

[54] **APPARATUS FOR EXTERNAL TREATMENT OF SHIPS' HULLS OR THE LIKE**

[76] Inventor: **Paul Hammelmann**, Zum Sundern 17, Oelde, Westphalia, Germany

[22] Filed: **Jan. 28, 1974**

[21] Appl. No.: **438,488**

[30] **Foreign Application Priority Data**

Feb. 1, 1973 Germany..... 2304751

[52] **U.S. Cl.**..... 114/222; 51/9 M

[51] **Int. Cl.²**..... B24C 3/06; B63B 59/00

[58] **Field of Search**..... 114/222; 51/8, 9 M; 118/108, 305, 207; 212/10

[56] **References Cited**
UNITED STATES PATENTS

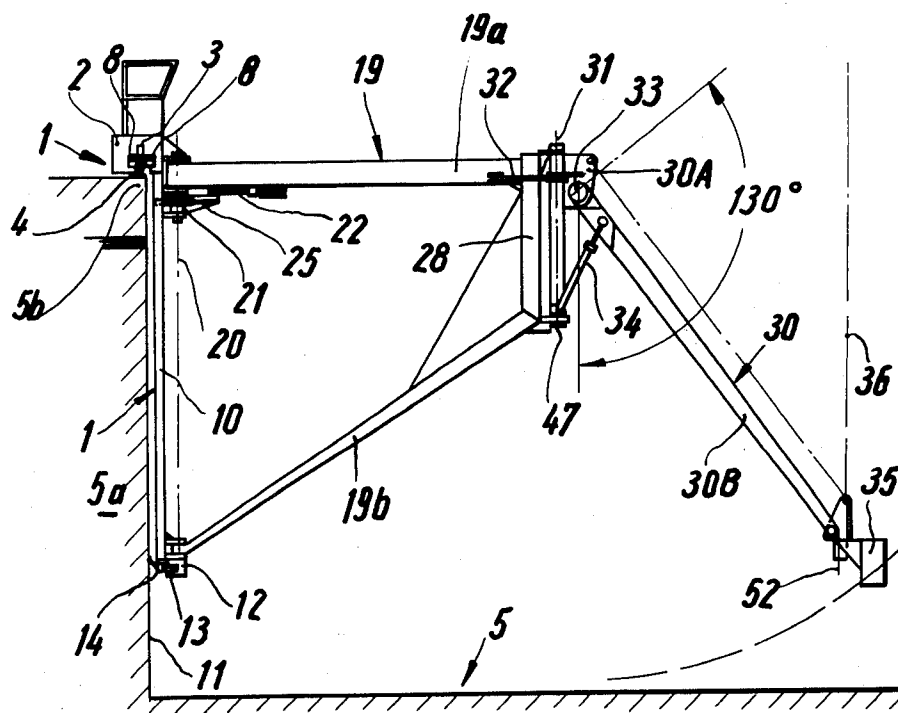
3,396,492	8/1968	Schenck.....	51/8 R
3,705,565	12/1972	Hammelmann.....	114/222
3,827,187	8/1974	Yamamoto et al.	114/222 X

Primary Examiner—Trygve M. Blix
Assistant Examiner—Stuart M. Goldstein
Attorney, Agent, or Firm—Michael S. Striker

[57]

ABSTRACT

Apparatus for cleaning, painting and/or similar treatment of ships' hulls in a dock has a carriage which has horizontal and vertical sections movable along the top surface and the vertical surface of a side wall in a dock, a frame-like beam which is pivotably secured to the vertical section for movement about a vertical axis along an arc of 180°, a boom which is pivotable with respect to the beam about horizontal and vertical axes, and a gondola for one or more surface-treating aggregates which is mounted at the free end of the boom. The beam and the boom can be moved to such positions that the aggregate or aggregates can reach the central vertical symmetry plane of the dock. The gondola is turnable relative to the boom about a vertical axis and the aggregate or aggregates are turnable relative to the gondola about a horizontal axis. Such mounting of the beam, boom, gondola and aggregate or aggregates enables the latter to treat an external surface of a hull all the way between the front and rear ends of the vessel.

19 Claims, 10 Drawing Figures


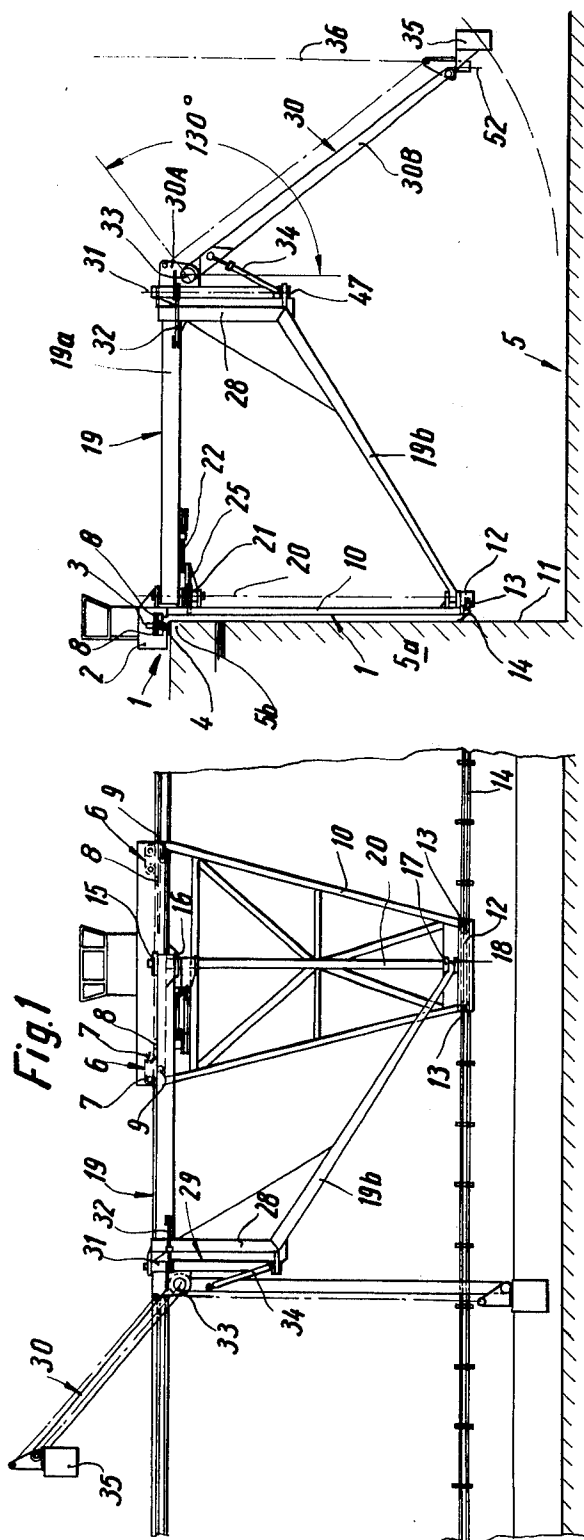


Fig. 3

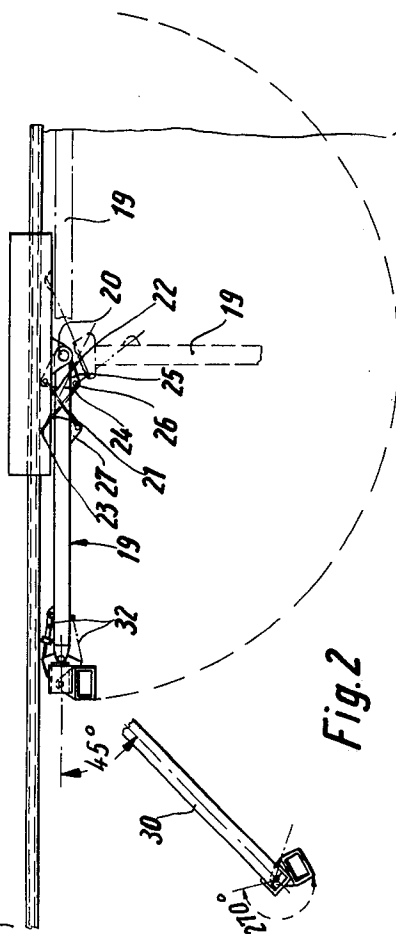


Fig. 2

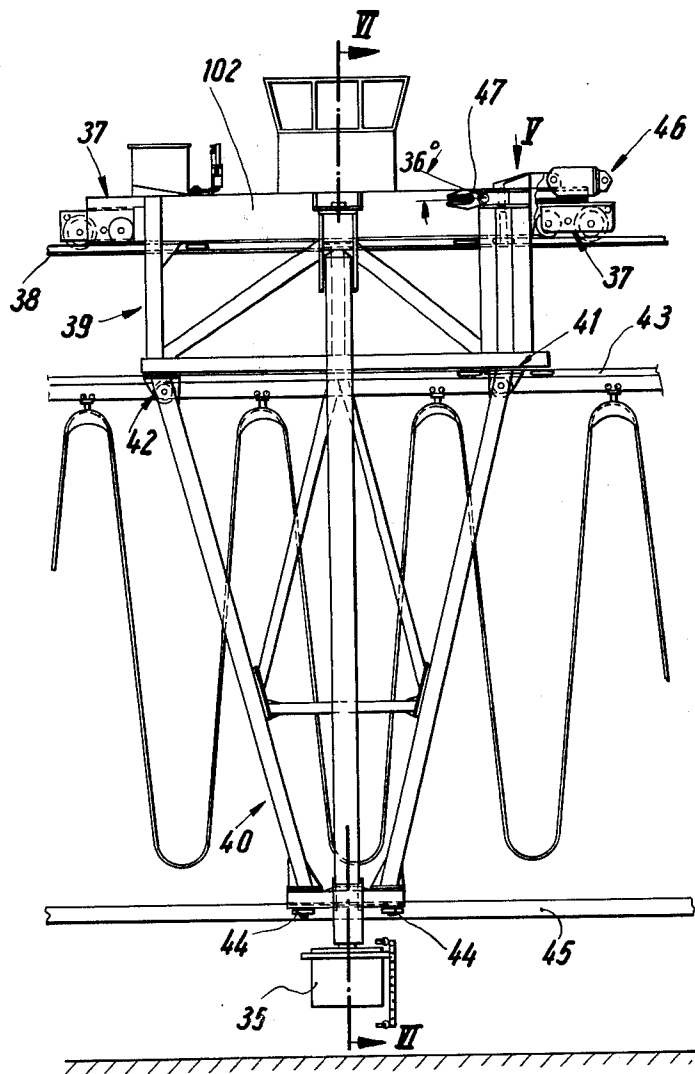


Fig. 4

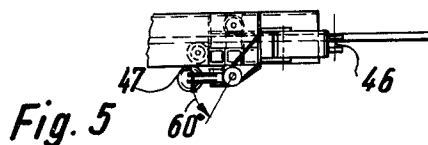


Fig. 5

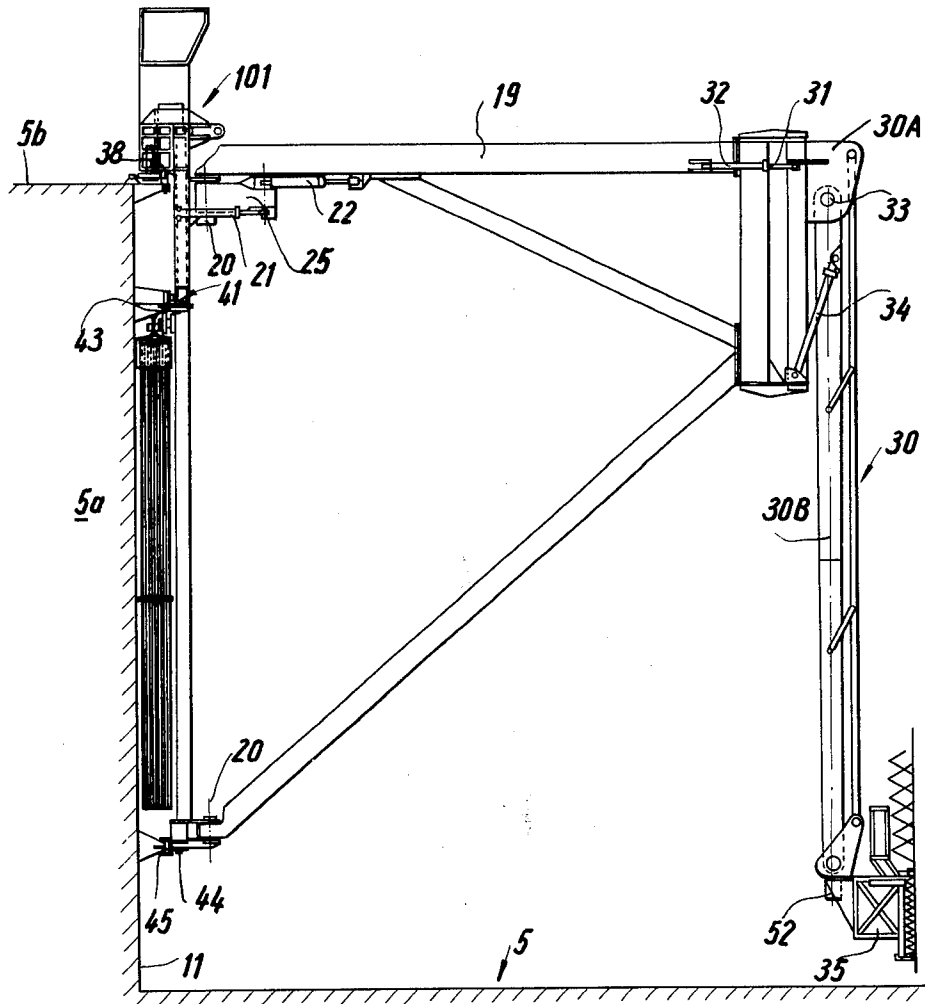
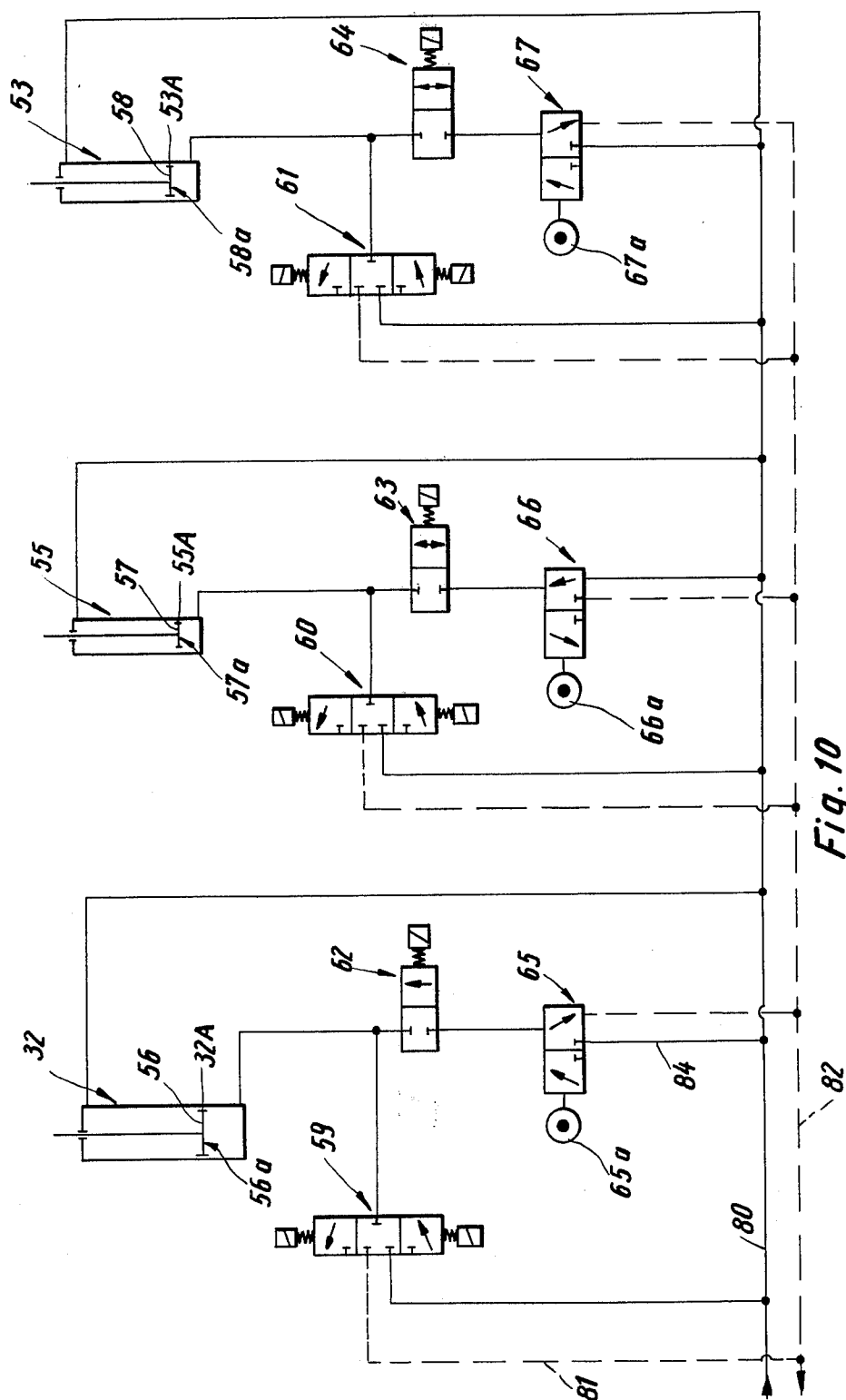


Fig. 6



APPARATUS FOR EXTERNAL TREATMENT OF SHIPS' HULLS OR THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for treating vertical or inclined surfaces, particularly for painting, inspecting, cleaning and/or other treatment of the external surfaces of ships in wet or dry docks.

My U.S. Pat. No. 3,623,902 discloses an apparatus having a carriage or vehicle which is movable lengthwise of a dock wall, preferably along the upper side of the bottom wall of a dry dock, and carries an elongated collapsible support or mast for one or more aggregates or working units which are employed to treat the adjacent surface of the hull of a ship in the dock. The aggregate or aggregates are installed at the free upper end of the mast and the latter comprises two sections and is pivotable with reference to the carriage about a horizontal axis so that the aggregate or aggregates can be moved to several levels, for example, to paint or clean the adjacent surface of a ship's hull in two or more stages. The mast further carries means for maintaining the aggregate or aggregates in a horizontal position irrespective of the inclination of the mast relative to the carriage. The aggregate or aggregates are further movable relative to the other parts of the apparatus along a horizontal path. A control system for the apparatus includes means for moving the carriage at a constant speed, for changing the inclination of the mast, and for moving the aggregate or aggregates relative to the mast along the aforementioned horizontal path. The arrangement is such that, when the inclination of the mast changes, the aggregate or aggregates are moved horizontally counter to the direction of movement of the carriage relative to the dock and at the exact speed of the carriage. When the aggregate or aggregates reach the one or the other end of their horizontal path during movement relative to the mast, they are rapidly moved in the direction of movement of the carriage to an extent which corresponds to the width of that portion of a surface which can be treated in a single pass. As mentioned before, the aggregate or aggregates are movable relative to the mast; as a rule, they are caused to pivot along an arcuate path whenever the inclination of the mast changes.

The horizontal pivot axis for the upper section of the mast is located substantially midway between the deck and the keel of a hull in the dock. This insures that the hull can be treated by an apparatus having a relatively short mast. If the carriage is arranged to travel along the upper side of a vertical wall of the dock, the controls can be mounted on the top surface of the dock to be readily accessible to attendants. Also, such mounting of the carriage facilitates the replenishing of the supply of fuel and/or other materials (such as pressurized water, paint, rustproofing fluid and/or others) which are being consumed when the apparatus is in use. This is in contrast to apparatus which are mounted at the lower edge of a vertical wall in a dry dock so that the supplies must be transported along a much longer route.

The just described apparatus exhibits the drawback that its aggregate or aggregates cannot treat the surfaces at the front and/or rear end of a ship's hull. Therefore, the patented apparatus must be used together with auxiliary apparatus which are specifically designed to treat the front and/or rear part of a hull

which is stationed in a dry or wet dock, preferably in a dry dock.

SUMMARY OF THE INVENTION

An object of the invention is to provide an apparatus which can treat vertical or inclined surfaces, particularly the external surfaces of ships' hulls in dry or wet docks, and which is more versatile than heretofore known apparatus, especially as concerns the ability of surface-treating aggregate or aggregates to reach the surfaces at the front and rear ends of the hull.

Another object of the invention is to provide an apparatus which can be operated automatically by remote control, wherein the surface-treating aggregate or aggregates are movable in more directions and have a greater range than in heretofore known apparatus, and which can be used as a means for moving a ship's hull into a dry or wet dock.

A further object of the invention is to provide an apparatus which is capable, by itself, of treating the entire surface at one side of a ship's hull without resorting to scaffoldings or special apparatus which are presently employed to treat the surfaces in the region of the front and/or rear end of a hull.

An additional object of the invention is to provide novel and improved means for moving the gondola, the surface treating aggregate or aggregates and other parts of the improved apparatus.

Still another object of the invention is to provide an apparatus which is constructed and assembled in such a way that its motors and aggregates can be readily and conveniently supplied with fuel as well as with paint, oil, rustproofing agent and/or other substances which are used in connection with cleaning, painting and similar treatment of ships' hulls.

The apparatus of the present invention is used for the treatment of vertical and/or inclined surfaces, particularly for cleaning, painting and/or similar treatment of external surfaces of ships' hulls in dry or wet docks. The apparatus comprises a carriage or vehicle, ways supporting the carriage for movement along a substantially horizontal path and lengthwise of a surface to be treated, a beam which preferably resembles a skeleton frame and is supported by and is pivotable with respect to the carriage about a first substantially vertical axis, and elongated boom which is supported by the beam at a point remote from the first vertical axis and is pivotable relative to the beam about a second vertical axis as well as about a horizontal axis, and at least one surface-treating device or aggregate mounted at that end of the boom which is remote from the horizontal axis and from the second vertical axis.

The carriage is preferably movable lengthwise of an upstanding side wall forming part of a dock and having a substantially horizontal top surface and a substantially vertical second surface which faces the surface to be treated. The carriage may comprise a horizontal section which has followers tracking one or more rails on the top surface of the wall and a vertical section which is adjacent to and has followers tracking one or more horizontal rails provided on the vertical second surface of the wall. The beam is preferably pivotable along an arc of 180°, and the means for pivoting the beam may comprise a pair of fluid-operated motors which cooperate with a bracket or an analogous member turnable about the first vertical axis.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved apparatus itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic front elevational view of an apparatus which embodies one form of the invention and whose carriage includes sections arranged to travel along the horizontal top surface and the vertical inner surface of an upright wall in a dry dock, the beam of the apparatus being shown in two different positions;

FIG. 2 is a plan view of the apparatus of FIG. 1, the beam of the apparatus being shown in three different positions;

FIG. 3 is a side elevational view of the apparatus with the beam and boom in positions they assume when the aggregate or aggregates at the free end of the boom extend all the way to the longitudinal central vertical symmetry plane of the dock;

FIG. 4 is a front elevational view of a second apparatus having a modified carriage for the beam;

FIG. 5 is a fragmentary plan view of a detail as seen in the direction of arrow V in FIG. 4;

FIG. 6 is a view as seen in the direction of arrows from the line VI—VI of FIG. 4;

FIG. 7 is an enlarged view of a detail in the apparatus of FIG. 4;

FIG. 8 is a plan view of a gondola shown in FIG. 7;

FIG. 9 is an enlarged view of a detail in the lower right-hand portion of FIG. 6; and

FIG. 10 is a diagram of the hydraulic control circuit for the apparatus of FIGS. 4 to 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The apparatus of FIGS. 1 to 3 is installed in a dry dock 5 having two upright side walls 5a (only one shown) and each side wall 5a has a vertical inner surface 11 which faces a hull (not shown in the dock 5 and a substantially horizontal top surface 5b. The longitudinal central vertical symmetry plane of the dock 5 is indicated by a phantom line, as at 36. The apparatus comprises a substantially L-shaped carriage or vehicle 1 including a relatively short horizontal portion or section 2 which overlies the top surface 5b and a relatively long vertical portion or section 10 which is adjacent to the vertical inner surface 11. The guide means or ways for the horizontal portion 2 comprises a T-rail 4 which is affixed to the side wall 5a and extends upwardly beyond the top surface 5b, and an elongated rail 3. The rails 3, 4 extend in parallelism with the horizontal edge between the surfaces 5b, 11 of the wall 5a and define a horizontal path for the section 2. The follower means 6 for tracking the ways 3, 4 for the section 2 of the carriage 1 comprises two sets of rollers which are mounted at the longitudinal ends of the horizontal section 2. Each set of rollers comprises several (for example, two) rollers 7 which engage the upper side of the T-rail 4, one, two or more rollers 8 which engage the edge faces of the rail 3, and one or more rollers 9 which engage the underside of the upper flange of the T-rail 4.

The rollers 7, 9 are rotatable about horizontal axes and the rollers 8 are rotatable about vertical axes.

The vertical section 10 of the carriage 1 constitutes a skeleton frame which is parallel to the inner surface 11 and whose width decreases downwardly, i.e., away from the horizontal section 2. A horizontal lower frame member or bar 12 of the section 10 carries several roller followers 13 which are rotatable about vertical axes and track a further horizontal T-rail 14 which is secured to the wall 5a and extends into the interior of the dock 5, i.e., away from the surface 11, and in parallelism with the rails 3, 4. The upper portion of the vertical section 10 is provided with integral or separable bearing plates 15, 16 which register with similar bearing plates 17, 18 on or close to the bar 12. The bearing plates 15-18 are traversed and turnably support a vertical shaft 20 for a cantilever or beam 19 which is thus movable with the carriage 1 lengthwise of the rails 3, 4, 14 and is also pivotable about the vertical axis of the shaft 20. As shown in FIG. 2, the beam 19 can pivot along an arc of up to 180°. FIG. 3 shows that the beam 19 is a hollow frame having a trapezoidal outline and including a horizontal upper portion 19a, a vertical portion 28 which is remote from the shaft 20, and an inclined lower portion 19b which connects the lower end of the vertical portion 28 with the lower end of the shaft 20.

The means for pivoting the beam 19 about the axis of the shaft 20 comprises two fluid-operated motors in the form of double-acting hydraulic cylinders 21 and 22. The cylinder 21 is pivotably secured to the vertical section 10 of the carriage 1 by a pin 23 and has a piston rod 24 which is articulately connected to a turnable member or bracket 25, as at 26. The bracket 25 is pivotably mounted on the shaft 20 and is coupled to the cylinder 22. The piston rod of the cylinder 22 is articulately connected to a lug or projection 27 of the beam 19. If the cylinder 21 is actuated to expel the piston rod 24, the bracket 25 turns on the shaft 10 in a counterclockwise direction, as viewed in FIG. 2. The cylinder 22 then acts as a rigid connector between the bracket 25 and lug 27 so that the beam 19 turns about the axis of the shaft 20 in a counterclockwise direction, i.e., in the same direction as the bracket 25. The cylinder 21 is dimensioned and mounted to turn the bracket 25 and the beam 19 along an arc of 90°. Thus, the cylinder 21 can pivot the beam 19 between the phantom-line and broken-line positions of FIG. 2. If, the beam 19 is to be pivoted along an arc exceeding 90°, the cylinder 22 is actuated after the beam has completed an angular movement through 90° under the action of the cylinder 21. When the piston in the cylinder 22 completes a full stroke, the beam 19 is pivoted through an additional angle of 90°, i.e., the cylinders 21, 22 can cooperate to move the beam 19 between the solid-line and phantom-line positions of FIG. 2.

The vertical portion 28 of the beam 19 carries a vertical sleeve 29 for a shaft 31 which carries an elongated boom 30. Thus, the boom 30 can participate in all movements of the beam 19 with and relative to the carriage 1 and is also pivotable relative to the beam 19 about the vertical axis of the shaft 31. The means for pivoting the boom 30 about the axis of the shaft 31 comprises one or more fluid-operated motors in the form of hydraulic cylinders 32 mounted on the beam 19. If the means for pivoting the boom 30 comprises

two cylinders 32, they are mounted at the opposite sides of the beam 19 (see FIG. 2).

The boom 30 comprises a first portion 30A which is pivotable about the shaft 31 by means of cylinders 22 and carries a horizontal shaft 33 for an elongated second portion 30B of the boom 30. The means for pivoting the portion 30B about the axis of the shaft 33 comprises one or more fluid-operated motors 34 each of which may constitute a hydraulic cylinder. In the embodiment of FIG. 1, the portion 30B of the boom 30 is pivotable through an angle of 130°. The free or outer end of the portion 30B carries a holder here shown as a basket or gondola 35 which can support one or more attendants and/or one or more surface-treating devices or aggregates, for example, one or more nozzles for the discharge of highly pressurized water, one or more nozzles for the discharge of paint, rustproofing means and/or other coating substances, one or more mechanical scrapers, and/or others. FIGS. 7 and 9 show that the gondola 35 carries a vertical tube 48 having at least one vertical row of spray nozzles 48a for pressurized water and a vertical tube 50 for at least one vertical row of nozzles 49 which discharge paint, a rustproofing agent or another fluid coating material. The tube 49 may be provided in addition to or instead of the tube 48. The tube 50 is mounted on an upwardly extending carrier 51. The carrier 51 is mounted on a bracket 51a of the gondola 35. Means are provided to insure that the orientation of the gondola 35 with respect to the adjacent surface of a ship's hull can remain unchanged when the portion 30B of the boom 30 is pivoted about the axis of the horizontal shaft 33. Thus, the tube 48 and/or 50 can remain vertical while the cylinder or cylinders 34 are actuated to pivot the portion 30B relative to the portion 30A. The gondola 35 is preferably movable relative to the portion 30B along a horizontal path, i.e., in parallelism with movements of the carriage 1 along the rails 3, 4, 14 but in the opposite direction, the same as disclosed in my U.S. Pat. No. 3,623,902. This insures that the nozzles 48a and/or 49 can treat surface portions of identical width in spite of the fact that the boom portion 30B is pivotable about the axis of the shaft 33. When the gondola 35 reaches the one or the other end of its path of movement relative to the portion 30B, the angular position of the beam 19 and portion 30B is rapidly changed so that the nozzles 48a and/or 49 can begin with the treatment of the adjoining strip of the external surface of a hull in the dock 5.

It is also within the purview of the invention to operate the apparatus in a slightly different way. Thus, the carriage 1, the beam 19 and the boom portions 30A, 30B can be moved to insure that the aggregate or aggregates (such as the tubes 48, 50) in or on the gondola 35 can treat a continuous strip of the external surface of a hull from the foremost to the rearmost end of the hull or vice versa. The discharge of water and/or a coating fluid is terminated when the gondola 35 reaches the front or rear end of the hull, and the level of the gondola 35 is then changed so that the material which is being discharged from one or more aggregates can be applied to the adjacent strip, either above or below the previously treated strip.

In the apparatus of FIGS. 1 to 3, the dimensions of the beam 19 and boom 30, and the various shafts for the beam 19, portion 30A and portion 30B are selected in such a way that the gondola 35 and the aggregate or aggregates in or on the gondola 35 can reach the afore-

mentioned central longitudinal vertical symmetry plane 36 of the dry dock 5. This insures that the apparatus can treat an entire side of the properly docked hull. The portion 30A of the boom 30 is pivotable about the axis of the vertical shaft 31 through an angle of 45°.

The apparatus of FIGS. 4 to 6 comprises an inverted L-shaped carriage 101 or vehicle whose horizontal section 102 overlies the top surface of the dock wall 5a and has two follower means 37 including rollers which track an elongated rail 38 secured to the surface 5b of the wall 5a. The vertical section of the carriage 101 includes a substantially rectangular upper skeleton frame 39 and a trapezoidal lower skeleton frame 40 whose width diminishes in a direction away from the skeleton frame 39. Additional or auxiliary roller followers 41 and 42 are provided in the region between the frames 39, 40 to track a horizontal rail 43 which is secured to the surface 11 of the wall 5a. The lower end portion of the frame 40 is provided with roller followers 44 which track a further horizontal rail 45 on the surface 11.

One end of the carriage 101 is provided with a forked coupling device 46 for one end of a cable or rope, not shown, which can be moved by a suitable winch on the wall 5a so as to move the carriage along the rails 38, 43, 45. Furthermore, the same end of the carriage 101 is provided with a fastener 47 which can be secured to one end of which is secured to a vessel so that the vessel can be pulled into the dock 5. This reduces the cost of docking facilities since the winch which pulls the carriage 101 can also be used to move a ship into the space between the two upright walls 5a of the dock 5. It will be noted that the shaft 20 for the beam 19 of FIGS. 4-6 comprises two discrete coaxial parts.

The carriage 101 supports a beam or cantilever 19 which is similar to or identical with the beam 19 of FIGS. 1 to 3. The cylinder or cylinders 32 for pivoting the portion 30A of the boom 30 about the axis of the vertical shaft 31 are designed to pivot the portion 30A through 45° to both sides of a central or neutral position.

The gondola or basket 35 at the outer end of the portion 30B of the boom 30 is turnable about the axis of a vertical shaft 52 through the medium of a hydraulic cylinder 53 shown in FIG. 10. The arrangement may be such that the gondola 35 is turnable through 15° in one direction and through 80° in the opposite direction. The tubes 48 and 50 are pivotable relative to the gondola 35 about the axis of a horizontal shaft 54 (see FIGS. 8 and 9) through the medium of a hydraulic cylinder 55, for example, through 5° in one direction and through 35° in the opposite direction.

The diagram of FIG. 10 shows that the smaller upper surfaces 56, 58, 57 of pistons 32A, 53A, 55A in the respective cylinders 32, 53, 55 are constantly subjected to the pressure of a suitable hydraulic fluid (e.g., oil) which is admitted via supply conduit 80. The flow of pressurized hydraulic fluid into the other chambers of the cylinders 32, 53, 55 is controlled by manually actuable three-way valves 59, 61, 60. When the valve 59 is open to admit fluid into the cylinder 32 from the supply conduit 80, the fluid acts against the larger surface 56a of the piston 32A and causes the piston rod of the cylinder 32 to move upwardly, as viewed in FIG. 10. When the valve 59 is moved to a neutral position, the lower chamber of the cylinder 32 is sealed from the supply conduit 80 and the piston 32A comes to a standstill. If the piston rod of the cylinder 32 is to move

downwardly, as viewed in FIG. 10, the valve 59 is set to connect the lower chamber of the cylinder 32 with a return conduit 82 which conveys fluid back to the source, e.g., a tank from which the fluid is forced into the supply conduit 80 by a pump or the like, not shown. The reference character 81 denotes a connecting conduit between an outlet of the valve 59 and the return conduit 81. The mode of operation of the valves 60, 61 is analogous to that of the valve 59.

The lower chamber of the cylinder 32 is further connectable with the supply conduit 80 by way of a solenoid-operated shutoff valve 62 which is in series with an automatic scanning valve 65. The solenoid of the valve 62 is energizable by a suitable control button, not shown, in order to avoid accidental opening of the valve 62. The valve 65 has a projection (e.g., a roller) 65a. A conduit 84 which contains the valve 62, 65 connects the lower chamber of the cylinder 32 with the supply conduit 80. The valve 65 is mounted on the support for the tube 48 (see FIGS. 7 and 8). When the valve 62 is actuated, it causes the cylinder 32 to move the portion 30A in a direction to advance the gondola 35 toward the adjacent exposed surface of a ship's hull, and the projection 65a then engages such surface to interrupt the flow of pressurized fluid from the conduit 80 to the valve 62 or to change the direction of fluid flow from the lower chamber of the cylinder 32 back to the return conduit 82. The operation of the valves 63, 66 and 64, 67 for the cylinders 55, 53 is analogous. When the valves 62-64 are open the respective cylinder 32, 55, 53 invariably cause the corresponding parts 30A, 48 and/or 50, and 35 to move toward the adjacent surface to be treated. The valves 66 and 67 have rollers 66a, 67a which are also shown in FIGS. 7 to 9.

It is clear that the hydraulic control system of the apparatus further comprises suitable limit switches or analogous safety devices of known design which automatically terminate the movements of corresponding parts when the pistons in the corresponding cylinders reach the ends of their respective strokes. Such safety devices are not shown in the drawing because their design forms no part of the present invention.

An important advantage of the improved apparatus is that, by pivoting the beam 19 about the axis of the shaft 20 and/or by pivoting the boom 30 about the axis of the shaft 31, the surface-treating devices or aggregates in and/or on the gondola 35 can reach deep into the interior of a dock, i.e., at least to the central symmetry plane 36 of the dock. This enables such device or devices to treat one surface of a ship's hull all the way from the bow to the stern or vice versa. At the same time, the pivotability of the portion 30B of the boom 30 about the axis of the shaft 33 enables the gondola 35 to move all the way from the deck of a ship in the dock and all the way to the keel. The pivotability of the gondola 35 relative to the boom 30 and the pivotability of the surface-treating device or devices relative to the gondola enables such device or devices to properly treat vertical as well as inclined portions of a surface and to properly treat those portions of the surface which are located in the region of the front or rear end of the hull. The structure shown in FIGS. 7-10 enables the surface-treating device or devices to automatically change their orientation in response to changes in the inclination and/or curvature of the adjacent surface to be treated. The beam 19 can be pivoted automatically while the carriage 1 or 101 travels along the ways

on the surfaces 5b and 11 of the wall 5a. Also, the boom portion 30B can be pivoted automatically about the axis of the shaft 33 while the carriage 1 or 101 travels along the wall 5a or while the carriage approaches the one or the other end of its horizontal path. As mentioned above, it is equally within the purview of the invention to change the position of the boom portion 30B relative to the shaft 33 only when the carriage 1 or 101 reaches the one or the other end of its path along the wall 5a.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. Apparatus for treating vertical and/or inclined surfaces, particularly for cleaning, painting and/or similar treatment of external surfaces of ships' hulls in dry docks, comprising a carriage; ways supporting said carriage for movement along a substantially horizontal path and lengthwise of a surface to be treated; a beam supported by said carriage and pivotable with respect thereto about a first substantially vertical axis; motor means connected to said beam for pivoting the same relative to said carriage along an arc of about 180°; an elongated boom supported by and pivotable with respect to said beam about a horizontal axis and a second vertical axis, said boom having an end remote from said last mentioned axis; and at least one surface treating device provided at said end of said boom.

2. Apparatus as defined in claim 1, wherein said carriage is movable lengthwise of an upstanding wall forming part of a dock and having a substantially horizontal top surface, said ways including at least one rail mounted on said top surface.

3. Apparatus as defined in claim 1, wherein said means for pivoting said beam comprises a member pivotable about said first vertical axis, a first-fluid operated motor coupled to said carriage and actuatable to pivot said member along a first portion of said arc, and a second fluid-operated motor coupled to said member and arranged to pivot said beam in response to actuation of said first motor, said second motor being actuatable to pivot said beam along the remaining second portion of said arc.

4. Apparatus as defined in claim 1, wherein said carriage is movable lengthwise of an upright side wall of a dock having a central vertical symmetry plane, said beam and said boom being pivotable about the respective axes to at least one position in which said surface-treating device is adjacent to said plane.

5. Apparatus as defined in claim 1, further comprising a holder mounted at said end of said boom and supporting said surface-treating device.

6. Apparatus as defined in claim 5, wherein said holder is a basket or a gondola.

7. Apparatus as defined in claim 5, wherein said holder is movable relative to said end of said boom and further comprising means for moving said holder relative to said boom.

8. Apparatus as defined in claim 7, wherein said holder is pivotable relative to said boom about a substantially vertical axis.

9. Apparatus as defined in claim 5, wherein said device is movable relative to said holder and further comprising means for moving said device relative to said holder.

10. Apparatus as defined in claim 9, wherein said device is pivotable relative to said holder and said holder is pivotable relative to said end of said boom, the pivot axis of said device being normal to the pivot axis of said holder.

11. Apparatus as defined in claim 1, wherein said carriage comprises fastener means for securing thereto the cable of a vessel so that the vessel can be docked in response to movement of said carriage along said ways.

12. Apparatus as defined in claim 1, wherein said beam has a trapezoidal outline and includes a vertical portion remote from said first vertical axis and defining said second vertical axis.

13. Apparatus as defined in claim 1, wherein said boom includes first and second portions which are pivotable as a unit about said second vertical axis, said second portion being pivotable with respect to said first portion about said horizontal axis, said end of said boom constituting the free end of said second portion.

14. Apparatus as defined in claim 13, and including fluid operated cylinder and piston means between said beam and said first portion for pivoting said boom about said second vertical axis.

15. Apparatus as defined in claim 13 and including fluid operated cylinder and piston means between said beam and said second portion of said boom for pivoting said second portion about said horizontal axis.

16. Apparatus as defined in claim 1, wherein said carriage is movable along an upright wall forming part of a dock and having a substantially horizontal top surface and a substantially vertical second surface extending downwardly from said top surface, said carriage having a first section overlying said top surface and a second section adjacent to said second surface.

17. Apparatus as defined in claim 16, wherein said second section is a skeleton frame and said beam is supported by said second section.

18. Apparatus as defined in claim 16, wherein said ways include at least one elongated rail on said top surface and at least one elongated rail on said second surface of said wall, said sections of said carriage having follower means tracking the respective rails.

19. Apparatus as defined in claim 16, wherein said ways include at least one first rail provided on said top surface and said first section of said carriage includes roller follower means tracking said first rail, said ways further including a plurality of additional rails provided on said second surface and extending in parallelism with said first rail, said second section of said carriage having discrete follower means for each of said additional rails.

* * * * *

35

40

45

50

55

60

65