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WATER SAMPLER FOR DEEP SUBMERGENCE VEHICLES

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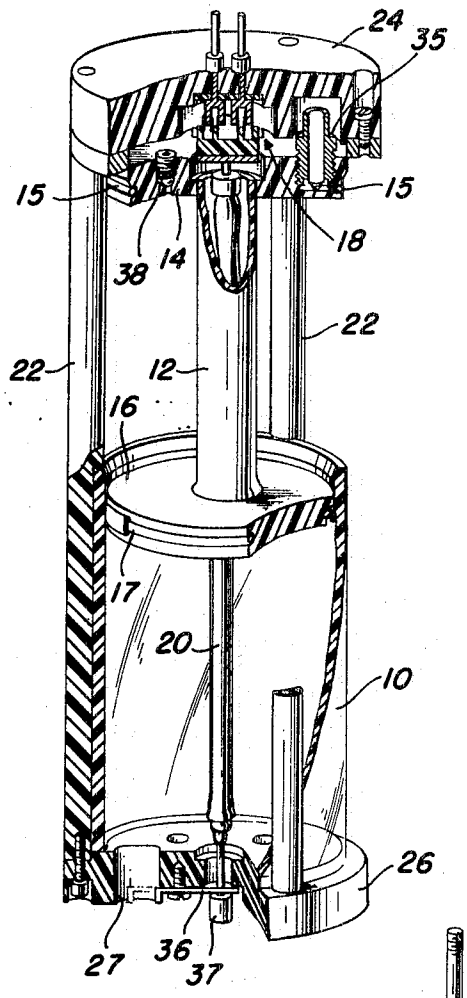


FIG. 1

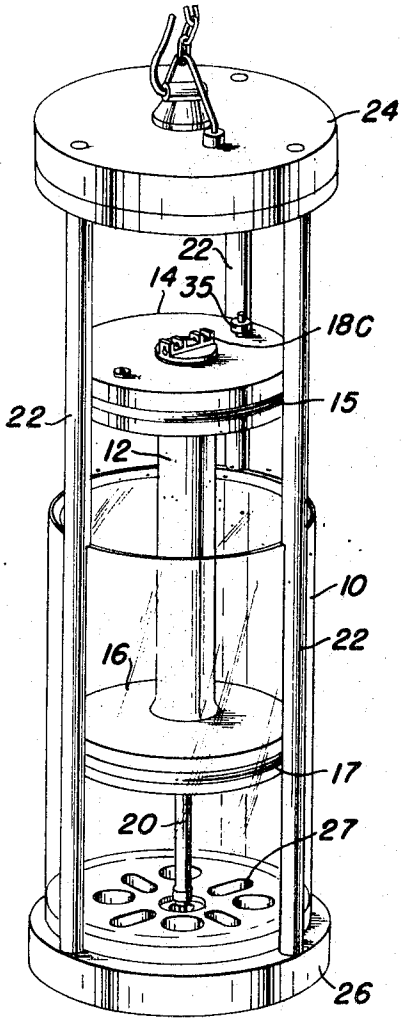


FIG. 2

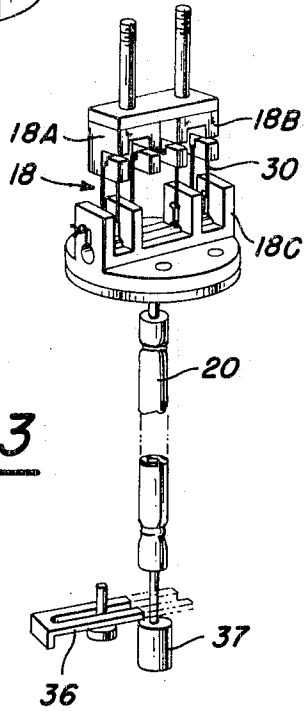


FIG. 3

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WATER SAMPLER FOR DEEP SUBMERGENCE VEHICLES

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ABSTRACT OF THE DISCLOSURE

A piston rod just the length of a cylinder can slide endwise along the axis of the cylinder. At a selected depth, disks at opposite ends of the rod are moved into the cylinder for first, expelling the contents of the cylinder and second, for immediately closing the ends of the cylinder to trap a fresh uncontaminated sample of water.

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

As the science of oceanography progresses, water samples must be obtained at progressively greater depths and the samples obtained must be of sufficient volume and free of contamination to reliably represent the water composition at the desired depth. The mechanism must not be damaged at extreme depths and must not leak as the pressure changes. Available samples leave much to be desired in many of these respects.

One embodiment of the liquid sampler of this invention is described in the following specification and shown in the accompanying drawing in which:

FIG. 1 is a perspective, partly sectioned, view of the sampler of this invention with the trigger mechanism thereof fully cocked;

FIG. 2 is a perspective view of the sampler of FIG. 1 after the trigger mechanism has been released; and

FIG. 3 is a detailed perspective view of the trigger mechanism of the sampler of FIG. 1.

The sampler shown in FIG. 1 comprises the cylinder **10**, axially aligned with the piston rod **12**, which rod is of the same length as the cylinder. At the ends of the rod **12** are affixed the piston discs **14** and **16**.

The discs are machined to a diameter to slip easily into the cylinder. O-rings **15** and **17**, respectively, in the periphery of the discs are selected to make a sliding watertight fit with the interior of the cylinder.

The rod and piston assembly is shown in cocked position in FIG. 1 and is held in that position by the trigger mechanism **18**. The trigger mechanism holds the assembly in this position against the relatively strong tension of the elastic member **20**. A spring or good quality rubber or latex may be employed for the elastic member.

When the sampler is first lowered into the water, the entire mechanism is flooded. This means that the mechanism can be lowered to any depth without damage to any part. When the desired depth for sampling is reached, the trigger mechanism is remotely operated to release the piston assembly. The assembly is drawn or snapped into the cylinder as shown in FIG. 2. Any water riding inside the

cylinder from the other depths is expelled by the piston **17** through the large holes **27** in header **26**, the piston being followed by water of the desired depth. The desired water is then trapped inside the cylinder by the piston **14** which now seals the upper end of the cylinder.

An important feature of the sampler of this invention comprises the framework for holding and properly aligning the cylinder, rod, and piston. Upper header **24** and lower header **26** are joined by several spaced parallel rods **22**. The lower end of the rods are relieved to receive the wall of the cylinder **10** so that one edge of each rod is in substantial alignment with the interior surface of the cylinder. The rods thus serve as a ways for supporting and guiding the pistons **14** from their cocked position of FIG. 1 to their fully loaded position in FIG. 2.

The particular trigger mechanism shown in the illustrated embodiment comprises a fusable wire for lashing the movable piston disc **14** to the header **24**. Specifically, in FIG. 3, the fusable wire **30** with knotted ends is passed through the key hole opening of Teflon block **18***c* and intermediate loops of the wire is caught in the hooks milled in the metal blocks **18***a* and **18***b*. Terminal lugs for the metal blocks **18***a* and **18***b* pass upwardly through the header **24** and are connected to an electrical cable threaded through the support chain for the sampler. Hence, the operator at the remote station, aboard ship, can at will burn out the fusable wire.

There is a considerable tension on the piston and when the wire **30** is fused, the wire runs through its threaded openings and permits the piston to descend.

The trapped sample of liquid is later removed through the drainage cock **35**.

To reuse the assembler, the tension on spring **20** is released by withdrawing the slide **36** from under the bolt head **37**. A new piece of wire **30** is then threaded through the blocks **18***a*, **18***b*, and **18***c*, and a hooking tool is employed to reach through the end opening of the cylinder in header **26** to engage the head **37** which may then be pulled into position for latching with slide **36**.

The spring-pressed ball **38** of a check valve is provided for permitting escape of high pressure liquid in the chamber. High differential pressures can, of course, be expected when, after a sample is trapped at a great depth, the sampler is brought to the surface.

What is claimed is:

1. A water sampler comprising:
- a right circular cylinder,
- a tubular piston rod substantially of the length of said cylinder reciprocable centrally in said cylinder,
- a piston on each end of said rod adapted to seal said cylinder,
- spaced parallel ways joined to and extending beyond one end of said cylinder for slidably guiding said piston and rod assembly along the center of said cylinder,
- an elastic member extending lengthwise through said tubular rod, tensioned between remote ends of the cylinder and rod to close the cylinder, and
- latch means to hold the piston assembly open.

2. The water sampler defined in claim **1** further comprising:
- a header across one end of said cylinder,
- a second header outboard from the other end of said cylinder and connected to the end of said ways, and
- a fusible wire for latching said outboard header to one

piston outboard from said cylinder, and circuit means for supplying burning electric current to said wire.

3. The water sampler defined in claim 1, further comprising:

a header across one end of said cylinder,

a second header outboard from the other end of said cylinder and connected to the ends of said ways,

the inner surfaces of said ways lying in a circle substantially in alignment with the interior surface of said cylinder.

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