United States Patent

Jackson

[15] **3,670,692**

[45] **June 20, 1972**

[54] UNDERWATER DYE-MARKER RELEASE MECHANISM

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[22] Filed: **May 12, 1970**

[21] Appl. No.: **36,520**

[52] U.S. Cl. ..... **116/124 B**, 89/1.81, 102/37.6, 124/37

[51] Int. Cl. **G09f 9/00**

[58] Field of Search ..... 116/124, 63, 124 B; 89/5, 1.81o; 102/37.6, 34.4, 92.7; 124/27, 37, 29; 114/20; 9/9; 340/366; 46/86 A; 42/1 L

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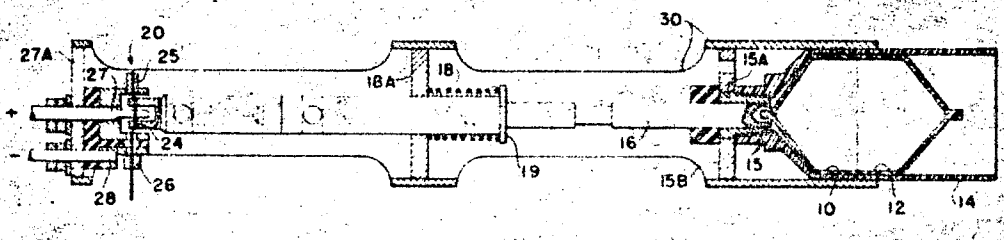
[57] **ABSTRACT**

A quantity of concentrated marker dyestuff is sealed between two lip-to-lip plastic cups. The cups are held together in a round tubular sleeve by a strong pre-loaded spring in response to a remote trigger pulse, whereupon the cups fall apart and release the dye.

3 Claims, 2 Drawing Figures



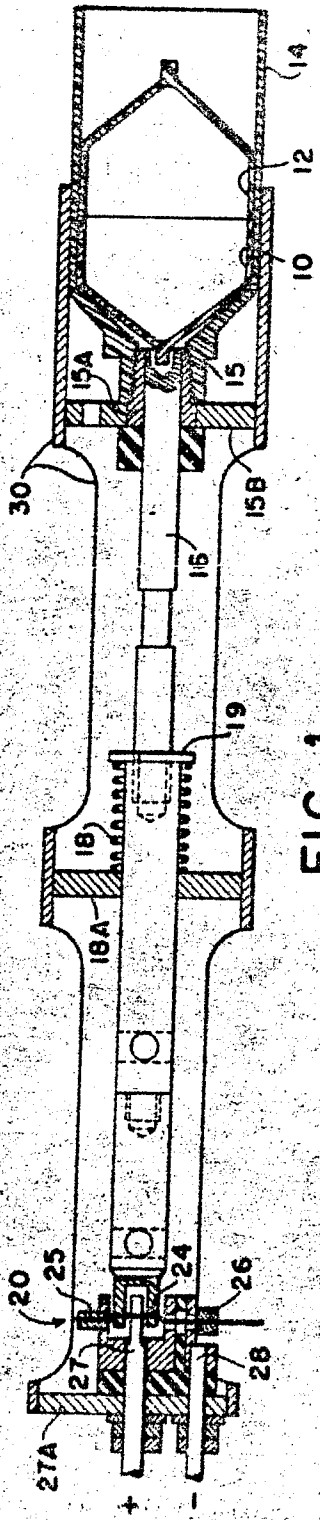


FIG. 1

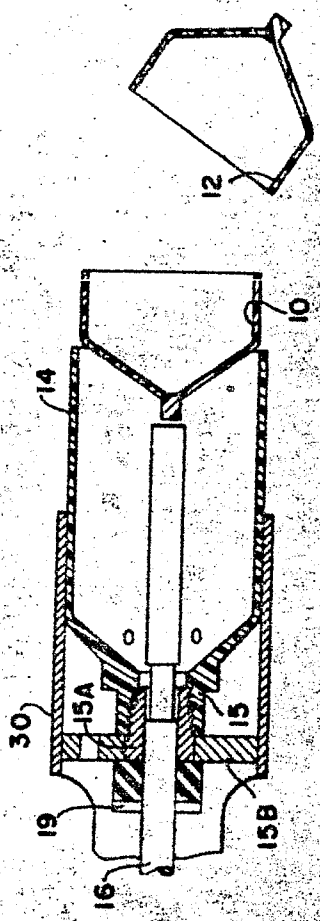


FIG. 2

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UNDERWATER DYE-MARKER RELEASE MECHANISM

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

In underwater exploration it is often necessary to measure ocean currents including velocity and direction of the water at various depths. The favorite technique is to release a brightly colored dye at the desired depth and watch the movement of the dye in the water. As the depth of submergence increases the problems of carrying and releasing the dye increase. When manned submersibles go to depths of ay 10,000 feet, it is impractical to provide the usual pa ing glands or openings in the hull to accommodate mechanical motion. Therefore the dyestuffs must be carried on the outside of the hull, and must be released electrically. The container for the dye must equalize and otherwise accommodate the high hydrostatic pressures.

Prior art devices leave much to be desired in the matter of pressure equalization and remote control.

SUMMARY OF THE INVENTION

The dyestuff is placed in a container comprising two cups disposed lip-to-lip and the two being slid into a sleeve. The cups are round and have a diameter to make a slideable watertight fit with the interior surface of the sleeve. A spring-loaded ram pushes the cups from the end of the sleeve to release the dyestuff. A fusible wire holds the ram in cocked position ready for release until an electric current burns the wire.

The principal features of this invention will be understood by those skilled in the art by referring to the one embodiment described in the following specifications and illustrated in the accompanying drawing in which:

FIG. 1 is a longitudinal half-section of the mechanism for holding ready for release dyestuff according to this invention; and

FIG. 2 is a half-section of the sleeve at the instant of release of the dyestuff.

The container for carrying the dyestuff to any depths in the ocean comprises the two cups 10 and 12 in FIG. 1. The cups are expendable and are preferably made of rubber or any inexpensive semi-soft plastic material such as polyethylene. The entire volume of the container is filled with the dye and, with the cups held together, are slid into the sleeve 14, the fit between the cups and sleeve being so chosen as to provide watertight seal at the rims of the cups and yet will slide lengthwise in the sleeve with small pressure.

According to the illustrated embodiment of this invention, the loaded cups are pushed from the sleeve 14 by the ram 16. The kinetic energy necessary to expel the cups is provided, for example, by the tensioned spring mechanism 18. The ram is held in the cocked position by the trigger mechanism 20. Conveniently, the trigger mechanism may comprise the fusible wire 24 which when melted by an electric current releases the ram under the tension of the spring 18 and projects the cups from the sleeve as best shown in FIG. 2.

The fusible wire 24 is swaged at each end to metal blocks 25 and 26 and the wire is threaded through registering hooks at the left end of the ram 16 and the end of one electrical terminal 27. The other electrical terminal 28 is connected to block 26.

When cocked the spring 18 is compressed between the collar 19 on the ram and the bulkhead 18A.

The sleeve 14 may also be of soft plastic. The sleeve shown is provided with a threaded neck 15 for screw attachment to the threaded nipple 15A carried on the header 15B.

The frame for supporting the entire assembly may conveniently comprise a section of round pipe 30 of hard plastic or metal and relieved intermediate its ends with large windows as shown and internally machined to receive the header 15B, the bulkhead 18A and the platform disk 27A.

The header 15B is perforated to permit free-flooding of the interior of the pipe 30. Likewise the space between the end of the sleeve 14 and the cup 10 is vented as by a perforation to permit free flooding of and equalized hydrostatic pressure over the entire surface of the cups. It will be perceived that as the hydrostatic pressure increases the cups will be compressed slightly until they come against the back pressure of the contained liquid dyestuff within the cups. A moderate pressure will thus be exercised axially against the cups to hold the lips in firm liquid-tight contact. However, there is no back pressure against the ram to impede the ready ejection of the cup-container from sleeve 14.

The entire frame 30, as shown, can be mounted in a bracket on the exterior of a submarine near an observation window with a trigger circuit connected to the mechanism through a pressurized electric bushing in the hull. At any depth the dye can be released by closing the circuit and observations made and/or pictures taken of the movement of the colored cloud in the water.

What is claimed is:

1. In combination in an underwater deep submersible dye-marker:
   - an elongated tubular sleeve,
   - two separable cups disposed within said sleeve in lip-to-lip engagement to form a chamber therebetween for holding a quantity of dyestuff,
   - said cups being cylindrical and being of a diameter to make a slideable watertight fit with the interior surface of said sleeve to maintain said cups in assembled relationship,
   - said sleeve having an end open to hydrostatic pressure and the other end perforated to permit free flooding when submerged, said cups being of a yieldable plastic-like material which will be compressed by said hydrostatic pressure to assist in maintaining the cups together,
   - a ram reciprocable along the axis of and extending into said sleeve for ejecting said cups from said sleeve to free the cups for separation and to release said dyestuff.

2. The combination defined in claim 1 further comprising:
   - a spring means connected to said ram,
   - a latch means connected with said ram for holding said ram in a cocked position and said spring means in compression, and
   - remote control actuating means connected with said latch means for releasing said ram from its cocked position and allowing said ram to be propelled by said spring means to eject said cups.

3. In combination in an underwater deep submersible dye-marker:
   - a sleeve having an open end,
   - a container disposed within said sleeve comprising a plurality of separable and mating portions for holding a quantity of dyestuff therebetween,
   - means within the sleeve for maintaining said separable container portions together in sealable engagement within the sleeve,
   - a ram for ejecting said container from the sleeve to free said portions from the maintaining means,
   - whereby said portions are free to separate in the water to release the dyestuff.

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