16/9/10.

S.S. "Cacique"

Extracts – from correspondence between Mr. H. C. Farren & Mr. Shearle re above vessel dated July. Aug. & Sept. 1910.

Main or 3rd deck down in way of No. 3 Hatch aft of Eng. Space, deflected between the hatch end beams.
Hatch 28'·2" long with wide spaced quarter pillars & girders between same in addition to flanged coamings. – see plans.
Measured deflections between hatch ends = 3" port, 5" star.d
– these deflections being permanent i.e. "set down"

"Wt. carried in lower deck space in way of No. 3 hatchway was 586 tons – nitrate of soda in bags – stows at about 30 ¢ per ton". —

Assume a normal load of coal on deck @ 50 ¢/ton
Wt. on both girders $= \frac{32 \times 28{\cdot}16 \times 8{\cdot}75}{50} = \underline{\underline{158 \text{ tons}}}$.

Compressive stress on upper edge of hatch coaming angles assuming no assistance or otherwise from ½ beams at sides beyond 16 ft. from Cr. line. & semi-rigid end attachments
i.e. $BM^t = \frac{Wl}{10}$ i.e. worst conditions under a normal load $= \frac{158 \times 338''}{10 \times 294} = 18{\cdot}2 \frac{\text{tons}}{\text{ins}^2}$.

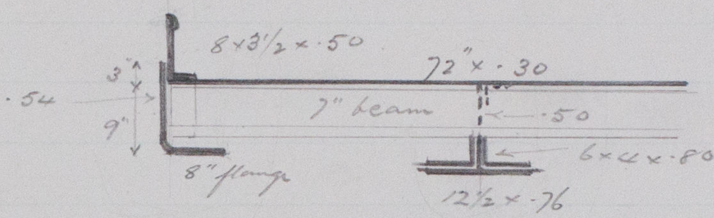
stress at top of plate coaming assuming B.A. fails
$= \frac{158 \times 338}{10 \times 334} = 16{\cdot}0 \frac{\text{tons}}{\text{ins}^2}$

With ~~5~~586 tons of cargo at $30 \frac{¢}{\text{ton}} = 17580$ ¢
Area of floor $50 \times 69 = 3450$ $\frac{17580}{3450} = 5{\cdot}1$
Wt. on girders assuming uniform distribution of cargo throughout compt. $= \frac{32 \times 28{\cdot}16 \times 5{\cdot}1}{30} = 153$ tons (c.f. normal lading of coal.)
Hence with any other distribution the stress may be considerably inc.d in direct proportion to the depth of cargo over the girders. —

W598-0281 1/4

Without B.A. 58.62

320.9	3110		11.76
5.47	1700		5.47
6.29	1410		6.29
8.47	I/y 224 ins³ bottom		
	= 167 " top		



11.76
4.38
7.18

Coaming	12×.54	6.48	4.5	29.2	131	78
flange	8×.54	4.32	8.73	37.7	330	
Web	4×.50	2.00	9.0	18.0	162	2
2 Angles	6×4×.80	14.72	8.89	131.0	1162	17
face plate	12½×.76	9.50	11.38	108.0	1228	
				323.9		
deck	72×.30	21.60	-.15	-3.24	—	
B.A.	8×3½×.50	6.25	-3.8	-23.8	90	50
		64.87		-27.0	3103	147
				296.9	147	
				4.58	3250	
				7.18	1360	
					1890	

I/y = 263 ins³ bottom
I/y = 147 " top

With double 12×4×4×.64 Channels in lieu of double angles + face plate.

Channels		24.22	13.0	394	5115	470
Web.	12×.5	6.00			542	72
		30.22		394	5657	
less ⊥⊥ as above		26.22		257	2571	
diff =		4.00		137	3086	
add above		64.87		296.9	3250	
		68.87		433.9	6336	
				6.3	2725	
				12.7	3611	

I/y = 284 ins³ bottom
= 247 " top

Note :- I/y of ⊥⊥ = 205 (bottom) Normal stiffness + 11.2
I/y of ⊥ = 237 (bottom)

W598-0281 2/4

Assume long[l] strip of deck 32 ft wide & 28.16 ft span
i.e. no work done by half beam.

$\frac{1}{2}$ of cargo $586 \times 30 = 17580$ ft.

$50 \times 69 \times 8 = 27500$.

Area floor $50 \times 69 = \frac{17580}{3450} = 5.1$ ft. Wt of cargo assuming uniform distribution

Area supported by girder = $28.16 \times 32 = 900$

Wt " " " = $\frac{900 \times 5.1}{30} = 153$ tons.

Stress of top edge of girder assuming simple supports = $\frac{153 \times 28.16 \times 12}{8 \times 147 \times 2} = 22$ tons/in² (wl)

" Do " bottom " " = $\frac{26 \times 147}{20.3} = 12.3$.

Assuming semi-fixed supports stresses are $\frac{wl}{10}$

top $\frac{26 \times 4}{5} = 17.6$

bottom $\frac{123 \times 4}{5} = 9.8$

Assuming worst case i.e. no

Total weight in Compartment as per Mr Farrow's

Hatches off upper Dk.

$17 = \frac{Wl}{10 \times 2}$

Take El. lt @ 17 $\frac{\text{tons}}{\text{in}^2}$ & B.M. = $\frac{Wl}{10}$

I_y of both sides = $147 \times 2 = 294$

Wt to strain to El lt. = $\frac{17 \times 10 \times 294}{350} = 143$ tons.

deflⁿ produced $= \frac{3}{384} \frac{Wl^3}{EI}$

$= \frac{3 \times 143 \times 350^3}{384 \times 13000 \times 3780} = .98''$

load on girders with 8.75 ft of coal @ 50ϕ

$= \frac{32 \times 28.16 \times 8.75}{50} = 158$ tons.