The system of iron diagonal riders which we have de­scribed is that adopted in line-of-battle ships. There are several variations from this system, in its adaptation to the smaller classes of vessels. The general features are how­ever the same. The modifications all tend more or less to simplify it in its details. There are, however, some instan­ces in which the iron bars have their upper ends extending outwards, towards the extremities of the vessel, probably in order to assimilate them to trusses ; but this is evidently, next to the vertical, the least advantageous position they could be placed in.

Of all the modern innovations in ship-building, the al­teration from the square termination to the round in the sterns of ships was received with most general reluctance, so wedded is the eye to the forms it has been habituated to gaze upon ; yet it may be fairly questioned whether, if cannon had been used for naval warfare when ships were first built, a square stern would have ever been construct­ed, and also whether the curvilinear termination to a body, every outline of which presents curves to the eye, is not more consistent with the requirements of a correct taste. Be these questions answered as they may, it is certain that the alteration was attended with a great local increase of strength in a part which had always previously been con­sidered the most imperfectly combined in the whole hull. This was in consequence of the various changes in the timbering which were required to maintain the angles in the contour of the square stern. (Plate CCCCLIX.) First, the ends of the transoms were very insecurely connected with the sides of the ship ; then the connexion between the counter-timbers and the transoms was equally insecure; and, lastly, the planking along the sides had no connexion with, and consequently formed no tie to, that on the stern. In the round stern, the timbers of the frame continue to give shift to each other, and to be firmly connected to­gether all round the curve of the stem ; the various inter­na) supports are uninterrupted ; and the principal planking, being continued from side to side, binds the whole together, and makes the stern little inferior to the broadside in local strength.

The object for which the circular stem was introduced was not so much increased strength in mechanical structure, as increased strength in defence from attack. Most of the modifications of the round stern which have been introdu­ced to preserve the appearance of the square form, and yet obtain the same increase of means of defence or of aggres­sion, have been considerable improvements in point of me­chanical construction on the old square stern, but they are certainly inferior to the circular stern in strength. This is partly in consequence of the great rake given to them, which also diminishes the advantage that was the object of the original alteration ; the increase of the means of attack or defence, as the explosion from the muzzle of the gun will scarcely clear the ship’s side.

The great extent to which this rake is now carried is exemplified by comparing the rake of the stern of the Queen, an English first-rate, which is three feet nine inches in ten feet, with the rake of the stem of the Achille, a French line-of-battle ship, which is only two feet two inches in ten feet. We quite grant the beauty of appearance aris­ing from the rake of the stern ; but beauty of appearance is not an essential for a ship of war. In fact, we believe that the stern adapted for a ship of war is yet to be designed, and that sterns will eventually be towers of strength, nearly vertical from the counter to the taffrail.

The three modifications of ships’ sterns of which we have been speaking will perhaps be more clearly understood by an examination of Plate CCCCLIX.

The drawings (Plate CCCCL.) which we have select­ed for exemplifying the various plans, sections, and lines connected with the draught and the laying off, are those of

the Vindictive, a frigate having an important improvement in the form of the bow above water, introduced by Mr Blake, the master-shipwright of Portsmouth yard, by which her battery for chase is very considerably increased in strength and efficiency. These advantages are gained with­out the loss of any strength, and without the addition of cost, in building ; so that it is highly to be desired that this ship should have a fair trial at sea. The stem of this ship is a modification of the circular formed stern, also from the de­sign of the same gentleman.

We shall now proceed to notice some of the peculiarities observable in the French practice of ship-building. The characteristic difference in their system from our own, which would strike an observer accustomed to English ship-building, would evidently be a less expenditure of material.

The French have retained the old system of frames and filling timbers. Frequently the frames are close jointed throughout their height, and the filling frames put up as single timbers, as is shown in fig. 50, Plate CCCCLVIII. The filling timbers are also frequently of fir. Both frames and filling timbers are chain-bolted. There is no shelf under the beams, only a thick clamp, and a wide chock worked upon the short stuff, and up to the beam (Plate CCCCLVIII. fig. 45). There are generally three side bind­ing strakes faced one inch on, and scored one inch over the beams, and bolted together by in and out bolts passing through the water-way, which is also faced and scored in the same manner. These bolts are secured with nuts and screws at the points, on the outside plank.

The water-way is not always scored over the beams, but is sometimes brought plain on their ends (fig. 46). The bolts of the binding strakes, which are then also merely brought on to the beams, secure its lower edge ; and in both cases it has in and out bolts through the ship’s side, to se­cure its upper edge.

The method of connecting the beam-ends with the ship’s side, which appears to be most generally adopted in the French ships at present, consists of a chock under the beam (fig. 45), securely bolted through the ship’s side, the points of the bolts being set up with a nut and screw. The beam­end hooks over the head of this chock. A plate-knee si­milar in shape to that known in the English service as Roberts’ knee is brought on each side against the chock and beam ; but these knees, instead of having a short arm against the ship’s side for taking in and out fastenings, themselves form the bolt, each knee having an arm which is driven through the side by means of a shoulder worked in the knee, similar to the shoulder of a dog-bolt. The outer end is secured by a nut and screw. The security of the plate-knees to the beam and chock consists only of three screws in each arm, and one screw in the diagonal brace. These screws are not above five inches long. Thus the security of either knee is completely unconnected with that on the opposite side of the beam.

The wales, diminishing stuff', and plank of the bottom, are all treenail-fastened, the buts are secured with two bolt­nails in the timber on which the but is placed, and a through-bolt is driven in the timber next the but In some instances the plank is nail-fastened, but whether with nails or treenails it is double fastened. The treenails are not caulked on the ceiling, but wedged with conical wedges. Most of the principal bolts, as those of the water-ways and chocks, under the beams, are set up outside with a nut and screw ; and great care is taken to omit the fastening of the wales and outside planking, wherever these bolts can be advantageously made to answer as fastenings for them.

There is no regular system observed in shifting the buts of the plank, as there is in the English service ; but the planks are worked to their full length, without reference to the shift : the only rule which appears to be observed is, that