United States Patent Office

3,466,782
Patented Sept. 16, 1969

3,466,782

STATIONARY PLANKTON SAMPLER

Charles J. Stuart, Jr., Chula Vista, Calif., assignor to the United States of America as represented by the Secretary of the Navy

Filed Oct. 19, 1967, Ser. No. 677,006
Int. Cl. A01k *73/00*; G01w *1/00*
U.S. Cl. 43—4 10 Claims

ABSTRACT OF THE DISCLOSURE

A plankton sampler operated in a stationary condition within the ocean. The sampler includes a means for propelling a selected amount of ocean water through a plankton bag. The propelling means is driven by a power unit and several mechanisms are provided for starting and stopping the power unit so that the plankton bag receives the selected amount of water. The start and stop mechanisms are individually operated by a respective messenger which is dropped on a cable from a surface ship.

The methods currently utilized in the investigation of plankton involve the use of collection devices falling into one of two categories: those which are towed and those which are operated while stationary. The former category contains a variety of nets and mechanisms, many of which can be operated both horizontally and vertically. The stationary category comprises those devices which instantaneously entrap a quantity of water and the attendant plankton population as well as pumping rigs which either convey their catch to the surface of filter it through a net at depths. Trapping devices are limited in the volume of water they can accommodate by virtue of their dimensions while pumping apparatus often requires an inordinate amount of ancillary equipment maintenance.

Horizontal towing has proven to be a satisfactory method of sampling under normal circumstances; however, there are several situations in which this method is found to be difficult or impossible. For example, shoal water may represent a hazard to the towing vessel; research may be desired near an irregular bottom which could jeopardize the sampling device; or ice cover may restrict the vessel's movements. In these instances the planktonologist is faced with the alternative of using a static sampler and must accept certain restrictions inherent in their design.

In the absence of shoal water or an irregular bottom condition the plankton sampler by Clarke and Bumpus has proven to be quite satisfactory. I have found that by combining this sampler with certain additional structure, which constitutes my invention, an overall resulting sampler can be provided which will acquire plankton samples while in a stationary condition. The Clarke-Bumpus sampler includes an impeller and a gate which are mounted within a hollow cylinder, the plankton bag being mounted to the aft end of the cylinder. While this hollow cylinder is being towed through the water the gate is selectively opened and closed by cable messengers and the revolutions of the impeller are recorded on a counter. My invention is cooperable with the Clarke-Bumpus sampler for propelling a selected amount of water therethrough. My invention includes a hollow cylinder which is connectable to the aft end of the Clarke-Bumpus cylinder and at the aft end of my cylinder I provide means for mounting the plankton bag. Within my hollow cylinder there is provided an impeller and this impeller is driven by a power unit which is selectively operated by start and stop mechanisms. The start and stop mechanisms are in turn operated by the same cable messengers which operate the gate of the Clarke-Bumpus sampler.

An object of the present invention is to overcome the aforementioned disadvantages of the prior art plankton samplers.

Another object of the present invention is to provide an efficient plankton sampler which can be operated in a stationary condition within the ocean.

A further object is to provide an apparatus which can be connected to the Clarke-Bumpus plankton sampler which will enable this sampler to operate in a stationary condition.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawing wherein:

FIG. 1 is a side view of my invention, which is generally shown on the left side of the figure, connected to a Clarke-Bumpus sampler, which is generally shown on the right side of the figure;

FIG. 2 is an enlarged portion of FIG. 1 with portions of the various components cut away to show details;

FIG. 3 is an isometric view of the plankton sampler which is shown in FIG. 1;

FIG. 4 is a top view of a ratchet mechanism;

FIG. 5 is a side view of a portion of the ratchet mechanism and a spring drum which is partially cut away to show details;

FIG. 6 is a side view of my cocking assist plunger with portions shown in longitudinal cross section;

FIG. 7 is a side view of my motor cocking plunger with a portion shown in longitudinal cross section;

FIG. 8 is a side view of my stop plunger, shown partially in cross-section, a stop rod and a stop sprocket;

FIG. 9 is a top view of my stop rod; and

FIG. 10 is an end view of a portion of my stop mechanism.

Referring now to the drawings wherein like reference numerals designate like or similar parts throughout the several views, there is shown in FIG. 1 a stationary plankton sampler **10** which includes the combination of a Clarke-Bumpus sampler, which is generally designated at **12**, and my selectively operable propelling apparatus, which is generally designated at **14**. As shown in FIGS. 2 and 3, the Clarke-Bumpus sampler includes a hollow cylinder **16** which is pivotably connected at **18** to a generally rectangular frame assembly **20**. Rotatably mounted within the hollow cylinder **16** by a shaft **22** and end supports **24** is an impeller **26**. The impeller **26** is drivingly connected to a counter **28** by a shaft and gears, which are generally designated at **30**, so that upon the passage of water through the hollow cylinder **16** the revolutions of the impeller **26** are recorded.

As shown in FIG. 3, the forward end of the hollow cylinder **16** is provided with a gate **32** which is spring biased (not shown) in a clockwise direction, when looking downwardly, for opening and closing the hollow cylinder **16**. In FIG. 3 the gate **32** is shown in an open position and is being retained in such position by a catch **34** which is perpendicularly mounted to a gate release rod **36**. When the gate release rod **36** is rotated 90° in a counterclockwise direction, when looking downwardly, the catch **34** will rotate free of the gate **32** and the gate will spring to a closed position.

The gate release rod **36** is rotatably mounted within a top cross frame member **38** and a similar bottom frame member (not shown), and it is biased in the counterclockwise direction by a torsion spring **40**. A collar **42** mounts a pair of transverse pins **44** (only one being shown) to an extension of the gate release rod above the frame member **38**. Above the pair of pins **44** there is provided