thereon the extremities of the ribband *a,* E, and alſe the point of interſection of the loof frame. Then ap­ply this flip of card to the triangle in ſuch a manner that the point *a* may be on the dotted line SB, the point E on thc line SM, and the point anſwering to the loof frame on the dotted line SZ ; and mark upon the card the ſeveral points of interſection of the lines Si,

S 2, &C. Now apply the card to the ribband .,E (fig. 24.) as before, and transfer the ſeveral points of diviſion from it to the ribband. In like manner proceed with, the other ribbands ; and lines drawn through the correſuonding points in the ribbands will be the projec­tion of the lower part of the frames in the fore body. The projections of the top-timbers of the ſeveral frames may be taken from the half breadth plan ; and hence each top-timber may be eaſily deſcribed.

In large ſhips, particularly in thoſe of the French navy, a different method is employed to form the top- timbers in the fore body, which is as follows :

Let BI (fig. 27.) be one fourth of the breadth of the ſhip, and draw IK parallel to AB. Take the height of the foremoſt frame from the plane of eleva­tion, and lay it off from A to B : from the point B draw BH perpendicular to AB, and equal to half the length of the wing tranſom. Let E be the place of the breadth ribband on the main frame, and F its place on the ſtem at the height of the wing tranſom. With a radius equal to five-sixths of half the greatdſt breadth of the ſhip deſcribe the quadrant EFG (fig. 28.) : Make EH equal to FG (fig. 27.), the point F being at the height of the wing tranſom. Through H draw HO perpendicular to EH, and interſecting the circum­ference in O ; then draw OL parallel to HE, and EL parallel to HO. Divide EL into as many equal parts as there are frames in the fore body, including the main frame, and from theſe points of diviſion draw the per­pendiculars 11, 22, &c. meeting’ the circumference as in the figure. Take the diſtance 11, and lay it off from G (fig. 27.) towards F to the point 1 ; and from the ſame point G lay off towards F the ſeveral per­pendiculars contained between the ſtraight line and the Curve to the points 2, 3, &c. and through theſe points draw lines parallel to EG.

Take any line AB (fig. 29.) at pleaſure : divide it equally in two in the point 8 ; divide 8 B in two parts in the point 7, and continue this method of diviſion un­til there are as many points as there are frames in the fore body, including the main frame. Upon AB conſtruct the equilateral triangle ACB, and draw the lines G8, C7, &c. Place a flip of card on the parallel a K 8 (fig. 27.), and mark thereon the points oppoſite to *a,* K, and 8 ; and let them be denoted accordingly. Then apply this flip of card to the triangle, ſo that the point *a,* which is that anſwering to the rabbet of the stem, may be on the line AC ; that the point anſwer­ing to K may be on C 8, and the extremity 8 on the line CB ; and mark on the card the points of interſec­tion of the lines C 7, C6, &c. and number them ac­cordingly. Now apply this flip of card to the ſeventh parallel (fig. 23.), the point *a* being on the line CD, and mark on this parallel the point of interſection 7 ; ſlide the card down to the ſixth parallel, to which tranſfer the point n⁰ 6. In like manner proceed with the other parallels.

The point K, at the interſection of the line IK with

the eighth parallel, is one point through which the eighth frame passes. From this point upwards a curve is to be deſcribed ſo as to reconcile with the lower part of this frame already deſcribed, and the upper part, forming an invented arch, which is to terminate at H. This top-timber may be formed by two ſweeps, whoſe radii and centres are to be determined partly from circumſtances and partly according to fancy. It how­ever may be more readily formed by hand.

Let LM (fig. 27.) be the line of the second deck at the main frame, and let LN be the difference of the draught of water, if any. Make GN (fig. 28.) equal to LN ; draw NM perpendicular to GN, meeting the circle in M ; and through the points G and M draw the parallels GV and MV ; divide GN as before, and from the ſeveral points of diviſion draw perpendiculars terminating in the curve. Transfer theſe perpendicu­lars from L upwards (fig. 27.), and through the points thus found draw the lines 11, 22, &c. parallel to LM. Apply a flip of card to the eighth parallel, and mark upon it the point anſwering to the ſtem, the eighth and main frames : carry this to the triangle, and place it ſo that theſe points may be on the correſponding lines. Then the points of interſection of the lines C 7, C 6, &c. are to be marked on the card, which is now to be applied ſirſt to the eighth parallel (fig. 27.), then to the ſeventh, &c. transferring the ſeveral points of divi­ſion in order as before.

Draw the line HO (fig. 27.) ; mark its length on a flip of card, and apply it to the triangle, ſo that it may be parallel to its base, and its extremities one on the eighth and the other on the main frame : mark on the card the points of interſection of the ſeveral intermedi­ate lines as before ; then apply the card to HO, and transfer the divisions.

There are now three points determined through which each top-timber must paſs, namely, one in the breadth ribband, one in the fifth, and one in the upper ribband. Through theſe curves are to be deſcribed, ſo as to reconcile with the lower part of the frame, and partake partly of the curvature of the eighth frame, and partly of that of the main frame, but most of that of the frame to which it is neareſt : and hence the plane of projection is ſo far finiſhed, that it only re­mains to prove the ſeveral frames by water lines.

Another method of deſcribing the frames in the body plan is by ſweeps. In this method it is neceſſary, in the firſt place, to deſcribe the height of the bιeadth lines, and the riſing of the floor, in the plane of eleva­tion. The half breadth lines are next to be deſcribed in the floor plan. The main frame is then to be deſcri­bed by three or more ſweeps, and giving it ſuch a form as may be most ſuitable to the ſervice the ſhip is designed for. The lower, upper, and top-timber heights of breadth, and the riſings of the floor, are to be ſet upon the middle line in the body plan, and the ſeveral half breadths are then to be laid off on lines drawn through theſe points perpendicular to the middle line. A mould may then be made for the main frame, and laid upon the ſeveral tilings, as in whole mouldings, explained in Chapter V. with this difference, that here an under breadth ſweep is deſcribed to paſs through the point which limits the half breadth of the timber, the centre of which will be in the breadth Une of that timber. The proper centres for all the frames being found, and