

a material that is viscous under pressure to minimize sealing problems and to transmit pressure hydrostatically. A cylindrical billet is then forced into the matrix-filled cavity by a punch. The flow of the displaced matrix material is restricted, causing the cavity pressure to increase till it is sufficient to overcome the clamping force  $P$  on the die halves. Once this occurs, the billet begins to upset in the cavity while

being acted upon by the pressure necessary to flow the matrix. Examples of this material are lead and other proprietary mixtures developed for this purpose.

### References

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## A Totally Enclosed Mechanical Power Isolation Clutch

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**Power-take-off clutches used in fishing boats are very often damaged by corrosion. Oil and dirt also get in between the working surfaces and affect adversely the working of the clutch. A totally enclosed clutch, which obviates these drawbacks, is described.**

**I**N small fishing boats, mechanical accessories, such as trawl winch, gurdy, etc. are driven off the main engine. They are usually coupled through a clutch. The clutches available in the market normally have their main working parts exposed to the atmosphere. The highly corrosive marine atmosphere and the bilge water inside the fishing boat cause much damage to the working components of the clutch. Further, dirt and oil get in between the friction surfaces and adversely affect the working of the clutch. Hence the development of a totally enclosed power isolation clutch which would obviate these defects was taken up at this Institute. The details of the clutch developed are presented in this communication.

### Description of the clutch

The clutch (Fig. 1) consists of an outer drum (1) with which a V-grooved pulley

is cast integral and is supported on a shaft on two ball bearings (15). Driving plates (2) lined with friction-material on either side slide freely along a spur wheel keyed to the shaft. The driven plates (4) move freely along four keys (16) fixed to the inner side of the drum and are fixed alternatively with the driving plates. The pressing plate (6) which also slides freely on the keys fixed to the drum serves to press the plates together while the clutch is engaged. The cover (5) is bolted to the outer drum by means of Allen screws. The cover carries three projections spaced equally at 120° for accommodating bell-crank levers (9). The bell-crank levers are fixed on pins and can oscillate freely about their respective pins. The operating pin (11) works as a sliding fit in a lead-bronze insert screwed on to the cover of the clutch. A stuffing gland arrangement (12) is provided in the lead-bronze insert to effectively prevent the flow of moisture inside the clutch. The

## TOTALLY ENCLOSED MECHANICAL POWER ISOLATION CLUTCH

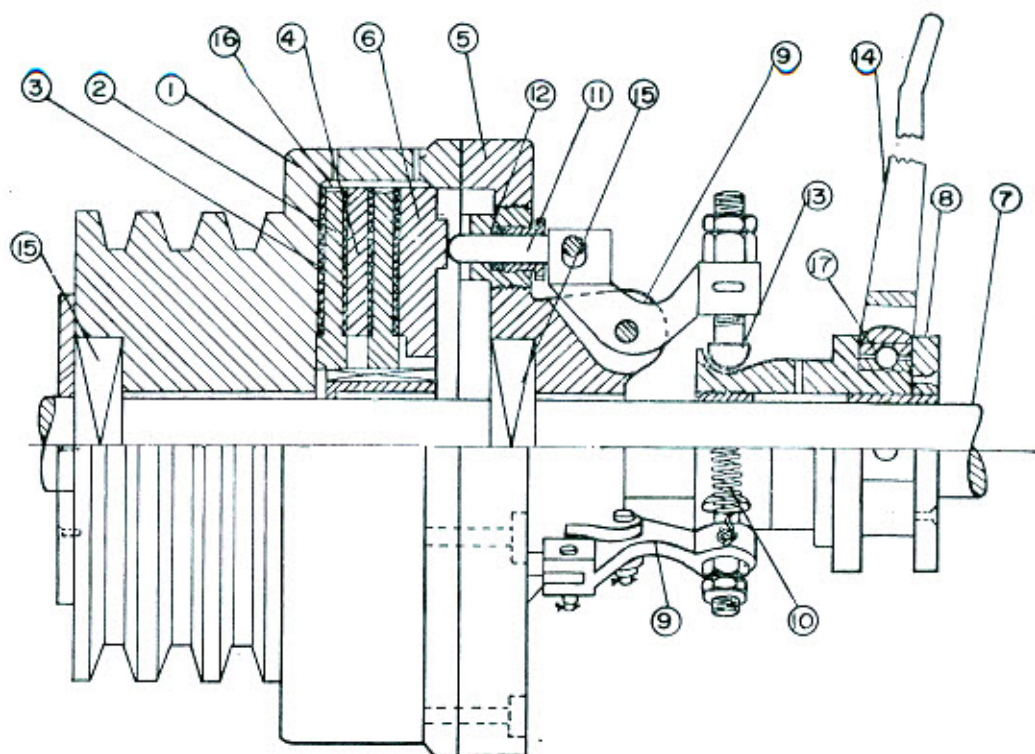


Fig. 1 — Clutch [1, Outer drum; 2, driven plate; 3, driven plate lining; 4, driving plate; 5, cover; 6, pressure plate; 7, shaft; 8, sleeve; 9, bell-crank lever; 10, spring; 11, pressing pin; 12, stuffing gland arrangement; 13, adjusting screw; 14, operating lever; 15, ball bearing; 16, key; and 17, double purpose ball bearing]

other end of the lever carries an adjusting screw (13), which can be screwed in and out and can be locked in any position. A sliding sleeve (8), which can slide freely along the shaft, has a groove in which a double purpose ball bearing (17) is fixed. A yoke is fitted on to this bearing and the bearing-yoke assembly is connected to the operating handle (14).

The three bell-crank levers are connected by means of springs (10) in a cyclic order, which facilitates quick disengagement of the clutch.

### Working of the clutch

One end of the shaft is coupled to the engine and the other end is supported on self-aligning ball bearings fixed on to the boat.

When the clutch is not engaged, only the shaft rotates and the clutch drum which carries the pulley is stationary. For engaging the clutch, the lever is moved towards the clutch. The bell-crank levers press the operating pins, thereby pressing the drum, the driven plates and the driving plates together. When the clutch is to be disengaged, the operating handle is pushed away from the clutch. This releases the pressure and the driving plates automatically separate themselves from the driven plates and the drum comes to rest instantaneously.

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