W. B. BUST.

SHIP CLEANING APPARATUS.

APPLICATION FILED JAN. 24, 1908.

910,110.

Patented Jan. 19, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

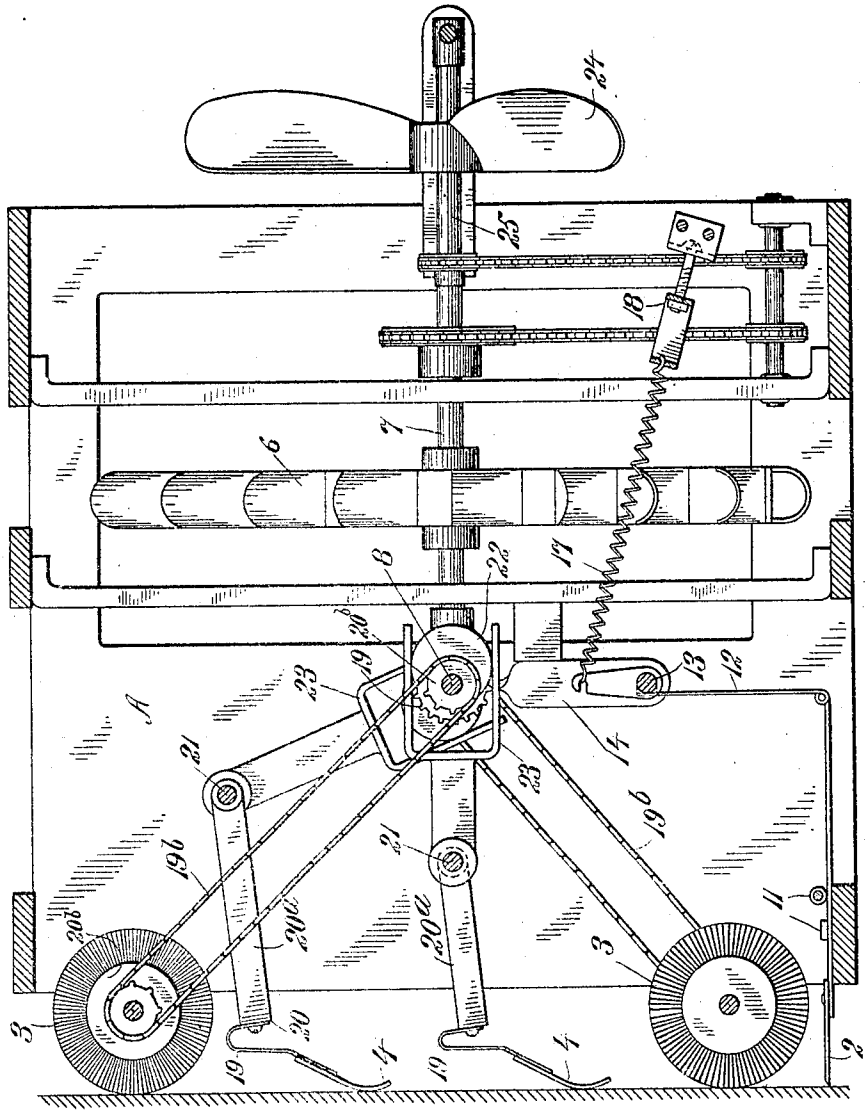
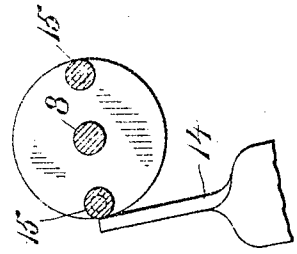


Fig. 2.



WITNESSES:

Alex. Currie

J. B. Howe

INVENTOR

William B. Bust.

BY

Geo. H. Strong.

ATTORNEY

THE NORRIS PETERS CO., WASHINGTON, D. C.

W. B. BUST.

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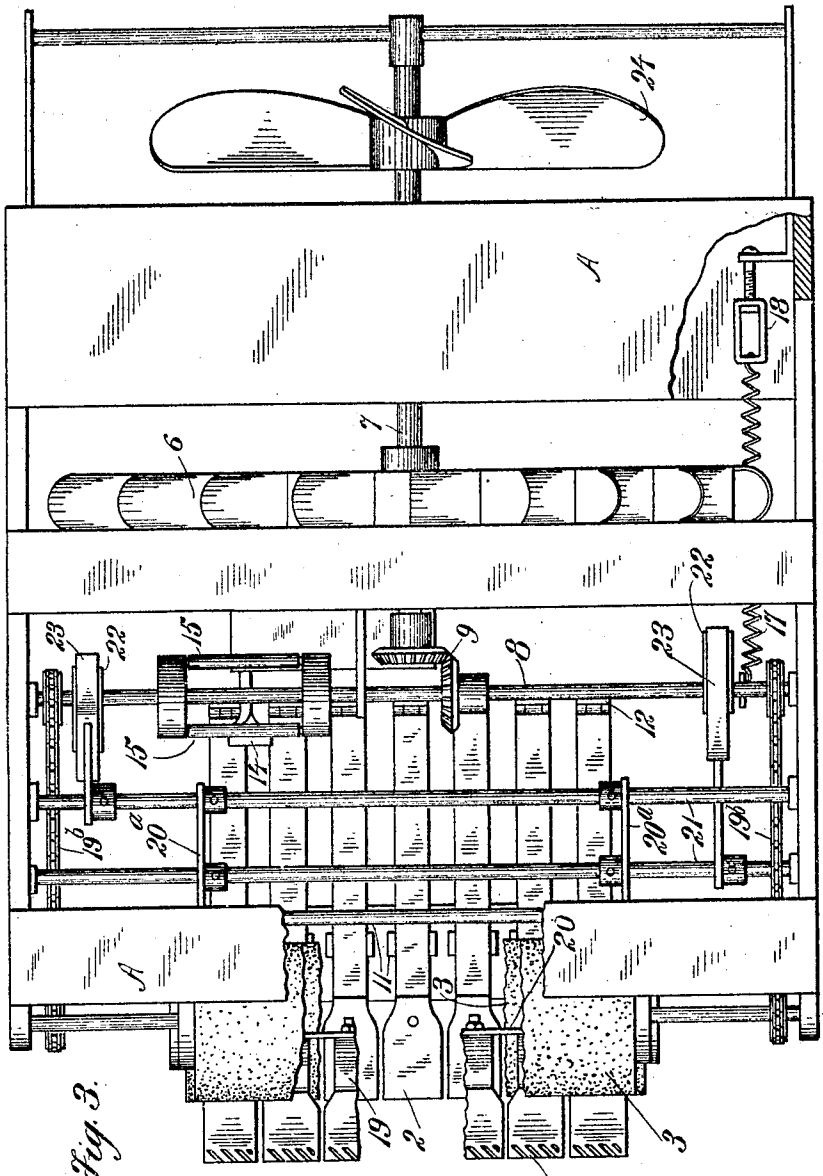


Fig. 3.

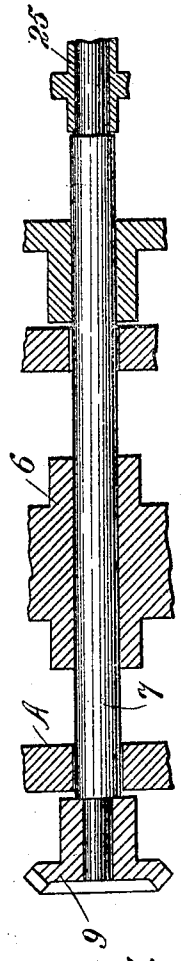


Fig. 5.

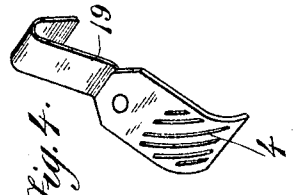


Fig. 4.

WITNESSES:

Alex Currie

INVENTOR

William B. Bust.

BY

Geo. H. Strong.

ATTORNEY

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM B. BUST, OF OAKLAND, CALIFORNIA.

SHIP-CLEANING APPARATUS.

No. 910,110. Specification of Letters Patent. Patented Jan. 19, 1909.

Application filed January 24, 1908. Serial No. 412,505.

To all whom it may concern:

Be it known that I, WILLIAM B. BUST, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Ship-Cleaning Apparatus, of which the following is a specification.

My invention relates to an apparatus which is especially designed for removing barnacles or other adhesive matter which collect upon the bottoms of vessels, and to effect this cleansing without placing the ship in dry dock.

It consists in a combination of parts, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal, sectional view of the invention. Fig. 2 is a detail view of a portion of the means for reciprocating the cutters. Fig. 3 is a plan view of the machine. Fig. 4 is a detail view of one of the scrapers; and Fig. 5 is a longitudinal, sectional view of a portion of the operating mechanism.

The necessary apparatus may be mounted upon any suitable frame or structure in which the parts can be conveniently carried. Such a support is here indicated at A, and upon this support are carried the various cleaning devices. These devices consist in part of chisels or cutters 2, with mechanism by which they may be reciprocated so as to strike sufficiently heavy blows to break away and loosen barnacles, or other hard substances which may adhere to and roughen the ship's bottom.

3—3 represent brushes which may be made of any suitable stiff material such as wire, whalebone, or any material which will serve for removing either the broken particles of hard substances, or grass, or other soft material which may have adhered; and in conjunction with these are employed brushes or scrapers 4, which are so reciprocated as to slide over the surface to which the apparatus is applied. These parts may be of any suitable size and length to include such sections of the vessel bottom as can be conveniently worked at one operation, and mechanism for producing the various movements may be driven either from the vessel itself, or from an exterior support if more convenient. In the present case I have shown a water or other impulse wheel 6, suitably journaled upon the frame-work, and capable of being moved therewith to any desired point where the work is to take place. This wheel may be driven by a strong jet of water furnished by pumps, or in some cases an equivalent gear or sprocket-wheel may be connected with the motor through which power is transmitted. In any case the power thus transmitted is communicated to a shaft or axle 7 of the wheel, which is suitably journaled upon the frame. I have here shown a second shaft 8 extending transversely across one end of the shaft 7, and by means of bevel-gears 9 motion is transmitted to this second shaft.

The means for actuating the chisels or breakers 2 are as follows: These chisels are slidable in suitable guides 11, and the rear ends are connected by arms 12, with an oscillating shaft 13, also journaled upon the frame. This oscillating shaft has an arm 14 extending therefrom, and the transverse countershaft 8 carries arms 15 or equivalent cams which, engaging the upper end of the arm 14, will alternately press it in one direction, thus oscillating the shaft and retracting the chisels. When the cam device releases the upper end of the arm 14, the chisels are thrown forward by the action of springs 17, so connected with the oscillating arm, or other part that when the cams release the oscillating parts after having retracted them, the springs will act to throw them forcibly forward and produce the necessary impact of the chisels against the surface to be cleansed. Turn-buckles or equivalent tension-regulating devices 18 serve to give the desired or necessary tension to the springs.

The rotating brushes 3 are mounted upon journal-shafts, and may be driven by means of chains 19^b passing around sprockets 20^b upon the countershaft 8, and upon the brush-carrying shafts respectively, so that the rotation of the countershaft imparts motion to these brushes, at any desired point. I have here shown one of these brushes situated contiguous to the chisels previously described, so that it may be made to follow the chisels and brush off any material which may have been loosened thereby. The other brush may be located at the opposite or upper part of the frame and beyond the oscillating scrapers, and may be, if desired, made of softer material so as to produce a finishing action after the other portions of the apparatus have completed their work.

The scrapers 4 may be of any suitable or

desired character. They may be in the form of rakes or brushes, or as shown in the present case, their curved steel plates roughened upon the outer faces in any manner which will produce the desired scraping and cleansing surface. These plates 4 are preferably secured to independent spring arms 19. These arms are secured to a transverse bar 20 having extensions 20ª to the rear, and these extensions are secured to a shaft 21, here shown as journaled parallel with the countershaft 8.

22 are eccentrics or cams fixed upon the shaft 14, and forked arms or eccentric straps 23 engage these eccentrics, the opposite end being fixed to the shaft 21 so that the rotation of the countershaft 8 causes an oscillating movement of the shaft 21, and the arms 20 which carry the scrapers. This movement being transmitted to the scrapers gives them a reciprocating movement against the side of the vessel which serves to rub off any material sufficiently loosened by the action of the previously described apparatus, or otherwise.

It will be seen that the arms connecting the chisels with the shaft by which they are reciprocated, may also be made elastic so that the chisels will move independently, and any one may be advanced further than another, depending upon the thickness of the incrustation, or other irregularities of the surface against which they act.

Various means may be employed for holding the apparatus to its work. It could be secured by cables passing around the ship, but I have here shown as a preferable means, a propeller 24 mounted upon a shaft 25, which is here shown as journaled in line with the main driving shaft.

The propeller may be driven at any desired rate of speed either by gearing, by chain and sprocket-wheel, or other connection by which the speed of the propeller may be increased to any degree greater than that of the main driving shaft. The action of this propeller when submerged will be such as to forcibly hold the cutting, scraping and cleaning mechanism against the side of the vessel.

The whole apparatus may be suspended so that it can be let down, turned to follow curvatures of the vessel, and operated freely and effectively whatever its position may be.

It will be understood that variations in the mechanism may be made, and other well known mechanical equivalents for parts here described may be substituted without materially altering the character and effect of the apparatus.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. An apparatus for the cleansing of ships' bottoms and the like, said apparatus including reciprocating cutters, rotary and oscillating cleaning elements, and mechanism by which they are actuated.

2. In an apparatus of the character described, the combination of a motor-shaft, a countershaft arranged transverse thereto, means for transferring motion from the motor-shaft to the countershaft, brush-carrying shafts arranged parallel to the countershaft, and power-transmitting devices between the countershaft and each of the brush-carrying shafts.

3. In an apparatus of the character described, the combination of a motor-shaft, a countershaft arranged at right angles thereto, connections between the two shafts, brush-carrying shafts arranged parallel with the countershaft, driving connections between the countershaft and the brush-carrying shaft, oscillating scrapers located contiguous to the brushes, and mechanism including rocking arms and actuating eccentrics whereby said scrapers may be oscillated.

4. In an apparatus of the character described, a motor, a countershaft, means by which motion is communicated to said countershaft, cams or eccentrics carried by the countershaft, a second shaft parallel with the countershaft, eccentric rods whereby said shaft is oscillated, arms extending from the oscillating shaft, and scrapers carried by said arms and to which oscillating motion is transmitted therefrom.

5. In an apparatus of the character described, an oscillating shaft having arms projecting therefrom, and partaking of its motion, independent scrapers, and elastic connections between said scrapers and the oscillating arms.

6. In an apparatus of the character described, independent scrapers, spring arms to which said scrapers are attached, bars to which the spring arms are connected and by which the scrapers are normally maintained in an approximately parallel position, and yieldably applicable to the surface to be acted upon, and oscillating bars to which the scraper-carrying bars are attached.

7. In an apparatus of the character described, independent guided chisels or cutters, an oscillating shaft, arms connecting said shaft with the cutter extensions, a countershaft with cams, an arm engaging said cams and advanced thereby in one direction, and springs whereby the cutters are impelled to strike a blow when released.

8. In an apparatus of the character described, independent slidably guided cutters having rearward extensions, a transversely journaled shaft, elastic arms connecting said shaft with the rear ends of the cutter extensions, an arm fixed to the shaft extending at right angles therewith, a countershaft having cams adapted to engage the end of the previously named arm to advance it in one direction and release it after its advance,

springs by which the arm is returned and the cutters forcibly advanced, and a motor from which motion is transmitted to the countershaft.

9. In an apparatus of the character described, independent reciprocating chisels, and elastic reciprocable scrapers and rotary brushes, a countershaft and intermediate mechanism by which said cleaning parts are respectively actuated, a propeller, means by which it is rotated to hold the cleansing devices against the part to be cleaned.

10. In an apparatus of the character described, reciprocating chisels, oscillating and rotating scrapers and brushes, a countershaft, intermediate mechanism by which movements are transmitted to the cleansing devices, a motor, connections between said motor and the countershaft, a propeller and connections whereby motion is transmitted thereto from the motor to hold the apparatus against the surface to be cleansed.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM B. BUST.

Witnesses:
CHARLES A. PENFIELD,
L. H. NOURSE.