compared, and altered, with very little trouble, before the construction is begun.

In order to apply this method of construction to practice, nothing more is requisite than to know the limits between which the exponents generally are for the class of ships in question, the proportion between the principal dimensions, and the distance the centre of gravity should be before the middle of the load water-line. In Swedish ships of the line and frigates, the distance of the centre of gravity of the displacement before the middle of the load water-line is be­tween 1/70th and 1/80th of the length, and in smaller vessels it is a little more, depending on the manner in which their stores and rigging are distributed. This distance being de­termined, the weight the ship is to carry, the weight of the hull, and the relative proportions of the different dimensions, or the value of the exponents, the calculations will give the areas of every section, leaving the constructor the power of giving them whatever form he may wish.

Captain Carlsund was employed in this country in build­ing steam-boats for the Swedish post-office service. He has given the calculations of one of these boats, which were all constructed on Chapman’s parabolic system, as an ex­ample of its practical application.

Suppose the ratio of the breadth to the length to be *α,* and that of the breadth to the depth to be *β* ; by substitut­ing them in the equation (*b*), it will become

∙α∙β∙B5 = D.

The values of *m* and *η* are known, being assumed from former experience ; the displacement is determined by the weight of the engines, added to the weight of the stores, &c. and an approximation to the weight of the hull. By assigning values to α and *β,* the value of B is obtained, and from that the values of the length and depth. The dimen­sions being now known, the scantling may be determined, and the true weight of the hull estimated ; which, if very different from the approximation which was used, will cause a corresponding alteration in the dimensions, &c. With a steam-boat the stability is of minor importance, therefore it is not necessary to refer to equation (*c*).

The vessel in question was intended for two twenty-five horse-power engines, the weight of which, with the neces­sary stores, and the other articles, was estimated to be about 2050 cubic feet of water, and the approximation which was at first made to the hull was 1850 cubic feet, which sup­posed the whole displacement to be 3900 feet.

The vessel was intended to be sharp both at the midship section and at the extremities ; hence *n* was taken = 242, and *m* = 3∙0 ; the proportion between the length and the breadth, or α*,* was taken = 5·25 ; and that between the breadth and the depth, or *β, —* 0∙32. By substituting this value in the equation, we have

BJ√Ξ⅛y.y3∙'8×<=ι8.a8.

\* 2∙12×3×S∙25×O∙33 Length = 5∙25 B = 87∙04, Breadth ≡ 0∙32 B = 5∙31.

By calculating the weight of the hull according to these di­mensions, it was found that the approximation was too small by 175 cubic feet. By adding this quantity to the displace­ment, and retaining the other values, it will be found, from the above equation, that the

Breadth = 16·822,

Length = 5∙25× 16-882 = 88∙315, Depth = 0∙32×l6∙882 = 5∙383.

The weight of the engine, its situation, and that of its centre of gravity, must determine the place of the centre of gravity of the vessel, which was found to be about 2∙25 feet before the middle of the length on the construction water-line ; and consequently, from equation (2), the situation of the midship section was determined to be 9∙27 feet before the middle of the construction water-line.

The stations of the other sections were determined by the room and space. The parameters for the fore and after bodies were first determined by substitution in the equation (3). In the fore-body

∕= — Λ = — 9∙27 = 34∙887,

and in the after-body

∕=^ + ⅛ = 53∙427.

The area of the midship section, from equation (5), = —‰ BΛ = ? × 16∙822 × 5∙383, m -∣- 1 \*

= 67∙912 square feet, and the half area = 33∙956.

Hence, by equation (3), the parameter of the fore-body

= w≡τT

83∙956 ,

and for the after-body,

, 53∙427∣s lj lβt,joo

a “ 33-956 - is54"∙

The calculations for the sections are contained in the following table.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| For the Fore-body, | | | | y2∙12  For the After-body, z \_ 13..499. | | | |
| Sections. | |  |  | Sections. | | Abscissa, or *x.* | Half the Mid­ship Section, —*x*. |
| Name. | Distance from the Midship Sect, or *y*. | Abscissa, or *x.* | ship Section,  —*x*. | Name. | Distance from the Midship Sect. or *y*. |
| End | Feet.  34∙89 | Square Feet 33·960 | Square Feet. ·0 | End | Feet 53∙43 50∙76 48∙ 42∙ 36∙ 30∙ 24∙ 18∙ 12∙  6∙ 0∙ | Square Feet  33∙960 30∙460 27∙060 20∙390 14∙700 9∙990 6∙225 3∙382 1∙432 ·329 ·0 | Square Feet. ·0  3·50  6∙90 13∙57 19∙26 23∙95 27∙785 30∙578 32∙528 33∙631 33·96 |
| *X*  *u*  *9*  *m*  *h*  *d*  Midship section. | 32·24 30∙  24∙  18∙  12∙  6∙  0∙ | 28∙730 24∙660 15∙360  8∙349  3∙535 ·813 ·0 | 5·23  9∙30 18∙60 25∙611 30∙425 33147 33∙96 | 34  32  28  24  20  16  12  8  4  Midship section. |