No. 646,357. Patented Mar. 27, 1900.

T. W. G. COOK & L. H. STERN.

MACHINE FOR CLEANING HULLS OF VESSELS.

(Application filed Aug. 31, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 2.

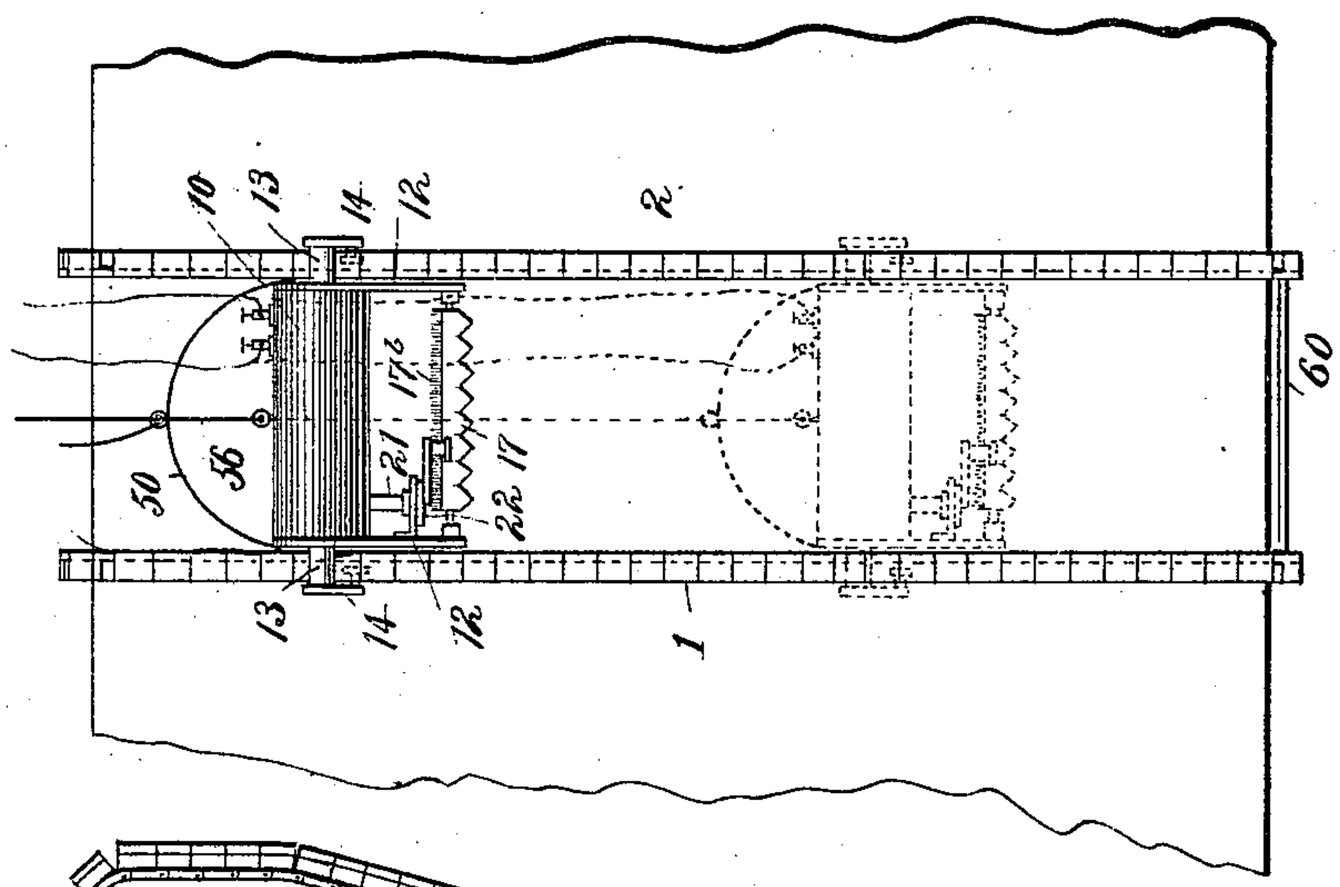

Fig. 1.

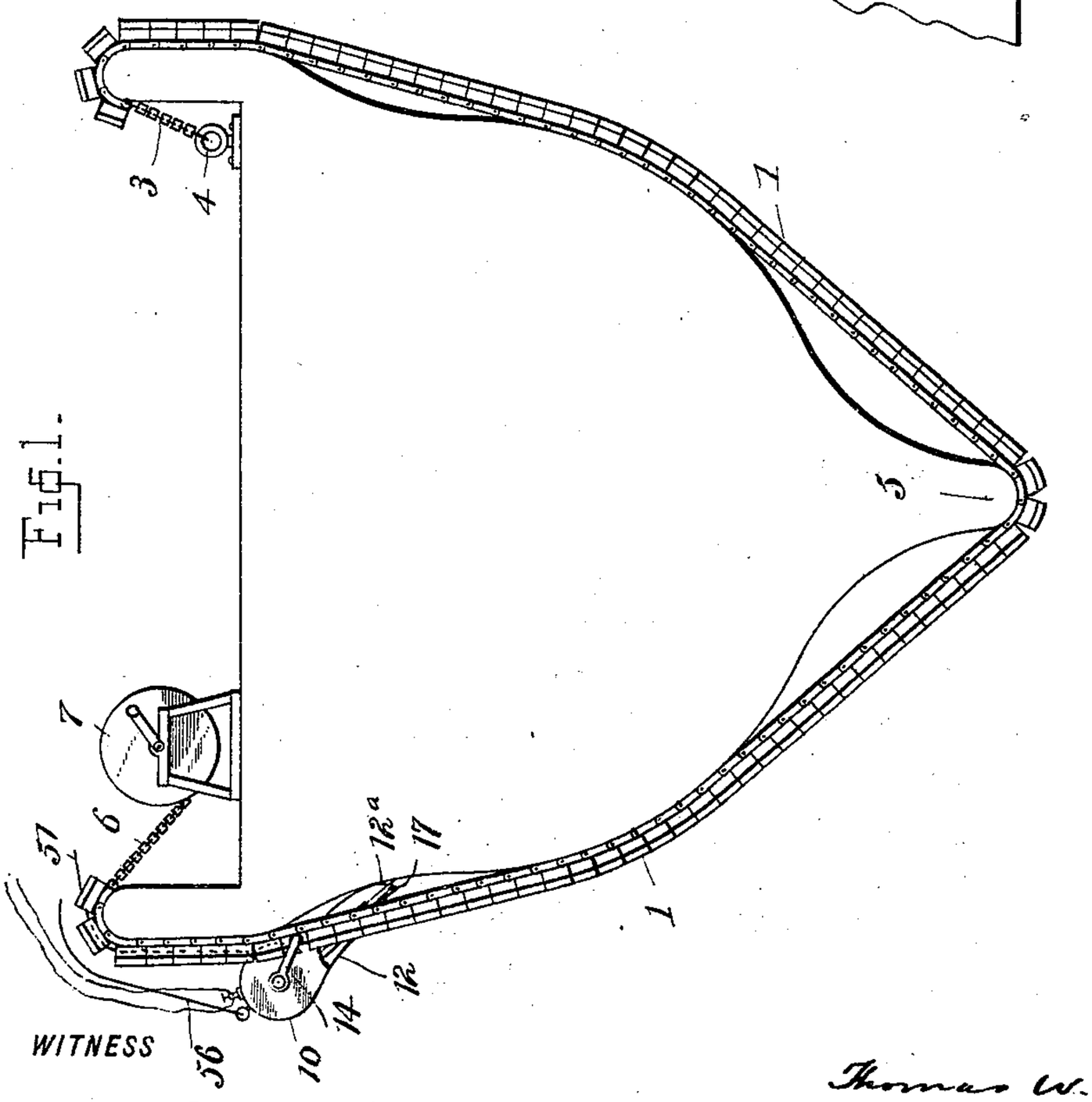

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Fig. 3.

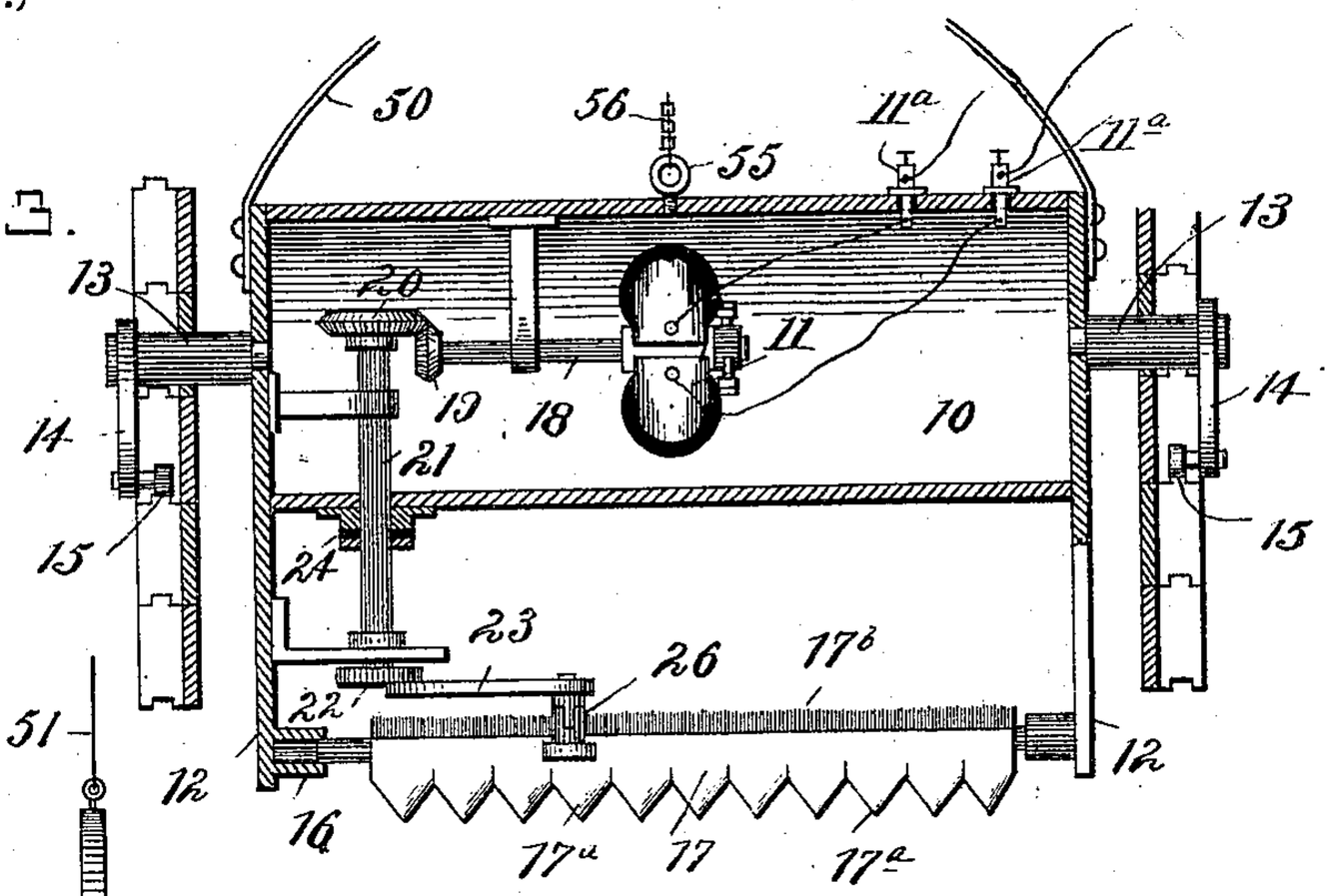

Fig. 4.

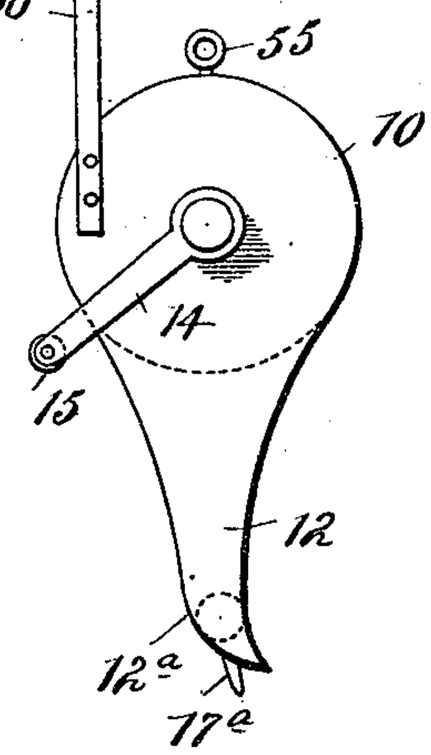

Fig. 5.

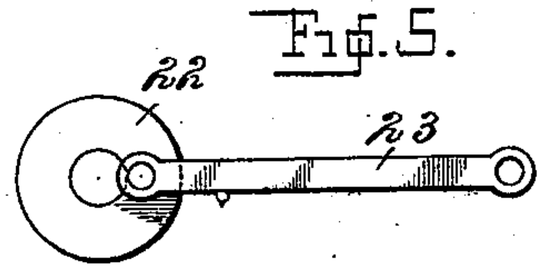

Fig. 6.

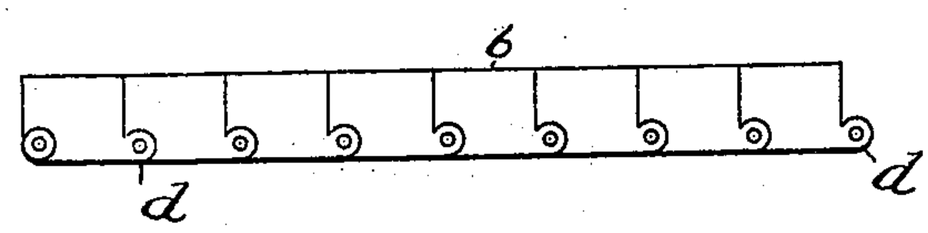

Fig. 7.

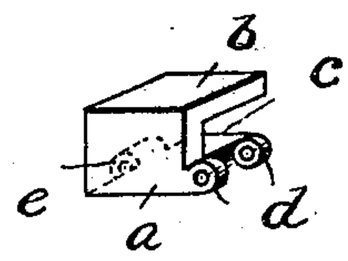

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Fig. 8.

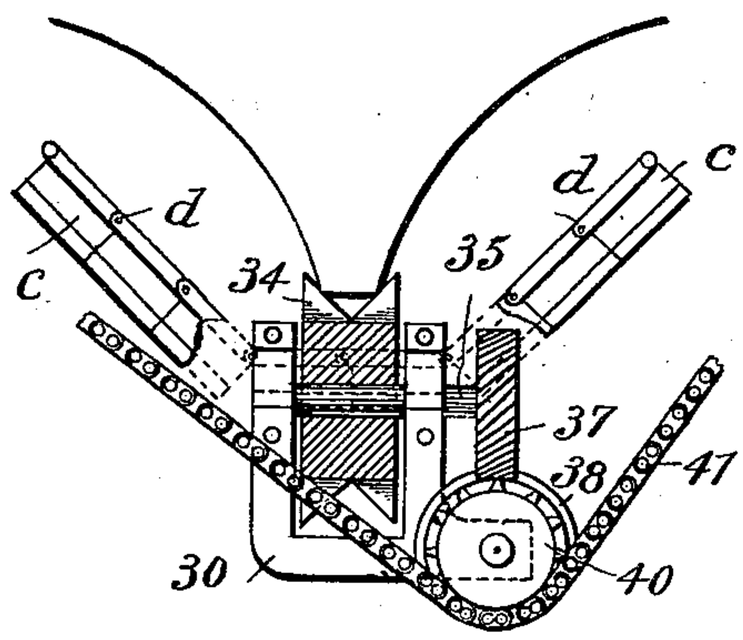
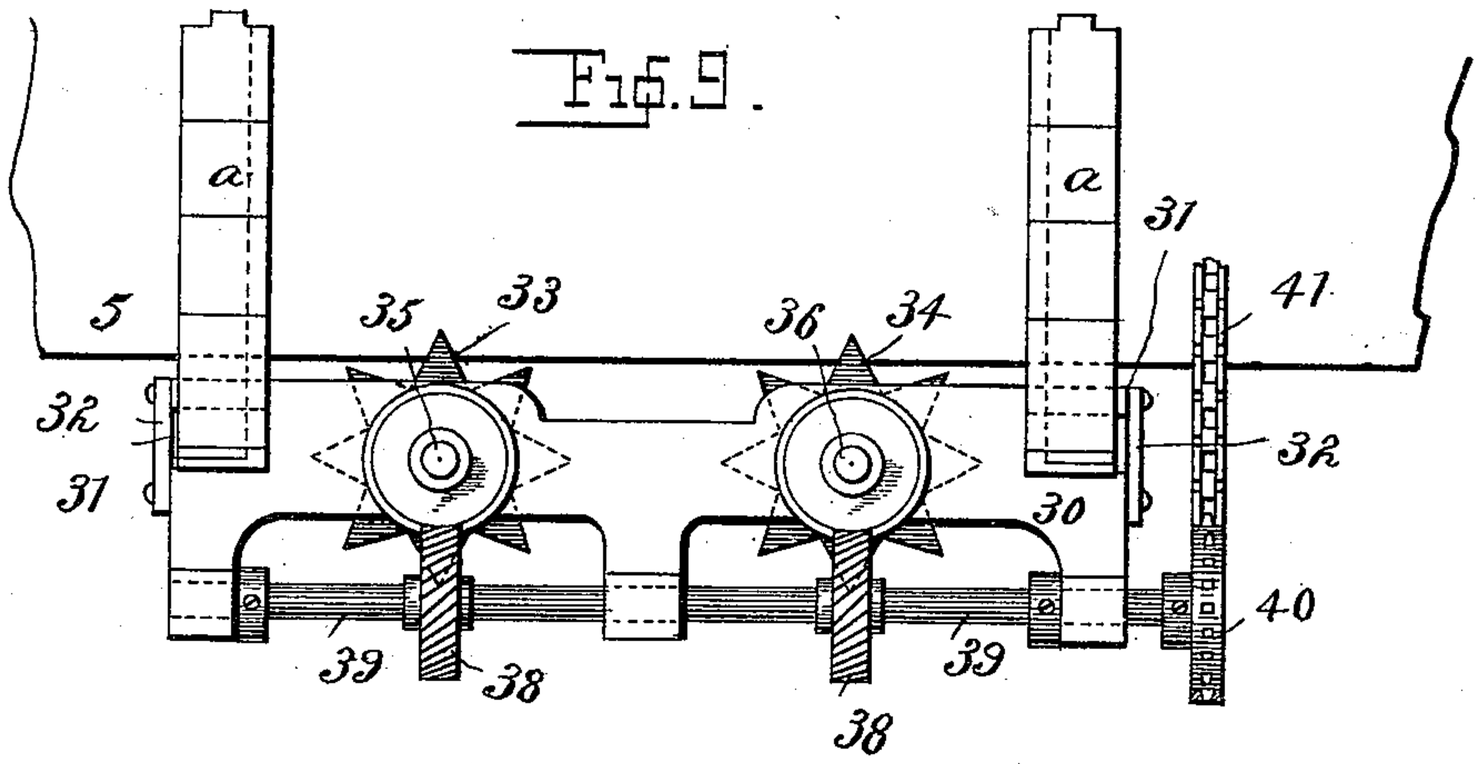


Fig. 9.



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UNITED STATES PATENT OFFICE.

THOMAS W. G. COOK AND LEOPOLD H. STERN, OF NEW YORK, N. Y.; SAID STERN ASSIGNOR OF ONE-HALF OF HIS RIGHT TO SAID COOK.

MACHINE FOR CLEANING HULLS OF VESSELS.

SPECIFICATION forming part of Letters Patent No. 646,357, dated March 27, 1900.

Application filed August 31, 1898. Serial No. 689,970. (No model.)

To all whom it may concern:

Be it known that we, THOMAS W. G. COOK and LEOPOLD H. STERN, citizens of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Machines for Cleaning Hulls of Vessels, of which the following is a specification.

The object of our invention is to provide a device for cleaning and polishing the hulls of vessels.

Our invention comprises, essentially, a guideway or track which is adapted to be secured in position upon the vessel-hull and a suitable frame or carriage arranged to travel in the guideway or track and provided with a cleaning-tool which is supported in operative relation to the surface of the vessel-hull. The guideway or track is preferably formed of a pair of chains of pivotally-connected channel-links, the chains being preferably anchored at one side of the vessel and passed under the keel and attached to a winding-drum or windlass, whereby the chains or flexible tracks may be secured in position. The cleaning frame or carriage supports a reciprocating cleaning-tool comprising, preferably, a scraping-knife and a polishing-brush, the cleaning-tool being reciprocated by a suitable motor mounted in the frame, the motor being operated by a dynamo communicating therewith through suitable circuit-wires. The frame or carriage is provided with rigidly-attached arms extending from it at an angle and engaging the guideway or track, so as to automatically hold the cleaning-tool in engagement with the surface of the vessel-hull. The frame or carriage is supported by a suitable bail by which it is lowered by gravity over the side of the vessel, and for the purpose of disengaging the cleaning-tool from any obstruction we provide a second controlling connection attached to the frame eccentrically to the point of attachment of the supporting-arms. We also provide a traveling frame to which the guideway or track is suitably connected and propelling devices mounted in the traveling frame and engaging the vessel-hull for the purpose of moving the guideway or track into different positions upon the hull.

In order that our invention may be fully understood, we will first describe the same with reference to the accompanying drawings and afterward point out the novelty with more particularity in the annexed claims.

In said drawings, Figure 1 is a side elevation of our improved hull-cleaning device, showing it in operative position. Fig. 2 is a front elevation of the same. Fig. 3 is a vertical sectional view of the same. Fig. 4 is a side elevation of the cleaning frame or carriage. Fig. 5 is a detail view of part of the tool-operating mechanism. Figs. 6 and 7 are detail views of parts of the flexible guideway or track. Fig. 8 is a sectional end view of the traveling frame and propelling devices. Fig. 9 is a side elevation of the same.

The guideway or track, which is adjustably secured in position upon the surface of the vessel-hull, comprises, preferably, two chains of channel-links 1 and 2. Each chain is formed of a series of links *a*, having integral flanges *b*, forming a channel *c*, and integral lugs *d* and *e*, by which the links are pivotally connected.

The flexible guideways or tracks 1 and 2 are suitably anchored at one side of the vessel—as, for example, by means of chains 3 and eyebolts 4. (Shown in Fig. 1.) The flexible tracks extend from the anchoring devices 3 4 over one gunwale, down one side of the vessel-hull, under the keel 5, up the other side of the vessel-hull, and over the other gunwale. At this side of the vessel the flexible tracks may be provided with chains 6, attached to a winding-drum or windlass 7, by which the flexible tracks may be secured in position. To assist in adjusting the flexible guideways or tracks longitudinally of the vessel, we may provide suitable propelling devices connected with the guideways or tracks and having means for propelling them along the hull of the vessel. One form of such device is illustrated in Figs. 8 and 9 and will be hereinafter referred to.

The hull-cleaning device comprises a suitable frame having a cylindrical portion 10, within which is mounted an electric motor 11;

side frames 12, having rounded or curved guiding-faces 12^a; studs 13, rigidly secured in the side frames 12, and arms 14, rigidly secured to studs 13 and supporting the antifriction-rollers 15. The antifriction-rollers 15 work in the channels or ways of the guideways or tracks 1 and 2 for supporting the frame of the cleaning device, the arms 14 being extended at such an angle from the frame of the cleaning device that the rounded portions 12^a of the side frames will be automatically held in engagement with the surface of the vessel-hull by the weight of the frame and operating parts of the cleaning device.

Adjacent to the rounded portions 12^a of the side frames are formed the inwardly-projecting guides or bosses 16, in which the cleaning-tool 17 reciprocates. The cleaning-tool, as shown, comprises a series of knives or scrapers 17^a, pointing forwardly, and a polishing-brush 17^b, pointing rearwardly from the central longitudinal axis of the cleaning-tool. The electric motor 11 is geared to the cleaning-tool through the armature-shaft 18, gears 19 20, shaft 21, crank-disk 22, and pitman 23, the parts being supported in suitable bearings in proper relation in the usual manner. The motor and directly-connected operating parts are inclosed within a cylindrical watertight casing to protect them from the action of the water, the shaft 21 passing through a suitable stuffing-box 24. The pitman 23 is connected with the reciprocating cleaning-tool through a swiveled arm 26, so as to allow for the slight vibrations of the cleaning-tool in operation without interfering with the free operation of the motor and connected parts.

The electric motor 11 is in circuit with binding-posts 11^a, which are insulated from the frame or carriage, said binding-posts being electrically connected with a dynamo or other current-supplying device, which is not shown and is designed to be operated from the deck of the vessel.

The frame or carriage of the cleaning device is supported by means of metal bail 50, rigidly secured to the side frames of the carriage and attached to the end of a rope or chain 51, operated from the deck of the vessel. By lowering the rope or chain 51 the cleaning device will move down over the side of the vessel by its own weight. 55 is an eye secured in top of the frame or casing eccentric to the line of connection of the arms 14, and 56 is a chain or rope attached to the eye 55 for controlling the action of the cleaning-tool.

Referring to Figs. 8 and 9, we will now describe the means for adjusting the guideways or tracks longitudinally upon the vessel. A suitable elongated U-shaped frame 30 is formed with openings 31 at its ends, through which the guideways or tracks 1 and 2 pass and in which they are secured by removable plates 32. 33 and 34 are double star-wheels, having V-shaped engaging teeth, which are adapted to engage the keel or other projection upon the vessel. The star-wheels 33 34 are mounted upon axles 35 36, journaled in the U-shaped frame 30 and carrying at their outer ends worm-gears 37, meshing with similar gears 38, keyed to a longitudinally-extending operating-shaft 39, which is also journaled in the frame 30. The shaft 39 has at one end a sprocket-wheel 40, operated by a sprocket-chain 41, which is designed to extend from both sides of the vessel under the keel. The sprocket-chain 41 may be operated from the deck of the vessel, and by the rotation of the shaft 39 the star-wheels 33 and 34 will be made to travel upon the vessel-keel or other part of the vessel-hull with which they engage. In this way the guideway or track can be adjusted longitudinally of the vessel. The guideway or track having been placed in the desired position upon the vessel-hull, the cleaning frame or carriage is put in position, with its supporting-arms in engagement with the guideway or track, and by lowering the rope 50 the carriage is allowed to drop over the side of the vessel by its own weight, the curved or rounded ends 12^a of the side frame resting in contact with the side of the vessel-hull, while the reciprocating cleaning-tool 17 is supported in close proximity, but out of contact with the vessel-hull. As the carriage is lowered over the side of the vessel the motor is operated for reciprocating the cleaning-tool, the scrapers or knives effectively removing any hard substances, such as barnacles, while the brushes complete the cleaning and polishing action.

It will be observed that the cleaning-tool reciprocates transversely of the direction of movement of the frame or carriage, making its action much more effective, as it has the forward thrust of the movement of the carriage and the transverse movement under the action of the motor. It will also be observed that should the cleaning-knife come into engagement with any obstruction which cannot be removed the further descent of the frame or carriage would be prevented. In such an emergency the chain or rope 56 is pulled upwardly slightly, which will rock the frame or carriage upon its supporting-arms and move the cleaning-tool away from the obstruction, when the frame or carriage will continue to move downwardly. The chain or rope 56 is then loosened, and the operation of cleaning the vessel will continue. It will further be observed that the rounded portions of the side frames of the carriage move over the surface of the hull and prevent the cleaning-tool engaging the seams in the sides of the vessel.

The guideways or tracks may be arranged without the traveling frame and propelling devices, as shown in Figs. 1 and 2, in which case the chains 1 and 2 are suitably spaced by a rod, such as 60. In this form of the de-

vice the guideway or track is moved from one position to another by loosening it up on the windlass and sliding it along the vessel, operating it from the two sides of the vessel.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a machine for cleaning hulls of vessels, the combination of a flexible, channeled guideway or track adapted to be secured in position on the vessel-hull, a frame arranged to travel on the guideway or track, and having projections engaging with the channels therein, a cleaning-tool mounted on the carriage and confined by the guideway-channels in working relation to the surface of the vessel-hull, means for moving the frame on the guideway or track and means for operating the tool in contact with the hull, substantially as set forth.

2. In a machine for cleaning hulls of vessels, the combination of a flexible guideway or track comprising two chains of pivotally-connected channel-links and adapted to be secured in position upon the vessel-hull, a frame arranged to travel on the guideway or track, a cleaning-tool carried by the frame, confined by the guideway-channel in working relation to the surface of the hull and means for moving the frame on the guideway or track substantially as set forth.

3. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position on the vessel-hull, a frame or carriage adapted to travel on the guideway or track, a reciprocating cleaning-tool mounted in the frame or carriage and means for imparting to the cleaning-tool reciprocating motion relatively to the carriage and in contact with the surface of the hull, substantially as set forth.

4. In a machine for cleaning hulls of vessels, the combination of a pair of chains formed of pivotally-connected channel-links, means for securing said chains in parallel position on the vessel-hull, a cleaner frame or carriage mounted to move on the guideway formed by said chains, a cleaning-tool mounted to reciprocate in the movable frame or carriage and held by the channels in the links in operative position relatively to the surface of the hull, and means for imparting reciprocating movement to the tool, relatively to the carriage, substantially as set forth.

5. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, with a frame or carriage arranged to travel in the guideway or track, a reciprocating cleaning-tool mounted upon the frame or carriage, means for moving the frame or carriage on the guideway or track, and means for reciprocating the cleaning-tool transversely to the direction of movement of the frame or carriage, substantially as and for the purpose set forth.

6. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, a cleaning frame or carriage supporting a cleaning-tool and having supporting-arms rigidly secured to it, said arms engaging the guideway or track and extending from the frame or carriage at such an angle that the cleaning-tool will be automatically held against the hull to its work by the weight of the frame or carriage, substantially as set forth.

7. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, a gravitating cleaning frame or carriage supporting a cleaning-tool and having supporting-arms rigidly secured to it, said arms engaging the guideway or track and extending from the frame or carriage at such an angle that the cleaning-tool will be automatically held against the hull to its work by the weight of the frame or carriage, and an operating connection secured to the frame or carriage by which the frame or carriage can be lowered and raised, substantially as set forth.

8. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, a cleaning frame or carriage, a cleaning-tool supported upon a portion of the frame or carriage projecting inwardly toward the vessel-hull, arms rigidly secured to the frame or carriage and projecting inwardly therefrom and engaging the guideway or track, whereby the cleaning-tool will be automatically held against the hull to its work, substantially as set forth.

9. In a machine for cleaning hulls of vessels, the combination of a suitable frame arranged to be moved over the surface of a vessel-hull, a reciprocating cleaning-tool mounted in the frame, and means for reciprocating the cleaning-tool transversely to the direction of movement of the frame, substantially as set forth.

10. In a machine for cleaning hulls of vessels, the combination of a suitable frame arranged to be moved over the surface of a vessel-hull, a reciprocating cleaning-tool mounted in the frame, and comprising a knife or scraper and a brush, and means for reciprocating the cleaning-tool transversely to the direction of movement of the frame, substantially as set forth.

11. In a machine for cleaning hulls of vessels, the combination of a suitable frame or carriage arranged to move over the surface of the vessel-hull, a suitable motor mounted within the frame, guides formed on the frame, a reciprocating cleaning-tool mounted in said guides, and gearing between the motor and cleaning-tool, substantially as set forth.

12. In a machine for cleaning hulls of vessels, the combination of a suitable frame or carriage arranged to move over the surface

of the vessel-hull, said frame or carriage being provided with guiding parts which engage the hull and slide or move thereover, and a reciprocating cleaning-tool mounted in the frame or carriage within the guiding parts in such relation thereto that the cleaning-tool will be held in working relation to the hull and will be prevented from injuring the surface thereof, substantially as set forth.

13. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, a cleaning frame or carriage supporting a cleaning-tool and having supporting-arms rigidly secured to it, said arms engaging the guideway or track and extending from the frame or carriage at such an angle that the cleaning-tool will be automatically held against the hull to its work by the weight of the frame or carriage, and a controlling device connected with the frame or carriage at a point eccentric to the point of attachment of the supporting-arms, whereby the cutting-tool can be disengaged from any obstruction, substantially as set forth.

14. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, a cleaning frame or carriage supporting a cleaning-tool and having supporting-arms rigidly secured to it, said arms engaging the guideway or track and extending from the frame or carriage at such an angle that the cleaning-tool will be automatically held against the hull to its work by the weight of the frame or carriage, an operating connection secured to the frame or carriage adjacent to the points of engagement of the supporting-arms with the guideway or track, and a controlling device connected with the frame or carriage at a point exterior and eccentric to the point of attachment of the supporting-arms with the frame or carriage, substantially as set forth.

15. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, with a frame or carriage arranged to travel in the guideway or track, a cleaning-tool carried by the frame or carriage, a traveling frame to which the guideway or track is suitably connected, star-wheels journaled in the traveling frame and in position to engage the vessel-hull, and suitable means for operating the star-wheels, as set forth.

16. In a machine for cleaning hulls of vessels, the combination of a flexible guideway or track adapted to be secured in position upon the vessel-hull, with a frame arranged to travel in the guideway or track, a cleaning-tool carried by the frame and confined in working relation to the vessel-hull by the guideway or track, means for operating the frame in the guideway or track, a traveling frame to which the flexible guideway or track is suitably connected, star-wheels journaled in the traveling frame in position to engage the vessel-hull, a driving-shaft journaled in the traveling frame and geared to the star-wheels for operating them, and means for operating said driving-shaft from the deck of the vessel, substantially as set forth.

17. In a machine for cleaning hulls of vessels, the combination of a guideway or track adapted to be secured in position upon the vessel-hull, with a frame or carriage arranged to travel in the guideway or track, a cleaning-tool carried by the frame or carriage, a traveling frame to which the guideway or track is suitably connected, star-wheels formed with V-shaped engaging teeth journaled in the traveling frame and adapted to engage the keel or other projection upon the vessel-hull, and means for operating the star-wheels for moving the frame and connected guideway or track, as set forth.

18. In a machine for cleaning hulls of vessels, the combination of a pair of chains of pivotally-connected channel-links forming guideways, a traveling U-shaped frame through which said chains pass and by which said chains are held in parallelism, star-wheels journaled in the traveling frame in position to engage the vessel-hull, means for operating said star-wheels for adjusting the frame and chains upon the vessel-hull, and a carriage mounted to operate in the guideway and carrying a hull-cleaning tool, substantially as set forth.

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