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ACOUSTIC MINESWEEPING DEVICE

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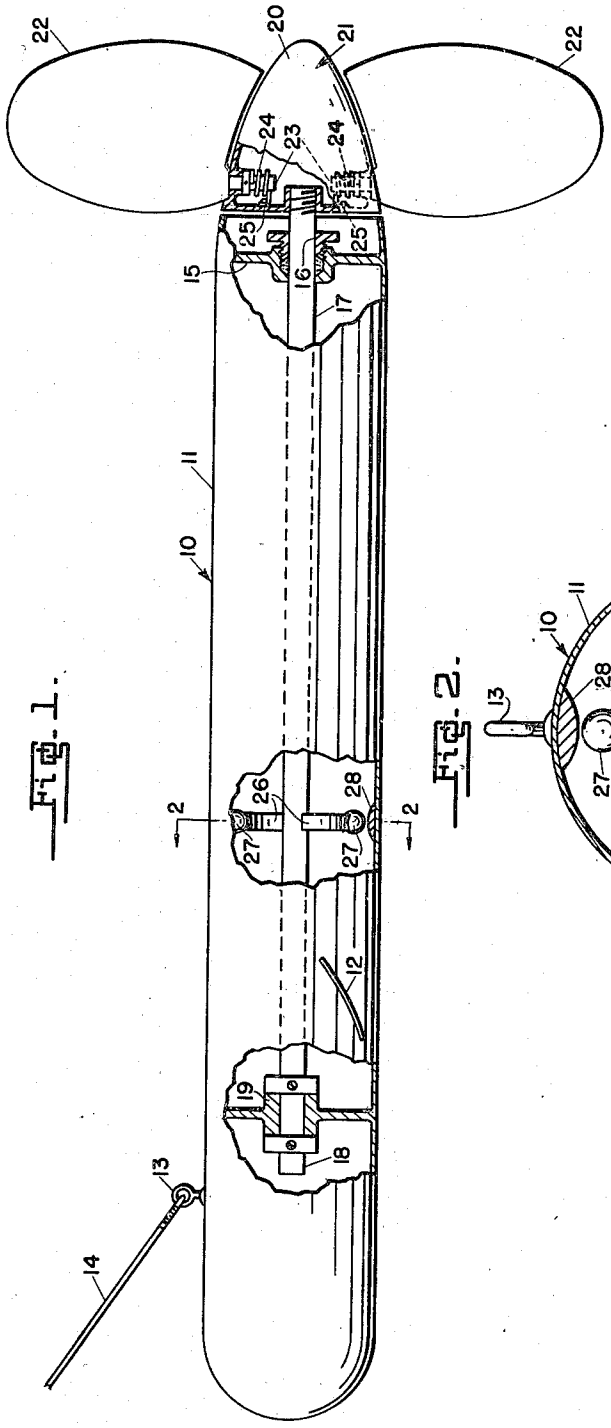


Fig. 1.

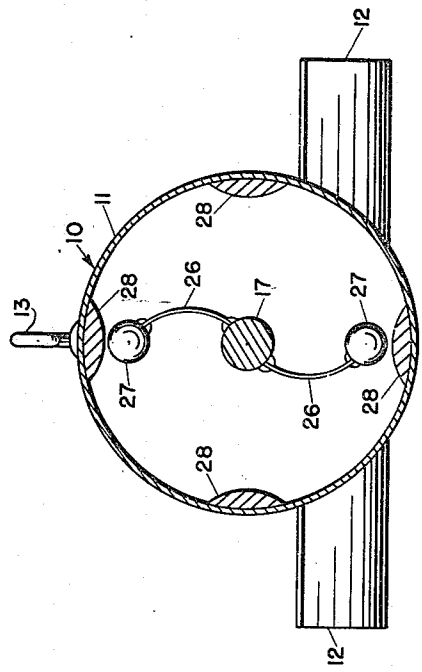


Fig. 2.

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ACOUSTIC MINE-SWEEPING DEVICE

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3 Claims. (Cl. 116—27)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention relates to improvements in submarine signals and more particularly to a device for use in sweeping acoustic mines.

The primary object of the invention is to provide a submarine signal device operated by a propeller when the device is towed through the water.

Another object of the invention is the provision of a device of the character described wherein the propeller operates at a substantially constant speed when the device is towed through the water at varying speeds.

A further object of the invention is the provision of rotary hammers for imparting vibratory movement to the device and which are resiliently mounted to prevent jamming at low speeds during starting and to prevent objectionable battering at higher operating speeds.

Yet another object is to provide a submarine signal device including a tubular shell containing hammer mechanism therein and provided with a propeller for operating the mechanism upon movement of the device through the water.

Other objects and advantages of the invention will become apparent during the course of the following detailed description, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing:

Figure 1 is a side elevational view of the device, with portions broken away to reveal the interior structure thereof;

Figure 2 is a transverse sectional view taken substantially on the line 2—2 of Figure 1.

In the drawing, which for the purpose of illustration shows only a preferred embodiment of the invention, and wherein similar reference characters denote corresponding parts throughout the views, the numeral 10 generally designates the device which includes an elongate tubular resonant shell 11 provided with suitable depressing and stabilizing fins 12 and means, such as an eyebolt 13, for attaching a tow cable 14 to the shell.

At its trailing end portion 15, the shell is provided with a suitably packed opening 16 through which extends a propeller shaft 17, disposed axially of the shell and provided at its forward end portion 18 with a bearing 19. This bearing 19 is secured to the shell at a location such that the vibration of the shell is least affected.

Fixed to the propeller shaft 17 is the fairwater or hub 20 of a propeller 21 including a pair of blades 22. The pitch of these blades 22 varies upon swinging movement thereof about the axes of pivot pins 23 rotatably mounted in the hub 20. Secured to the pins 23 are coil springs 24 having their free ends 25 attached to the hub 20, these springs 24 urging the blades 22 into positions transversely of the direction of travel of the shell 11.

Secured to the propeller shaft 17 within the shell 11 is a pair of oppositely disposed arcuate leaf springs 26 extending substantially radially of the propeller shaft 17 and provided at their outer free ends with spherical hammers 27. Fixed to the interior surface of the shell 11 in a plane intersecting the hammers 27 and springs 26 are four equidistantly spaced convex projections 28 in a circle of radius slightly greater than the radial distance of the hammers 27 from the shaft 17.

In the operation of the device, as the shell 11 is towed through the water, the propeller blades 22 tend to swing about the axes of their pivot pins 23 against the force of the coil springs 24 due to the disposition of the pivot pins 23 forwardly of the longitudinal centers of the blades. When the device is towed at slow speeds, the turning force exerted on the blades is small so that the pitch of the blades is high, but the turning force becomes greater as the towing speed increases so that the pitch of the blades is reduced. Thus the propeller 21 tends to rotate at a constant speed even though the speed of towing varies.

The arcuate leaf springs 26 tend to straighten, upon rotation of the propeller shaft 17, due to the centrifugal force exerted by hammers 27, whereby the hammers 27 are successively swung into striking engagement with the spaced convex projections 28 circumferentially of the shell, causing the shell to vibrate. Thus a vibratory motion is imparted to the water through which the device 10 is towed for any purpose such as the sweeping of acoustic mines.

Various changes may be made in the form of invention herein shown and described without departing from the spirit of the invention or the scope of the following claims.

This invention may be manufactured and/or used by or for the Government of the United States of America for governmental purposes without the payment of any royalty thereon or therefor.

We claim:

1. In a signal, a vibratory member, a shaft mounted for rotation relative to said member, means for rotating the shaft, a resilient normally curved arm fixed to the shaft for swinging movement about the axis thereof, and a hammer carried by the free end of the arm and of a mass

sufficient to reduce the curvature of the arm upon rotation of the shaft, whereby the hammer tends to travel in a circular path of a radius greater than the normal distance between the hammer and the axis of rotation of the shaft, said member provided with a projection disposed in said circular path of travel of the hammer.

2. In a signal, a vibratory member having an annular section, a shaft mounted for rotation coaxially of said annular section, means for rotating the shaft, a plurality of resilient normally curved arms fixed to the shaft for swinging movement about the axis thereof, and hammers carried by the free ends of the arms and tending to travel in a circular path of a radius greater than the normal distance between the hammers and the axis of rotation of the shaft, said annular section provided with a series of spaced projections disposed in said circular path of travel of the hammers.

3. A device for producing sound vibrations in water comprising a hollow, substantially cylindrical water-tight vibratory member adapted to be towed through the water at varying speeds, a shaft extending into and mounted for rotation relative to the member, a variable pitch propeller connected to the shaft outside said member and operated by movement through the water, means automatically regulating the pitch of the propeller whereby the propeller tends to operate at a given, substantially constant speed upon travel through the water at varying speeds, a resilient normally curved arm fixed at one end portion to the shaft within said member for swinging movement about the axis of rotation of the shaft, a hammer carried by the free end portion of the normally curved arm and of a mass such that the hammer, under the influence of centrifugal force, will rotate in a circular path of a predetermined radius only upon rotation of the shaft at approximately said given speed, said member being provided with a projection disposed in said circular path of travel of the hammer.

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