

SPECIFICATION

Apparatus for cleaning or preserving vertical or inclined surfaces, particularly the sides of ships

5 The invention relates to an apparatus for cleaning or preserving vertical or inclined surfaces, for example, the sides of ships; such apparatus may comprise a carriage which can travel along a rail at the top edge of a dock or the like, a jib connected to the carriage for swinging about a vertical axis, and articulated to the jib, a mast which can pivot about a horizontal and a vertical axis and which carries the working equipment.

15 The vertical or inclined surfaces are cleaned with pressurised water which is supplied to the nozzles of the working equipment.

Pieces of apparatus travelling on the dock wall and moving along its whole length are being used increasingly in shipyards. Water has hitherto been supplied to such apparatus through appropriate hoses. In the rough conditions of the docks the hoses are subject to enormous wear and often lead to operations being interrupted as a result of careless maintenance or interference by outsiders.

25 However, these expensive pieces of apparatus can be used effectively only if one can ensure that they will operate continuously. The hoses still have to be half the length of the dock, even in the most favourable case, and their replacement is expensive and time consuming. In addition, the operating personnel is condemned to inaction during the repair work.

35 It was therefore desirable to design an apparatus of the above type, which can dispense with hoses for supplying water from the dock water pipe to the apparatus.

According to the present invention there is provided apparatus for cleaning and preserving vertical or inclined surfaces, for example, the sides of ships, comprising a carriage which can travel along a rail at the top edge of a dock or the like, a jib connected to the carriage for swinging about a vertical axis, and articulated to the jib, a mast which can pivot about a horizontal and a vertical axis and which carries the working equipment, wherein a water tank is fixed to the carriage and has a water inlet aperture extending almost along the whole length of the tank, in the upper region, at the side associated with the vertical dock wall, a dock water pipe provided with a plurality of tapping points, being arranged at the dock wall opposite the water inlet aperture, and wherein the discharge nozzles of the tapping points can be opened by a control means fixed to the apparatus and responding to the water level in the water tank.

In an advantageous embodiment of the invention the water tank extends along the whole length of the apparatus.

The water tank of the apparatus must be large enough to span the distance between the tapping points minus the length of the apparatus. The necessary amount of water is transferred from the dock water pipe to the tank of the apparatus while travelling and during the washing process, until the tank is filled to the maximum degree. Only then does the

control means of the apparatus release a lever for operating the shut-off valve of the discharge nozzle, so that the valve can move into the closed position.

70 It is possible to provide electrical control means for the valve for the water tank, instead of operating the valve mechanically.

An example of the invention is illustrated in the accompanying drawings and will now be described. In the drawings:

75 Figure 1 is a perspective view of the apparatus for cleaning and preserving vertical or inclined surfaces, particularly the sides of ships,

Figure 2 is a vertical section through the upper part of the Figure 1 apparatus,

80 Figure 3 shows constructional details and

Figure 4 is a diagrammatic representation of an electrical control for the supply valve.

In the embodiment illustrated the apparatus comprises a carriage 1 which is angular in vertical section. The horizontal part 2 of the carriage is mounted movably on a rail 3 and a T-profile 4. The T-profile 4 is anchored to the upper edge 5 of the dock. The rail 3 and T-profile 4 interact with sets of rollers arranged at the lateral ends of the horizontal part 2 of the carriage. The vertical part 6 of the carriage runs parallel with the dock wall 7 and is in the form of a frame construction.

Rollers bearing against the dock wall 7 are mounted in the lower cross beam 8.

95 A jib 9 is connected to the carriage 1 so that it can swing about a vertical axis, its maximum swinging angle being 180°. The jib 9 forms a trapezoidal frame as seen from the side. Displacement cylinders 10, which may e.g. be hydraulically operated, are provided to swing the jib 9. The jib 9 carries a mast 11 which can swing about a horizontal axis and a vertical axis relative to the jib. The swinging movement about the horizontal axis is brought about by displacement cylinders 12. Displacement cylinders 13 are provided to swing the mast 11 about the vertical axis. The mast carries working equipment 14 at its front, free end. This may comprise one or more high pressure spraying pipes fitted with nozzles for cleaning the sides of the ship.

110 A water tank 15 is fixed to the vertical part 6 of the carriage 1. The tank extends along the whole length of the apparatus and has a water inlet aperture 16 at the side facing towards the dock wall 7. This aperture, which is rectangular, extends along almost the whole length of the tank 15. A water deflecting plate 17 is fixed above the top edge of the aperture. It extends into the interior of the tank and runs obliquely downwards from the top edge of the inlet aperture. Water striking the plate 17 is deflected and guided into the interior of the water tank.

120 A feed plate 18 is fixed to the lower edge of the water inlet aperture 16. It extends in the direction of the dock wall 7, runs upwardly and engages below the short feed pipes 19 of the tapping points in the dock water pipe 20. The pipe 20 is provided at the vertical level of the aperture 16 and fixed behind the dock wall 7. It is equipped with tapping points distributed uniformly along its length, each tapping point being formed by a discharge nozzle 21 fitted with a short feed pipe 19. The feed pipe is taken through the

dock wall 7 and extends into the interior of the dock. Each discharge nozzle is fitted with a gate-type shut-off valve, which is coupled to an operating lever 22 mounted for pivoting movement. The operating lever 22, which in the example illustrated has a roller 23 at its free end, is arranged inside the dock and can be actuated by means of a switching beam 24 of a control means fixed to the apparatus. In Figures 2 and 3 the operating lever 22 is shown in a position where the shut-off valve of the discharge nozzle is in the closed position. The switching beam 24 may be moved into the position indicated in dash and dot lines in Figure 2, by means of a piston cylinder unit 25 equipped with a dual action cylinder. In this position the beam 24 comes within the range of movement of the lever 22. The apparatus, which starts up the tapping point with the beam 24 in this position, swings the lever 22 by means of the beam, bringing the lever into the position also indicated by a dash and dot line in Figure 2. Here the shut-off valve of the discharge nozzle 21 is in the open position, so that the water tank 15 is filled by the dock water pipe 20 by means of the short feed pipe 19. The tank is provided with a level control 26 which switches a multi-way valve 27. With the aid of this valve and by means of a pump 28, the control medium is conveyed into the appropriate control chamber of the piston cylinder unit 25. When the water tank 15 has been filled to the maximum, the reversing valve 27 is switched by the level control 26, bringing the switching beam 24 outside the range of movement of the lever 22 by means of the piston cylinder unit 25. The lever 22 then returns to the closed position, so that the transfer of water from the dock water pipe 20 to the tank 15 is terminated.

The degree to which the water tank 15 is filled is chosen so that, with a full washing action, the apparatus can travel the distance between two tapping points minus its own length.

Figure 4 shows an electrical control for the feed valve 30 for the water tank 15. The feed valve is in the form of an electro magnetic valve and is arranged in the same way as the discharge nozzle 21 described.

The negative pole for the electro magnetic valve 30 is taken from the rail 3, 4, which is connected to the negative pole of the energy supply 36 to the apparatus by the runners 31. A live rail 32 is mounted on the apparatus with insulation and extends along the whole length of the tank 15. A contact wiper 33, interacting with the live rail, is also provided.

The automatic water filling plant is set in operation by a switch 34. The float switch 35 breaks the circuit supplied by the current source 36, to prevent the tank 15 from over-filling.

This arrangement ensures that additional water is let in only if the switch 34 is operated, the float switch 35 closed and the contact wiper 33 in contact with the live rail 32.

CLAIMS

1. Apparatus for cleaning and preserving vertical or inclined surfaces, for example the sides of ships, comprising a carriage which can travel along a rail at the top edge of a dock or the like, a jib connected to the carriage for swinging about a vertical axis, and

articulated to the jib, a mast which can pivot about a horizontal and a vertical axis and which carries the working equipment, wherein a water tank is fixed to the carriage and has a water inlet aperture, extending almost along the whole length of the tank, in the upper region, at the side associated with the vertical dock wall, a dock water pipe, provided with a plurality of tapping points, being arranged at the dock wall opposite the water inlet aperture, and wherein the discharge nozzles of the tapping points can be opened by a control means fixed to the apparatus and responding to the water level in the water tank.

2. The apparatus of claim 1, wherein the length of the tank extends over the whole length of the apparatus.

3. The apparatus of claim 1 or 2, wherein the dock water pipe is provided with the discharge nozzles behind the dock wall, and each discharge nozzle has a short feed pipe extending through the dock wall into the interior of the dock, and an operating lever which is coupled to the shut off valve of the discharge nozzle and mounted for pivoting movement inside the dock, adjacent to the dock wall.

4. The apparatus of claim 3, wherein the control means fixed to the apparatus comprise a switching beam which can be actuated by a piston cylinder unit and transported into the range of movement of the operating lever.

5. The apparatus of claim 4, wherein the piston cylinder unit has a dual action cylinder, to which the control fluid can be supplied by a pump with the aid of a multi-way switching valve which can be reversed by a level control.

6. The apparatus of claim 4 or 5, wherein the operating lever is equipped with a roller at its free end.

7. The apparatus of any of claims 1 to 6, wherein a water deflecting plate projecting obliquely downwardly and into the interior of the water tank is fixed above the inlet aperture.

8. The apparatus of claim 7, wherein a supply plate is fixed to the lower edge of the inlet aperture and engages below short feed pipes upwardly and towards the dock wall.

9. The apparatus of claim 1, wherein the feed valve for the water tank is in the form of an electro magnetic valve, the apparatus is provided with an electrical circuit including a live rail associated with a contact wiper fixed to the dock, and the circuit can be broken by a float switch.

10. Apparatus for cleaning or preserving the sides of ships substantially as described with reference to the drawings.

11. A dock installation comprising apparatus according to any preceding claim.

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The degree to which the water tank 15 is filled is chosen so that, with a full washing action, the apparatus can travel the distance between two tapping points minus its own length.

Figure 4 shows an electrical control for the feed valve 30 for the water tank 15. The feed valve is in the form of an electro magnetic valve and is arranged in the same way as the discharge nozzle 21 described.

The negative pole for the electro magnetic valve 30 is taken from the rail 3, 4, which is connected to the negative pole of the energy supply 36 to the apparatus by the runners 31. A live rail 32 is mounted on the apparatus with insulation and extends along the whole length of the tank 15. A contact wiper 33, interacting with the live rail, is also provided.

The automatic water filling plant is set in operation by a switch 34. The float switch 35 breaks the circuit supplied by the current source 36, to prevent the tank 15 from over-filling.

This arrangement ensures that additional water is let in only if the switch 34 is operated, the float switch 35 closed and the contact wiper 33 in contact with the live rail 32.

CLAIMS

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articulated to the jib, a mast which can pivot about a horizontal and a vertical axis and which carries the working equipment, wherein a water tank is fixed to the carriage and has a water inlet aperture, extending almost along the whole length of the tank, in the upper region, at the side associated with the vertical dock wall, a dock water pipe, provided with a plurality of tapping points, being arranged at the dock wall opposite the water inlet aperture, and wherein the discharge nozzles of the tapping points can be opened by a control means fixed to the apparatus and responding to the water level in the water tank.

2. The apparatus of claim 1, wherein the length of the tank extends over the whole length of the apparatus.

3. The apparatus of claim 1 or 2, wherein the dock water pipe is provided with the discharge nozzles behind the dock wall, and each discharge nozzle has a short feed pipe extending through the dock wall into the interior of the dock, and an operating lever which is coupled to the shut off valve of the discharge nozzle and mounted for pivoting movement inside the dock, adjacent to the dock wall.

4. The apparatus of claim 3, wherein the control means fixed to the apparatus comprise a switching beam which can be actuated by a piston cylinder unit and transported into the range of movement of the operating lever.

5. The apparatus of claim 4, wherein the piston cylinder unit has a dual action cylinder, to which the control fluid can be supplied by a pump with the aid of a multi-way switching valve which can be reversed by a level control.

6. The apparatus of claim 4 or 5, wherein the operating lever is equipped with a roller at its free end.

7. The apparatus of any of claims 1 to 6, wherein a water deflecting plate projecting obliquely downwardly and into the interior of the water tank is fixed above the inlet aperture.

8. The apparatus of claim 7, wherein a supply plate is fixed to the lower edge of the inlet aperture and engages below short feed pipes upwardly and towards the dock wall.

9. The apparatus of claim 1, wherein the feed valve for the water tank is in the form of an electro magnetic valve, the apparatus is provided with an electrical circuit including a live rail associated with a contact wiper fixed to the dock, and the circuit can be broken by a float switch.

10. Apparatus for cleaning or preserving the sides of ships substantially as described with reference to the drawings.

11. A dock installation comprising apparatus according to any preceding claim.