

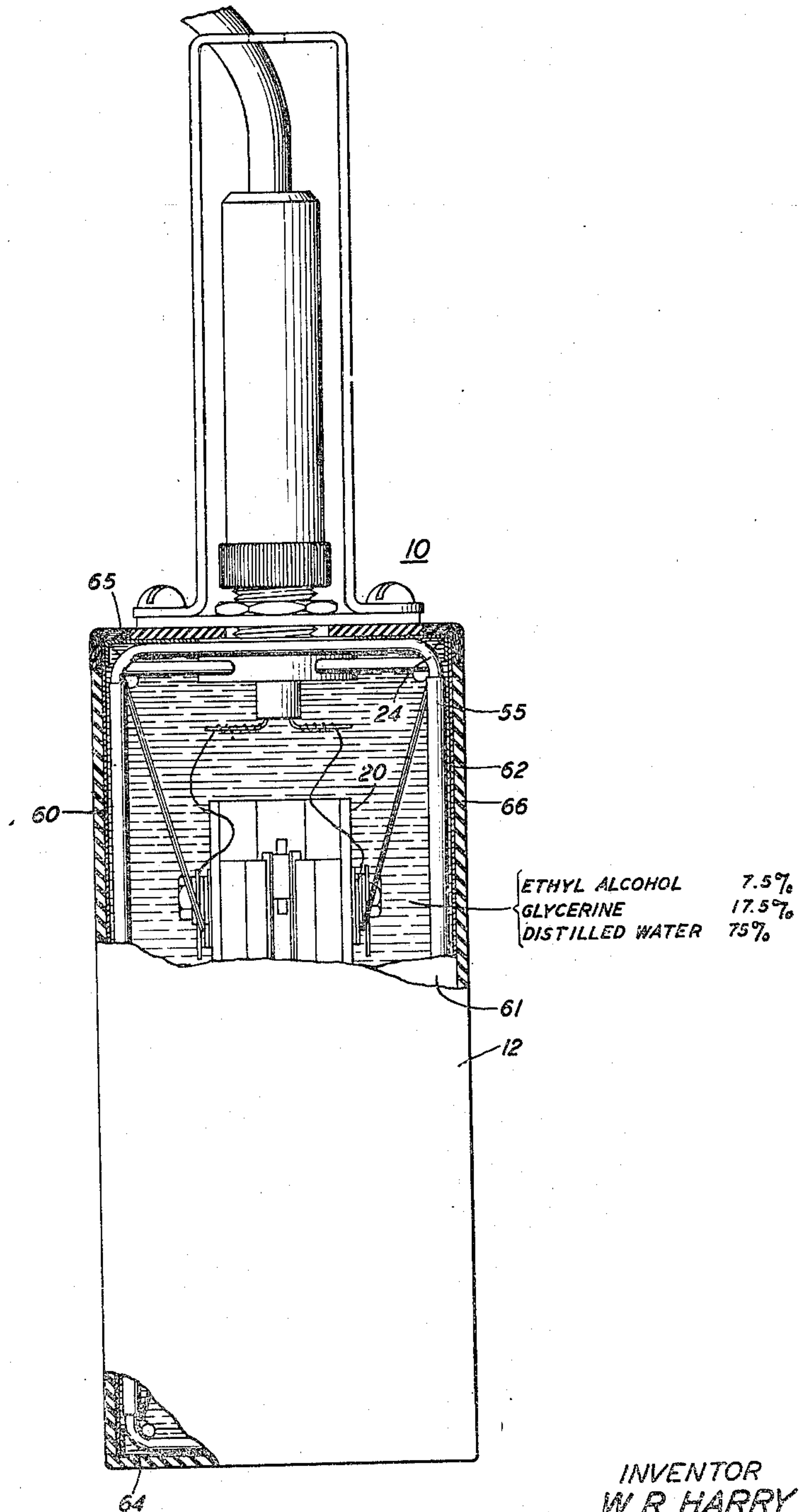
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SUBMARINE SIGNAL DEVICE

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SUBMARINE SIGNAL DEVICE

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4 Claims. (Cl. 177—386)

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This invention relates to signaling devices and, more particularly, to submarine signal devices and a wave transmission medium for use therein.

An object of the invention is to enable the use of a submarine signal device, such as a pressure gradient type detector, microphone or signal wave translating unit, in a liquid medium at or below freezing temperature for such medium.

A further object is to make available a substantially non-corrosive liquid solution or mixture for use in submarine signal devices of the type in which a signal wave translating unit is enclosed in a container to isolate it from the gases and/or particles or objects in the liquid medium in which the device is immersed.

Still another object is to couple a signal wave translating unit through one liquid medium with a second liquid medium, the media having substantially the same signal transmission properties, the one liquid medium being substantially chemically inert with respect to the materials of the translating unit and retaining its liquid character for low temperatures of the second liquid medium.

In accordance with the invention, a signal wave translating unit enclosed in a substantially fluid-tight container or envelope and intended for use submerged in a liquid medium is completely surrounded by a liquid solution or mixture filling the container space not occupied by the unit and the latter's supporting means. The liquid contents of the container should be particle-free, gas bubble-free, substantially chemically inert with respect to the materials of which the unit and container are fabricated, and remain liquid at a temperature at or below freezing for the liquid medium in which the container-enclosed translating unit is submerged. A solution or mixture satisfying these requirements may comprise ethyl alcohol and glycerine in the proportions of three (3) parts of the former to seven (7) parts of the latter. A small or a large number of parts of water may be added without affecting the density times velocity of wave propagation constant of the mixture. A specific solution or mixture may comprise ethyl alcohol, glycerine and distilled water in the volume proportions of 7½ per cent, 17½ per cent and 75 per cent, respectively.

A more complete understanding of the invention will be derived from the detailed description that follows, taken in conjunction with the single figure of the appended drawing. The latter is a front elevational view, partly in section and

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partly broken away, of the submarine signal device disclosed and claimed in Harry-Romanow application Serial No. 449,604, filed July 3, 1942, for Submarine signal device. As more fully described in the aforesaid application, the device 10 comprises a substantially fluid-tight container 12 enclosing a signal wave translating unit 20 of the pressure gradient type that is resiliently supported from and centrally within a wire frame 24 by a plurality of resilient or flexible rubber bands or strips (of which only the support at the upper end of the unit is shown). The container comprises a plurality of metallic walls 60 to 65, such as thin sheet brass, substantially completely covered on their external surfaces with a thin layer of rubber 66 vulcanized thereto. Frame 24 may be fabricated of phosphor bronze, and be exposed to the liquid contents of the container except where covered with the thin rubber coating 55. The metallic portions of the translating unit to be exposed to the container's liquid contents are preferably tin-plated. The moving coil of the unit may comprise a "bakelite" spool on which the coil has been wound and vacuum impregnated with a "bakelite" varnish.

The container space not otherwise occupied is completely filled with a solution comprising ethyl alcohol, glycerine and distilled water in the volume proportions of substantially 7½ per cent, 17½ per cent, and 75 per cent, respectively. This mixture is prepared and introduced into the container free of particles and is rendered free also of gas bubbles as outlined in the aforesaid copending application. The solution has substantially the same density times velocity of wave propagation constant as that for water. The ethyl alcohol and the glycerine are in such proportions that together they have substantially the same density and compressibility as the water. The mixture enables the use of the submarine signal device in a liquid medium, such as a river, lake or ocean, in which the temperature may be at or below the freezing point, for example, of the order of -10° F. The proportions of the ethyl alcohol and the glycerine, that is, three (3) parts of the former to seven (7) parts of the latter ensures that, regardless of whether any or much or little water is added to the ethyl alcohol and glycerine, the density times velocity of wave propagation constant of the solution or mixture will remain the same and substantially equal to that of water. For temperatures and pressures of about 20° C. and an atmosphere, respectively, these substances have the following constants, as given in the Hand-

book of Chemistry and Physics, 23d edition (1939), published by Chemical Rubber Publishing Co., Cleveland, Ohio.

	Density, grams per cubic centi- meter	Tempera- ture, °C.
Ethyl alcohol.....	.79	20
Glycerine.....	1.26	0
Water.....	1.00	4

	Compressi- bility, unit volume per atmosphere	Tempera- ture, °C.
Ethyl alcohol.....	112×10^{-6}	20
Glycerine.....	22×10^{-6}	14.9
Water.....	49.1×10^{-6}	20

In so far as this disclosure is made with reference to a specific arrangement and proportions, the latter are believed at this time to be the best mode of practicing the invention, but it is not intended, of course, that they shall be construed as limitations on the scope of the invention.

What is claimed is:

1. A signaling device comprising a liquid-filled container in which a signal wave translating unit is supported, the liquid containing ethyl alcohol and glycerine in the proportion of three parts of the former to seven parts of the latter.
2. A signaling device comprising a liquid-filled container in which a signal wave translating unit is supported, the liquid containing ethyl alcohol and glycerine in such proportions that together they have substantially the same density as water.
3. A signaling device comprising a liquid-filled container in which a signal wave translating unit is supported, the liquid containing ethyl alcohol and glycerine in such proportions that together they have substantially the same compressibility as water.
4. A signaling device comprising a liquid-filled container in which a signal wave translating unit is supported, the liquid containing ethyl alcohol and glycerine in such proportions that together they have substantially the same density and compressibility as water.

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