

[54] **FLUORESCENT MARKER**

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[51] Int. Cl. **G01n 21/38**

[58] Field of Search **250/302, 365, 372, 461, 250/304**

[56] **References Cited**

UNITED STATES PATENTS

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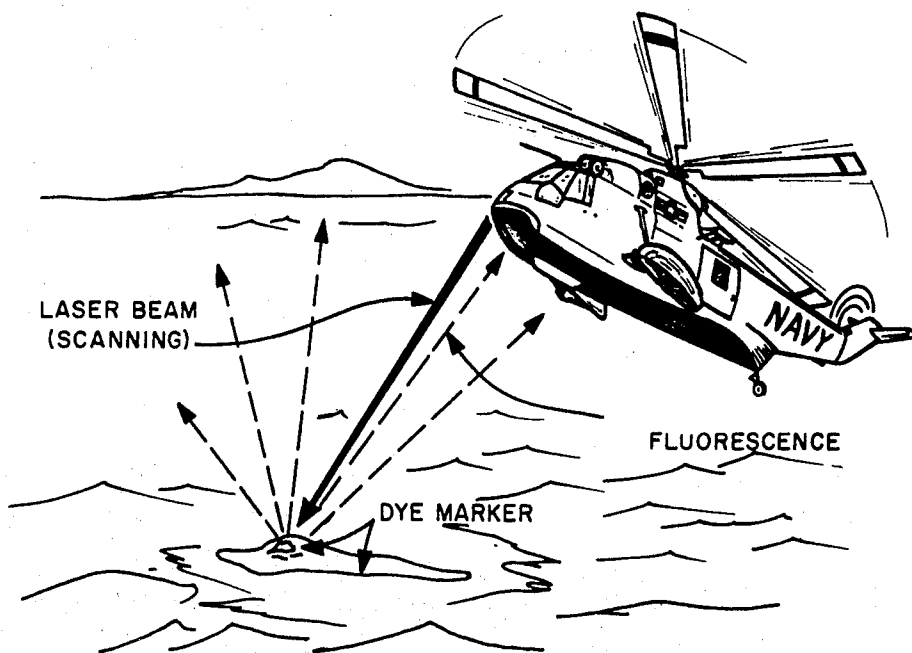
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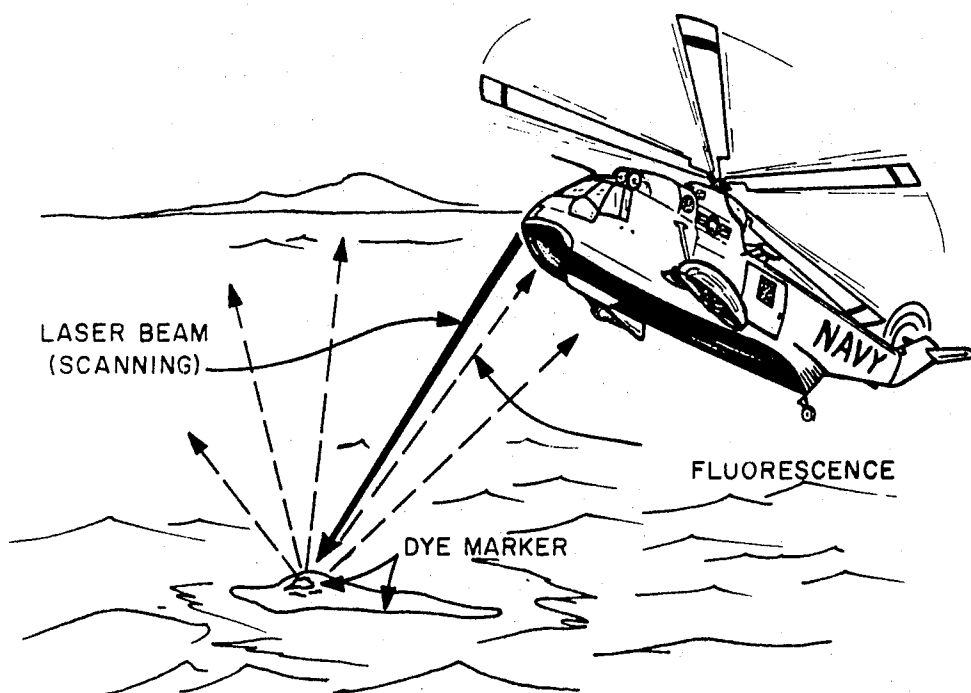
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ABSTRACT

A means for locating (search and rescue), and enabling surveillance of, articles, and the identification of reference points, particularly on water and at night, in which a laser is used to illuminate available fluorescent chemicals such as those used for current daylight search and rescue missions.

1 Claim, 1 Drawing Figure





FLUORESCENT MARKER

CROSS REFERENCE TO RELATED APPLICATIONS

U.S. Pat. application Ser. No. 361,929, filed May 21, 1973, entitled "Automatic Night Search and Rescue System" by the inventor of the present application.

BACKGROUND OF THE INVENTION

In the field of sea marking wherein a dye is used to aid in the search and rescue of survivors at sea, no known prior system can provide satisfactory results at night. Presently, most aircraft and ships include in their survival equipment dye material to be used as a sea marker in emergencies. The dye marker is brightly colored and covers an area much larger than the raft or other platform on which survivors may be drifting. As a result, the dye marker is much easier to locate in a search and rescue mission than would be a raft or other small vessel.

In all sea search missions wherein the objective is to rescue survivors by locating the sea dye marker, the mission's success depends on the visual observations of the searchers. Therefore, if the available light is reduced the dye marker will be less visible and harder to detect. As a result, such search and rescue missions are presently ineffectual at night.

SUMMARY OF THE INVENTION

The present invention is a search system that extends the available search period throughout the night, and utilizes presently used dye markers. The invention employs a laser for illuminating the dye marker. When illuminated by the appropriate laser the dye marker fluoresces, and gives off a light easily visible at night. As a result, the present invention is the only known effectual means or approach to search at night when a dye marker is the only locator used by the survivors.

The present invention provides a means for locating articles on water and keeping them under surveillance, identifying reference points at sea, identification of friendly vessels, retrieval of training devices, and navigation. It is a visual search or identification system that can be used in daylight or at night, and extends the available search or surveillance period throughout the night.

BRIEF DESCRIPTION OF THE DRAWING

The FIGURE is a diagrammatic view showing the operation of the preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The FIGURE shows a diagrammatical view of the preferred embodiment of the present invention. A sea dye marker is placed in the sea. And, the dye is illuminated by a laser beam. The result is a fluorescence visible even at night to the human eye. The novelty of the present invention resides in the use of the presently available and utilized dye marker in a manner heretofore un contemplated. That is, the novelty resides in the use of a laser to illuminate presently available dyes and, thereby, causing them to fluoresce, which fluorescence is visible even at night.

As shown in the FIGURE the laser may be carried in an aircraft, such as a helicopter. The laser beam is op-

erated in a scanning mode over the surface of the water in an area adjacent the aircraft. When the scanning operation illuminates the surface of the water colored by the dye, the dye fluoresces and radiates energy in all directions. The radiated energy, as previously mentioned, may be visible to the human eye. Presently available lasers and dye markers provide a fluorescence that is easily visible, even at night.

It should be noted that the dye may be placed in the water or in containers of various shapes and sizes. In either case the principles used for locating the marker are the same.

With respect to the dye: if a fluorescent dye is placed in an appropriate host; such as alcohol, water, or plastic, it will fluoresce when excited by light of an appropriate wavelength. The fluorescent dye can be hosted in a plastic, e.g., polymethylmethacrylate, sticks or sheets. And, if a stick or sheet is exposed by a rescuer to the intense light of the appropriate wavelength, it will light up or fluoresce. The exciting or pumping light must be of a shorter wavelength than the dye's fluorescent wavelength. The monochromatic light of a laser appropriately chosen for the dye used is the preferred illuminator of the present invention.

The sea dye marker presently used in all U.S. Navy life vests and rafts will also fluoresce brilliantly when illuminated by light of the appropriate wavelength. The fluorescent material contained in the packet or canister sea dye marker containers used by the U.S. Navy is fluorescein sodium salt (FSS). This organic compound has a very high fluorescence quantum efficiency and is, itself, at excellent organic dye laser material. The nitrogen (N_2) gas laser is an appropriate choice for illuminating the FSS compound. The 337 nanometer output of the N_2 gas laser is absorbed heavily by the FSS, and a concentrated solution of the dye will lase, or fluoresce, super-radiantly when pumped by the N_2 laser.

The present invention may be practiced by using any solid, liquid, or gaseous material that will lase or otherwise fluoresce when excited by laser light of the appropriate wavelength. The material, for example, may be any of a numerous variety of compounds. And, the laser may be chosen from any of those in the group having a wavelength shorter than the materials fluorescent wavelength.

It is intended that the invention not be restricted to the particular application disclosed and described herein. The invention is intended to include all applications wherein a fluoresceable material is illuminated by a laser source to identify a reference point or friendly vessel, to locate and, if desired, track vessels or other articles on the water, to provide an improved means to be used in search and rescue missions, and to provide a low altitude hovering aid, particularly at night.

What is claimed is:

1. An automatic search and rescue system for application during both daylight and dark periods, wherein personnel, such as a downed aircraft pilot, are located from the air for immediate or subsequent pickup and rescue, comprising:

a sea dye marker visible to the human eye during day light and capable of fluorescing when illuminated by an appropriate source, deployed by said personnel in the area of his position;

a helicopter piloted by a human operator in a search pattern, wherein at least one person aboard said

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helicopter can visually scan the surface of the earth
for detection of said marker; and
a gas laser supported by said helicopter and operated
to perform a preselected scan pattern over said sur-
face during said dark periods, providing a beam 5
having a wavelength shorter than the fluorescent
wavelength of the marker, such that said marker
fluoresces and is detectable during said dark peri-

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ods when illuminated by said beam;
wherein said at least one person can visually detect
and identify said marker during both daylight and
dark periods such that search and rescue opera-
tions can be extended into and throughout the
night without loss of effectiveness.

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