United States Patent [19]

Arneson

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[54] **JET CLEANING APPARATUS FOR BOATS**

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[52] **U.S. Cl.** **134/123**, 134/176, 134/181, 114/222, 239/251, 239/563

[51] **Int. Cl.** **B60s 3/02**, B08b 3/02

[58] **Field of Search** 134/94, 123, 144, 134/176, 179, 180, 181, 198; 114/222; 239/DIG. 13, 251, 255, 563

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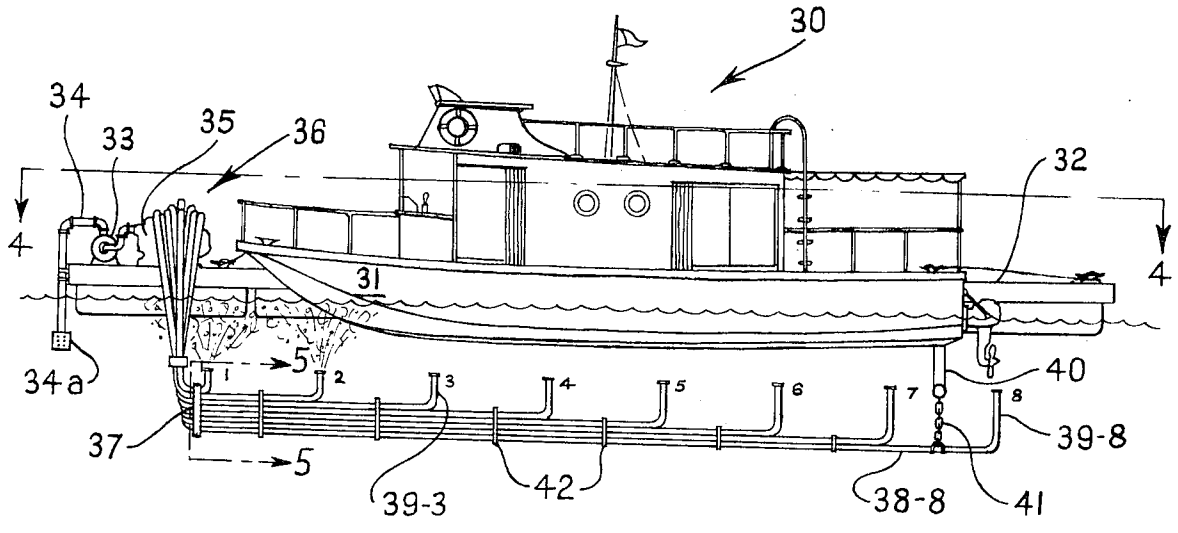
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[57] **ABSTRACT**

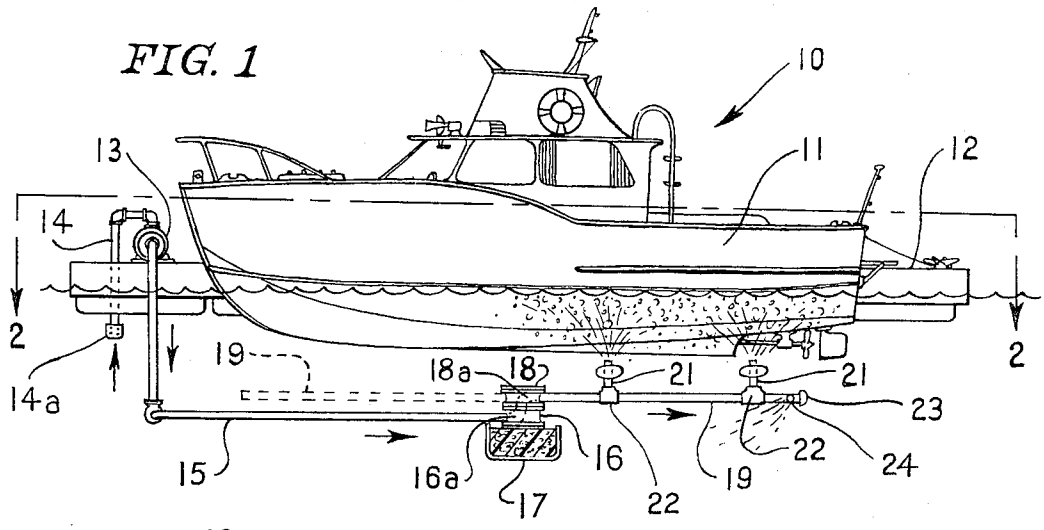
Boat cleaning apparatus wherein submerged jets of water are caused to impinge upon submerged hull of boat. The jets are moved (e.g., rotated) or are turned on in sequence to contact the entire underwater structure.

1 Claim, 7 Drawing Figures



2 Sheets-Sheet 1

FIG. 1



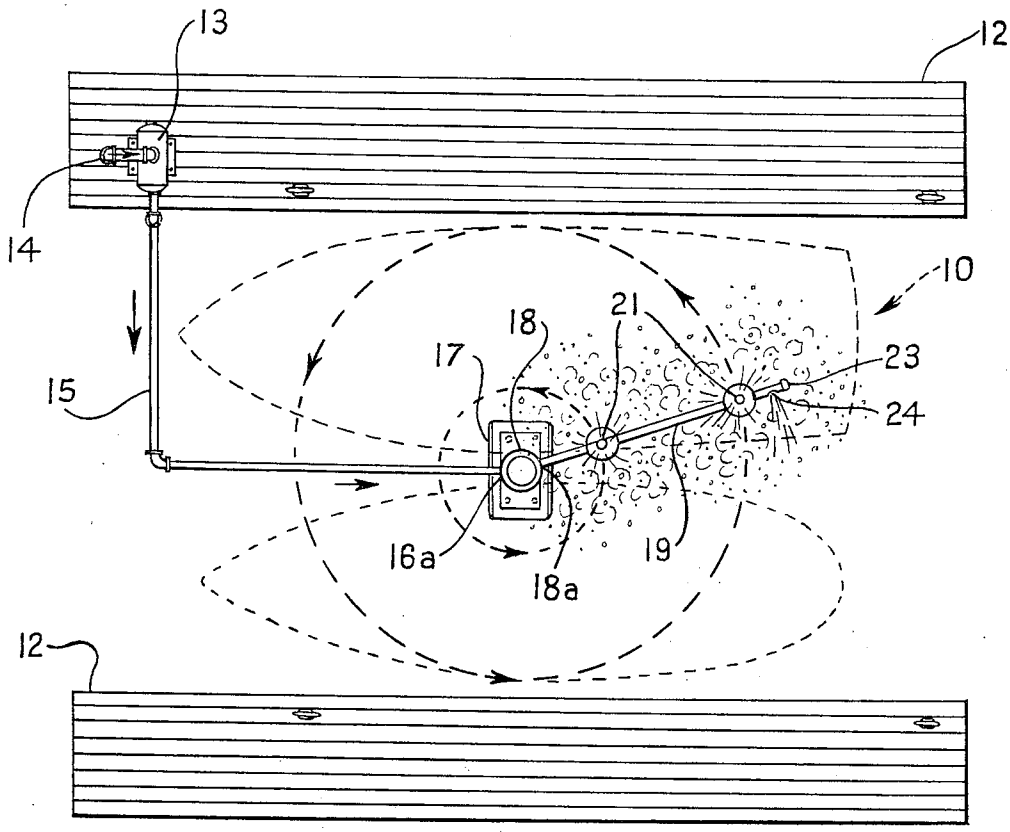


FIG. 2

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FIG. 3

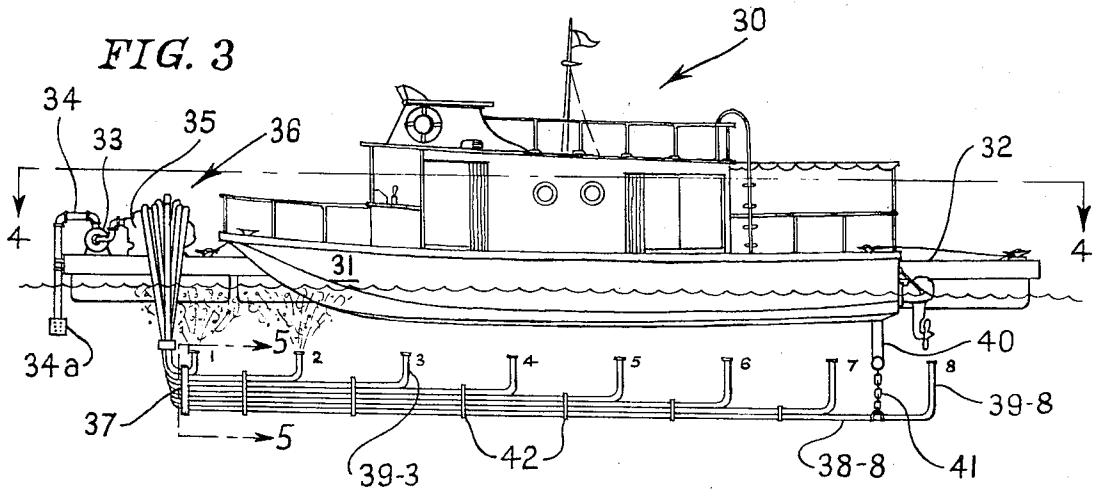
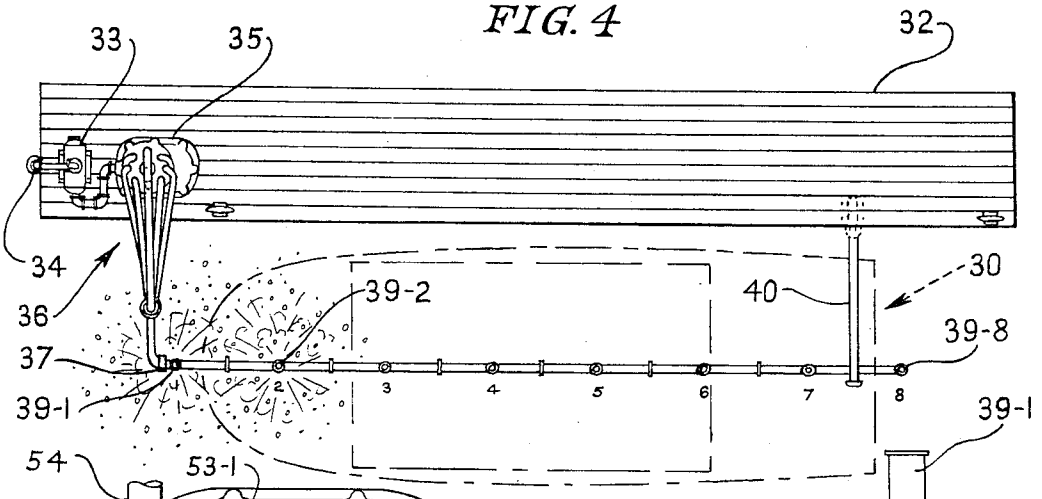


FIG. 4



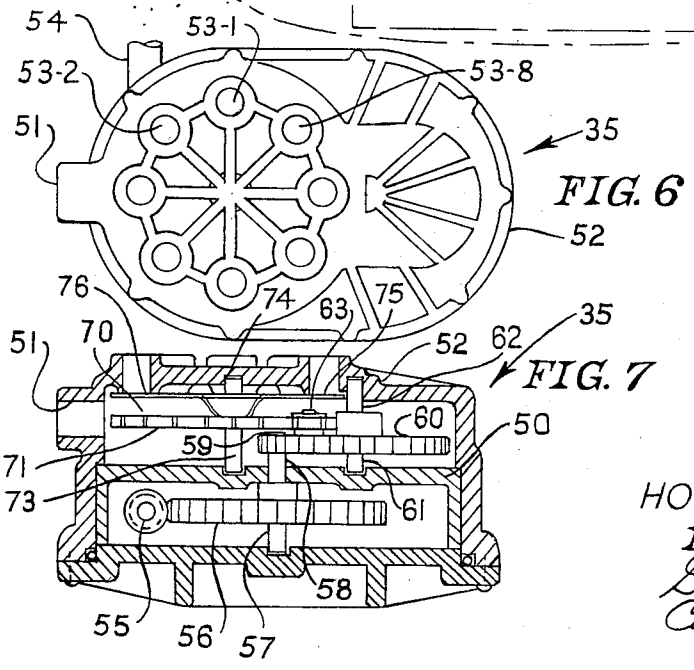


FIG. 6

FIG. 7

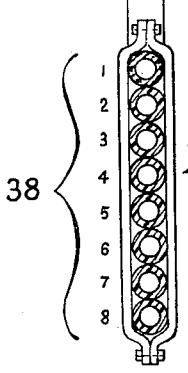


FIG. 5

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JET CLEANING APPARATUS FOR BOATS

SPECIFICATION

This invention relates to apparatus for cleaning boat hulls while in the water. As will become apparent, the invention is also applicable to other submerged or partially submerged structures, but for convenience the description is directed mainly to boat hulls.

Boat hulls become rapidly fouled by the growth of algae and/or other marine vegetable and animal life. Such fouling is undesirable in that it is unsightly and cuts down on the efficiency of a boat and will attack the hull of a boat. Customarily this problem is attacked by placing the boat in a drydock and cleaning it by hosing it down, or more often, by mechanical scraping. In permanent submerged or partially submerged structures the problem is attacked by other means, such as draining the water from a pool, basin or other confined body and cleaning by hosing down, brushing, scraping and the like, and/or by treating the surface exposed to water with a material which is toxic to marine growth.

It is an object of the present invention to provide improved means of cleaning the hulls of boats and of other submerged or partially submerged structures.

It is a further and particular object of the present invention to provide an apparatus for carrying out a cleaning process whereby incipient growth of marine organisms and their attachment to a boat hull or other underwater structure are prevented and/or removed in situ (i.e., without the need to remove the boat from the water).

The above and other objects of the invention will be apparent from the ensuing description and the appended claims.

In accordance with the present invention, a boat hull or other submerged or partially submerged structure is cleansed at suitably frequent intervals by jets of water applied thereto, such jets being moved so as to contact the entire underwater surface of the boat or structure or being located at points such that stationary jets will cover the entire underwater structure.

Certain embodiments of the invention are shown by way of example in the accompanying drawings, in which:

FIG. 1 is a view in side elevation of a boat such as a cabin cruiser in a dock space with one form of jet cleaning mechanism shown in operative to the underwater portions of the boat.

FIG. 2 is a view taken along the line 2—2 of FIG. 1 showing the jet structure operating to clean the underwater surfaces of two boats docked side-by-side.

FIG. 3 is a view in side elevation of a boat in a dock space with another form of jet water cleaning apparatus.

FIG. 4 is a top plan view taken along the line 4—4 of FIG. 3.

FIG. 5 is a section taken along the line 5—5 of FIG. 3 showing the manifold structure.

FIG. 6 is a top plan view of the valve timing mechanism employed to operate the jets in rotation.

FIG. 7 is a view taken along the line 7—7 of FIG. 6 showing the interior construction of valve timing mechanism.

Referring now to drawings and preliminarily to FIGS. 1 and 2, a boat is there shown and is generally designated by reference numeral **10**, such being shown for purposes of illustration as a pleasure cabin cruiser, and

including a hull **11**. The boat is shown alongside a dock **12** on which is located a pump **13** with an intake **14** submerged in the water **15** in which the boat is floating, such intake having a filter **14A** to exclude coarse material that might foul the pump, jets, etc. The outlet of the pump **13** is connected by piping **15** to a connector member **16** which is buoyantly supported by a float **17** of any suitable material such as foamed polystyrene. The connector member **16** has an outlet **16*a*** in alignment with the inlet **18*a*** of a mating rotary connector member **18** which is free to rotate on the member **16**. A suitable annular seal may be employed between members **16** and **18**. The outlet of the rotary member **18** is connected to a pipe **19** to which a suitable number, for example two, jets **21** are connected by tees **22**, the outer end of the pipe **19** being closed by a cap **23**. A lateral jet outlet **24** is provided at the free end of the pipe **19**.

It will be apparent that as the pump **13** operates to draw in water through the intake pipe **14** and to force it through the piping **15**, the connector members **16** and **18** and the pipe **19**, the lateral jet issuing from the jet hole **24** will cause the pipe **19** to rotate in the manner illustrated in FIGS. **1** and **2**. At the same time jets of water will issue from the jet nozzles **21** and will impinge upon the keel, hull, propellers, rudder and other underwater structures of the boat **10**, thereby effectively cleaning the same.

Each time that the boat is docked this scrubbing operation may be carried out simply by actuating the pump **13**. The operation of the jet cleaning mechanism may be continued for a suitable time until the boat is cleaned. By this means material fouling the boat hull is removed each time the boat comes into dock so that an accumulation of fouling material is prevented.

If the boat is kept in dock for a considerable length of time the jet cleaning mechanism may be operated at suitable intervals, for example daily or weekly, and if desired an automatic timing mechanism (not shown) may be employed to initiate the jet cleaning mechanism at suitable intervals and for suitable periods of time during each interval.

Another form of jet cleaning mechanism is shown in FIGS. **3** to **7**. Referring now to FIGS. **3** and **4** a boat is shown at **30** comprising a hull **31**, and the usual underwater structures such as a keel, propeller, rudder, etc. The boat is shown alongside a dock **32** on which a pump **33** is located having an intake **34** with a filter **34*a***. The outlet of the pump **33** is connected to a valve and distributor mechanism **35** which is described in detail hereinafter. Eight jets are illustrated, although the number may be varied, being less for smaller vessels and more for larger vessels. Accordingly, an equal number of outlet pipes generally designated by the reference number **36** are connected to the valve and distributor mechanism **35**. The eight pipes **36** are connected in turn to a manifold **37** (see FIG. **5**), having an equal number of ports connecting with pipes **38-1**, **38-2**, etc., each of which terminates in a jet outlet **39-1**, **38-2**, etc., respectively. The longest of the pipes designated as **38-8** is supported from the dock by a pipe **40** and a chain **41**, and the several pipes **38-1**, **38-2**, etc., are banded together at **42** as illustrated, so that the entire assembly is suspended beneath the keel of the boat and is in alignment with the keel of the boat. (Alternatively, there may be a pipe-jet system, **38-39**, on either side of the keel).

Referring now to FIGS. 6 and 7, the valve timing mechanism 35 includes a housing 50, having an inlet port 51 and a cover 52 formed with eight ports 53-1, 53-2, etc., each of which is connected to one of the eight pipes 36 and therefore to one of the pipes 38-1, 38-2, etc., and jets 39-1, 39-2, etc. A drive shaft 54 (see FIG. 6) connected to a suitable source of power such as a fractional horsepower electric motor (not shown), drives a pinion 55 meshing with a gear 56 having stub shafts 57 and 58 suitably journaled in the housing. A pinion 59 affixed to the shaft 58 meshes with a gear 60 having stub shafts 61 and 62 suitably journaled in the housing. By this means a suitable gear reduction is provided to drive the gear 60 at a suitable rpm. The gear 60 is provided with a pin 63 intended to engage with pockets 70 in a Geneva wheel 71 in known manner so that the Geneva wheel is moved one increment (the distance between two of the pockets) during each revolution of the gear 60. The Geneva wheel is supported on a shaft 73 suitably journaled in the housing and it has a shaft 74 affixed to a circular plate 75 having a single opening 76 therein. During rotation of the Geneva wheel, this opening is brought into registry in succession with ports 53-1, 53-2, etc., to 53-8 and then the cycle is repeated.

It will therefore be apparent that when the pump 33 is caused to operate and the input shaft 54 of the valve timing mechanism 35 is also operated, the jets 39-1, 39-2 through 39-8 will be turned on in sequence and the cycle will be repeated after the jet 39-8 has completed its operation. It will be apparent that by this means the underwater structure including the hull, keel, propellers, rudder, etc., of the boat are cleaned in the manner described above with reference to FIGS. 1 and 2, the structure of FIGS. 3 to 7, however, being better adapted to larger boats.

I claim:

1. An underwater jet apparatus adapted to permanently underlie a submerged structure having an underwater surface and to automatically apply a jet or jets of water to such underwater surface to clean the same, said apparatus comprising:

a. an elongated conduit means having jet means adapted to apply one or more jets of water to said underwater surface, said conduit means having also inlet means through which water under pressure may be introduced;

b. means permanently supporting said conduit means beneath said underwater surface;

c. means for supplying water under pressure to said inlet means, and

d. means for automatically effecting motion of the water issuing from said jet means relative to said underwater surface to cause impingement of water on different portions of said underwater surface in automatic sequence, said means comprising a plurality of separate conduits each having an inlet and having an outlet jet orifice, the said outlet jet orifices being located beneath different horizontally spaced areas of said underwater surface, said apparatus also comprising sequential valving means adapted to supply water to the several inlets in sequence and to repeat a sequential cycle of application of jets of water to the underwater surface.

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