of at least one fixed tube 20, substantially eliminating the drawbacks of the known art since the said joint operates at low pressure.

Claims

1. Apparatus for supplying the product to be sprayed to spraying machines of the rotating type, having the guns mounted on a carousel or on a transfer device, in which the ends of the pipes (4) supplying the spray guns (G) are connected to a header (3) provided with a vertical supply tube (1) which is made to rotate by suitable means (2) in a synchronized manner and in the same direction as the gun assembly mounted on the said carousel or transfer device and this supply tube (1) is connected to at least one flexible pipe (14) which, after a short curved and upward trajectory (414), is arranged horizontally with a middle section (314) rotatably supported by special means (15) and which with the other end of its curved and downward section (214, 114) is connected to a hollow and vertical hub (7) in turn connected to the delivery of a pump (9) of any suitable type, arranged vertically on a vertical support (8) integral and coaxial with the said hub (7) which is made to rotate by special means at the same speed as the said supply tube (1), but in the opposite direction, while with its bottom axial draw-off the said pump (9) is immersed inside the fixed container (10) with the product to be sprayed, consisting of paint for example, all of which so that the said flexible pipe (14) rotates without twisting about its longitudinal axis and is able to supply the paint or other product to the guns of the spraying machine, without the intervening arrangement of rotating joints and without the problems associated with them.
2. Apparatus according to Claim 1), in which the said flexible pipe (14) consists of a protective sheath for example of the corrugated type having, arranged inside it, one or more high-pressure tubes passed through by the paint or other product to be supplied

to the spray guns.

3. Apparatus according to Claim 1), in which the draw-off (109) of the pump (9) rotates inside the container (10) of paint and keeps the said paint suitably mixed and fluid.

4. Apparatus according to Claim 1), in which laterally with respect to the booth (C) of the spraying machine, a fixed protection chamber (6) is provided outside the latter, said chamber having a height which is slightly less than that of the said booth (C) and being provided with a door (106) for example with a mesh-work screening, and the upper wall of this chamber has, rotatably mounted thereon, the vertical hub (7) which supports inside the said chamber (6) a coaxial cage (8) arranged so as to circumscribe and carry fixed a pump (9) which is oriented downwards and which with its own bottom coaxial draw-off (109) can be adjusted in terms of its heightwise position using suitable means and is immersed inside the container (10) with the paint to be sprayed, situated in a fixed and sufficiently central position on the bottom of the said chamber (6), the delivery of the said pump (8) being connected to the bottom end of the said hub (7) in turn connected to one end of the said flexible pipe (14).

5. Apparatus according to Claim 2), in which the pump (9) is for example of the volumetric and pneumatic type and the said hub (7) is axially hollow and, outside the axial cavity passed through by the paint, has another cavity which with the bottom end is connected to a pipe (11) which supplies to the pump the compressed air necessary for operation thereof, while with the top end the said outer cavity is connected to a rotating joint which with its fixed part (12) is connected to the fixed pipe (13) supplying the compressed air.

6. Apparatus according to Claim 3), in which the said hub (7) and the said pipe (1) supplying the guns (G) of the spraying machine are connected together by means of any kinematic chain of the positive type which causes rotation of the said components at the same speed and in opposite directions, for example by means of a first positive movement drive (16) which is connected to the top end of the said supply tube (1) and with the other end is connected to a movement reversal unit (17) connected to a second positive movement drive (18) which actuates the said hub (7) or via equivalent means which use for example angular movement transmission systems.

7. Apparatus according to Claim 5), in which, at any point of the said kinematic chain which connects together the hub (7) and the supply tube (1), an electric motor may be provided, said motor operating the car-

ousel or the transfer device with the guns having its shaft connected electrically to the actual motor of the spraying machine.

8. Apparatus according to Claim 3), **characterized in that**, according to a constructional variant, the draw-off (109) of the pump is devoid of heightwise adjustments and draws from the container (10) of paint, which may be situated outside the protection chamber (6), via a rotating joint (19) coaxial with the said draw-off and by means of at least one fixed tube (20).

