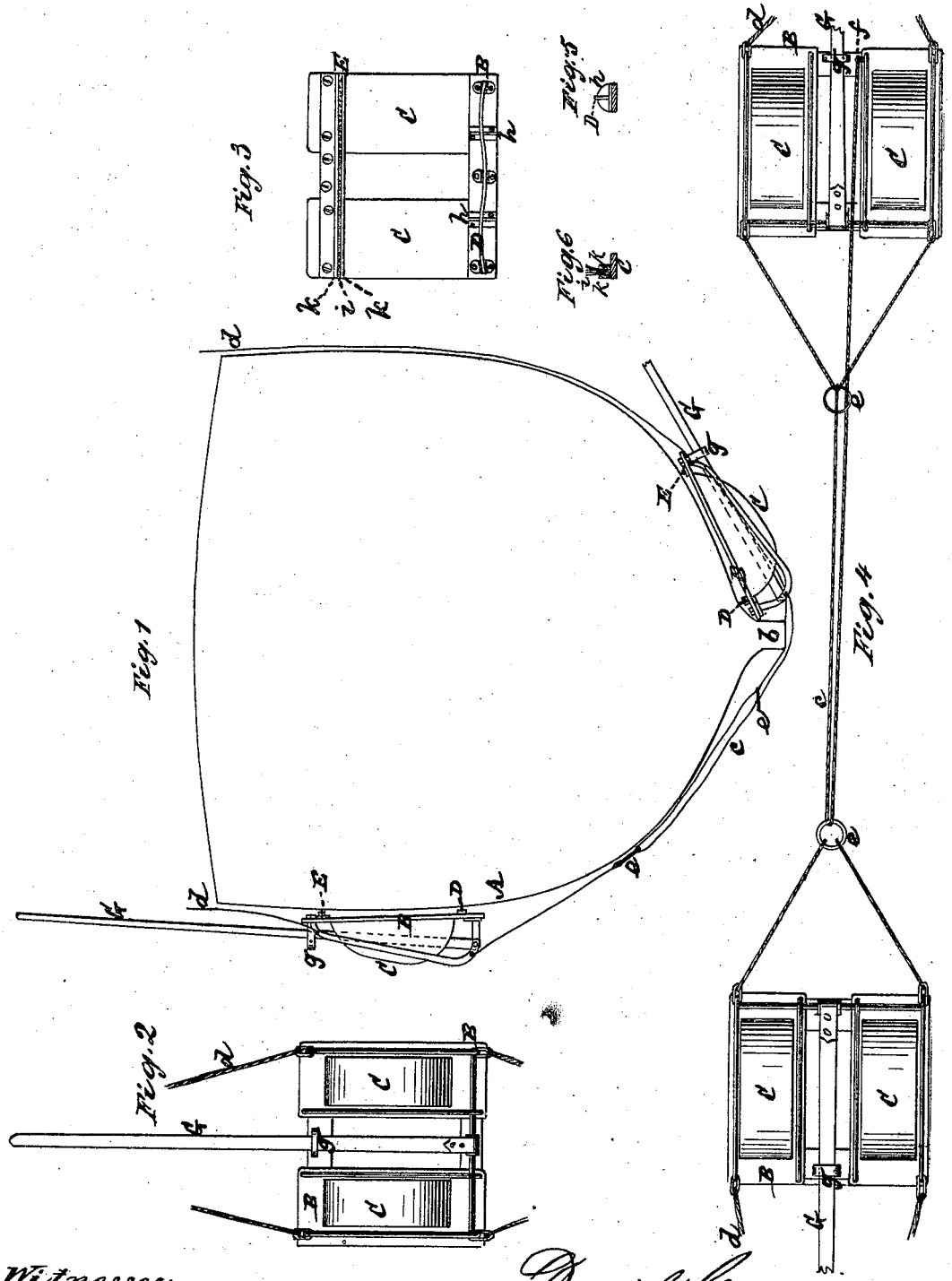
2 Sheets—Sheet 1.

D. CORNING.

APPARATUS FOR CLEANING SHIPS' BOTTOMS.

No. 185,081. Patented Dec. 5, 1876.



Witnesses:
Michael Ryan
Fred. Haynes

Daniel Corning
by his Attorneys
Brown & Allen

2 Sheets—Sheet 2.

D. CORNING.

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Fig. 10

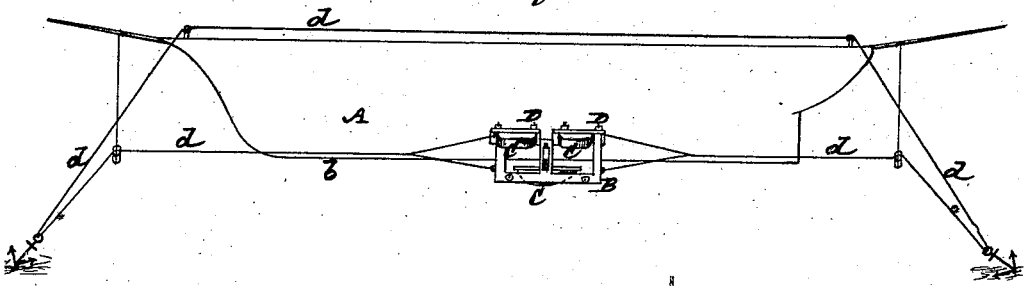


Fig. 8

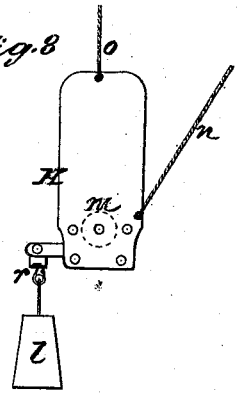


Fig. 9

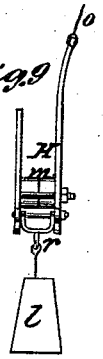
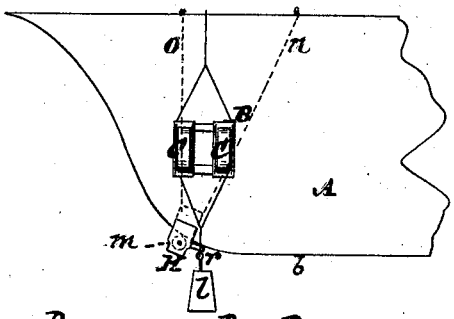


Fig. 7



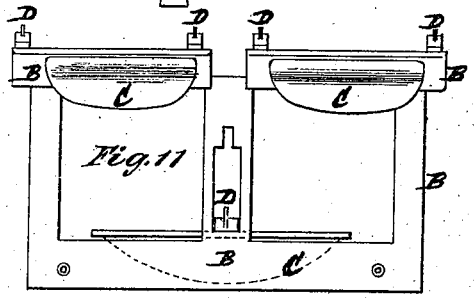
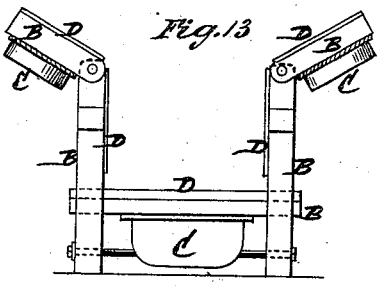


Fig. 11

Fig. 13



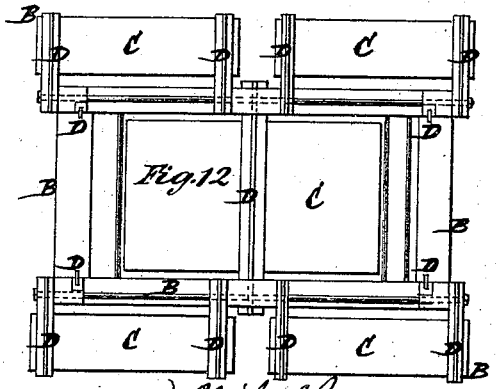


Fig. 12

Witnesses { Michael Ryan, Fred. Haynes

Daniel Corning
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE

DANIEL CORNING, OF YONKERS, NEW YORK, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO LEWIS N. MORRIS, OF SAME PLACE.

IMPROVEMENT IN APPARATUS FOR CLEANING SHIPS' BOTTOMS.

Specification forming part of Letters Patent No. **185,081**, dated December 5, 1876; application filed March 23, 1876.

To all whom it may concern:

Be it known that I, DANIEL CORNING, of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Devices for Cleaning the Bottoms or Submerged Portions of Ships and other Vessels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to devices for cleaning ships' bottoms without beaching the vessel or removing her from the water, and in which one or more scrapers or brushes, having one or more attached floats to keep them in contact with the submerged portion of the vessel being cleaned, are manipulated up and down or backward and forward over said submerged outer portion or surface of the vessel.

The invention consists in certain novel constructions of certain details of such an apparatus, and in devices for operating and controlling the same, whereby great efficiency is combined with durability and simplicity.

Figure 1 represents the transverse section in outline of the hull of a vessel with a pair of connected cleaners arranged to operate athwart the vessel's bottom on opposite sides of the keel. Fig. 2 is a back or outside view of one of said cleaners; and Fig. 3, an inside or face view of the same in part, showing a pair of floats with a scraper and a brush attached. Fig. 4 is a rear or outside view of the connected cleaners detached from the vessel, and showing a certain arrangement of ropes for working them. Fig. 5 is a side view of a guide which carries the scraper, and Fig. 6 a transverse section of one of the brushes. Fig. 7 is a side view of the forefoot and stem portion of a vessel with one of said cleaners as being adjusted to its place by the aid of a weighted stop or guide. Fig. 8 is a side view of said stop upon a larger scale, and Fig. 9 an edge view of the same. Fig. 10 shows a side view of the hull of a vessel, with a modification of the cleaner constructed and applied to clean the keel as well as more or less of the bottom on either side of the keel. Fig. 11 is a side view, upon a larger scale, of one of said keel and bottom cleaners; Fig. 12, a plan thereof; and Fig. 13, an end view of the same.

Referring, in the first instance, or more particularly so, to Figs. 1, 2, 3, 4, 5, and 6, A represents the hull of a vessel or transverse profile thereof. The devices for cleaning the bottom of said vessel may either be worked separately or in pairs by means of poles or ropes; but they will here first be described as working in pairs on opposite sides of the keel *b*, by means of a connecting rope or ropes, *c*, passing under the keel, and other ropes, *d*, extending up to the deck, so that the devices may be worked from the latter, or from a plank or planks overhanging the deck, the motion given to said devices causing them to be operated athwart the vessel up and down successively from about the water-line to near the keel on opposite sides of the hull, each one of said connecting devices alternately ascending while the other is descending. These cleansing devices consist generally of a frame, B, of any desired shape, length, and depth, and having one or more floats, C, attached to their backs or elsewhere, and one or more scrapers, D, and one or more brushes, E, or either scrapers or brushes, secured to them on their inner surfaces or faces. Said scrapers and brushes are arranged to extend across the path of motion described by the frames when the cleaning devices are being worked.

The floats C may either be of cork or other buoyant material, or they may be hollow air-vessels, constructed of copper or other heavy material, but of sufficient buoyancy to hold or bear up the scrapers and brushes, or either, against the bottom of the vessel. The rope *c*, which connects the two cleaning apparatuses or devices on opposite sides of the keel, passes through eyes or rings *e*, and is made fast to the one cleaning device at *f*, to adjust said two devices to their proper distance apart.

After one portion in the length of the vessel's bottom has been cleaned, the rope *c* is loosened from its fastening at *f*, and the two cleaning devices slid or adjusted along the vessel, to operate on a fresh portion of the

vessel's bottom, the rope *c* being made fast, as before, at *f*, and so on until the vessel throughout the whole length of its bottom is cleaned.

The operating-ropes *d* may be worked from the deck by any suitable means. Attached to the frames B of either cleaner is a pole, G, pivoted at its lower end to the back of the frame, and adjustable in a strap or guide, *g*. These poles, which should be made removable, may be used to direct the cleaners relatively to the surfaces being cleaned, especially when working at the bow of the vessels. They may also be used as handles in place of the ropes *d*, to operate the cleaners on vessels of light draft.

The scrapers D may be variously constructed, and be either straight or crooked; but to prevent them catching in longitudinal seams of the vessel's bottom, and to facilitate their working over lapped joints of the latter, as in the case of an iron vessel or copper-bottomed one, I prefer to construct each scraper D of a crooked or waved form in direction of its lengths, as shown in Fig. 3, and to hold said scraper in guides *h*, made curved or beveling on their outer edge, as shown in Fig. 5, to gradually establish the contact of the scraper with the ship's bottom while the cleaner is being worked. The motion of these sinuous scrapers is transversely of their length, so that, in being worked edge onward athwart the vessel, their waved or sinuous edges will cross the longitudinal seams in the ship's bottom throughout the whole length of the scrapers at or near the same time, without, however, being in exact line with the seam, so that said edges cannot possibly catch in the seam. This is essentially different from a serrated scraper lying face onward, and the motion of which is coincident with its length.

The brushes E may also be of any suitable construction, and be wholly of bristles, or only partly so, or wholly of rubber or other suitable material; but the brush represented in Figs. 3 and 6 is composed of one or more rows of bristles, *i*, between strips *k*, of rubber, on either side of them, whereby the bristles are supported and kept in position, or prevented from being bent unduly over by the pressure of the floats on the back of the cleaner.

Referring, in the next instance, to Figs. 7, 8, and 9 of the drawing, there is there represented a stop or guide, H, having an attached weight, *l*, and formed of two opposite sides or cheeks, made adjustable in relation with each other, and having a roller or support, *m*, in between them. This guide or stop H has guy-ropes *n o*, by which it is lowered and directed to its place, and may be afterward made fast. Said guide H straddles the keel, and bears on either side of the vessel's bottom by means of its cheeks or sides and roller *m*. Its use is to keep the cleaner or cleaners in place when working them over the stem and forefoot of the vessel, as in Fig. 7, by passing the rope which connects or operates them through an eye or ring, *r*, on the weight *l*, and so preventing said rope from slipping up the stem of the vessel. This guide or stop H may also be used in connection with the modification shown in the remaining figures of the drawing, numbered, respectively, from 10 to 13, inclusive.

In Figs. 10, 11, 12, and 13, the frame B of the cleaner is represented as of cradle-like construction, with its sides adjustable toward or from each other, and provided with any number of scrapers D, or scrapers and brushes, or either, arranged to operate on the bottom and sides of the keel (also, if desired, on either side of the bottom of the vessel for any desired distance up the latter) by constructing the cradle-like frame with flaring hinged or jointed wings having attached scrapers. The scrapers or brushes of this frame are held up to their place by any number of suitably disposed and attached floats C, as in the other modification of the cleanser or cleansers, which the modification shown in Figs. 10, 11, 12, and 13 may either take the place of or be used in addition for cleaning the keel.

Other constructions of the cleaner with its attached scrapers or brushes and floats may be adopted without changing the leading principle of the invention. When, however, the frame of the cleaner is of cradle-like construction, as shown in Figs. 10, 11, 12, and 13, and in certain other constructions as well, the cleaner, instead of being operated athwart the vessel, is worked longitudinally thereof, so as to sweep the keel and bottom of the vessel, or either, without interruption or stoppage.

Various means may be employed for working the cleaner lengthwise of the vessel; but, as shown in Fig. 10, the same may very conveniently be done by first adjusting the cleaner to its place through its operating-rope *d* by means of the guide or stop H, hereinbefore referred to, and afterward passing said rope over blocks suspended from the fore-and-aft booms, from thence under pulleys attached to the shanks of bow and stern anchors, and from thence over blocks and guides on the deck, thus giving the rope *d* an endless character, and so that it may be worked by any suitable means lengthwise of the vessel.

I claim—

1. The scrapers D of the cleaners, with their floats, of a waved or sinuous construction in direction of their length, and arranged for operation edge onward in directions transversely to their length, substantially as shown and described.

2. The brushes E of the cleaners, with their floats, composed of one or more rows of bristles, *i*, and rubber supporting-strips *k*, arranged on reverse sides of the rows of bristles in front of the floats, substantially as specified.

3. The stop or guide H, constructed sub-

stantially as described, in combination with the cleaner or cleaners, for holding and directing the latter, essentially as specified.

4. In an apparatus for scraping and cleaning the keels of vessels, the keel scraper or cleaner supporting frame, provided on its upper sides with scrapers, arranged to clean the under side of the hull, substantially as specified.

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