P. GANZ.

SHIP CLEANING DEVICE.

APPLICATION FILED APR. 5, 1916.

1,213,091.

Patented Jan. 16, 1917.

2 SHEETS—SHEET 1.

Fig. 1,

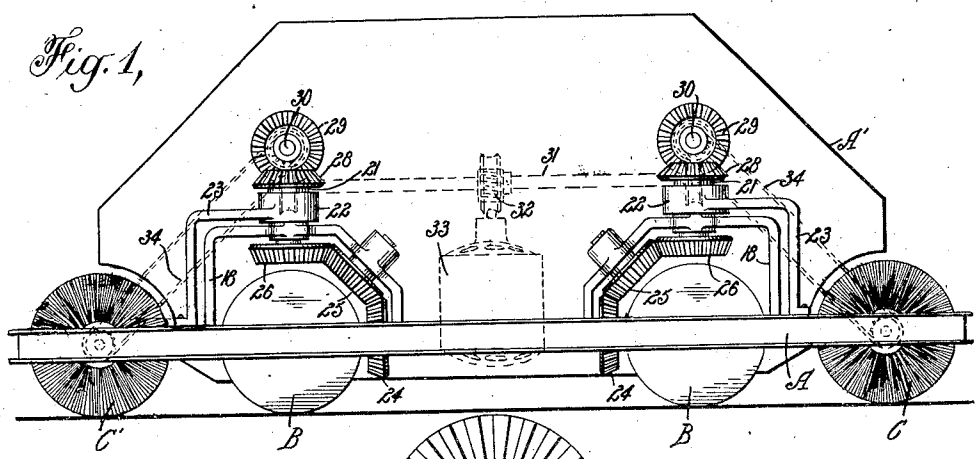
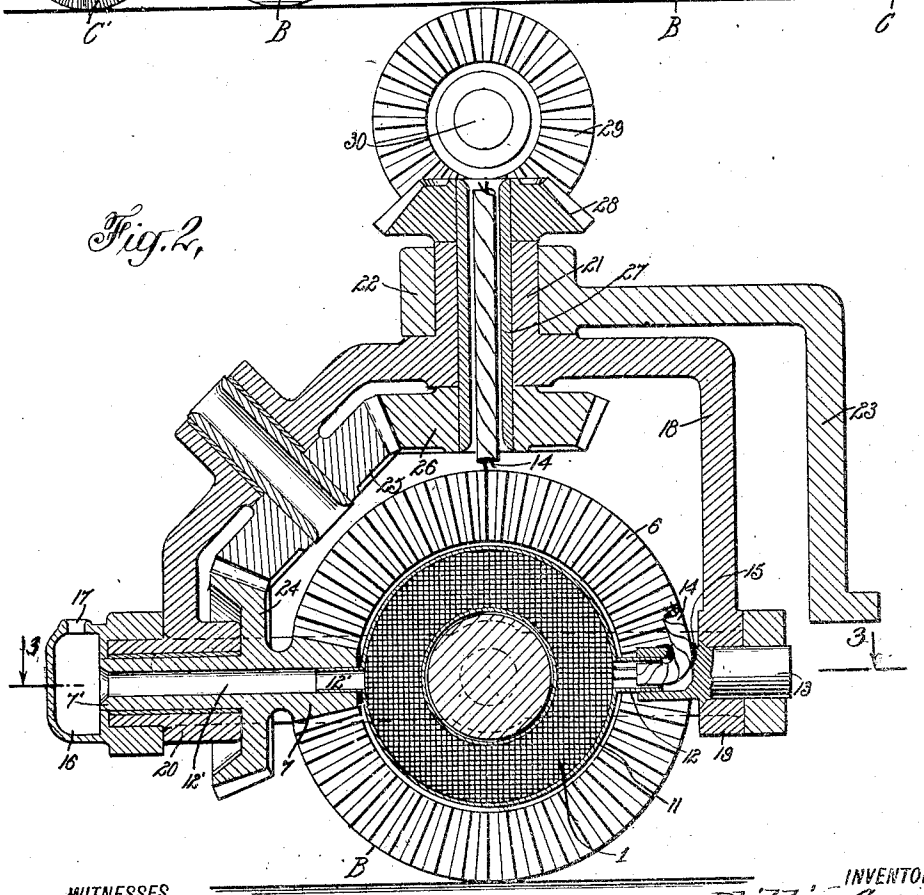


Fig. 2,



WITNESSES

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Fig. 3.

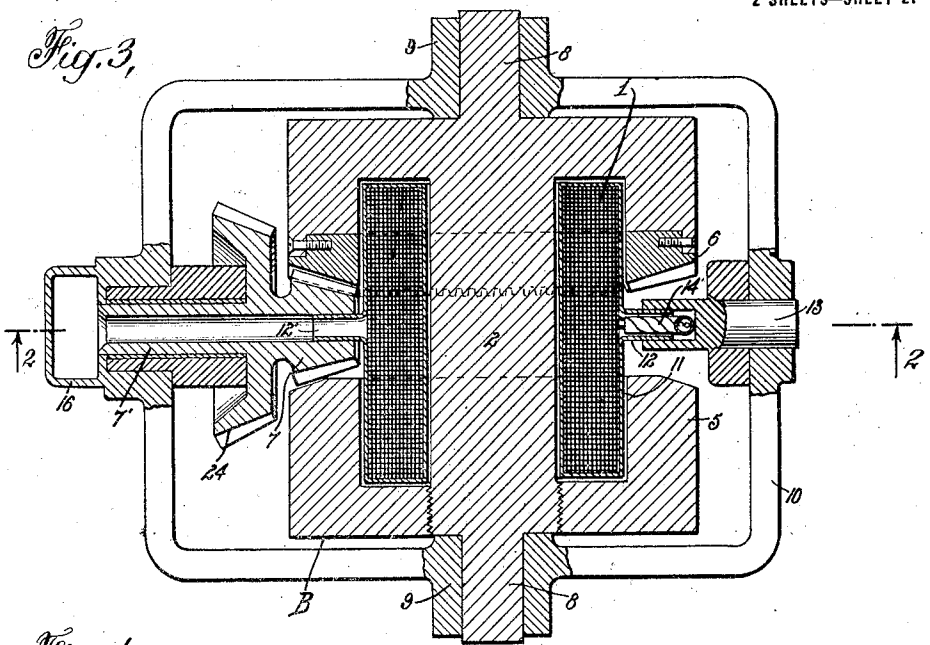
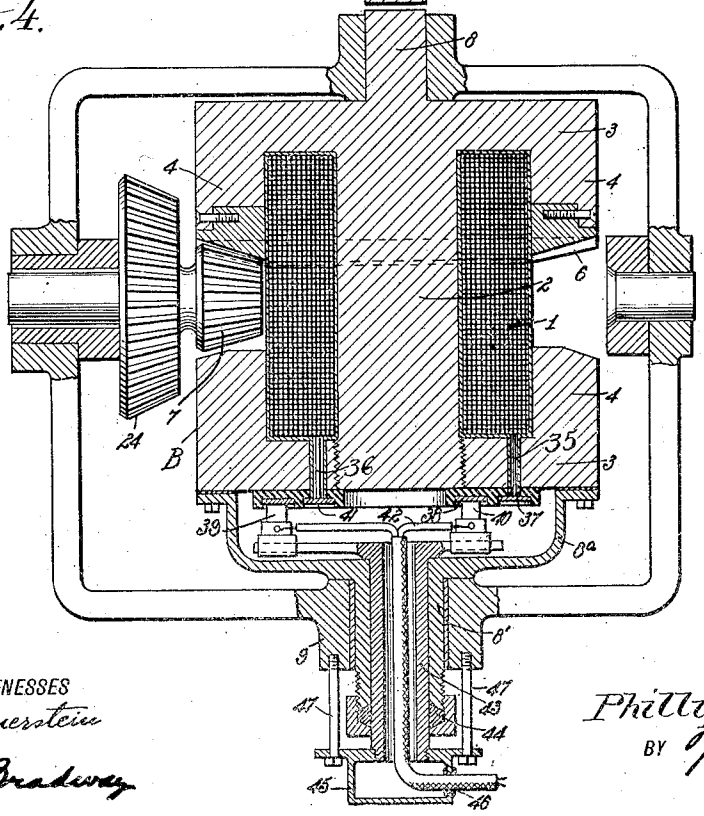


Fig. 4.



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SHIP-CLEANING DEVICE.

1,213,091. Specification of Letters Patent. Patented Jan. 16, 1917.

Application filed April 5, 1916. Serial No. 89,037.

To all whom it may concern:

Be it known that I, PHILLIP GANZ, a citizen of the United States, and a resident of Des Moines, in the county of Polk and State of Iowa, have invented a new and Improved Ship-Cleaning Device, of which the following is a full, clear, and exact description.

This invention relates to a device for cleaning the hulls of ships, and has to deal more particularly with electromagnetic rollers whereby the device can be kept in running contact with the hull so that the cleaning device can clean the outer surface thereof, but it is to be understood that the invention is not necessarily limited to this particular use.

The invention has for its general objects to improve and simplify the construction and operation of devices of the character referred to so as to be reliable and efficient in use, comparatively simple and inexpensive to manufacture, and so designed as to enable a free running contact with a magnetic surface.

A more specific object of the invention is the provision of a combined electromagnet and roller for maintaining a powerful running contact with the magnetic surface, the roller being so designed that it can be oppositely driven by suitable mechanism, and the magnetic force will be always operative to maintain the roller in attractive contact with the surface to be cleaned.

Still another object is the provision of a novel mounting for the magnetic roller, and means for supplying current to the winding, the design being such that the roller can, if desired, be submerged in water without danger of short-circuiting.

With such objects in view, and others which will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and claims appended hereto.

In the accompanying drawings, which illustrate certain embodiments of the invention and wherein similar characters of reference indicate corresponding parts in all the views, Figure 1 is a side view of the apparatus; Fig. 2 is an enlarged sectional view of one of the magnetic rollers and its mounting and driving means, the section being taken on the line 2—2 of Fig. 3; Fig. 3 is a horizontal section on the line 3—3, Fig. 2; and Fig. 4 is a horizontal section of a modified form of construction.

In the present instance the invention is shown in connection with an apparatus for cleaning the outer surface of the hull of a ship without drydocking the same, but it is to be understood that the invention is capable of other uses.

Referring to the drawing, A designates a suitable body or frame supported by a plurality of rollers B of which there may be any desired number, the rollers being so mounted that there will always be a square contact between the individual rollers and the hull of a ship, irrespective of the curvature of the hull. The frame carries one or more brushes C or other cleaning elements which clean the surface of the hull as the apparatus travels thereover.

The magnets that form the rollers B are substantially of the iron-clad type and each comprises a winding 1 around a central core 2, and the ends of the core are enlarged into disks 3 that have flanges 4, the core, disks and flanges coöperating to form an annular chamber for receiving the winding 1. The winding 1 may be stationary, as shown in Fig. 3, or it may rotate with the magnetic body forming the roller, as shown in Fig. 4. Between the flanges 4 of the roller is a circumferential groove or channel 5 to one wall of which is fastened a gear 6 with which meshes a pinion 7, whereby the magnetic roller is rotated, the roller being provided with journals 8 at its ends, which rotate in bearings 9 on a yoke or frame 10, as is shown in Fig. 3. In Fig. 4 the journal 8′ is tubular and enlarged into a cover 8^a which is fastened to the roller, the cover and the tubular form of the journal being provided for accommodating the means for connecting the winding with a source of current. The magnetic winding is inclosed in a shell 11 so as to be watertight. In Figs. 2 and 3 the shell 11 has oppositely extending tubular members or studs 12 and 12′ which extend respectively into a support 13 and the pinion 7. The support 13 and pinion 7 are mounted in the yoke or frame 10, the pinion of course being journaled so as to rotate. The tubular member 12 contains the leading-in wires 14 of the magnet winding, said wires entering the support 13 through a bushed opening 15, as shown in Fig. 2. The

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tubular opening 12' may serve to receive the leading-in wires, and in this case the member extends outwardly to a box 16 disposed at the outer end of the hub extension 7' of the pinion, and this box has an opening 17 through which the leading-in wires pass. The frame 10 is supported on a yoke or frame 18 disposed at right-angles to the frame 10 and the members 13 and hub extension 7' engage respectively in bearings 19 and 20 of the frame 18, whereby the frame 10 can swing on an axis extending transversely to the axis of the roller B. The frame or yoke 18 has an upwardly extending journal 21 disposed in a bearing 22 of a bracket 23 fastened to the main frame A, whereby the frame 18, together with the frame 10 and roller B, can swing on an axis at right-angles to the axis of the roller B and to the axis on which the frame 10 swings. It will thus be seen that the roller can swing on two right-angularly disposed axes, which is advantageous because the roller can maintain a square contact with the hull of the ship with respect to the curvature thereof.

The pinion 7 may be driven in any suitable manner, but in the present instance a train of gears 24, 25 and 26 is employed for each roller, the gear 24 being integral or rigidly connected with the pinion 7, while the gear 25 is an idler journaled on the yoke 18, and the gear 26 serves as a driver, the same being fastened to one end of a shaft 27 which passes through the journal 21 of the yoke 18. The shaft 27 may be tubular to receive the leading-in wires 14. The shaft 27 has a bevel gear 28 which meshes with a bevel gear 29 on a shaft 30. The shafts 30 for the various rollers extend transversely of the apparatus within the body A' and are operatively connected with a shaft 31 extending longitudinally of the body and are connected by gearings 32 with an electric motor 33. It will thus be seen that the magnetic rollers B can be positively driven while at the same time they hold the apparatus in contact with the magnetic surface over which the apparatus moves. The brushes C can be driven from the shafts 30 by suitable driving connections 34. It will be understood that the machine as a whole will have suitable means for guiding its movement or bringing it into operative relation with the ship's hull, but as such means forms no part of the present invention a detailed description or an illustration thereof is unnecessary.

In the construction shown in Fig. 4 the magnetic winding rotates with the roller as a rigid part thereof, and for this purpose it is necessary to provide special contact means so as to supply current to the winding. The terminals 35 and 36 are connected with collector rings 37 and 38 fastened to the end of the roller, and stationary brushes 39 and 40 bear on these rings to maintain the circuit connections. These brushes are disposed in holders which are connected with wires 41 and 42 that lead in through the tubular-like hub 43 of the brush supporting means. The member 43 passes through the hub 8' but does not rotate with the latter, there being a stuffing box 44 to prevent leakage of water into the chamber that contains the collector rings and brushes. On the outer end of the tubular member 43 is a box 45 which has a bushed opening 46 through which the wires 41 and 42 enter, the box being fastened by bolts 47 to the yoke or frame 10, whereby the brush-carrying means will be kept stationary with respect to the yoke.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A cleaning machine of the class described comprising a frame, a cleaning device mounted thereon, magnetic traction rollers for driving the machine over a magnetic surface to which the machine is held by the rollers, means for mounting each roller to swing on two right-angularly disposed axes transverse to the axis of rotation of the rollers, and means for driving the rollers.

2. In a machine of the class described, the combination of a magnetic traction roller, a frame in which the roller is rotatably mounted, a yoke in which the frame is pivotally mounted on an axis at right-angles to the roller, a bearing in which the yoke is mounted to turn on an axis transverse to that on which the frame swings, a magnet within the roller, and means for supplying current thereto.

3. A machine of the class described comprising a body frame, a magnetic traction roller, a secondary frame in which the roller is journaled, a yoke in which the frame is pivotally mounted, a bearing bracket in which the yoke is pivotally mounted, a gear connected with the roller, a pinion meshing with the gear and journaled on the yoke, a driving shaft journaled on the yoke, and transmission means between the shaft and pinion for applying power to the roller.

4. A magnetic traction roller, a mounting therefor, and a stationary magnetic winding in the roller.

5. A magnetic traction roller, a mounting therefor, a stationary magnetic winding in the roller, said roller having between its ends a circumferential groove, and gear teeth forming one side of the groove.

6. A magnetic traction roller, a mounting therefor, a stationary magnetic winding in the roller, said roller having between its ends a circumferential groove, gear teeth forming one side of the groove, and a gear element journaled on the mounting and meshing with the gear teeth.

7. A magnetic traction roller comprising a cylindrical body having journals at its ends and formed with a circumferential groove intermediate its ends, a winding disposed within the said body, a shell inclosing the winding, and stationary supports connected with the shell for holding the winding stationary while the body rotates.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PHILLIP GANZ.

Witnesses:

JOHN P. JAMES,

THOMAS WATTERS, Jr.