FESSENDEN OSCILLATOR

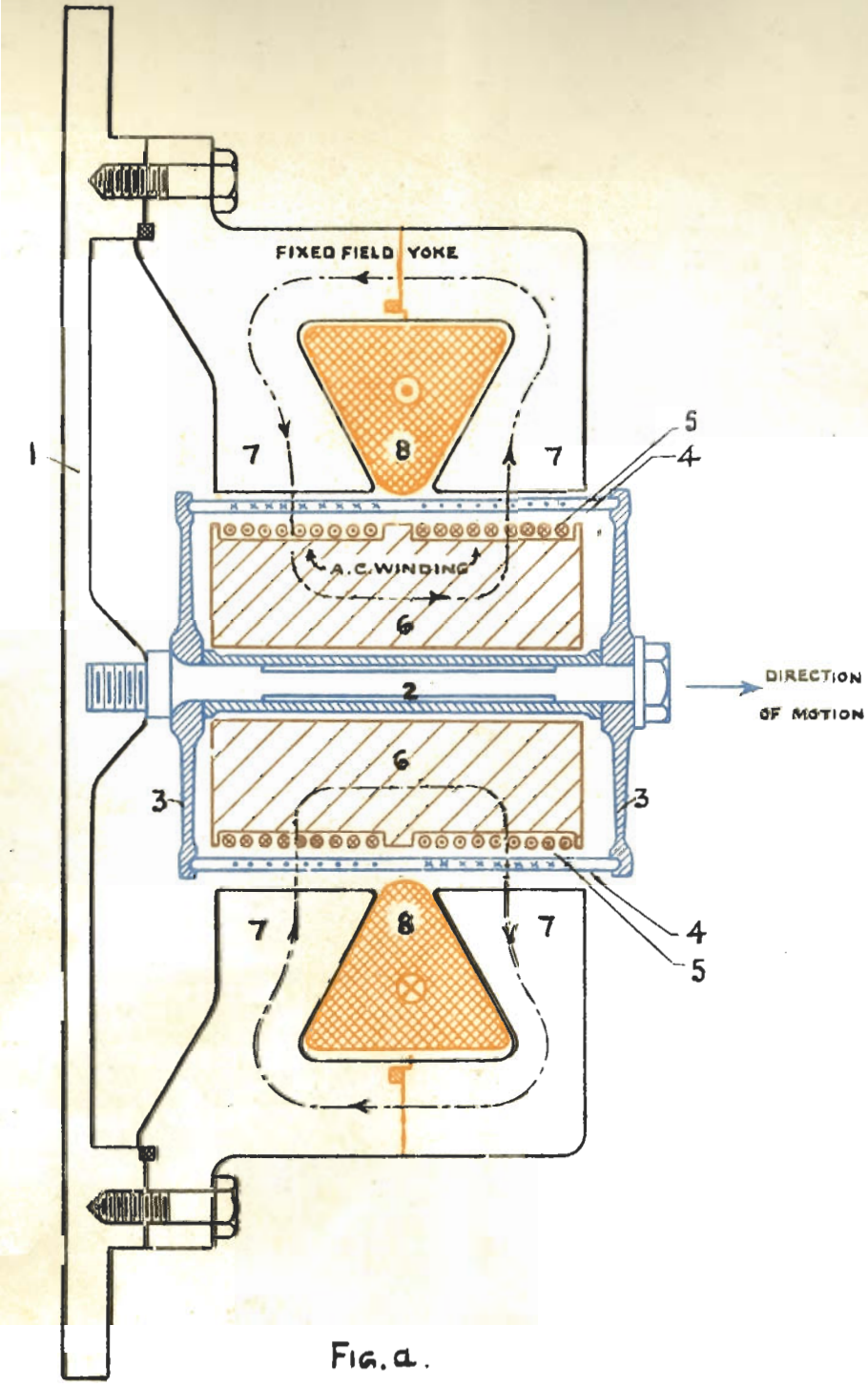
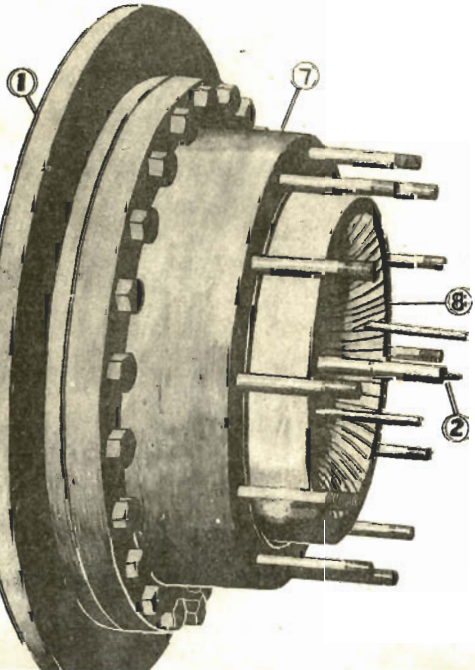


Fig. a.



FESSENDEN OSCILLATOR

Date of design: 1914.
Where fitted: Types 102, 104, 105 and 105A.

This is a device by which a diaphragm bolted flush with the ship's side can be made to vibrate at some definite frequency. The moving system consists of a copper cylinder (4) and a steel rod (2) with two steel clamping discs (3) holding them together, the outer end of the steel rod being secured to the centre of the diaphragm (1). Inside the copper cylinder is an iron core (6) carrying the alternating current winding (5) and outside it are two steel ring magnet yoke pieces (7) between which is housed the D.C. field coil (8).

Action. On D.C. being supplied a magnetic flux is set up and this crosses the air gap and copper cylinder passing through the iron core. When A.C. is supplied induced currents are set up in the copper cylinder (4) and since this is placed in the strong magnetic field a force is exerted on it tending to move it in an axial direction. The copper cylinder (4) and steel rod(2) being connected by the clamping discs, this force is applied by the steel rod to the diaphragm(1). As the alternating current and therefore the induced currents in the copper cylinder are constantly reversing their direction the force will be constantly changing direction at alternator frequency causing the diaphragm to vibrate. The A.C. winding (5) is wound in a reverse direction in its two halves, as otherwise equal and opposite forces, which would balance one another, would be exerted on the opposite ends of the copper cylinder.

To receive, special low resistance telephones are connected to the A.C. windings. Sound waves set the diaphragm and therefore the copper cylinder vibrating. The magnetic field set up by the D.C. thus will cause currents to flow in the copper cylinder and, by induction, current will flow in the A.C. windings and through the telephones. A note magnifier may be used with this system of reception if desired.

If the water pressure is insufficient to keep the water always in contact with the surface of the diaphragm a partial vacuum will be formed over its centre part, where the acceleration is greatest, once in each oscillation. This effect is known as cavitation and, since sound cannot be transmitted through a vacuum, will cause a considerable reduction in the strength of the transmitted signal. Pressure due to a head of water of at least 12-ft. is required to ensure continuous contact between the water and the surface of the diaphragm. Figure b. shows the relation between the depth of the transmitter and the strength of signal transmitted.

Three different pattern numbers of oscillator are supplied. Two of these are identical except that in one case the D.C. winding is designed for 100 volt supply and takes 3½ to 4 amps and in the other case for 220 volt supply, taking 1¼ to 1½ amps. Both these oscillators operate at a frequency of 540 cycles per second. The other pattern number, which is used in Type 105A only, operates at a frequency of approximately 1000 cycles per second, the D.C. coil being designed for 220 volt supply, taking 1¼ to 1½ amps.

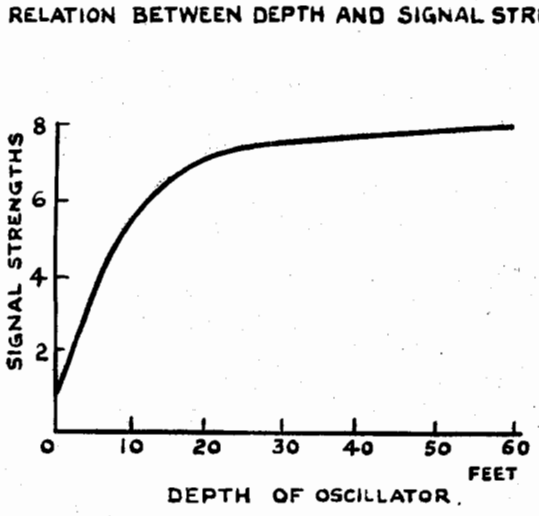


Fig. b.

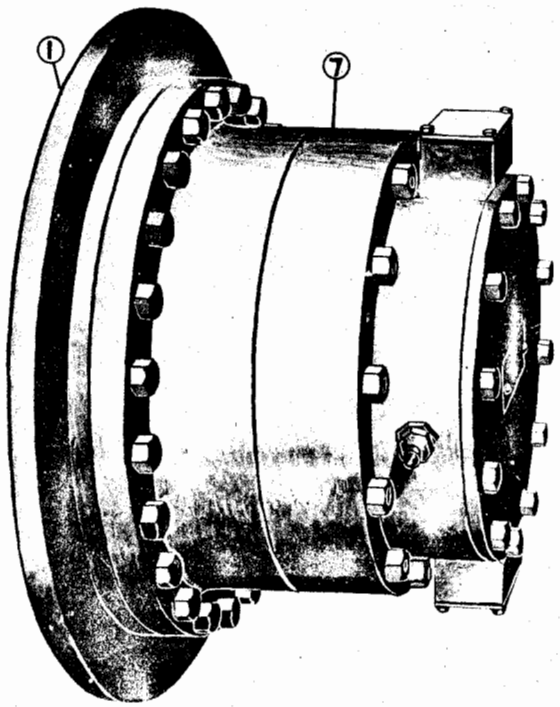


Fig d.