

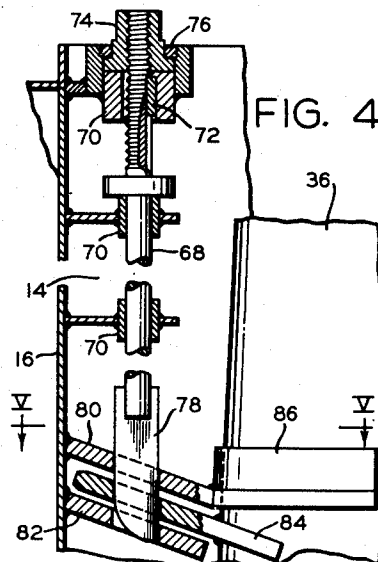
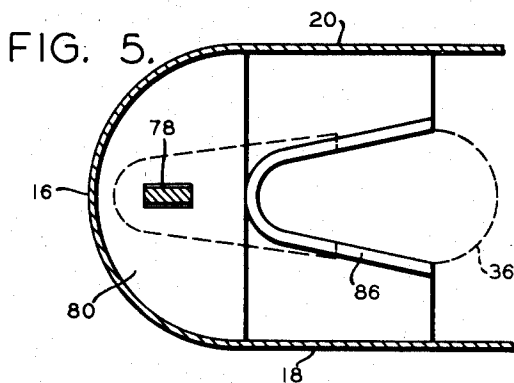
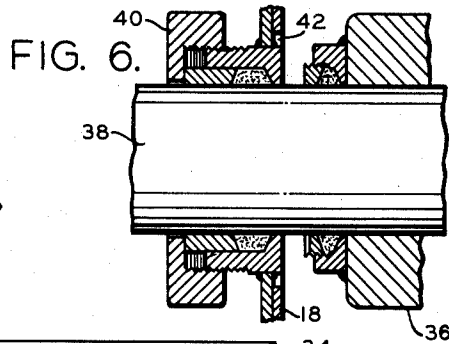
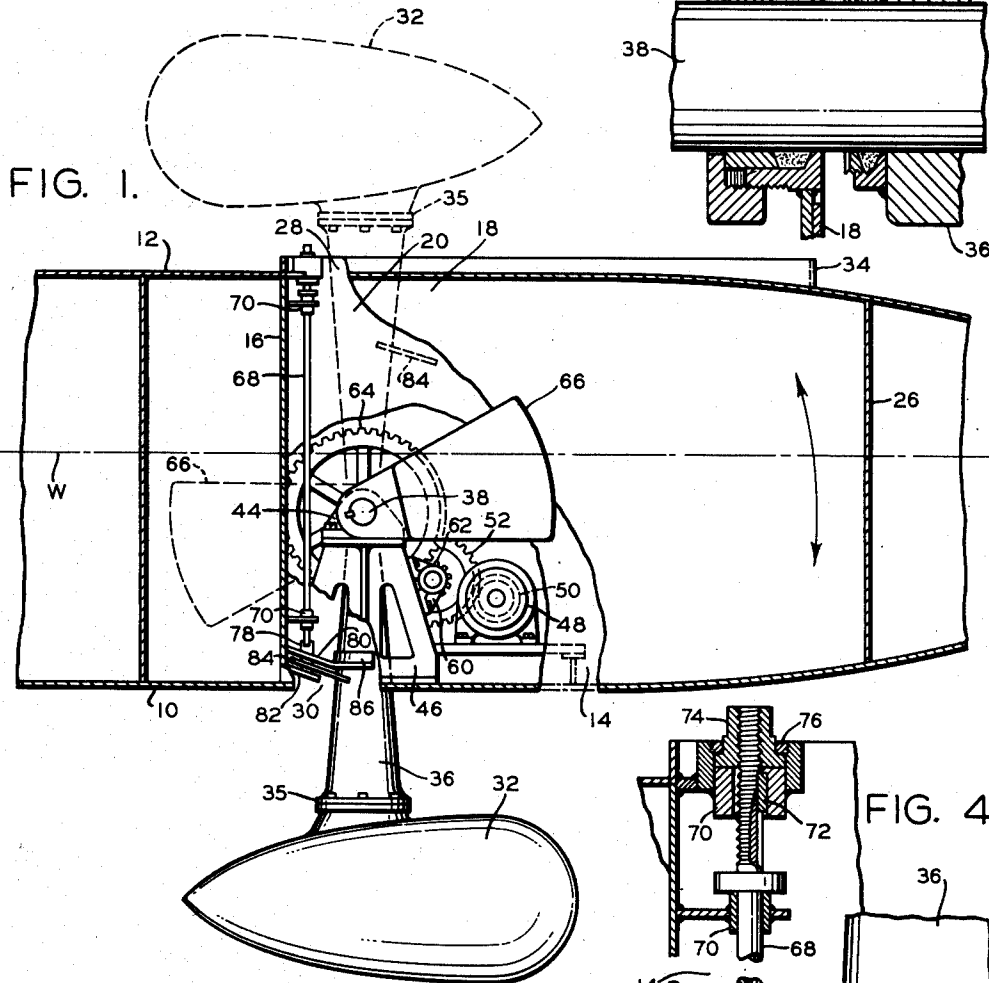
Aug. 22, 1950

W. R. DOW
SOUND HEAD MOUNTING

2,519,360

Filed May 31, 1945

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 2.

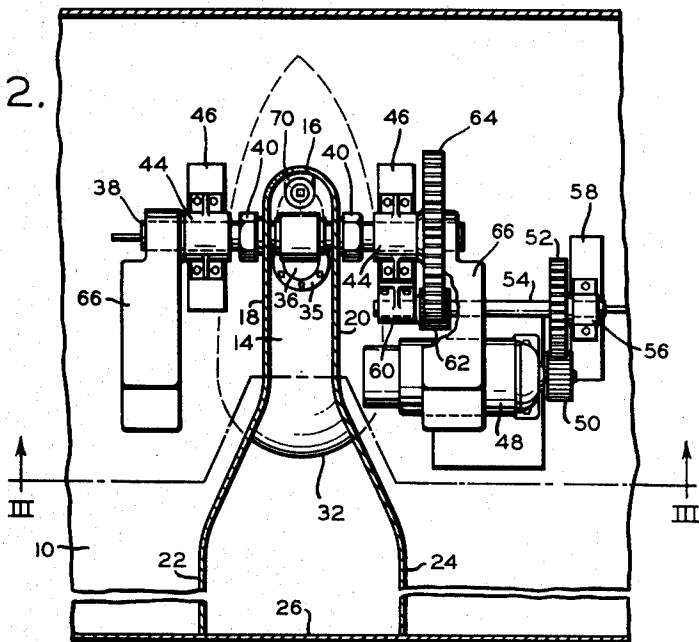


FIG. 3.

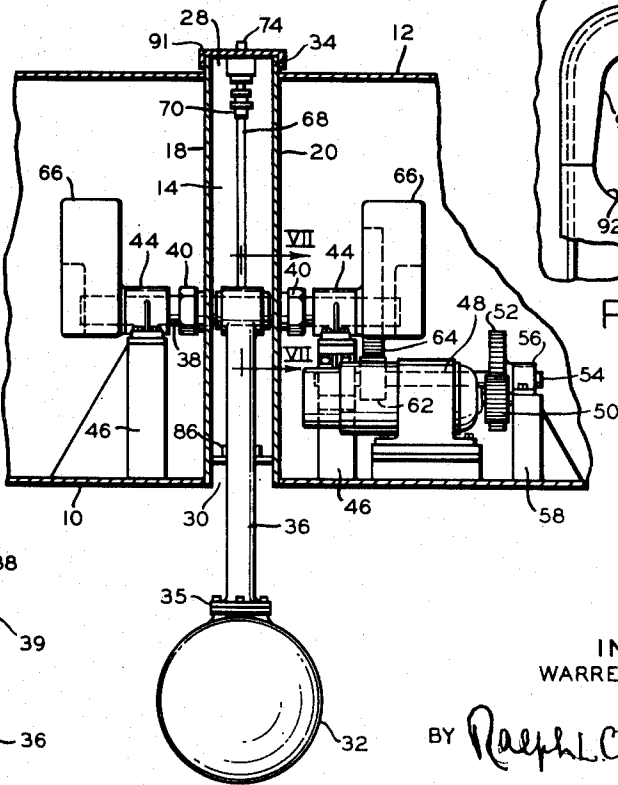


FIG. 8.

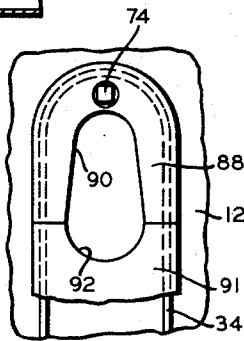
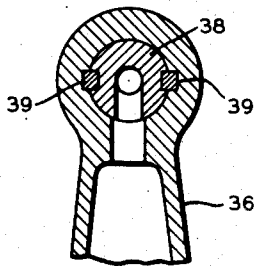


FIG. 7.



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SOUND HEAD MOUNTING

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10 Claims. (Cl. 116—27)

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

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This invention relates to underwater object locating equipment such as is used on ships, and more particularly, to a sound head mounting including mechanism for moving the head between emerged and submersed positions.

The acoustically operated object locating equipment presently used on ships includes a dome or sound head containing a large number of delicate parts that require frequent servicing and adjustment. These sound heads must be protractable into a submersed position without the confines of the ship for their effective operation, and retractable into a protected position within the ship when not in use and when the above mentioned servicing operations are to be performed thereon.

One type of construction now being used for this purpose utilizes telescopically operating tubes arranged to raise and lower the sound head into and out of a recess provided in the bottom of the ship. When the head is fully raised within the recess a knife-edged rim on the top of the head makes a watertight engagement with a rubber gasket encircling the underside of a capped opening in the top of the recess. The cap may then be removed without an inrush of water from the opening and safe access may be had to the internal parts of the sound head. This construction and mode of operation is not altogether satisfactory because the hoisting and lowering members located immediately above the opening together with the necessarily confined location of the mechanism tend to make the access that is finally attained, indirect, inconvenient, and generally inefficient for the frequent servicing operations required for the proper operation of the system. Moreover, the raising and lowering mechanism of this construction includes many precision machined and especially designed parts which, considering the nature and operative requirements of the device, are liable to get out of order, susceptible to deformation and misadjustment, and generally expensive to manufacture and maintain.

It is accordingly an object of the present invention to provide a mechanism for rapidly raising and lowering a sound head between a submersed, operative position outside of a ship and an emerged, servicing, position inside of the ship where easy, direct and convenient access may be had thereto.

Another object of the invention is to provide a mechanism of this character that is constructed of a few, mainly standard, and otherwise simple, inexpensive parts, and that has a general organ-

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ization which is rugged, durable and reliably operative and lends itself to a compact installation in the unused hold space of a ship.

A further object of the invention is to provide a means for locking the sound head in its submersed position whereby the forces acting upon the head while the ship is underway are not exerted upon the power driven elements of the raising and lowering mechanism.

Another object of the invention is to insure an evenly distributed load upon the driving mechanism throughout the range of movement of the sound head.

With the above and other objects and features in view, the invention will now be described with reference to the accompanying drawings which illustrate a preferred embodiment of the invention and will be pointed out in the claims.

In the drawings:

Fig. 1 is a sectional side elevation of a portion of a ship illustrating the arrangement of a well therein and the installation of the sound head raising and lowering mechanism with respect to the well, the operative and servicing positions of the head being shown in full and dotted lines, respectively;

Fig. 2 is a sectional plan view of the mechanism illustrating the location of the parts transversely of the well;

Fig. 3 is a sectional end elevation taken on the line III—III of Fig. 2;

Fig. 4 is a detailed side elevation, partly in section, of the device for locking the sound head in its submersed, operative position;

Fig. 5 is a detailed sectional view taken on the line V—V of Fig. 4;

Fig. 6 is a detail view in cross section showing the stuffing-box and bearings used for mounting the sound head shaft in the side walls of the well.

Fig. 7 is a detailed sectional view taken on the line VII—VII of Fig. 3 showing the connection of the sound head raising and lowering arm with the shaft, and

Fig. 8 is a detailed top plan view illustrating a cover adapted to be placed over a coaming extending above deck over the well.

The invention is herein shown, for illustrative purposes only, as embodied in a shallow draft ship, the sectional portion of the ship shown in Fig. 1 being located just aft of the bow thereof. The keel 10 below the water line W. The keel 10 and deck 12 converge slightly toward each other in the direction of the bow. A compartment or well 14 is built integrally into the ship and extends perpendicularly between the

deck 12 and the keel 10. This well 14 is preferably formed of one continuous piece of sheet metal or other suitable material (see also Fig. 2) with a curved aft end 16 merging into side walls 18 and 20 that flare outwardly toward their forward ends 22 and 24 which are welded to a transversely disposed forward end plate 26. By this arrangement of the well 14 there is provided in the unused hold space of the ship a direct passageway having an opening 28 at the deck above the waterline W and an opening 30 at the keel below the waterline W through which openings and passageway the sound head 32 may be freely raised or lowered.

A coaming 34 (Fig. 1) is provided around the upper opening 28 for a purpose to be later described.

The sound head 32 is of hollow streamlined construction, and as previously stated houses many sensitive, electrical devices and connections that require frequent servicing. The head 32 is detachably but watertightly secured at 35 to one end of a hollow strut or arm 36 the opposite end of which is mounted internally of the well 14 on a shaft 38 of the sound head raising and lowering mechanism, now to be described, the arm 36 being secured for rotation with the shaft by a pair of keys 39 (Fig. 7).

The shaft 38 extends transversely through the well 14 (Fig. 2) at a point adjacent to the aft end 16 thereof and below the waterline W (Fig. 1). Stuffing boxes 40 (Fig. 6) are provided adjacent to openings 42 in the sidewalls 18 and 20 through which the shaft extends to provide a watertight seal therefor. The shaft is supported for rotation in bearings 44 mounted at opposite sides of the well 14 upon upstanding supports 46 fixed to the bottom of the ship.

The shaft 38 may be driven in rotation in clockwise or counterclockwise direction (Fig. 1) by a reversible motor 48 which is connected through a train of reduction gearing to the shaft. A pinion 50 secured on the motor shaft meshes with a gear 52 secured to an intermediate shaft 54. The shaft 54 is journaled at its right end in a bearing 56 fixed on an upstanding support 58 and at its left end in a bearing 60 mounted on the support 46. A pinion 62 fixed to shaft 54 adjacent to bearing 60 meshes with a gear 64 fixed on the shaft 38, completing the driving connections between the motor and the shaft.

There is preferably provided a remote, dual, push-button control (not shown) operable to start, stop or reverse the direction of drive of the motor 48 at the will of the operator. In this manner the shaft may be rotated in either a counter-clockwise direction to swing the head 32 from the submersed, operative position shown in full lines in Fig. 1, in an arc of about 180° through the well 14 into the emerged or servicing position as indicated by the dotted lines, or, in a clockwise direction, from the latter position to the former. It is noted that the arm 36 is sufficiently long to bring the head 32 into a clear open position above the deck 12 where there are no obstructions and where the servicing operations may be directly, easily and conveniently performed.

If desired the head may be retracted to an intermediate position, i. e., a position where it lies within the well 14. This is done by simply opening the motor circuit when the head reaches this position.

In order that the load of the head and the arm

36 upon the gears and the motor may be more evenly distributed throughout their range of movement, a pair of counterweights 66 are secured on the opposite ends of shaft 38 that project beyond the bearings 44. The weights extend radially from the shaft and are so disposed angularly thereon with respect to the arm and the head that in raising operations, when the latter are about to leave the waterline and lose the buoyant effect of the water, the weights commence to assist the motor 48 and thereafter continue to assist it throughout the remaining travel of the arm and head into the servicing position. Conversely, in the reverse travel of the arm and the head downwardly, as they enter the water and receive the buoyant effect thereof, the position of the weights is such that they assist the motor throughout the remainder of the movement of the arm and head into submersed, operative position. Thus, it is seen that the weights 66 act to distribute the load evenly upon the driving elements as the arm and head are swung in the 180° arc between their extreme positions.

When the ship is underway and the arm and the head are in their submersed, operative position the water exerts considerable force against these parts. In order to prevent any undue strain upon the driving elements described above owing to this water pressure there is provided a locking device now to be described.

A vertically disposed rod 68 is mounted internally of the well 14 adjacent to the aft end 16 thereof in spaced bearings 70 projecting from this end of the well. The upper bearing 70 carries a key 72 (Fig. 4) engaging in an elongated keyway in the rod thus preventing rotation, but permitting vertical movement thereof. The upper end of the rod is threaded within a nut 74 rotatably mounted in the upper bearing 70, the nut being held therein by a threaded collar 76. Turning of the nut by any suitable wrench means (not shown) moves the rod vertically to raise or lower a blade 78 secured to the lower end of the rod. Thus, the blade 78 is movable into and out of interlocking position within apertures provided in brackets 80 and 82 fixed to and projecting from the aft end 16 of the well 14 and a corresponding aperture provided in a tongue 84 secured to the back of the arm 36 and entering between the brackets 80 and 82. The upper bracket 80 is formed with a forwardly projecting yoke 86 that embraces the back and sides of the arm 36 when the arm is in its submersed, operative position. Hence, the arm 36 and head 32 may be securely locked and stresses incident to forces acting thereon are prevented from being transmitted to the driving elements.

If desired, a cover may be provided for the coaming 34 to enclose the top of the well 14. The cover is shown in Figs. 3 and 8 and preferably is of two part construction, the rear part 88 being permanently fixed to the coaming and having a recess 90 formed to fit the back and sides of the arm 36 and the forward part 91 being removably mounted over the coaming and having a recess 92 formed to fit the front of the arm 36.

By the provision of this cover the top of the well may be watertightly enclosed while the head is in its emerged or servicing position illustrated in dotted lines in Fig. 1.

The invention described herein may be manufactured and used by or for the Government of the United States of America for Government purposes without the payment of any royalty thereon or therefor.

Having described the invention, what is claimed as novel and desired to be protected by Letters Patent of the United States is:

1. A sound head mounting for use in a ship, comprising, in combination, a well in said ship having an opening entering into the confines of the ship and an opening entering into the water, a shaft disposed transversely of said well, an arm connecting said head and said shaft, and means for rotating said shaft to swing said head through said well from a position within the confines of the ship to a position therewithout or vice versa.

2. A sound head mounting for use in a ship, comprising, in combination, a well in said ship having openings above and below the water line thereof, a shaft extending transversely of said well, an arm connecting said head with said shaft, and power driven means operable to rotate said arm and head about the shaft through said well between a position where said head is above said upper opening and a position where said head is below said lower opening and vice versa.

3. A mechanism for mounting a sound head in a ship, comprising, in combination, a well in said ship having openings above and below the water line thereof, water-tight bearings oppositely disposed in said well, a shaft extending transversely of said well through said bearings, an arm connecting said head with said shaft and operable to swing said arm and head through said well between a position where said head is emerged and a position where said head is submerged.

4. A mechanism for mounting a sound head in a ship, comprising, in combination, a well in said ship having openings above and below the water line thereof, a shaft extending across said well, means supporting said sound head on said shaft for movement through said well into a position above or below the corresponding openings thereof, and reversible power driven means for driving said shaft to impart such movement to said head.

5. A mechanism for mounting a sound head in a ship, comprising a well in said ship having openings above and below the water line thereof, means in the well for supporting said head for movement from a position above the well, there-through, to a position below the well and vice versa, power operated means for imparting said movement to said supporting means, a weight associated with said supporting means and arranged to counteract the buoyancy of said sound head as it is submersed and to counterbalance the weight of said head as it is emerged.

6. In a mechanism for mounting a sound head in a ship, the combination of a watertight enclosure having oppositely disposed openings above and below the water line of said ship, said enclosure being longer than its depth and formed to permit the travel of said sound head in an arcuate path therethrough, with a shaft water-tightly and rotatably mounted transversely of said enclosure, an arm within the enclosure connected at one end to said shaft and at its opposite end to said head, said arm being movable in an arcuate path through said enclosure and of such length as to extend beyond the openings of said enclosure at the termini of the path, and

power driven means connected to said shaft whereby said head may be moved from a position above the upper opening of the enclosure to a position below the lower opening thereof or vice versa.

7. A mechanism for mounting a sound head in a ship, comprising a well in said ship having openings above and below the water line thereof, a shaft extending across said well and rotatably journaled in the walls of said well, an arm within the well secured at one end to said shaft and at its opposite end to said sound head, said arm being movable in an arcuate path substantially through an angle of 130° within said well, said arm being of such length as to extend beyond the openings of said well at the termini of the path, power operated means for imparting said movement to said arm, and a weight secured to said shaft arranged to counteract the buoyancy of said sound head as it is submersed and to counterbalance the weight of said sound head as it is emerged.

8. A mechanism for mounting a sound head in a ship, comprising, a well in said ship having openings above and below the water line thereof, a shaft extending across said well, means supporting said head on said shaft for arcuate movement through said well into a position above or below the corresponding openings thereof, and means for driving said shaft to impart such movement to said head.

9. A mechanism for mounting a sound head in a ship, comprising, a well in said ship having openings above and below the water line thereof, a shaft extending across said well, means supporting said head on said shaft for arcuate movement through said well into a position above or below the corresponding openings thereof, means for driving said shaft to impart such movement to said shaft, and means for locking said head in position below the water line.

10. A mechanism for mounting a sound head in a ship comprising, a well in said ship having openings above and below the water line thereof, a shaft extending across said well, means supporting said head on said shaft for arcuate movement through said well into a position above or below the corresponding openings thereof, means for driving said shaft to impart such movement to said shaft, means for locking said head in position below the water line, and a weight secured to said shaft arranged to counteract the buoyancy of said head when it is below the water line and to counterbalance the weight of said head as it is immersed.

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