

S.S. "STETTIN"

It is submitted that the Owners should be informed that their request that the thrust shaft recently fitted at Lisbon should be considered to be satisfactory as a permanent repair has received careful consideration and it is regretted that it is not possible to accede thereto.

The shaft was turned out of the heart of a piece of a condemned steel crank shaft which was originally $15\frac{1}{4}$ inches diameter, not from a forging made for the purpose. It is to be observed that in the case of all steel forgings the quality of the material depends largely upon the amount of forging work put upon it in reducing it from the ingot to the finished forging. It is always found that due to the forging work the material nearest the surface is of considerably better quality than that in the heart of the forging. This consideration leads to the invariable practice of making the test pieces from which the quality of a forging is judged from as near the surface of the forging as possible. In this case in making the shaft from a large piece the best of the material has been turned off, leaving only the steel of the inner part to form the shaft. Further it is on account of the relative inferiority of the material at the inner part of a forging that in all modern engines the diameter of the thrust shaft measured under the collars is required to be made larger than that of the ordinary intermediate shafts which have to sustain the same strain, because this part is necessarily turned out of the heart of a forging large enough to make the collars instead of from one only large enough to make the shaft.

It is also to be noted that in this vessel the engines were built so long as 40 years ago, and at the time they were modified in 1889 the new shafts were made to the same design as the old ones. The thrust shaft was made 8" in diameter, the same size as the intermediate shafting. If

engines were now made of the same size as those of the "STETTIN" the thrust shaft would be made not less than $8\frac{3}{8}$ " diameter, this provides a strength 15% greater than that of an 8 inch shaft.

In consideration of all the circumstances the present thrust shaft can only be accepted as a temporary repair, and should be replaced by a new one as recommended.

J.M.
22/3/16

A.R.R.
/ J.M.

The drawings should be returned to The Owners.

A.R.R.

Dr:- 24/3/16