

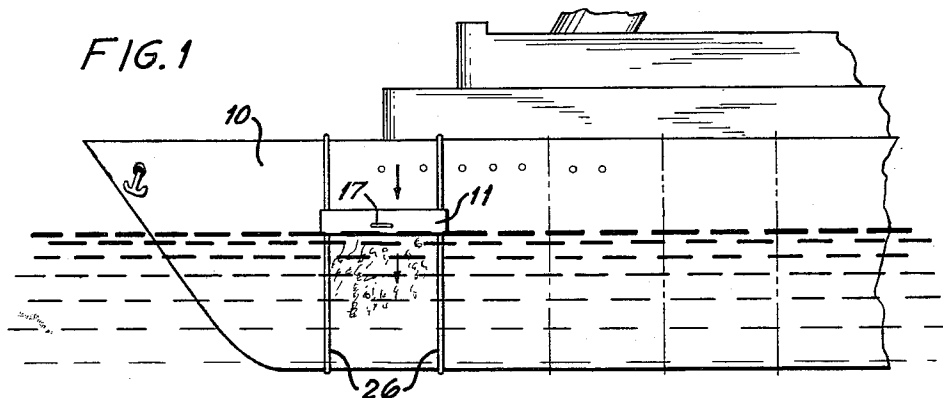
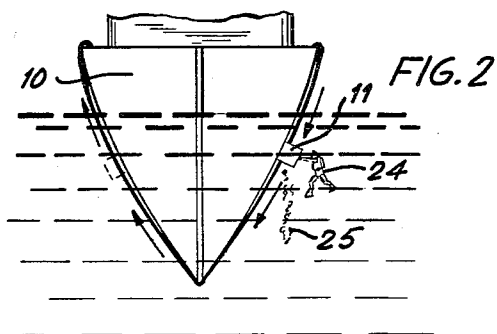
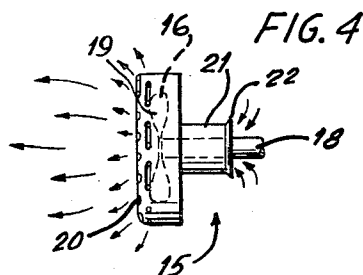
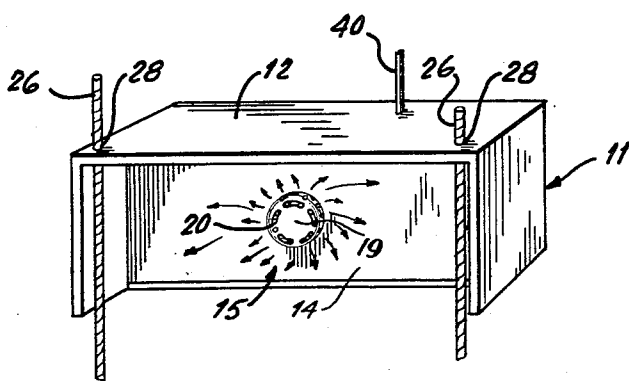
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DEVICE FOR CLEANING VESSELS

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1

3,068,829
DEVICE FOR CLEANING VESSELS
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This invention relates generally to the art of cleaning the hull of vessels; relates particularly to accomplishing the above without putting the vessel into dry-dock; and relates especially to the method of cleaning the hull of vessels utilizing high-energy vibrational waves of an ultrasonic frequency.

After one or more voyages the hulls of vessels become coated with sea growths, such as barnacles, weeds, or the like. This greatly impairs the efficiency of the vessel and may seriously impede the speed thereof. At present, it is necessary to move the vessel into dry-dock in order to effect a thorough cleaning. This is both expensive and time consuming.

It is a cardinal object of this invention, therefore, to provide a method of cleaning the hulls of vessels without moving the vessel into dry-dock.

It is another primary object to provide a method of cleaning the hulls of vessels with high-energy waves of an ultrasonic frequency.

It is another object to provide an efficient and yet economical apparatus for cleaning the bottoms of vessels.

Still another object is to provide means for cleaning the under-water exterior of vessels without materially interfering with its use.

With these objects in view, the invention consists of the novel features of construction and arrangement of parts which will appear in the following specifications and recited in the appended claims, reference being had to the accompanying drawings in which the same reference numerals indicate the same parts throughout the various figures, and in which:

FIG. 1 is a side elevational view of a vessel illustrating the use of the invention; and

FIG. 2 is a front elevation view corresponding to FIG. 1; and

FIG. 3 is a view in perspective of the ultrasonic cleaner and housing; and

FIG. 4 is a diagrammatic representation of the high-energy ultrasonic wave generator.

Referring to the drawings which illustrate what may be for some purposes a preferred embodiment of the invention, I have illustrated generally a boat, or vessel, 10 to be cleaned, and a cleaning device indicated generally at 11.

As best illustrated in FIG. 3, the cleaning device 11 has an outer shell or frame 12 fully enclosing an area except for one open side wall and an at least partially open bottom wall. The shell 12 may be rectangular as illustrated, or otherwise.

Fastened to one wall 14 of the shell 12 is at least one high energy wave generator 15 producing waves in the ultrasonic range (approximately 40,000 cycles per second), FIG. 4 is a diagrammatic representation of one form of wave generator 15.

The wave generator 15 comprises an impeller 16 which is mounted for rotation on the upper end of a spindle 18

2

driven by an electric motor or the like (not illustrated). The impeller 16 consists of a series of even spaced blades. The edges of the blades of impeller 16 are in close proximity to the inner surface of a rigid dome or cowl 19.

The cowl 19 is formed with a plurality of slots 20 through which liquid is ejected by the action of the impeller 16 into the interior of the shell 12. In consequence, the liquid flow between each of the blades of impeller 16 produced by its rotation will be periodically interrupted and accordingly the stream of liquid through each slot will have superimposed thereon vibrations of a relatively high frequency (supersonic).

Referring again to FIG. 4 it may be observed that the liquid in the form of sea water is drawn into the device between the spindle 18 and its surrounding collar 21. For this purpose a central opening 17 (see FIG. 1) will be provided in the wall 14 of the shell 12. The said central opening 17 may be of any convenient shape to permit the passage of the seawater into the wave generator 15. A screen, as at 22 may be provided to remove any of the larger impurities such as sea weed or the like. From there the liquid passes to the center of the cowl 19 to be periodically thrust forward by the impeller as hereinabove explained. As is well known the action of such high energy waves in the ultrasonic frequency range (approximately 40,000 cycles per second) is extremely effective in removing any impurities clinging to the sides of the vessel.

The bottom of the outer shell 12 is open (either partially or fully as shown) to permit the removed impurities 25 to fall freely to the bottom of the water instead of collecting within the shell. The open side wall of the shell 12 is held firmly against the side of the vessel 10 as by a diver 24 as shown in FIG. 2.

To aid the diver 24 guide ropes 25 may be fastened around the vessel and slidingly fit through holes 28 in the shell 12.

An electric cable 40 may be suspended from the surface of the vessel to provide power for the electric motor.

The foregoing will suffice to impart a clear understanding of my invention without further explanation.

While there are above disclosed but a limited number of embodiments of the structure, process and product of the invention herein present, it is possible to produce still other embodiments without departing from the inventive concept herein disclosed, and it is desired therefore that only such limitations be imposed on the appended claims as are stated therein or required by the prior art.

Having thus described my invention, and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. An ultrasonic energy cleaner for removing sea growths from the hulls of vessels while said hulls are under water comprising, a shell having a central opening and adapted to move over the hull of a vessel, the side of said shell facing said hull and the bottom of said shell being at least partially open and communicating with said water, at least one high energy ultrasonic wave generator fastened to one wall of said shell and within said central opening and so positioned that the preponderance of waves emitted therefrom are directed toward said open side, and guide ropes along said vessel to guide the movement of said shell.

3

2. An ultra-sonic energy cleaner for removing sea-growths from the hulls of vessels while said hulls are under water, comprising, a shell having a central opening and adapted to move over the hull of a vessel, the side of said shell facing said hull being at least partially opened and communicating with said central opening, said central opening being positioned on the side of said shell opposite said partially opened side, and at least one high energy ultrasonic wave generator within said central opening.

3. An ultra-sonic energy cleaner for removing sea-growths from the hulls of vessels while said hulls are under water as described in claim 2, wherein the bottom of said shell is at least partially opened.

4. An ultra-sonic energy cleaner for removing sea-

4

growths from the hulls of vessels while said hulls are under water as described in claim 2, wherein said central opening is so positioned that the preponderance of waves emitted therefrom are directed toward said open side.

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