series of points on the several water, diagonal and buttock or bow lines corresponding to each square station, being held in position by nails, specially adapted for the purpose, lightly driven into the floor, the batten in each case being adjusted so as to lie in a fair curve. Usually the batten will not under these conditions pass through all the points found for the curve on account of irregularities introduced or magnified in the process of enlarging to full size, and it must be allowed to take up a mean position passing outside some of the points and inside others. All of the sections in the body plan are drawn in with chalk in this way. The section where the greatest breadth of the ship occurs, usually at or near the middle of the length, must have the line parallel to and half the moulded breadth of the ship from the middle line for a tangent, and no section must project beyond this line.

The intersections of each section thus drawn, with the water and other lines, are the vertical projections on the body plan of points, the horizontal projections of which lie in the horizontal trace of the transverse plane at the corresponding square station or ordinate in the sheer and half-breadth plans, and are at the same perpendicular distances from the middle line of the half-breadth as the corresponding vertical projections are from the middle line of the body. For example, in fig. 99 *p*1 and *q*1 are the projections in the half-breadth of the same points of which *p* and *q* are projections in the body plan, and are found by making the ordinates of *p*1 and *q*1 measured from the middle line of the half-breadth plan at square station 2 equal to the perpendicular distances of *p* and *q* respectively from the middle line of the body plan. Thus points in the projections in the half- breadth of the water and diagonal lines can be found from the body plan already drawn, and in order that the surface of the ship may be fair, the series of points corresponding to any water or diagonal line must lie on a fair curve. In the case of a diagonal line the distance from the middle line of the body to the intersections of the diagonal with the square stations may be measured along the diagonal, and set off on the corresponding square stations in the half-breadth. This gives the true or rabatted form of the intersection of the diagonal plane with the ship’s surface, and this, equally with the projected diagonal, must be a fair curve if the surface is fair. The diagonals are also projected into the sheer plan by measuring the height above the base-line at which each diagonal in the body plan cuts each square station, and setting up this height from the base-line of the sheer plan at the corresponding square station. The projections of the bow and buttock lines in the sheer plan are obtained in a similar manner. Thus in fig. 99 V2 is projection in the sheer plan of the

intersection of the bow plane 1B with square station 2, and *t*2 is the projection in the sheer of the intersection of water-line 2WL with the same bow plane. The water-lines and diagonals in the half-breadth and the diagonals and bow and buttock lines in the sheer may thus be drawn as fair lines by the help of battens, and if the lines do not pass through all the points obtained by projection from the body plan, the sections in the latter are rubbed out and new ones obtained from the lines in the half-breadth. This process should be repeated until the curves in both plans are fair and the intersections correspond accurately with one another as the pro­jections of points in space.

No frame of the ship, however, is made to the curves of these water and diagonal lines, so that their true shapes are not required for any practical purpose except fairing the body. For the whole length of the ship, except about three to four twentieths at each end, space and labour are therefore saved and greater accuracy is ensured by using the contracted method of fairing. In this method the ordinates of the half-breadth are set only from ⅕th to ⅒th of their true distance apart, while the transverse

measurements are made to full size as before, thus making the curva­ture of the water and diagonal lines sharper throughout the region over which it would otherwise be somewhat flat and indefinite. As the curvature of the contracted level and diagonal lines depends upon the differences between the lengths of the ordinates of the curves and not upon their actual length, a further saving of space is effected by measuring the distances to be set up as ordinates in the half-breadth not from the middle line of the body but from a point selected arbitrarily in each water or diagonal line, generally a few inches outside the midship section. By suitably varying the distances outside the midship section of these arbitrarily chosen points in the different water and diagonal lines, it can be arranged that the curves in the half-breadth do not interfere with one another, an advantage from the point of view of clearness. With the above modifications the process of fairing by the contracted method is precisely similar to that when the ordinates arc their full distance apart.

In fig. 88 the diagonals 1D and 2D are shown laid off by the con­tracted method, the spacing of the ordinates in the contracted half-breadth being ⅙th of that representing the spacing in the diagram of the uncontracted sheer and half-breadth. In the con­tracted half-breadth the ordinates 4*r*1, 5*s*1, &c., are equal to the distances O*r*, O*s*, &c., measured to sections 4, 5, &c., in the body, O being a point arbitrarily selected in the diagonal 1D.

The principle of contracted fairing is sometimes extended by the