

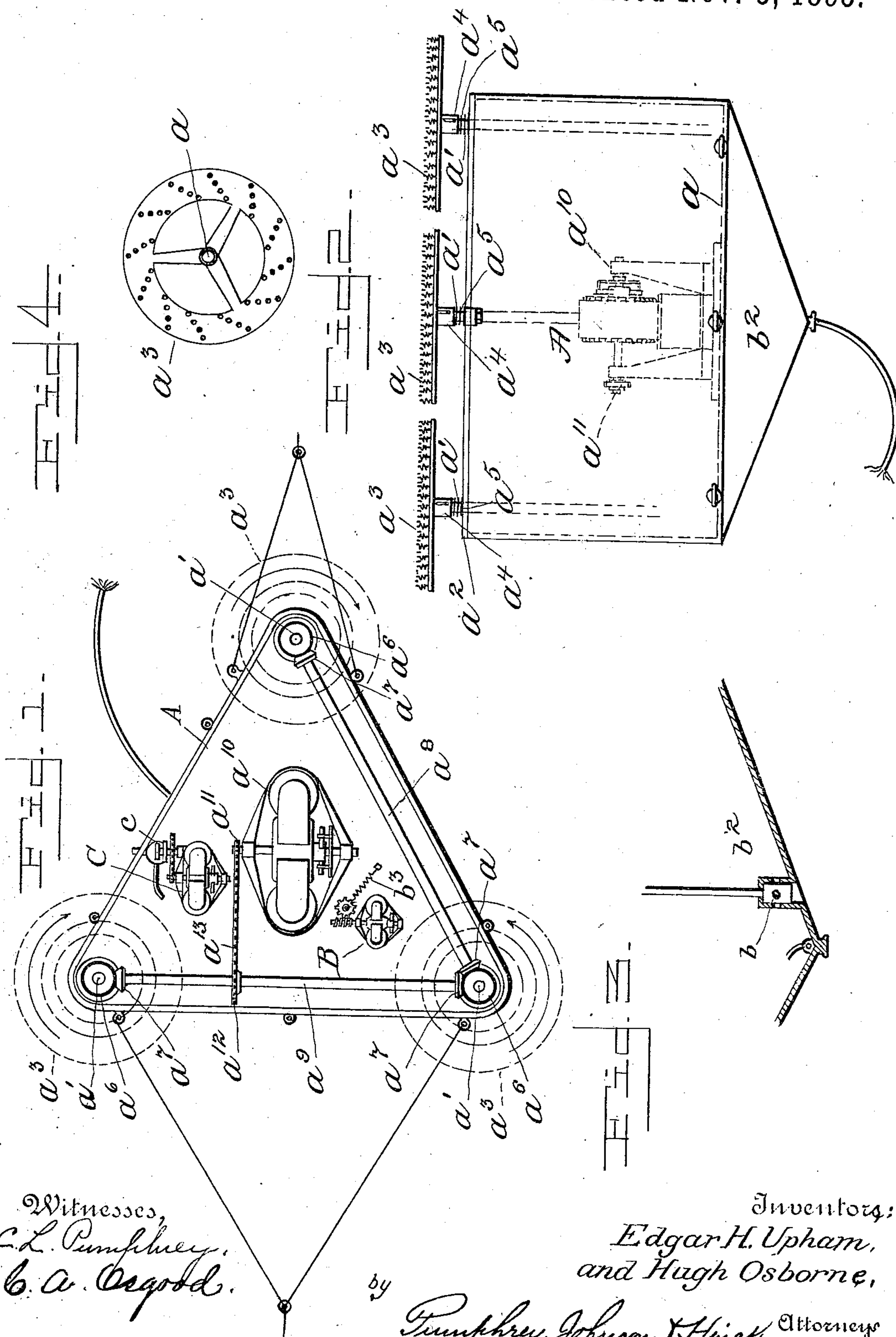
(No Model.)

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E. H. UPHAM & H. OSBORNE.
MACHINE FOR CLEANING HULLS OF VESSELS.

No. 549,340.

Patented Nov. 5, 1895.



Witnesses,
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C. A. Osgood.

by

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Inventors:
Edgar H. Upham,
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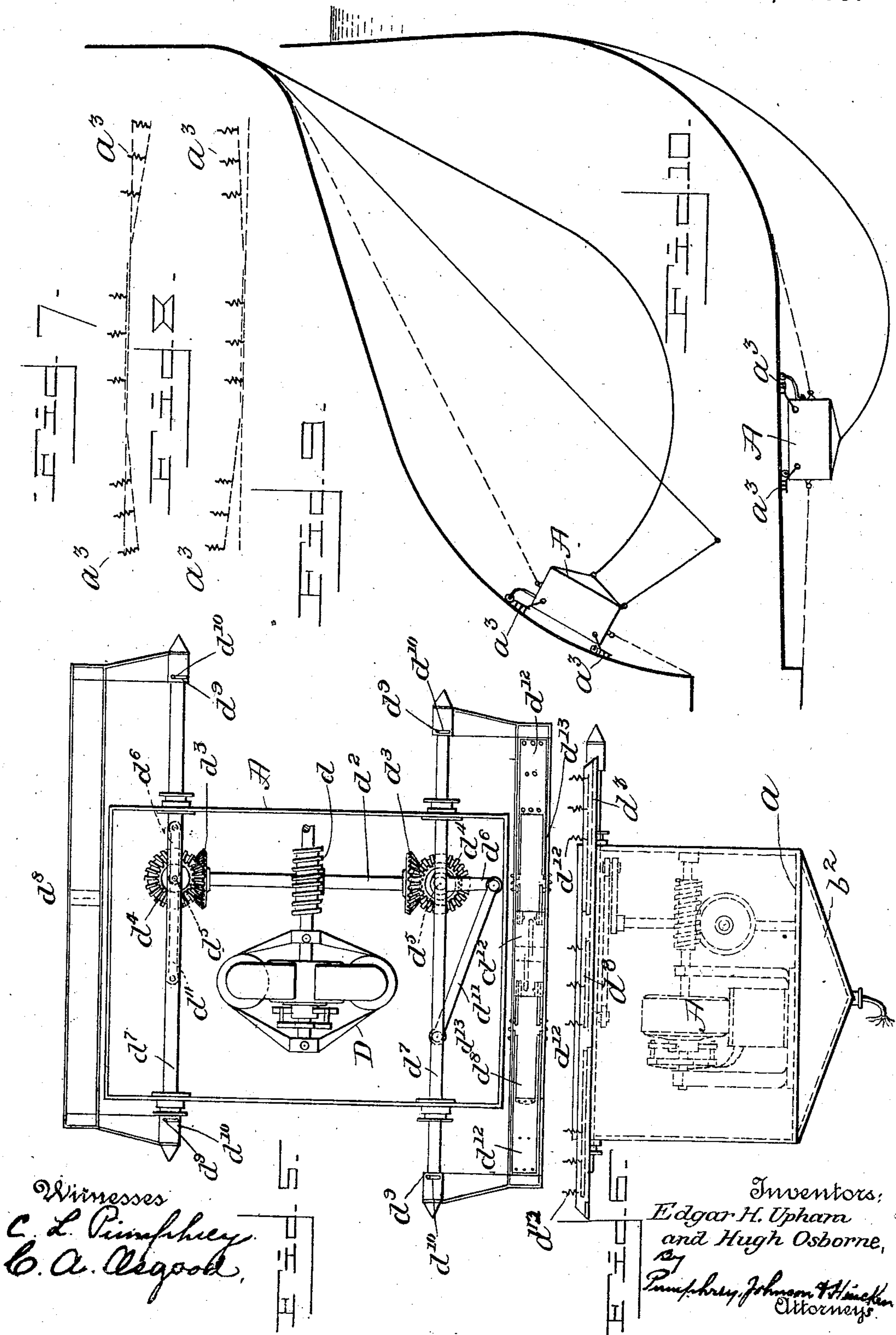
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UNITED STATES PATENT OFFICE.

EDGAR H. UPHAM AND HUGH OSBORNE, OF ORLEANS, MASSACHUSETTS.

MACHINE FOR CLEANING HULLS OF VESSELS.

SPECIFICATION forming part of Letters Patent No. 549,340, dated November 5, 1895.

Application filed January 21, 1895. Serial No. 535,671. (No model.)

To all whom it may concern:

Be it known that we, EDGAR H. UPHAM and HUGH OSBORNE, citizens of the United States, residing at Orleans, in the county of Barnstable and State of Massachusetts, have invented a new and useful Improvement in Machines for Cleaning the Hulls of Vessels, of which the following is a specification.

The invention relates to machines of a class particularly adapted for use in cleaning the hulls of vessels.

The object is to produce apparatus by which the removal of all accumulation of foreign substances from the hull, and especially the bottom, of steel and iron vessels may be effected with economy and in a ready and convenient manner and without necessitating beaching or docking the vessels, and, further, to provide means for controlling the machine, so as to direct and cause it to operate upon any point of the hull of a vessel, thereby keeping the entire surface free and clear of all adhering particles and enabling a maximum speed to be maintained at a minimum consumption of fuel.

With these objects in view the invention consists in an improved construction and certain novel combinations and arrangements of parts, which will be hereinafter described and claimed.

In the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in the several views, Figure 1 is a view in plan of one embodiment of the invention, with the top or cover of the casing removed. Fig. 2 is a view in elevation of the same, looking from the rear. Fig. 3 is a detail view in section of a valve. Fig. 4 is a plan view of one of the brushes. Fig. 5 is a view in plan of a modified arrangement of the brushes and driving-gearing, the top or cover of the casing being removed. Fig. 6 is a view in elevation of the same. Figs. 7 and 8 are views in diagram, showing the brushes in action upon curved portions of the hull. Figs. 9 and 10 are views in elevation, showing the machine in operation at the stern and amidships.

In the drawings, A designates a water-tight box of any suitable size and shape, but is preferably triangular, as shown in Fig. 1. This box is divided into two compartments by a

horizontally-arranged partition *a*, the upper compartment being designed to contain and support the driving mechanism and the lower smaller one serving as a water-ballast tank. At each corner of the frame a vertically-disposed shaft *a'* is rotatably mounted, with one end thereof projecting through a water-tight box in the cover *a*², and has loosely mounted thereon a circular brush or scraper *a*³. These brushes are each provided with a collar or sleeve *a*⁴, which encircles the shaft and is yieldingly held at the outer end of the shaft under the action of a spiral spring *a*⁵. At the opposite end, within the upper compartment, the shafts have keyed thereto bevel-gears *a*⁶, which are connected to rotate together by the terminal engaging pinions *a*⁷ of the angularly-disposed shafts *a*⁸ *a*⁹, intermeshing with the gears *a*⁶. Power from an electric or other motor *a*¹⁰ is transmitted to the shaft through sprocket-wheels *a*¹¹ *a*¹² and an endless chain *a*¹³.

B designates a second and smaller electric or other motor, which is geared to operate a balanced valve *b* and admit water to the tank *b*², a spring *b*³ being employed to close the valve when the circuit is broken.

C designates a similar motor, which is geared to operate a pump *c* and exhaust the chamber or compartment, thus lightening the machine and thereby causing the machine to rise. These motors are each wired on a separate circuit by being connected in multiple branches from the ship's source of electrical supply, the wires serving as leads being formed into a single cable, which is carried through a water-tight box in the wall of the motor-chamber and extends to the deck of the vessel, where the currents are separately controlled by suitable switches.

The machine when used is held in proper position at any desired point by means of attached chains, which lead up on each side of the ship and are secured on deck. To prevent the brushes from bearing too forcibly upon the hull of the vessel, the machine may be provided with rollers, or the buoyancy may be so adjusted.

The modification illustrated consists in the substitution of reciprocating for the rotary brushes and the necessary gearing.

D represents a motor, from which power is transmitted through worm-gearing *d* to a

shaft d^2 , carrying at its ends bevel-gears d^3 . These gears mesh with similar gears d^4 upon vertical shafts d^5 , to the upper ends of which are keyed crank-arms d^6 . Sliding in boxes in the sides of the casing are shafts d^7 , the ends of which project and have pivoted thereon brush-carrying frames d^8 . The rotary movement of these frames is limited by stop-pins d^9 , working in slots d^{10} of the sleeves of the frame. Reciprocatory motion is imparted to the shafts through connecting rods or links d^{11} , which are interposed between the shafts and the crank-arms. Upon each frame three or more brushes d^{12} are spring-seated and held between pivoted links d^{13} so as to yield readily against the action of the springs and adapt themselves to the curvature of the hull of the vessel. This action may be facilitated by the use of springs which would encircle the sliding shafts and be inclosed by the sleeves of the frames.

The operation is as follows: The machine is lowered from the deck by chains over the bow of the vessel, so that one chain lies on each side of the hull. Water is then admitted to the chamber of the box or casing by closing the circuit through the valve-opening motor, and upon the buoyancy of the machine being overcome it sinks to the keel of the ship, where it is held by the chains. The circuit is then closed through the pump-motor, and as the machine is relieved of its water-ballast it rises under the ship, with the brushes yieldingly pressed against the side thereof. On closing the circuit through the brush-motor the scrapers are set in motion and the machine is then gradually hauled to the surface, after which it is moved aft a short distance, sunk to the keel, floated under the bottom, and manipulated as above described, and so on until the entire hull has been operated upon. Being held by the chains, the buoyancy of the machine serves to press the brushes firmly against the side of the ship, and thereby operates effectually

in removing all adhering deposit of foreign substance.

It will be understood that we do not wish to confine ourselves to the particular construction or arrangement of parts set forth, as many changes may be made without departing from the general principle involved.

Having thus fully described our invention, what we claim as new is—

1. In a machine of the class described, a casing having a motor inclosed in one of a series of water-tight compartments, exteriorly mounted brushes or scrapers operatively connected with the motor and means for varying the buoyancy of the casing.

2. A machine of the class described, comprising a water-tight casing provided with a plurality of non-communicating compartments and a series of electrically driven scrapers or brushes and means for partially or wholly filling and exhausting one or more of the compartments, for the purpose set forth.

3. A machine of the class described, comprising a water-tight casing having compartments, means for opening one or more of the compartments for the entrance of water, an exhaust pump controlling devices and a series of electrically driven brushes, for the purpose set forth.

4. A machine of the class described, comprising a water-tight casing having compartments, scrapers or brushes, inclosed mechanism for operating the scrapers and brushes, and means for varying the buoyancy of the casing, for the purpose set forth.

In testimony whereof we have hereunto affixed our signatures in the presence of two subscribing witnesses.

EDGAR H. UPIAM.
HUGH OSBORNE.

Witnesses:

GEO. F. MAYO,
H. M. PERCIVAL.