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MECHANICAL NOISEMAKER

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FIG. 1 FIG. 2

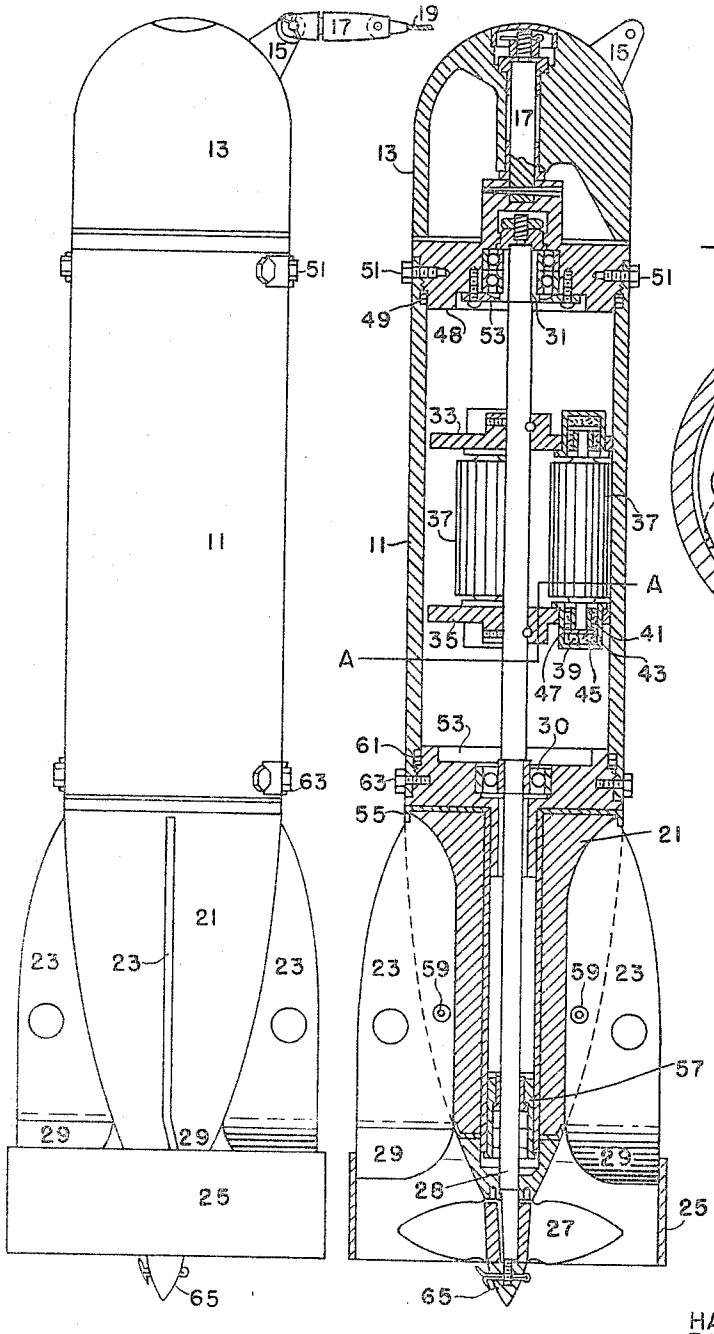
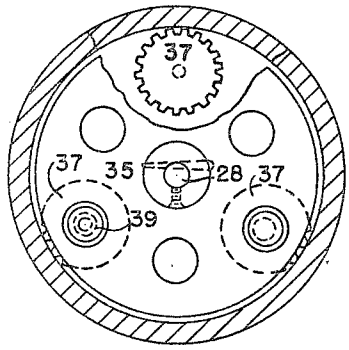


FIG. 3



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MECHANICAL NOISEMAKER

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2 Claims. (Cl. 181—.5)

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.

This invention relates to a mechanism for making noises, and, more particularly to one for making underwater noises.

It may be desirable for various reasons to produce an underwater sound at a point some distance from a vessel. Such a source may, for instance, be used in the testing of hydrophones or other water sound transducers, or other underwater sound transducers, or may be for the purpose of affecting noise controlled equipment such as acoustic mines or acoustically controlled torpedoes.

Various arrangements have been proposed for producing such noises or underwater sounds astern of a towing vessel, but each of the devices heretofore proposed have had rather narrow frequency limitations and have been particularly poor in the production of supersonic sounds. It is desirable to produce underwater sounds having a wide band of frequencies ranging from the sonic frequencies through the supersonic frequenices. The latter are particularly necessary in order to affect certain types of sound controlled mines and torpedoes.

It is the object of this invention to provide a mechanical noisemaker which shall operate through a broad band of frequencies, and which will produce particularly the higher sound frequencies.

It is another object of this invention to produce a mechanical noisemaker which will interfere as little as possible with the acoustic devices on the towing vessel.

It is still a further object of this invention to produce a noisemaker which will require a small amount of energy in the form of towing energy in proportion to the sound volume produced by the noisemaker.

It is still another object of this invention to produce a noisemaker which shall be of sturdy construction and which may readily be renewed to replace worn parts with a minimum of expenditure of time and material.

These and other objects of the invention will become apparent from the following specification taken in connection with the accompanying drawings.

In accomplishing the objects of this invention there is provided a torpedo-shaped device which presents a low resistance to the water through which it is being towed. Means are provided for preventing the driving action of the noisemaker within the torpedo-shaped body from twisting the towing cable. The body portion of the mechanism is prevented from rotating freely by means of stabilizing fins and an impeller actuated by the action of the water through which it is being towed imparts rotation to a spider in which are journalled a plurality of corrugated or otherwise irregularly surfaced noise making rollers adapted to contact the inner periphery of the main body of the device. Thus, as the noisemaker is towed through the water, the spiders rotate relative to the main body and the noise making rollers impact within the main body or barrel and produce a range of high frequency vibrations.

Having thus briefly described the invention, attention is invited to the drawings in which:

FIG. 1 shows a general arrangement of the noisemaker constituting the present invention;

FIG. 2 is a longitudinal cross-section of the noisemaker shown in FIG. 1; and,

FIG. 3 is a cross-section of the noisemaker taken on the line A—A of FIG. 2, partially through one of the noisemaker rollers.

Attention is now particularly invited to FIG. 1 which shows the noisemaker comprising a main body **11**, a head **13**, and an after body or tail portion **21**.

The head is connected to the main body portion **11**, by means of the swivel which will be described later. It is equipped with a towing lug **15** to which by means of the swivel shackle **17**, is connected the towing cable **19**.

The tail portion **21**, includes the stabilizing fins **23**, and the shroud ring **25** inside of which is the impeller **27**, shown in FIG. 2.

Referring now more particularly to FIG. 2, in which the details of construction of the noisemaker are clearly shown, it is seen that the head **13** is connected to the main body portion **11** by means of the swivel generally indicated at **17**. This will permit the main body portion **11** to rotate relative to the head **13**, although stabilizer fins **23** are provided for the purpose of reducing as much as possible rotation of the body portion **11**. These stabilizer fins are each provided with a portion **29** which is bent slightly relative to the main portion of the fin for the purpose of resisting rotation which would otherwise be caused by the action of the noisemakers within the body as will appear clear. The impeller **27** is mounted on a shaft **28** which is journalled at **30** in the after body and also at **31** in the main body portion **11** just abaft of the swivel. Upon the shaft are mounted a pair of spiders **33** and **35** rigidly affixed thereto for supporting and causing the rotation of free rolling noise rollers **37** of which there may be any desired number such as the three shown more particularly in FIG. 3 to which attention is currently invited. These rollers are each mounted in a resilient bearing comprising an outer bearing cup **39**, a washer **41** of rubber or other resilient material, an inner bearing bushing **43**, and an end cushion **45** separated from the remainder of the bearing by a spacer **47**. Each of the noise rollers is similar to a pinion gear having for instance 24 corrugations similar to elongated gear teeth mounted as shown to roll in the manner of a free roller upon the inner surface of the body portion or barrel as the spiders are rotated relative thereto. Alternatively there may be provided rollers having different numbers of corrugations or teeth although care must be taken that each roller has the equivalent mass in order that the whole system shall not be unbalanced and produce unwanted vibrations.

The noise rollers may be of any appropriate material although hardened steel is to be preferred in order to reduce their wear during operation.

The diameters of the rollers and the inside of the barrel should preferably be so selected relative to each other and to the pitch of the corrugations on the rollers, that there would be a precession of one tooth each revolution. Since the hardened steel teeth of the corrugated rollers will soon wear slight internal gear teeth in their path, it may be in this manner be insured that the teeth of each of the three or more rollers will impact with the inside of the body portion at different and successive times.

Alternatively the rollers may have corrugations of different pitch or may be roughened in an irregular pattern to give any desired frequency combinations.

The forward end of the main body portion is closed by means of a cap **48** which is screwed in the outer threaded end of the main portion of the device and made water tight by means of the gaskets **49**. These parts are locked

together as shown by means of the set screws **51** which may be wired together as indicated or otherwise secured to prevent their loosening under vibration. The forward bearing **31** is provided with a retainer ring **53** by means of which it may be removed for packing with grease as necessary. The after connection of the main body with the after body is accomplished by means of a screw thread in the after end of the main body which screws onto the cap **53**. The cap **53** is welded or otherwise secured to the shaft housing **55** which passes through the tail portion **21** to the stuffing bearing **57**. The after tail portion is made of wood or other suitable material and the stabilizer fins are secured in slots cut therein as shown or by any appropriate means, such as by the pins indicated at **59**. The connection between the after end of the main body and the after cap is made water tight by means of the gasket **61** and the parts are secured against rotation by means of set screws **63**, wired to prevent their working loose under vibration of the noise maker in operation.

The impeller **27** is secured on the shaft by means of the nut **65** which latter is secured against working loose by means of the cotter pin.

Having thus described the present invention attention is invited to the fact that various modifications may be made therein without departing from its scope which is accordingly defined and set forth in the following claims.

We claim:

1. An underwater noisemaker having a hollow cylindrical body portion, a driving shaft journaled within said body portion axially thereof, means for rotating said shaft relative to said body portion, a pair of spiders mounted on said shaft for rotation within the body, a plurality of corrugated rollers journaled in said spiders symmetrically about the shaft to rotate on axes parallel to the shaft and adapted to roll around the inside surface of said body portion as the shaft rotates relative to said body, said rollers being corrugated longitudinally, and rubber cushioned bearings resiliently holding the rollers against the inside surface of the body as the shaft is rotated irrespective of variation in roller surface due to corrugation whereby said rollers will produce underwater noise, the diameter of said rollers and the inside diameter of the hollow body with which they contact being so related to each other and to the pitch of the corrugations, that there will be a precession of one corrugation each revolution.

2. An underwater noisemaker having a hollow cylindrical body portion with a plain inside cylindrical surface, a driving shaft journaled in said body portion longitudinally thereof, a pair of spiders mounted on said shaft within said body portion for rotation by the shaft, a plurality of noisemaker rollers journaled in said spiders and adapted to roll around upon the inside plain surface of said body portion as the shaft rotates the spiders relative to the said body portion, said rollers having irregular surfaces and mounted to roll freely over said surface, and means resiliently holding said rollers against the inside surface of said hollow cylindrical body portion as the shaft rotates the spiders.

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