

pl.
G.S. SWAN & HUNTER,
LIMITED
SHIPBUILDERS.

PRIVATE WIRE FROM
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Telegraph Address, "Hunter, Wallsend"

I.H.

Wallsend.

Newcastle-on-Tyne.

4th July, 1903.
Saturday.

Ackd. 6

Dear Mr. Cornish,

DIAGRAM OF EQUIVALENT GIRDERS
and stresses.

I have to thank you for your letter of the 23rd inst., which came to hand during my absence in Belfast.

With regards to your remarks, the Vessels we have selected for our diagram of comparative stresses were those about which we had sufficient information for our purpose, our aim having been to satisfy ourselves that our proposed scantlings would prove satisfactory.

In three of the instances, viz: the "Milwaukee", "Ivernia" and the 760' design, we had all the figures available, and we worked out a complete stress diagram of each very carefully, and the factor 29.25 was deducted therefrom. You will observe that in the formula Bending Moment - $D \times L$ we take for D not the displacement at which the bending moment is calculated, viz: with bunkers empty, but the load displacement with bunkers full. This method gave for the three examples worked out by us, a remarkably constant factor. The explanation is that in the "Milwaukee" and "Ivernia" the weight of engines and boilers is not in proportion to the space occupied by them when compared with the weight which the same spaces would have contained had they been filled with homogeneous cargo. The result being a large excess of buoyancy amidships. On the other hand in the 760' design the bunkers extend so far forward that when they are empty the excess of weight at the ends is reduced and the bending moment also, while the weight of the engines and boilers were relatively heavier than in the other examples quoted. Of course the ships whose bunker capacity would be relatively larger than in the "Ivernia" and smaller than in the 760' design would very likely have a smaller factor than 29.25, as would be the case in the "Oceanic" and "Korea".

With regard to the point raised by you that the load displacement of the "Ivernia" and "Oceanic" are generally less than

H.J.C. Esq.,

those we have assumed, we suppose that these ships would be strong enough to carry the deadweight for which they have been designed. It would of course have been more satisfactory if this had been repeatedly tested by actual practice, but on the other hand, the bending moments have been calculated on the assumption that the Vessels are filled with homogeneous cargo, and it is quite evident that in ships with large cargo carrying capacities, the cargo may be stowed in a very different way subjecting the vessels to greater stresses. In the case of the "Ivernia" the holds up to the Upper deck are filled with general cargo and the balance is stowed in the shelter tween decks in the end compartments, the midship portion being reserved for passengers. We therefore do not think that the bending moments have been over-estimated even at a less draught than the summer freeboard. Of course in the 760' design the actual distribution of weight could not differ from the one assumed in our calculations.

Re "MONARCH".- The distribution of the longitudinal material is exactly the same as in other ships designed from the first with a shelter deck. We have built several Vessels of this kind, viz: "Monarch", "Mount Royal", "Saint Andrew" and others. No doubt similar ships have been built in other Yards, and this type must by this time have been well tested. It would therefore be interesting to know whether it has been deemed necessary to increase the Scantlings.

With regard to the "DEUTSCHLAND" we are not aware that she has proved weak amidships. She has given trouble at the ends, especially the after end, but this may be due to local weakness, and we do not see that this can be used as an argument to advocate stronger scantlings amidships.

We wish also to point out that the 760' design being so much longer than the other ships is very much less likely to meet in practice the extreme conditions assumed in our calculations.

I am, dear Sir,

Yours faithfully,

E. W. DeRussell.
P. J. H.

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(Dictated).