# MODIFICATION TO THE BILGE AND SEA WATER PUMPS FITTED IN 17.5 METRE JINGHA TYPE TRAWLERS

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This paper brings out the difficulties encountered with the Bilge and sea water circulating pumps which are fitted and drawn in series alongwith a fresh water pump in the 17.5 m. fishing trawlers.

### INTRODUCTION

The Deep Sea Fishing Organisation, Bombay have procured a score of Jingha type trawlers of overall length 17.5 m. constructed indigenously at various ship While operating these building yards. vessels this department faced various difficulties and breakdowns and efforts were made to rectify these defects with suitable modifications. One such difficulty was with the bilge and sea water circulating These pumps, being of impeller pump. type, were provided with imported seals, replacement to which was difficult to procure. There have been frequent leakage through seals, breakage of coupling, impeller bearing, shaft bearing, air locking. Hence a modified bilge and circulating pump replacing the seal with a gland with provision to change the gland without dismantling the whole set was designed and successfully tried in one of the vessels. Details of modifications effected and results of trials are presented in this communication.

## MATERIAL AND METHODS

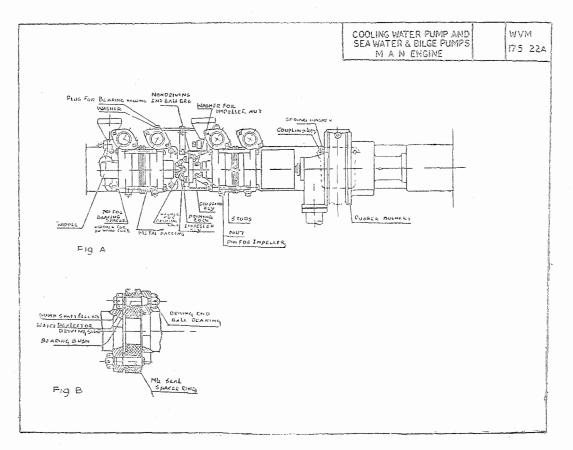
The set up of the pump is shown in figure 'A'.

The sea water pump circulates sea water through heat exchanger which in turn cools the fresh water circulating through the main engine. The bilge pump which is similar in every respect to the sea water circulating pump is fitted in series with the sea water pump while the fresh water pump is of different construction. The drive for the fresh water pump is taken from the main engine drive shaft through gears which change the direction of pump. The pump operates at 1000 r. p. m. The pump is coupled to two other centrifugal pumps with flexible coupling shown in drawing (Fig. 'B').

Fig. 'C' shows modified centrifugal pump fitted on to the main engine. The main modification is the replacement of water seals with  $\frac{1}{4}$ " gland packing which can quite easily be tightened without dis-

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mantling the whole unit. In the original pump the ball bearings were housed in the pump casing exposing the same to sea water corrosion, but in the modified version the bearings are fixed on extensions to pump body far removed from contact with sea water.

#### RESULTS AND DISCUSSION

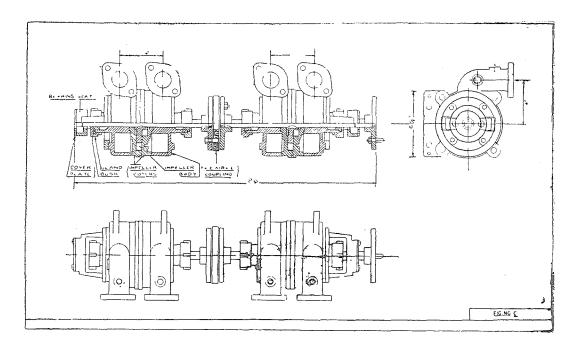
Since all the three pumps are fitted in line, alignment had to be maintained correctly. A slight misalignment (inspite of the dowel pins used for maintaining the correct alignment) would damage the water seals, shaft and the impeller. On numerous occasions (as evident from records) it was seen that the average loss of fishing days for break down of these pumps were high due to water seals at either end of both of the pumps leaking. Due to leakages flow of circulating water

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through the main engine as also loss of bilge suction was being experienced. The stainless steel shaft of the pumps were showing distortion resulting in the impeller fouling with the pump casing. To refit or reuse the mechanical carbon seals, springs as also ball races in the pump, it was necessary to completely remove the pump from the main engine mounting. It was also noticed that the coupling flange bolts were broken on many occasions and the flexible rubber coupling was found to be damaged.

As the modified pumps have an increased length due to additional space taken by the ball race bridge support and gland packing, certain modification had to be carried out in regard to securing the pumps to the main engine without major alterations. This was accomplished by providing new brackets and drilling and

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tapping new holes in the cylinder block. The original tap holes were plugged and revetted over. The sea water lines as well as the bilge lines both inlet and discharge require modification due to the fact that there has been longitudinal displacement of the pumps to the extend of approximately 50 mm. There was no need to replace the pipes but some were heated and bent to suit the new position of the pump flanges. As the bilge pumps run dry when the bilges are not connected, it was necessary to have the pipe connection between the delivery of the sea circulating pump and suction side of the bilge so as to prevent the bilge running dry thereby burning packing and overheating the shaft. The discharge of both the pumps are more than the original as the clearance between the impeller and pump body has been maintained to the minimum.

Modifications carried out to the pump did not result in any increase in the cost. Additional expense to the extent of Rs. 200/- per boat has to be incurred for fixing the pump to the engine.

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