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UNDERWATER POWER TOOL

Filed May 29, 1968

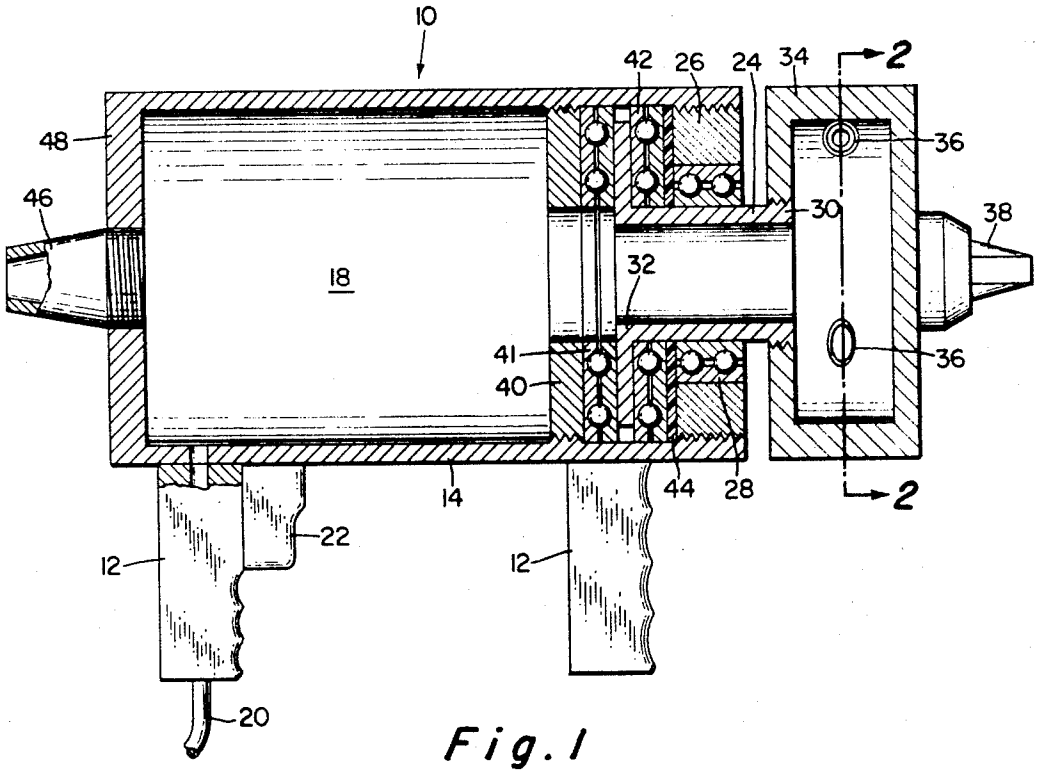


Fig. 1

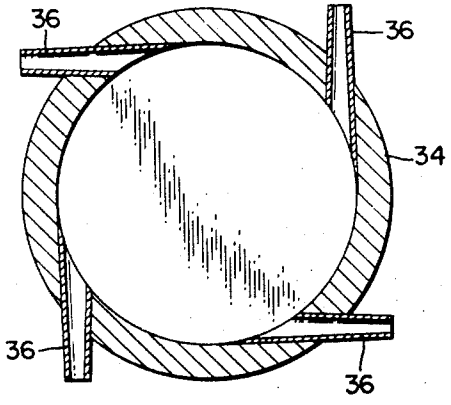


Fig. 2

INVENTOR.
SALVATORE J. PENZA

BY Gayward N. Mann
Baxter, Warner
ATTORNEYS

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UNDERWATER POWER TOOL

Salvatore J. Penza, 2430 S. M St.,
Oxnard, Calif. 93030

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ABSTRACT OF THE DISCLOSURE

A device for transforming energy from a high pressure fluid source into tool manipulating movement at an underwater location. It includes a fluid receiving body to which the fluid is admitted by a manually controllable fluid flow valve and a movable tool supporting member which is driven by the reaction force of the fluid as it is discharged into the ambient water. Means is provided to also utilize the high pressure fluid reaction force to urge the tool into contact with the work.

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

Field of the invention

This invention relates in general to underwater power equipment and in particular to a power drill employed in underwater activities which utilizes high pressure environmental water to rotate the drill.

Description of the prior art

Various devices have been employed as underwater tools including drills, screwdrivers, hammers and the like. These devices are powered primarily by either electrical or pneumatic means and as such have been moderately successful in performance. However all such prior art tools have inherent disadvantages which seriously impair their value as underwater tools. For example, they must be protected against the external pressure exerted by the surrounding water. Furthermore pneumatic tools require an increasing volume of gas as the depth of operation increases. Unfortunately as more gas is required in operating the tool, an increase in bubble production occurs as the gas is released from the equipment which obscures the tool operator's vision and also alerts any possible enemy who may be lurking in the immediate vicinity. The use of electrical equipment creates a particular problem in that the hazard of electrical shock is always present. This requires undue care to be employed with the use of electrically powered tools and seriously impairs their value. Despite the fact that many of the prior devices employed as underwater power equipment are a definite advance over the utilization of hand powered tools, they are not in general use because of cost, inflexibility, maintenance problems and vulnerability to environmental conditions.

SUMMARY

The present underwater power source includes a tubular body with a rotatable tool operating head attached thereto. A series of inclined peripheral nozzles in the drill head serve as a means of exhausting high pressure water pumped into the body. As the water is exhausted, a rotational movement is imparted to the head thus driving any drill or other attached tool. Other nozzles may be located on the body to counteract the torque caused by rotation of the head and to aid in applying pressure to the work.

Since the invention utilizes environmental water as the power source, the danger of electrical shock, and the production of vision obscuring bubbles are obviated. Also the present device requires little maintenance because environmental water is used as the power source.

An object of the present invention is to provide an improved fluid pressure activated driving means.

Another object of the present invention is to provide such a driving means utilizing environmental water as the power transmitting medium.

A further object is to provide an underwater power device in which air bubbles during tool operation are eliminated.

Still another object of the invention is to provide an underwater source having improved stabilizing and pressure applying means.

Another object of the invention is to provide a simple, inexpensive and trouble free underwater power source.

Other objects, advantages, and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a longitudinal sectional view of one embodiment of the present invention.

FIGURE 2 is a transverse sectional view through the device of FIG. 1 taken along a line substantially corresponding to line 2—2 of FIGURE 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, wherein like reference characters designate like or corresponding parts, there is shown an elongate hollow body **10** having one or more spaced handles **12** connected to the exterior surface **14**. One of the handles **12** has a channel extending the full length thereof which opens into the chamber **18** formed within the interior of the tubular casing **10** substantially as shown in the drawing. A high pressure hose **20** is attached to the outer end of the handle **12** and is adapted to deliver high pressure water to chamber **18** via the channeled handle **12** to which it is attached. A finger controlled trigger valve **22** mounted on the handle **12** controls the flow of high pressure water forced into the casing chamber **18**.

An axial and hollow shaft **24** is centrally positioned at the forward end **26** of casing **10** and may be mounted for rotational movement within a radial bearing **28**. Outer end **30** of shaft **24** extends a suitable distance forward of the casing **10** and an inner end **32** opens into the casing chamber **18**. A hollow tool head **34** is detachably mounted on the outer end **30** of shaft **24** and has a plurality of spaced and inclined nozzles **36** tangentially located at the periphery thereof through which the high pressure water is exhausted from the apparatus. The exhausting operation causes the head **34** and its supporting shaft **24** to rotate which in turn will also rotate any tool chuck **38** attached to the outer surface of the head.

A flange **40** attached to the inner end **32** of shaft **24** is sandwiched between thrust bearings **40** and **42** which cooperate with bearing **28** to allow free rotation of shaft **24** and at the same time maintain the same geometrical position thereof. A seal **44** positioned just forward of bearing **42** prevents leakage of water from the rotating head.

Nozzle **46** positioned in the aft end **48** of casing **10** permits a controlled quantity of water to be exhausted at this point in order to urge the power source and attached tool towards the work. This helps to provide reaction forces which affect handling due to the submerged operator's nearly weightless condition. This nozzle **46** may be adjustable to vary the flow and hence the pressure applied to the work.

The operation of the present invention is as follows: high pressure water may be supplied from a suitable source (not shown) through the hose **20** and handle **12** where the flow is controlled by finger valve **22** as it empties into the casing chamber **18**. The water passes through the hollow shaft **24** into drill head **34** where it is exhausted through the tangentially inclined peripheral nozzles **36** thereby causing the head to rotate and in turn causing any tool attached to the head to also rotate.

The finger valve **22** manually controls the flow of high pressure water into the chamber **18**, and thus controls the speed at which the drill head will rotate since the thrust of nozzles **36** is dependent upon the flow of high pressure water therefrom.

Nozzle **46** provides thrust in the direction of operation and urges the tool toward the work.

Other nozzles may be placed at convenient locations on casing **10** to provide counteracting thrust to the rotational torque created by the drill head **34**. If desired reduction gearing or reverse gearing may be incorporated between the shaft **24** and drill head **34** to increase the torque or reverse the direction of rotation.

It will be apparent that by making the opening in nozzle **46** variable the pressure applied to the work by the tool can be changed in accordance with the needs of work being performed.

What is claimed is:

1. A fluid pressure actuated driving means for an underwater power tool comprising:

a body having a pressurized fluid receiving chamber therein;

conduit means for delivering pressurized fluid to said chamber;

a fluid actuated member in communication with said chamber to receive pressurized fluid therefrom;

means for exhausting said fluid to impart movement to said member;

said fluid exhausting means including a plurality of fluid dispensing nozzles communicating from the interior of said member to disperse fluid into the ambient water outside of said member;

said nozzles being canted so as to impart tool actuating movement upon emergence of pressurized fluid therefrom.

2. The device of claim **1** wherein the pressurized fluid comprises environmental fluid.

3. The device of claim **1** wherein the fluid actuated member in communication with the fluid receiving chamber is mounted for rotational movement.

4. The device of claim **3** wherein the fluid actuating member is provided with pressurized fluid discharging nozzles tangentially mounted to impart rotary movement to said member.

5. The device of claim **1** wherein a portion of the pressurized fluid is emitted in a direction opposite to the direction of tool approachment to the work to thereby urge the tool into work approachment.

6. The device of claim **1** wherein the conduit means for delivering pressurized fluid to the interior of the body includes a handle portion whereby the device may be manipulated.

7. The device of claim **6** wherein manually operable control means is provided in said handle portion to regulate the admission of pressurized fluid into the interior of said body.

References Cited

UNITED STATES PATENTS

890,065	6/1908	Kellow	173—159
2,538,969	1/1951	Kessler	173—159
2,710,980	6/1955	Pletcher	253—33 X

NILE C. BYERS, JR., Primary Examiner

U.S. Cl. X.R.

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