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Keir

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[54] **WATER SAMPLING DEVICE**

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[73] Assignee: **The United States of America as represented by the Secretary of the Navy**

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[52] **U.S. Cl.** .....**73/425.4 R**

[51] **Int. Cl.** **G01n 1/10**

[58] **Field of Search** .....73/425.4 R, 425, 421 R

[56] **References Cited**

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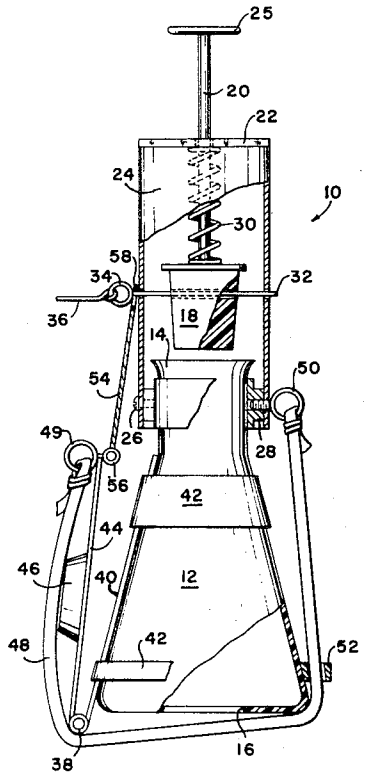
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[57] **ABSTRACT**

A water sampling device capable of carrying a conventional laboratory-type flask container having a neck opening and a bottom opening with means for closing each of said openings to capture a water sample therein at a preselected water depth whereby the contamination problems of transferring the water sample to another container for laboratory analysis are avoided.

2 Claims, 2 Drawing Figures



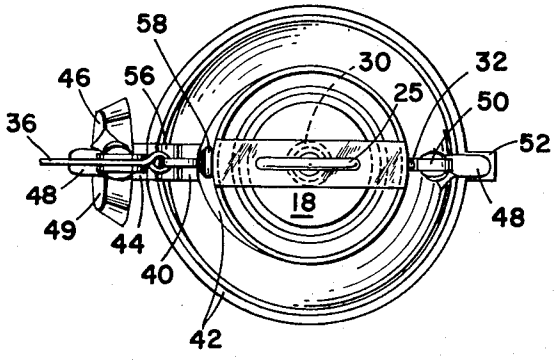


FIG. 2

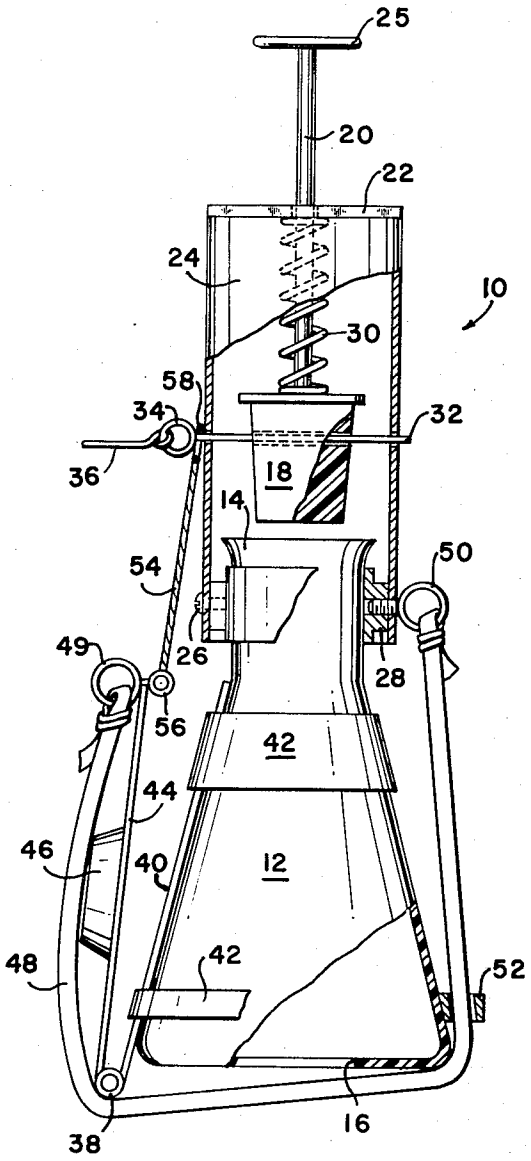


FIG. 1

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WATER SAMPLING DEVICE

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

The invention relates to water sampling devices, and more particularly to a water sampling device which utilizes a conventional laboratory-type container that eliminates the need for transferring the water sample to another container for analysis purposes.

The determination of the amount of dissolved oxygen in sea water by the so-called "Winkler" method involves three basic steps, namely; the capture of the water sample at the preselected depth; the addition of chemicals to the sample; and the titration of the sample.

Previous methods of analysis require transfer of the water sample from one container to another between the several method steps described above. One of the most commonly used techniques is to transfer the sea water sample obtained by a Nansen bottle or similar seawater sampler by pipetting to a 300 ml reagent bottle in which the sample is pickled. The sample is then acidified and 50 ml aliquots are transferred to an "Erlenmeyer" flask for titration.

A modification of the above method provides for the transfer of the water samples from the "Nansen" bottle to "Erlenmeyer" flasks in which the subsequent pickling and titration steps are conducted. This procedure eliminates one of the pipetting transfer operations of the sample between the steps of pickling and titration. However there remains a practical problem involving the relative capacity of the 140 ml flask compared to that of a Nansen bottle of 1 liter. Since proper techniques require overflowing the flask by at least one volume to avoid a contaminated sample, no more than two flasks of sea water can be drawn from any one "-Nansen" bottle in order to leave enough sea water for salinity analysis as well as other chemical analyses that may be desired.

There are several disadvantages of transferring the water sample between containers among the method steps described above. It is difficult to prevent the water sample from being exposed to air, the amount of exposure being heavily dependent on operator technique. Exposure of the sample to air presents two major sources of error, namely, loss of iodine gas owing to its appreciable volitility, and secondly, oxidation of acid solutions of iodine by oxygen of the air. Accepted procedure calls for a length of tubing to be connected to the petcock on the "Nansen" bottle and extended to the bottom of the laboratory flask. The petcock is opened slowly and the flask is filled, avoiding the creation of air bubbles. In practice, this result is difficult to achieve as air bubbles are very easily trapped in the transfer tubing. If air bubbles are present, the sample must be discarded and a new one redrawn--a condition the limited capacity of the "Nansen" bottle will not always allow. The magnitude of this error cannot be quantitatively estimated as it depends on the rate of transfer of oxygen gas from the air into solution in the sea water sample. This, in turn, depends on rate of

filling of the sample bottle, turbulence of the inflowing sample, air bubbles trapped in the delivery tubing, i.e., conditions strongly dependent on operator skill. Such errors become quite significant when one is dealing with sea water samples having very low dissolved oxygen concentrations.

SUMMARY OF THE INVENTION

A water sampling device utilizing essentially a laboratory-type container preferably an "Erlenmeyer" flask, which has openings at the top and bottom thereof to permit the passage of water therethrough as the device is lowered to the desired depth. The flask is of a conventional design modified to the extent of cutting the opening in the base. Means are provided to close each opening at the selected water depth to capture a water sample at that level. When the device is raised to the surface the necessary laboratory analysis can be conducted in the sample container without the need for transferring the sample, minimizing the likelihood of contamination.

STATEMENT OF THE OBJECTS OF INVENTION

A principal object of this invention is to provide a water sampling device utilizing a conventional container in which the sample can be captured and chemically analyzed, which will eliminate the need for transferring the water sample between separate containers.

Another object of this invention is to provide a water sampling device which incorporates a conventional laboratory container.

Still further objects are to provide a water sampling device which is simple and inexpensive; which will ensure a more accurate laboratory analysis; and which will expedite the laboratory processes.

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 drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of the water sampling device, partially in section, shown in an open condition such as during lowering; and

FIG. 2 is a top view of the water sampling device of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings where like reference numerals refer to similar parts throughout the figures, there is shown in FIGS. 1 and 2 a novel water sampling device **10** comprising basically a container **12** for capturing a sample of the sea water. Container **12**, preferably, is a conventional polycarbonate clear plastic 125 ml "Erlenmeyer" flask having a neck opening **14**. The flask is modified only to the extent of cutting a 20 mm opening **16** in the enlarged base portion thereof. The oppositely disposing openings **14** and **16** in flask **12** enable the free flow of sea water therethrough as the device is being lowered to the selected depth to ensure that the water in the flask at all times is representative of the water outside the flask at all levels.

Neck opening **14** is adapted to be closed by a polyethylene stopper **18** secured at the lower end of a plunger **20** slidably mounted in a bar **22** secured to the top of a tube **24**. Plunger **20** is provided with a handle **25** for manually unseating the stopper for insertion of chemicals into the flask during laboratory testing. The lower end of tube **24** is attached by a set of screws **26** to a bossed collar **28** secured around the neck of the flask.

A compression spring **30** is positioned between stopper **18** and bar **22** to bias the stopper to a seated position in the flask. Stopper **18** can be locked to an open position by a pin **32** which projects through both sides of tube **24** and through a horizontal opening in the stopper. One end of pin **32** has an integral eye portion **34** to which is attached a lanyard **36** for pulling the pin from the device to enable the stopper to be seated by spring action. Lanyard **36** can be tripped by the rotatable operation of a conventional "Nansen" bottle (not shown), to which the invention sampling device may be attached, or by any other mechanical action available on the particular lowering devices presently employed.

Base opening **16** in the flask is also provided with a closure means including a hinge **38** having one vertical leaf **40** fixedly strapped by spaced bands **42** to one side of flask **12**. Another spring leaf **44** is rotatable having secured thereto a polyethylene stopper **46** adapted to be seated in opening **14** when leaf **44** is swung to a horizontal position. Spring leaf **44** is resiliently biased to its horizontal position by an elastic tubing **48** secured at its free end to a ring **49** attached to the end of leaf **44** and anchored at the other end to the flask, by a ring **50** through a guide **52**. There is sufficient resiliency in tubing **48** when in a contracted condition to maintain stopper **46** seated in its closed position in the flask.

Hinge **38** is maintained in an open, vertical position shown in FIG. **1** against the tension of tubing **48** by a wire **54** attached to the free end of hinge leaf **44** at ring **56** and at the other end secured to a ring **58** through which pin **32** is normally threaded. When pin **32** is pulled free of tube **24** by lanyard **36**, ring **58** is detached to unleash hinge **38** to its closed position with respect to the flask. It is obvious that the two closure means heretofore described need not be operated simultaneously nor triggered by the same means.

OPERATION

In an oceanographic operation one or more of the invention water sampling devices may be secured piggy back, for example, to a conventional "Nansen" bottle or any other available water sampling lowering device. Stoppers **18** and **46** are maintained in an unseated condition with respect to flask openings **14** and **16** to enable the sea water to flow freely therethrough until the desired depth is reached at which the sample is to be taken. When the "Nansen" bottle is flipped by the research personnel to record the temperature, etc., this movement may be utilized in the present invention to trigger lanyard **36** which simultaneously releases stoppers **18** and **46** to close their respective openings and capture the desired water sample.

The "Nansen" bottle and the invention water sampling devices are simultaneously retrieved. Each flask **12** is transferred to the laboratory for the conduct of the chemical analyses. Plunger **20** can be lifted by hand to enable the required chemicals to be added to the flask and the stopper reseated. After acidification of the sample, the entire top closure mechanism including tube **24** is unscrewed and removed. A magnetic stirring bar can be inserted in the flask for titrating the sample.

After the laboratory processes are concluded flask **12** can be reassembled with the top closure mechanism and the device ready for reuse.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A water sampling device for lowering in a body of water comprising:

a conventional laboratory-type transparent container having an opening in a neck portion and an opening in the base portion thereof;

a closure member for each of the neck and base openings;

separate resilient means for biasing each of said closure members to a closed position to block its respective opening;

releasable restraining means for each of said resilient means;

said restraining means maintaining each of said closure members to an open position to enable passage of the water through the container as it is being lowered in said body of water and operable to simultaneously release both closure members;

whereby release of said restraining means will enable the closure members to block their respective openings by the action of its resilient means to trap a sample of water in the container at a predetermined level in the body of water.

2. The device of claim **1** wherein said container is an Erlenmeyer type flask.

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