

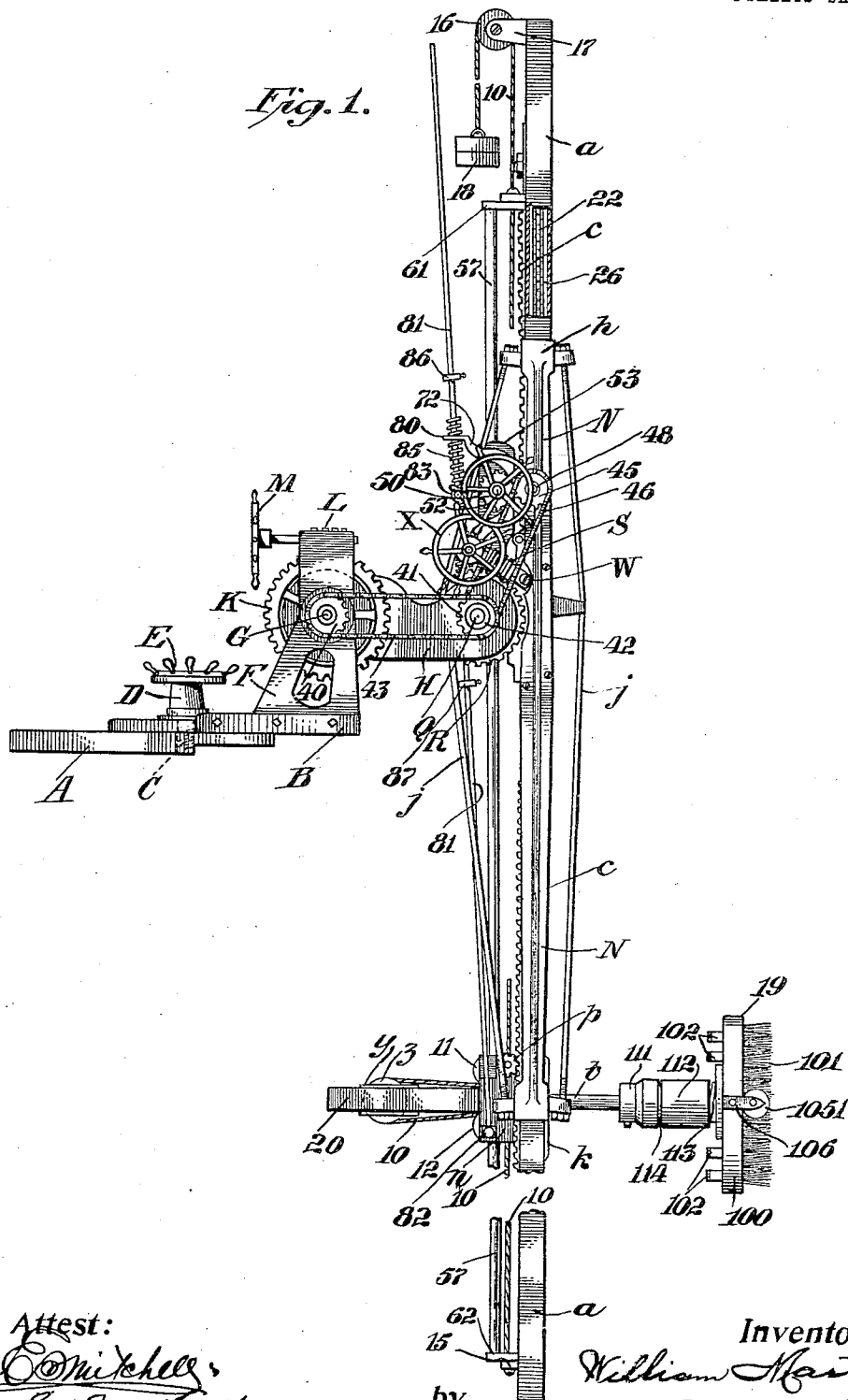
936,466.

W. MARTIN.
SHIP CLEANING DEVICE.
APPLICATION FILED JAN. 5, 1907.

Patented Oct. 12, 1909.

4 SHEETS—SHEET 1.

Fig. 1.



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Comiskey
Lee J. Mathey

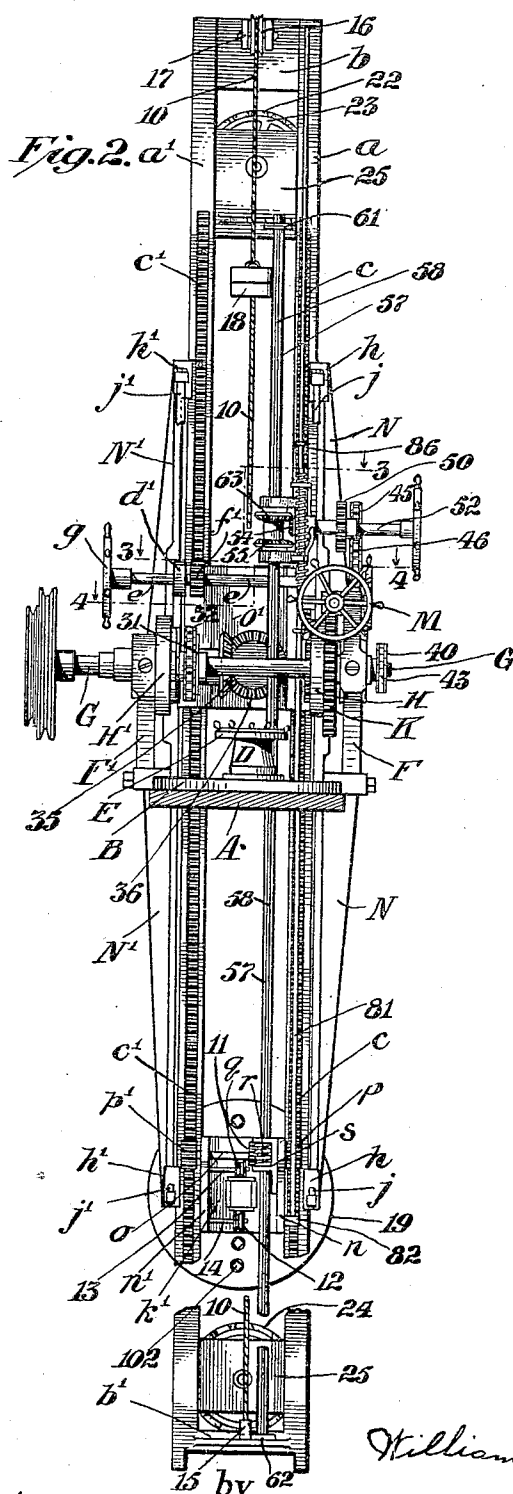
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

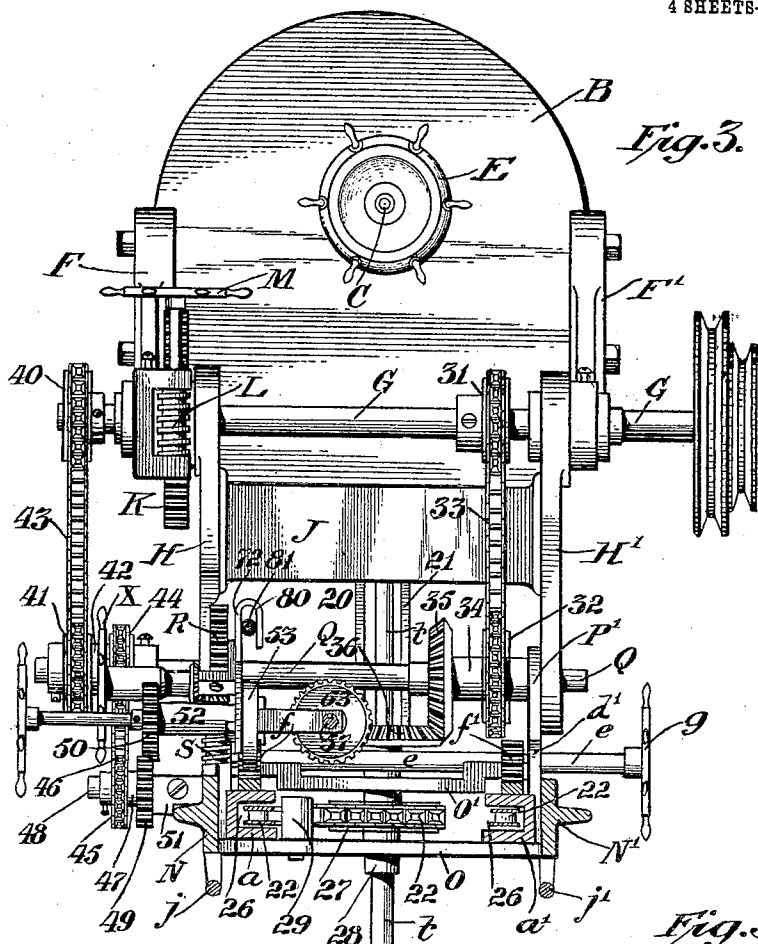


Fig. 3.

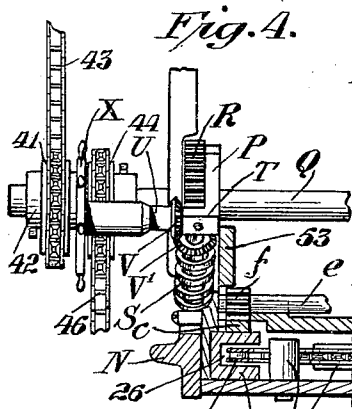


Fig. 4.

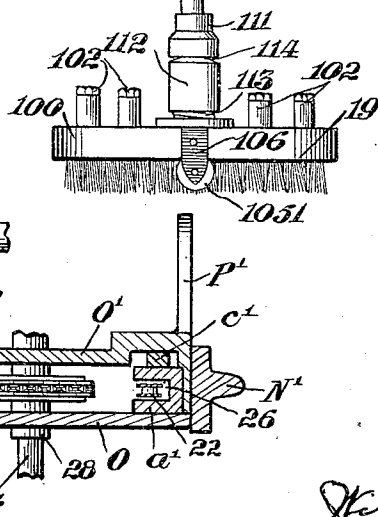


Fig. 5.

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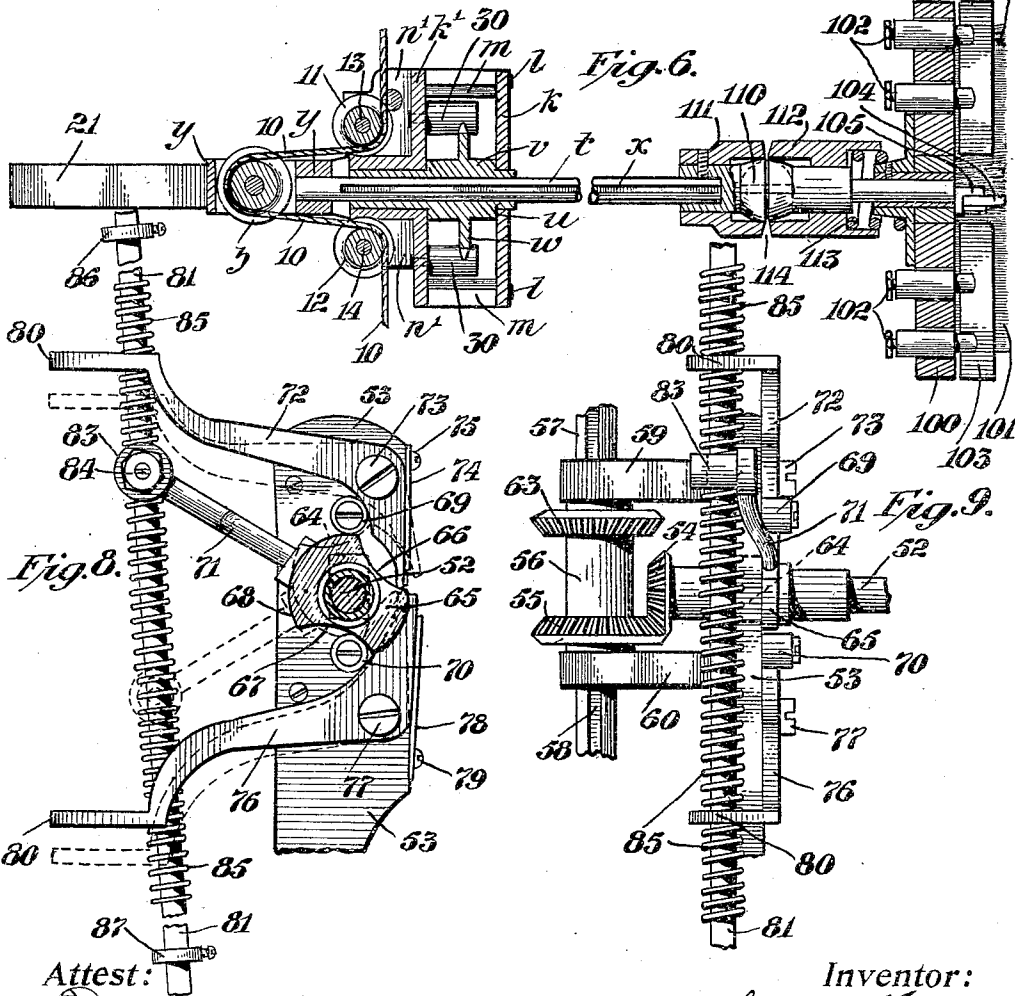
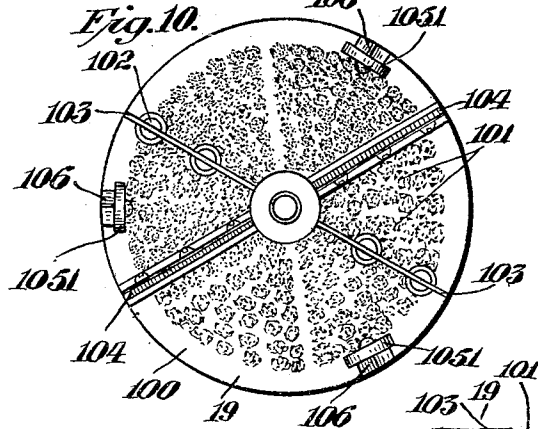
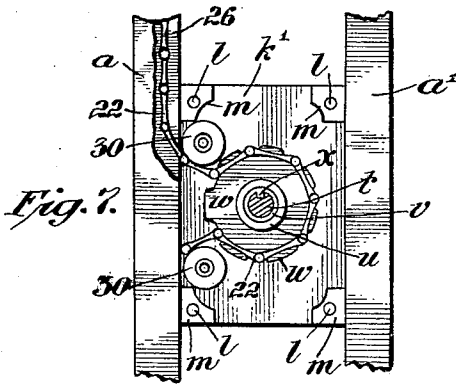
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

WILLIAM MARTIN, OF WATERTOWN, NEW YORK.

SHIP-CLEANING DEVICE.

936,466.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed January 5, 1907. Serial No. 351,012.

To all whom it may concern:

Be it known that I, WILLIAM MARTIN, a citizen of the United States, and a resident of Watertown, county of Jefferson, and State of New York, have invented certain new and useful Improvements in Ship-Cleaning Devices, of which the following is a specification, accompanied by drawings.

This invention relates to ship cleaning devices, more particularly to ship cleaning devices which are adapted to be mounted upon a pontoon, and the objects of the invention are to improve the construction of such devices, and to construct an adjustable frame for supporting a brush or scraper, which is adapted to be continuously operated during all the movements of the frame.

Further objects of the invention will hereinafter appear, and to these ends the same consists of a device for carrying out the above objects, embodying the features of construction, combination of elements, and arrangement of parts having the general mode of operation, substantially as herein-
after fully described and claimed in this specification and shown in the accompanying drawings, in which—

Figure 1 is a side elevation of the cleaning device with parts broken away; Fig. 2 is a rear elevation with parts broken away; Fig. 3 is a plan view partly in section on the line 3—3 of Fig. 2; Fig. 4 is a plan view partly in section on the line 4—4 of Fig. 2, with parts broken away; Fig. 5 is a detail view of the arm P with the plates O and O' in section and with parts broken away; Fig. 6 is an enlarged longitudinal sectional view of the carriage and cleaner; Fig. 7 is an enlarged view, with parts broken away, of the inside of the carriage; Figs. 8 and 9 are enlarged details of the reversing means for operating the carriage; Fig. 10 is an enlarged plan view of the cleaner or brush.

Referring to the drawings, the support A is an overhanging portion of a pontoon, the remainder of which is not shown in the figures. On the support A is pivoted a base plate B by means of the post C, which passes through a suitable bearing in the base B and is screwed into the support A. The upper part of the post C is provided with a flange D, which bears against the top of the base plate B when the post C is screwed into position by turning the wheel E secured at its upper end. The base plate B is rounded

at both ends, suitably supporting at one end two uprights F and F', each of which is provided with a bearing in which the power shaft G is journaled.

An arm frame which consists of the two arms H and H' is held together by means of the web plate J. The inner ends of the arms H and H' are supported upon the power shaft G, about which the arm frame is free to move. To the arm H is secured the worm wheel K, which meshes with a worm L rotatably secured to the upright F. By turning the wheel M secured to the worm L the arm frame can be moved about the shaft G upon which the arm frame is loosely mounted, the worm L thereby holding the arm frame in any desired position.

The guide frame which consists of the flanged members N and N' is held together near the center by means of the plates O and O'. To the plate O' are secured the arms P and P', which are rotatably supported upon the shaft Q, which passes through the outer ends of the arms H and H'. To the arm H is secured the worm wheel R which meshes with a worm S, one end of which is rotatably supported upon the arm P by means of an extension T, in which is journaled a shaft U provided with a small beveled gear V, which meshes with a corresponding beveled gear V' on the end of the worm S. The other end of the worm S is rotatably supported upon the arm P at W. By turning the wheel X, which is secured to the outer end of the shaft U, the guide frame can be turned about the shaft Q upon which the guide frame is rotatably mounted.

The main frame is slidably mounted on the guide frame and consists of the two members a and a', suitably held together at the top and bottom by means of the cross pieces b and b'. On the sides of the members a and a' are provided the racks c and c', which preferably extend nearly the full length of the members a and a'. To the arms P and P' are secured the brackets d and d', in which is journaled the shaft e provided with the pinions f and f', which mesh with the racks c and c' on the members a and a' of the main frame. By turning the wheel g at the end of the shaft e the main frame may be moved up and down the guide frame to any desired position, the members a and a' being guided in guides

h and h' at each end of the guide frame members N and N' . Suitable rods j and j' are secured to the members N and N' at the top and bottom for strengthening the guide frame.

The carriage is slidably mounted on the main frame and consists of the plates k and k' suitably connected by means of the bolts l , which pass through the corners of the plates, the plates k and k' being held a suitable distance apart by means of the sleeves m . The plate k is preferably a little wider than the distance between the two members a and a' , to hold the carriage in position on the main frame. The plate k' is provided on each side with the brackets n and n' , in which is journaled the shaft o , at each end of which are secured the pinions p and p' . Between the brackets n and n' on the shaft o is secured a worm wheel q , which meshes with a worm r , which is rotatably supported on the bracket s secured to the bracket n . The worm r is suitably splined to the shaft 57 , through which power is applied to the worm r . On the rotation of the worm r which meshes with the worm wheel q , the shaft o is rotated, the pinions p and p' meshing with the racks c and c' respectively, thereby moving the carriage up and down along the main frame on the racks c and c' .

Through the center of the carriage in the plates k and k' is suitably journaled the shaft t by means of a sleeve bearing u which is adapted to rotate and is held in position between the plates k and k' by means of an enlarged portion v , to which is secured the sprocket wheel w . The sleeve u is suitably splined to the shaft t by means of the spline x , which permits the shaft to be rotated and at the same time permits the shaft to be moved longitudinally in relation to the sleeve u , which is only adapted to rotate. The inner end of the shaft t is rotatably secured to the pulley carriage y , in which is journaled the grooved wheel z , about which the flexible rope or cord 10 passes. Suitable grooved pulleys 11 and 12 are revolubly secured to one end of the shafts 13 and 14 , the other ends of which are secured to the bracket n' on the plate k' . One end of the rope 10 is secured to the lower part of the main frame at 15 , from which it passes upward around the grooved pulleys 12 , z and 13 about the grooved pulley 16 , which is revolubly secured to the top of the main frame by means of the bracket 17 . To the other end of the rope 10 is secured the weight 18 , which keeps the rope 10 always taut, thereby keeping the cleaner or brush 19 pressed outward against the bottom of the ship by continually forcing the pulley z toward the carriage, the pulley carriage being moved back and forth between the guides 20 and 21 , the inner ends of which are secured to the plate k' .

The shaft t is operated by an endless sprocket chain 22 , which is suitably supported in the main frame on the sprocket wheels 23 and 24 which are each suitably journaled to the main frame, one at each end thereof, upon the cross pieces 25 . Suitable grooves 26 are preferably provided on the inner sides of the members a and a' for holding the sprocket chain 22 in position. The sprocket chain 22 on one side of the main frame passes around the sprocket wheel 27 which is secured to a shaft 28 suitably journaled in the plates O and O' . To the plate O are secured the idlers 29 for holding the sprocket chain 22 in contact with the sprocket wheel 27 similar to the construction shown in Fig. 7. The sprocket chain 22 also passes around the sprocket wheel w which is splined to the shaft t , and is held in position on the sprocket wheel w by means of the idlers 30 secured to the plate k' in the same manner as the sprocket chain is held in position on the sprocket wheel 27 between the plates O and O' by means of the idlers 29 .

The sprocket chain 22 , which operates the brush 19 , is driven from the power shaft G , to which the chain is adjustably connected in the following manner: To the power shaft G is secured the sprocket wheel 31 , which is connected to the sprocket wheel 32 by means of the sprocket chain 33 . The sprocket wheel 32 is secured to the sleeve 34 , which is rotatably mounted on the shaft Q . The beveled gear 35 is also secured to the sleeve 34 and meshes with the beveled gear 36 secured to the end of the shaft 28 .

By applying power to the shaft G the sprocket chain 22 can be driven, thereby operating the brush 19 secured to the shaft t . Due to the arrangement of the means above described for operating the sprocket chain 22 , it will be seen that the brush 19 can be continuously operated during all the movements of the frame into different positions without stopping the rotation of the brush 19 . The carriage is also driven from the power shaft G , to which the means for moving the carriage up and down the main frame is adjustably connected in the following manner: To the power shaft G is secured the sprocket wheel 40 , which is connected to the sprocket wheel 41 on the sleeve 42 by means of the sprocket chain 43 . A sprocket wheel 44 is also secured to the sleeve 42 which is rotatably mounted on the shaft Q . The sprocket wheel 44 is connected to the sprocket wheel 45 by means of the sprocket chain 46 . The sprocket wheel 45 is secured to the sleeve 47 which is rotatably mounted on the shaft 48 , which is secured at one end to the guide frame, as shown at 51 . A gear wheel 49 is secured to the sleeve 47 which meshes with a gear 50 secured to the shaft 52 , which is supported upon the bracket plate 53 , as shown in Fig.

8 and Fig. 9. The bracket plate 53 is suitably secured to the arm P on the inside thereof, suitable holes 90 being provided in the plate P for the insertion of bolts to hold the bracket plate 53 in position. In Fig. 5 the bracket plate is removed to show the other parts. To the inner end of the shaft 52 is secured the beveled gear 54 which meshes with a beveled gear 55 on the sleeve 56. The sleeve 56 is splined to the splined shaft 57 by a suitable spline 58, which extends the full length of the shaft 57. The sleeve 56 is rotatably supported between the brackets 59 and 60, which hold the splined shaft 57 in position. The lower portion of the splined shaft 57 is splined to the worm *r*, which is rotatably secured in the bracket *s*, said worm *r* meshing with a worm wheel *q* on the shaft *o* for moving the carriage up and down along the main frame. The upper and lower ends of the splined shaft 57 are rotatably secured to the main frame at 61 and 62 respectively. The splined shaft 57 on being operated as above described moves the carriage along the main frame at the same time that the brush 19 is being revolved. Due to the arrangement of the means above described for operating the carriage and also the arrangement of the means for operating the brush, it will be seen that the frames can all be adjusted into different positions, as desired, without stopping either the rotation of the brush or the movement of the carriage.

In order to reverse the rotation of the splined shaft 57 a beveled gear 63 is secured to the sleeve 56, with which the beveled gear 54 is adapted to engage to reverse the direction of rotation of the splined shaft 57. To permit the beveled gear 54 to engage either the beveled gear 55 or the beveled gear 63, the shaft 52 upon which the beveled gear 54 is supported, is adapted to fit in the longitudinal slot 64 in the bracket plate 53, which is long enough to permit the shaft 52 to be moved a sufficient distance to have the beveled gear 54 mesh with either of the beveled gears 55 or 63 respectively, as desired.

The means for moving the shaft 52 in the slot 64 consists of the cam 65, through which the shaft 52 passes and upon which the cam 65 is rotatably mounted. The cam 65 is provided with the concave faces 66 and 67 and the convex face 68, which engage the idlers 69 and 70 secured to the bracket plate 53. Secured to one end of the cam 65 is the arm 71, which upon being moved up, as shown in Fig. 8 and Fig. 9, forces the shaft 52 down, as the idler 69 engages the convex face 68 of the cam 65, while the idler 70 engages the concave face 67. The cam 65 is held in engaged position by means of the dog 72 which is pivoted to the bracket plate 53 by means of the screw 73. The dog 72 is held in engaged position against the concave portion

66 by means of the spring 74, secured to the bracket plate 53 by means of the screw 75. The dog 76, similar to the dog 72, is also pivoted to the bracket plate 53 by means of a screw 77. The dog 72 is held in engaged position by means of a spring 78, which is secured to the bracket plate 53 by means of the screw 79. It will be seen by reference to Fig. 8 that the cam 65 cannot be operated by pushing down on the lever 71 until the dog 72 is pressed out of engagement with the concave face 66. When the cam 65 is in the reverse position, as shown in dotted lines, the dog 76 has to be pressed out of engagement with the face 67 before the cam can be operated.

Instead of the cam 65 being operated by hand, automatic means are provided for accomplishing this object, which are described as follows: The outer ends of the pawls 72 and 76 are suitably bent as shown at 80, Fig. 3, to engage the rod 81, the lower end of which is secured to the carriage by means of the bolt 82. The upper end of the rod 81 is preferably not secured, but is left free. The lever 71 is secured to the rod 81 by means of a sleeve 83, which fits loosely over the rod 81 and is pivoted to the end of the lever 71 by means of the screw 84. To the sleeve 83 is secured the spiral spring 85, which is coiled loosely about the rod 81 and extends equally in both directions from the sleeve 83. Suitably adjustable stops 86 and 87 are secured to the rod 81 for engaging the outer ends of the dogs 72 and 76. The stops 86 and 87 may be set at any suitable position on the rod 81, one on each side of the sleeve 83. The position of the stops and the distance between the same regulates the vertical movement of the carriage. If the stops are set as shown in Fig. 8 and Fig. 9 the shaft 52, on being rotated, rotates the splined shaft 57, which moves the carriage downward along the main frame, carrying the rod 81 along with it. After the carriage has traveled a certain distance the stop 86 comes in contact with the spring 85 and compresses the same until the stop strikes the dog 72, releasing the other end of the dog from the face 66 of the cam 65. Thereupon, due to the compression of the spring 85, the lever 71 is pushed suddenly into the dotted position and the spring 78 holds the dog 76 into engaged position against the face 67 of the cam 65. The beveled gear 54 is thereby made to mesh with the beveled gear 63, reversing the direction of rotation of the splined shaft 57. The rotation of the splined shaft 57 being reversed, the carriage then moves upward along the main frame until the stop 87 on the rod 81 compresses the spring 85 and then operates the dog 76 in the same manner as the stop 86 operated the dog 72 when the carriage was moving in the other direction. The

automatic movement of the carriage up and down the main frame can therefore be regulated by setting the stops 86 and 87 in any desired position along the rod 81, depending upon the desired vertical movement of the carriage.

Any suitable brush, scraper or cleaner can be used on the end of the shaft *t*, although the brush 19 in the present instance consists of a circular body portion 100, in which the bristles 101 are suitably inserted in the usual manner. Radiating from the center of the body portion and secured thereto by means of the adjustable screws 102 are the scrapers 103. The scrapers 103 are preferably set a short distance below the ends of the bristles 101 so as not to mar the bottom of the ship, the object of the scrapers being to remove any substance-like barnacles that project above the surface of the ship and are not easily removed by the bristles. The strips of rubber 104 are secured to the brackets 105 in any suitable manner, the same radiating from the center of the body portion similar to the scrapers 103. The strips of rubber preferably extend to the edges of the bristles and may, if desired, project slightly above the bristles as the brush on being pressed against the surface of the ship bottom will bend the rubber strips, whose object is to assist the bristles in making the surface of the ship clean and smooth.

Three rollers 105 are set at equal distances about the circumference of the body portion 100 and are supported on the brackets 106. The rollers project slightly above the upper edges of the scrapers 103 so as to prevent the scrapers from coming in contact with the surface of the ship.

The brush 19 is preferably connected to the shaft *t* by means of a ball and socket joint 110. Two sleeve members 111 and 112 are provided for regulating the movement of the ball and socket joint. The member 111 is rigidly secured at one end to the shaft *t*, while the other end of the sleeve 111 partly covers the ball and socket joint 110. The sleeve member 112 fits loosely on the other end of the ball and socket joint and is kept in position against the edge of the sleeve 110 by means of the spiral spring 113.

The abutting edges of the sleeves 111 and 112 are preferably chamfered as shown at 114 to allow a certain limited movement of the brush. If, however, the brush is bent at a greater angle, the movement of the joint is resisted by the compression of the spring 113, which upon the pressure being released returns the brush to its original position, as shown in Fig. 6, so that the brush 19 is normally in an upright position in relation to the shaft *t*.

The cleaning device is operated from a pontoon upon which the base of the cleaning device is secured as above described. A suit-

able source of power is preferably placed on the pontoon for operating the power shaft *G*, to which it is connected by any suitable means.

The pontoon with the cleaning device is preferably secured to the ship to be cleaned by guy ropes secured to the bow and stern of the ship. The cleaning device is then adjusted so that the main frame is inserted in the water to the total depth of the ship, so that the carriage will operate the brush to clean the ship from the keel to the water line. By suitably tightening the guy ropes the pontoon can be brought within working distance of the ship so that the brush 19 will bear against the side of the ship. The pressure of the brush against the side of the ship is regulated by means of the weight 18 secured to the end of the rope 10, which keeps the brush always in contact with the ship bottom. The main frame is then placed at a suitable angle to the ship bottom so that the brush 19 will come in contact with the same as it is moved up and down along the main frame. If the brush is to be automatically moved up and down the main frame the stops 86 and 87 are spaced at suitable positions on the rod 81 to regulate the vertical movement of the carriage. The power is then applied to the power shaft *G*, which is connected, as above described, to rotate the brush 19 secured to the end of the shaft *t*. The power shaft *G* is also connected, as above described, to move the carriage up and down the main frame at the same time that the brush 19 is rotating. The direction of travel of the carriage is regulated by the stops 86 and 87 coming in contact with the dogs 72 and 76 respectively, which operate the cam 65 for reversing the movement of the carriage by shifting the bevel gear 54 from engagement with the bevel gear 63 to engagement with the bevel gear 55, and vice versa. The cleaning device on being operated in this manner will clean a vertical strip on the bottom of the ship equal to the width of the brush and as long as the distance between the stops 86 and 87. The cleaning device is then moved either to the right or left of the cleaned strip by adjusting the guy ropes, and the operation proceeds as before for cleaning another strip, the operation continuing until the whole bottom on one side of the ship is cleaned. The whole operation is completed without stopping either the rotation of the brush or the movement of the carriage. If due to the curvature of the ship bottom the frame cannot be adjusted to complete a full vertical strip, the frame can be adjusted at any time without stopping the movement of the brush.

What I claim is:

1. In a ship cleaning device, the combination of a base adjustable in a horizontal plane, an arm frame adjustable on said base

in a vertical plane, and a main frame adjustable about said arm frame in a vertical plane.

2. In a ship cleaning device, the combination of a base, a frame adjustable thereon in a vertical plane, and a plurality of relatively movable frames adjustable in a vertical plane about said first named frame.

3. In a ship cleaning device, the combination of a base, a frame adjustable thereon in a vertical plane, and a plurality of relatively movable frames adjustable in a vertical plane about said first named frame, one of said relatively movable frames being provided with a cleaner.

4. In a ship cleaning device, the combination of an adjustable base, an arm frame one end of which is adjustably mounted on said base, a guide frame adjustably mounted on the other end of said arm frame, a main frame slidably mounted on said guide frame, a carriage mounted on said main frame, a cleaner thereon, means for continuously operating said cleaner, and means for adjusting said frames into different positions.

5. In a ship cleaning device, the combination of an adjustable base, an arm frame one end of which is adjustably mounted on said base, a guide frame adjustably mounted on the other end of said arm frame, a main frame slidably mounted on said guide frame, a carriage slidably mounted on said main frame, a shaft slidably mounted in said carriage, a cleaner on one end of said shaft, means for continuously operating said cleaner, and means for adjusting said frames into different positions.

6. In a ship cleaning device, the combination of an adjustable base, an arm frame mounted on said base, a guide frame mounted on said arm frame, a main frame movably secured to said guide frame, and an adjustable cleaner secured to said main frame.

7. In a ship cleaning device, the combination of an adjustable base, an arm frame mounted on said base, a guide frame mounted on said arm frame, a main frame mounted on said guide frame, a cleaner secured to said main frame, means for continuously operating said cleaner, and means for adjusting said frames into different positions while the cleaner is in operation, and means for automatically moving the cleaner up and down the main frame.

8. In a ship cleaning device, the combination of an adjustable guide frame, a main

frame slidably mounted thereon, a carriage movably mounted on said main frame, a shaft provided with a cleaner mounted on said carriage, an endless chain secured to said main frame for operating said shaft, and means secured to said main frame for operating said carriage.

9. In a ship cleaning device, the combination of a base, an arm frame mounted on said base, a guide frame mounted on said arm frame, a main frame mounted on said guide frame, a carriage movably mounted on said main frame, a shaft mounted in said carriage, a cleaner on one end of said shaft, means for operating said cleaner, and means for operating said carriage.

10. In a ship cleaning device, the combination of a base, a main frame adjustably supported thereon, a carriage movably supported on said main frame, a cleaner rotatably secured to said carriage, and means for regulating the outward pressure of said cleaner.

11. In a ship cleaning device, the combination of a base, a main frame adjustably supported thereon, a carriage movably supported on said main frame, a shaft rotatably secured to said carriage to permit longitudinal movement of the same, a cleaner secured to said shaft, and means for regulating the outward pressure of said cleaner.

12. In a ship cleaning device, the combination of a base, a main frame adjustably supported thereon, a carriage movably supported on said main frame, a sprocket wheel rotatably secured to said carriage, a shaft splined to said sprocket wheel, a cleaner secured to said shaft, a sprocket chain secured to said main frame one side of which is connected to said sprocket wheel to permit the operation of the carriage.

13. In a ship cleaning device, the combination of a base, a main frame adjustably supported thereon, racks on said main frame, a carriage movably supported on said racks, a cleaner secured to said carriage, and reversible means for moving said carriage up and down said racks.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM MARTIN.

Witnesses:

OLIN A. FOSTER,
LEO J. MATTY.