No. 639,079. Patented Dec. 12, 1899.

B. S. MILES.

APPARATUS FOR CLEANING SHIPS' BOTTOMS.

(Application filed Sept. 20, 1899.)

(No Model.) 2 Sheets—Sheet 1.

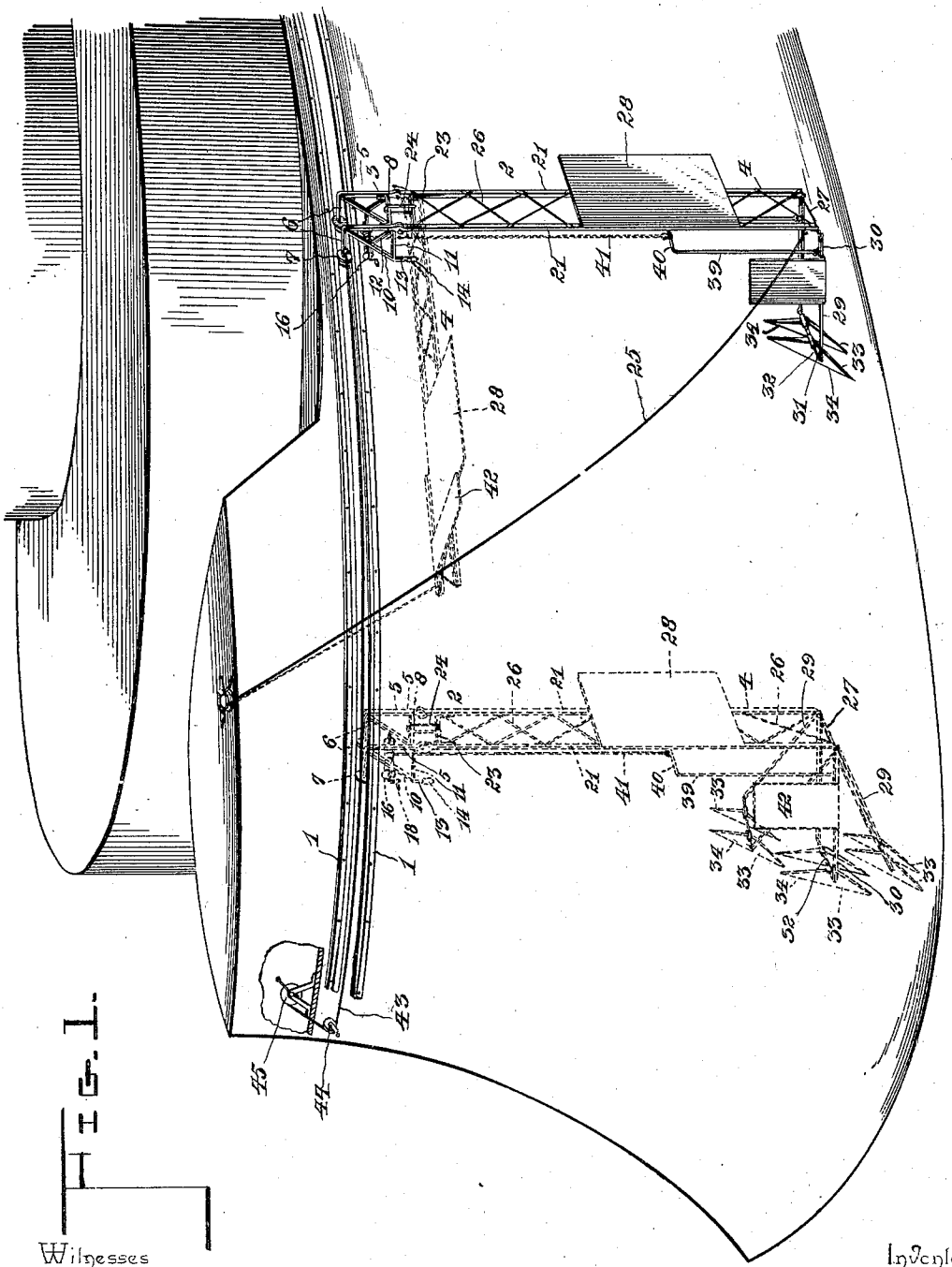

FIG. 1.

Witnesses

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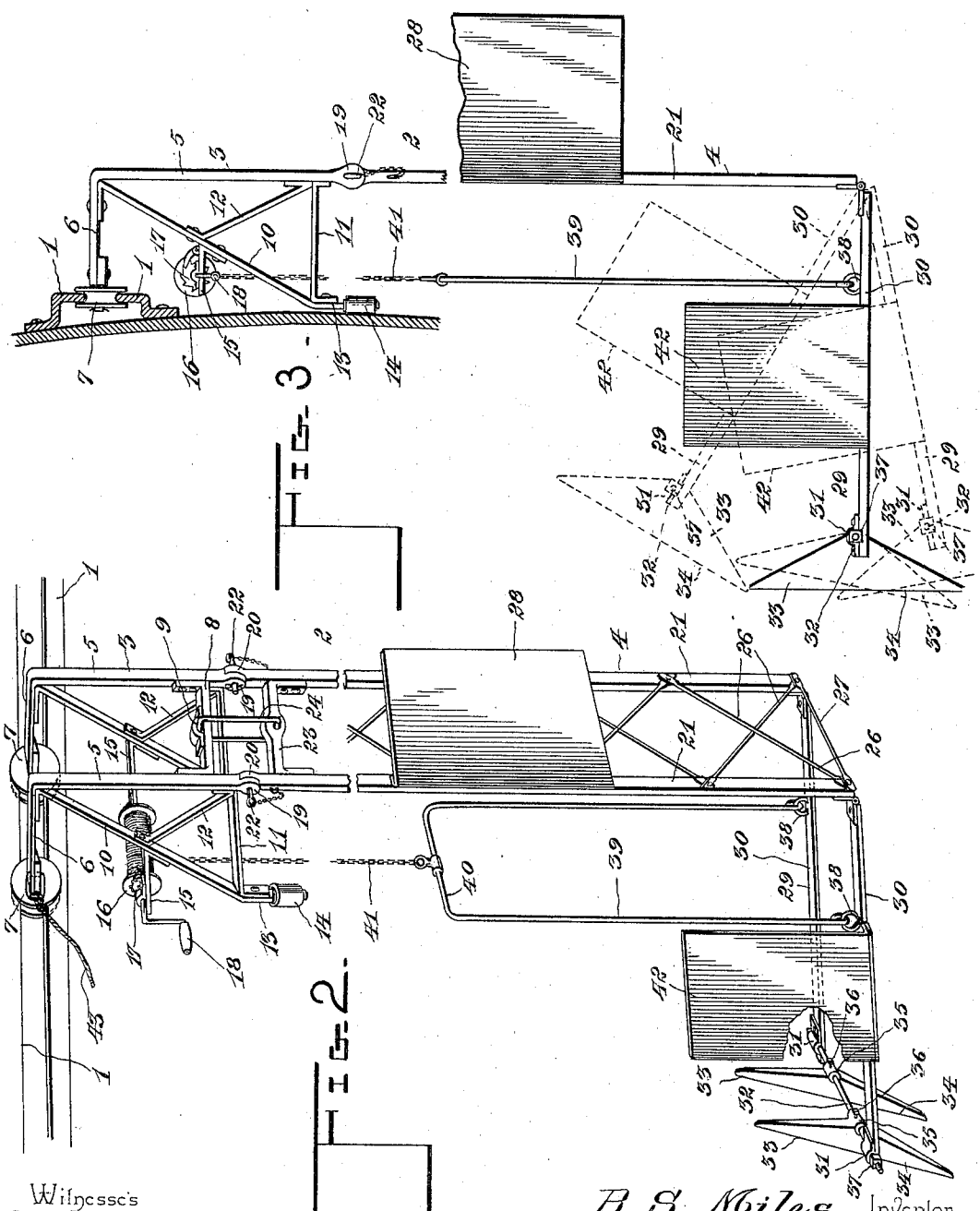

FIG. 3.

FIG. 2.

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UNITED STATES PATENT OFFICE.

BRADFORD S. MILES, OF GRAY'S SUMMIT, MISSOURI.

APPARATUS FOR CLEANING SHIPS' BOTTOMS.

SPECIFICATION forming part of Letters Patent No. 639,079, dated December 12, 1899.

Application filed September 20, 1899. Serial No. 731,086. (No model.)

To all whom it may concern:

Be it known that I, BRADFORD S. MILES, a citizen of the United States, residing at Gray's Summit, in the county of Franklin and State of Missouri, have invented a new and useful Apparatus for Cleaning Ships' Bottoms, of which the following is a specification.

This invention relates to apparatus for cleaning ships' bottoms without beaching or docking the vessel or removing her from the water; and the object of the same is to provide mechanism adapted to be submerged and held in contact with the ship's bottom and including scrapers which are adjustable to vary their elevation without adjusting the supporting frame or devices therefor and to have said scrapers gradually worked or moved from the bow toward the stern by the water-pressure exerted against portions of the apparatus when the ship is moving forwardly and acting to hold the scrapers in close contact with the portion of the ship being cleaned, and also to have the supporting-frame or other device so arranged that it may be easily swung up out of the water when not in use or entirely disconnected from the ship's side.

Other objects and advantages will become apparent in the subjoined description and the novelty clearly expressed in the appended claims, a preferred embodiment of the improved apparatus being shown in the accompanying drawings, wherein—

Figure 1 is a perspective view of a portion of a ship, showing the improved apparatus in several positions thereon in full and in dotted lines. Fig. 2 is a perspective view of the improved apparatus on a larger scale and shown broken through at different points. Fig. 3 is a sectional view of a portion of a ship's side and track for the improved apparatus and the latter in end elevation broken through in parts and showing in dotted lines the angular adjustment of which the scrapers are capable.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The numeral 1 designates reversely-arranged track-rails, which are secured to opposite sides of a ship at a suitable elevation, as clearly shown by Fig. 3. These rails are open at their front ends, as clearly shown in Fig. 1, to permit the disconnection therefrom or mounting thereon of the improved apparatus, and at their rear terminals the said rails will be closed, so as to prevent the apparatus from moving rearwardly beyond a predetermined extent and avoid disconnection thereof.

The improved apparatus comprises a frame 2, composed of upper and lower sections 3 and 4, the said upper section having vertical bars 5, with upper inturned angular extremities 6, having grooved track-wheels 7 on their free ends which are held between the track-rails 1. The vertical bars 5 are connected by a cross-tie 8 near their lower extremities, which has on the upper central portion thereof a fulcrum-seat 9 for a purpose which will be presently set forth. Inwardly-extending angular braces 10 are attached at their upper ends in part to the vertical bars 5 and the inturned angular extremities 6, said braces standing inward some distance from the bars 5 at their lower terminations and attached to the latter by transverse ties 11, which are horizontally disposed. The braces 10 are reinforced by counter-braces 12, which are attached to the bars 5 and said braces 10 and have a reverse angle to the latter. The lower inner terminals of the braces 10 and the ties 11 are turned downwardly, as at 13, and said braces are supplied with suitable bearings, on which are mounted antifrictional brace-rollers 14, adapted to bear against the ship's side and hold the frame steady and prevent strain on the parts thereof, particularly the track-wheel 7, and also ease the movement of the entire device. It will be observed that the inward inclination of the braces 10 provides means for holding the apparatus in a constant position at a predetermined extent from the ship's side and also affords sufficient space for the manipulation of movable parts, as will be hereinafter explained. One of the advantages of the arrangement of the said braces 10 is that they provide means for supporting inwardly-extending horizontally-disposed arms 15, on which a windlass 16 has rotative support and is provided with ratchet mechanism 17 for obvious reasons and also a crank-handle 18. The lower ends of the bars 5 are broadened, as at 19, and mortised to movably and separably receive the upper terminals 20 of the side bars 21 of the lower sec-

tion 4, which have a similar construction, the two sets of terminals being connected by removable pivot-pins 22. The terminals of the bars 5 and 21 are so united that they may be made to easily break joint to accommodate a swinging adjustment of the section 4 of the frame in withdrawing the scraping devices from the water for the purpose of manipulation or correction of defect or at a time when their use is not further required. The bars 21 are connected adjacent their upper terminals by a cross-tie 23, to the center of which is movably secured a pivot-link 24 and also has inseparable bearing on the fulcrum-seat 9 of the tie 8, heretofore referred to. By releasing the pins 22 the section 4 of the frame will be freely suspended by the link 24 and can be swung up to clear the devices carried thereby from the water, and for this purpose a rope or cable 25 is attached to the lower extremity of one of the bars 21 and adapted to be fastened in a convenient manner on the deck of the ship or at any other point where it can be easily reached. This rope or cable 25 will be long enough to permit the apparatus to run its full length or travel entirely over the side of the ship.

The bars 21 of the section 4 are strengthened at regular intervals by crossed braces 26, and also at the lower extremities by a transverse brace 27. This gives the section a light formation of a strong and durable nature, and to the foremost of the bars 21, considered relatively to the bow of the ship to which the apparatus is applied, a deflector-plate 28 is fastened and has an outward inclination gradually from the front to the rear in the form of a wing and acts to force the section 4 inwardly toward the ship's side as the water-pressure is brought to bear thereon during the movement of the ship.

To the lower terminals of the bars 21 a scraper-frame 29 is hinged and comprises opposite inwardly-extending parallel bars 30, with bearings 31 on their inner extremities in which a scraper-rod 32 has free movement, and provided with a pair of scrapers 33 of the form shown. The scrapers 33 have elongated scraping edges 34, which are adapted to be brought squarely against the portion of the ship's side on which they are arranged to operate. One, two, or more of these scrapers may be used, and they preferably have in each instance an integral transversely-extending sleeve 35, into which extends a set-screw 36, the scraper-rod 32 passing through the sleeve, and the screw 36, used to secure the adjustment of the scraper and prevent it turning on the rod. The one end of the rod 32 is screw-threaded and provided with a removable nut, as at 37, so that said rod may be removed and rearranged at will for the purpose of disconnecting and resetting the scrapers and also varying the number of the same. If more than one scraper is used, the edges of all the scrapers will be preferably arranged parallel and at an angle best adapted to serve the purpose for which they are intended, and also to conform to the inclination of the ship's side, over which they are arranged to move. As shown by Fig. 3, the scrapers 33, together with the frame 29, supporting the same, are adapted to be unitedly adjusted to elevate or depress the same at varying angles above a horizontal plane, so as to cause the said scrapers to operate on a large area of the ship's side. To facilitate this adjustment, the bars 30 of the frame 29 have eyes 38 therein, to which are movably attached the terminals of a bail 39, and to the connecting member 40 of said bail the lower end of a chain or other similar device 41 is secured and is adapted to be wound on and unwound from the windlass 16. By letting out the chain or other device 41 the frame 29 will be permitted to depress and carry the scrapers 33 therewith, the said parts being heavy enough to overcome the buoyant effort of the water and will remain in such adjusted position without variation. Conversely, by winding the chain or other device 41 on the windlass the frame 29 and scrapers 33 may be elevated, all of which is clearly shown by Fig. 3. On the forward bar 30 of the frame 29 an impelling-vane 42 is secured and vertically disposed, and thereagainst the water impacts when the vessel is moving forwardly and propels or moves the entire apparatus from the bow end to the stern of the ship. As before stated, the main function of the deflector 28 is to hold the section 4, and consequently the scraper-frame and scrapers, inwardly toward the ship's side to make contact of the scrapers certain and invariable; but it will be understood that the said deflector to a considerable extent also serves in an auxiliary capacity of assisting in moving the apparatus on the ship's side, and thereby takes the part of the strain of such work from the vane 42 and allows the latter to exert its impulsion more directly on the scraper-frame 29, close to the scrapers 33, or at the point of greatest resistance created by the sedimentary deposit or sea-growth on the ship's side.

When the apparatus has run the full length of the ship's side within the limit of the track-rails 1, the section 4 of the frame is elevated, as shown in dotted lines in Fig. 1, through the medium of the cable or other device 25, and at times it may be possible to pull the apparatus, when thus clear of the water, forwardly toward the bow end of the ship without any other means; but it is preferred that it be so operated by a rope or cable 43, which moves, preferably, over a direction-pulley 44, and from thence to a drum or windlass 45, which may be manually operated or supplied with motive power. Through this rope or cable 43 the entire apparatus may also be run out from connection with the track-rails 1 at the bow end of the ship and be hoisted on deck by suitable means or stored in any other preferred manner. When the appara-

tus is drawn forwardly, the angle of the scrapers may be varied, as shown in dotted lines in Fig. 1, by operating the windlass 16 and by changing the position of said scrapers. A large surface of the ship's side may be effectively cleaned in a substantially automatic manner without requiring the ship to be docked, or at least making such operation necessary only at long intervals. The head or speed of the ship will govern the rapidity of movement of the apparatus, as will be readily understood, and though the operation of the apparatus might institute an impediment to the speed of the ship the delay is of small moment as compared to the time required in docking and cleaning a ship under the present methods. Furthermore, the ship may be at a point or station remote from a dock, and the uncleanly condition of her sides and bottom may be such as to materially obstruct her rapid progress. The use of the improved apparatus at such a time will relieve the ship of such obstruction and permit an increased speed. Furthermore, a frequent use of the improved apparatus and a removal thereby from the ship's side or bottom of a deposit or growth before it has obtained a firm fastening will result with less injury to the sheathing or the hull-covering, and in the operation of the device the pressure of the scrapers against the ship's side or bottom will be normally tempered to such a degree as to avoid injury.

In some uses of the device it may be necessary to use one or more additional scraper-frames on the supporting-frame above the one set forth. In this obvious duplicate arrangement only one scraper-frame and set of scrapers will be used at one time, and those not in use will be permitted to hang down in such manner as not to touch the side of the ship.

To suit various applications, changes in the form, proportions, and minor details may be resorted to without in the least departing from the nature or spirit of the invention.

Having thus described the invention, what is claimed as new is—

1. In an apparatus of the character set forth, the combination of a support automatically movable by the force of the water, and a vertically-adjustable non-rotatable scraper.

2. In an apparatus of the character set forth, the combination of an automatically-movable support, means for swinging the said support upwardly clear of the water, and a scraper adjustably carried by the said support.

3. In an apparatus of the character set forth, the combination of a movable support, a deflector thereon, a non-rotatable scraper connected to said support and adapted to be held inward close to a ship's side by the pressure of water against the said deflector, and another deflector on the connection for the scraper.

4. In an apparatus of the character set forth, the combination of a movable support, a deflector attached to said support arranged at an oblique angle, an adjustable scraper-frame connected to the lower extremity of said support and carrying a vertically-adjustable scraper and a vane on the scraper-frame, the said deflector and vane being adapted to receive the impact of water thereagainst to hold the scraper inwardly toward the ship's side and propel the same over the latter.

5. In an apparatus of the character set forth, the combination of a support comprising an upper section having track-wheels connected thereto adapted to move on a track on a ship's side and the lower section movably connected to the upper section and adapted to be swung upwardly clear of the water, and a scraper adjustably connected to the lower section of the support.

6. In an apparatus of the character set forth, the combination of a movable support applied directly to the ship to be cleaned, a frame movably connected to the lower extremity of said support and having an inward direction toward a ship's side to which the apparatus may be applied, a scraper movably carried inwardly from the lower extremity of the said frame, and means for adjusting the said frame to vary the angle of the scraper relatively to the ship's side.

7. In an apparatus of the character set forth, the combination of a support adapted to be applied directly to the ship to be cleaned and freely adjustable to clear it from the water, a scraper having an automatic adjustment movably carried by the support and adapted to have its angle varied, and means for propelling the said devices.

8. In an apparatus of the character set forth, the combination of a support having a movable attachment, a scraper-frame movably connected to said support, an automatically-adjustable scraper carried by said frame, and means for adjusting the said frame.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

BRADFORD S. MILES.

Witnesses:
J. W. NORTH,
W. H. MILES.