mentioned as having been written by a Swedish naval en­gineer, Captain, then Lieutenant Carslund. It says,

Chapman endeavoured to discover whether or not the areas of the several transverse sections in well-constructed ships followed any law ; and if so, to find that law. For this purpose he calculated the areas of the sections of se­veral ships ; and in order to make the numbers more conve­nient, he divided these areas by the breadth of the midship section ; then, at their respective stations on the drawing, setting off from the water-line, distances equal to the quo­tients, he traced a curve representing the areas. This curve he called the curve of sections. He then endeavour­ed to find the equation to the curve, or rather that of ano­ther curve which would coincide with this for the greatest length ; and he found, that if the power and parameter of a parabola were so determined as to allow that curve to pass through three given points of the curve of sections, the two curves would nearly coincide. In the fore-body the three points were taken ; one forward, one at the midship section, and one midway between. In the after-body the points were similarly situated. In some ships the exponent to the curve was higher in the after-body than in the fore-body, in some it was the same for both. It was also found that there w ere ships in which the curve of sections almost ex­actly agreed with the parabola, and these ships invariably bore excellent characters. Chapman consequently con­cluded, that if the areas of the several sections of a ship were made to follow the law of the abscissas of a parabola, a vessel possessing good sailing qualities might be formed, and the process of construction much simplified.

This account shows that the method is applicable to all sorts of constructions, as it only requires that the relative areas of the sections shall decrease from the midship sec­tion towards the extremities in a certain relation, which can be varied to infinity ; it is therefore equally useful in constructing the sharpest man-of-war as the fullest mer­chant-man.

Suppose a ship is found to answer well at some given water-line, AC (fig. 21). Let the areas of the transverse vertical sections be divided by some constant quantity, as, for instance, the breadth ; and suppose the distances *ab, cd,* &c. cqual to the quotients, to be set off on the respec­tive sections from the water line; then a curve drawn through the points *b, d,* &c. will be the curve of sections. It will be found to be convex to the water-line at the ex­tremities.

The order of the parabola which coincides for the great­est distance with this line may easily be found.

Let the general equation to the parabola be expressed by *yn — ax ;* then it is always possible to determine *n* and α, so that the parabola shall pass through two points besides the vertex. Any two points between *b* and C may be taken, but it is evident that the farther apart the three points are taken, the longer will the parabola coincide with the line of sections. Of course, neither point may be in the convex part of the line of sections. It will be found that the point *g* at the foremost frame, and *h* in the middle between *g* and *b,* are the points which should be taken.

Draw a tangent to the curve at the point *b,* which will be parallel to the water-line ; then *mb* and *ng* are abscissas, *bm* and *bn* ordinates to a parallel passing through *b, h,* and *g ;* put *mh — x', ng — xl', bm — g,,* and *bn* = y' ; then, sub­stituting these values in the equation to the parabola, we have

*y'n = ax',* and *y'h, — ax",* or *n* log. *y' —* log. *a* + log. *xft* and *n*log. *y'' =* log. *a* + log. x" ; , log. *x' —* log. x"

hence *n = τ-≡—-. 5-s->*

log. y —log. yr \_y α- «"

and log. *a =*

o h>g∙ y — ι°g∙ y

We have now the values of *n* and *x,* and by calculating several other abscissas, we can trace the parabolic curve. The same operation applied to the after-body will give the exponent and parameter of the parabola, which is the most similar to the curve of sections in that body.

It generally happens that the exponents are nearly the same in both bodies, if the place of the midship section be determined in the manner to be shown in the sequel.

It will be found that the parabola and the line of sections very nearly coincide, the former being sometimes a little within the latter between *g* and *h,* and without at the fore­side of *h,* and sometimes, but much more seldom, the con­trary. The parabola always cuts the water-line at a short distance from the rabbets, this distance being rather great­er forward than abaft.

Several American ships of war have been submitted to this method of investigation, which was found to answer very well with their bodies. Indeed there can be no great deviation, as the parabola varies according to its exponent and parameter ; if the ship is full, a large exponent adapts it to that shape ; and if the ship is lean, a small one. lf the body has a long straight of breadth, and sharpens quick­ly at the extremities, by deducting a part in midships from the comparison, the system may still be applied ; or if, as is the case generally with English merchant-ships, there is a very great draught of water in proportion to the breadth, by deducting a part from the water-line downwards, this method may be applied to the remainder.

From this reasoning, it appears that ships may be con­structed to coincide exactly with the parabolic line, with­out deviating from the forms which experience has proved to be the most conducive to giving ships good qualities. Chapman stated that this would most probably be superior to the old system, and the result has confirmed his state­ment; for ships of the line, frigates, and merchant-men have been constructed after it, all of which have been very fine vessels.

From the manner in which the curve of sections is form­ed, it follows that its area multiplied by the breadth is equal to the displacement, and that the centre of gravity of the area is in the same transverse section as the centre of gra­vity of the body ; but the area of this curve, supposing it to be a parabola of a certain power, is a known part of the rectangle formed by the greatest ordinate and the abscissa ; hence, by making the areas of the sections decrease in the ratio of the abscissas in the parabola, we obtain certain equations between the quantities. To find these equa­tions, suppose the parabolic line, now also representing the line of sections, to be ACB (fig. 22), cutting the water-