Of the internal planking the lowest strake, or combination of strokes, in the hold, is called the limber-strake. A limber is a passage for water, of which there is one throughout the length of the ship, on each side of the keelson, in order that any leakage may find its way to the pumps.

The whole of the plank in the hold is called the ceiling. Those strokes which come over the heads and heels of the timbers are worked thicker than the general thickness of the ceiling, and are distinguished as the thick strokes over the several heads. The strokes under the ends of the beams of the different decks in a man-of-war, and down to the ports of the deck below, if there were any ports, were called the clamps of the particular decks to the beams of which they are the support—as the gun-deck clamps, the middle-deck clamps, &c. The strokes which work up to the sills of the ports of the several decks were called the spirketting of those decks—as gun-deck spirketting, upper-deck spirketting, &c.

The fastening of the plank is either “single,” by which is meant one fastening only in each stroke as it passes each timber or frame ; or it may be “double,” that is, with two fastenings into each frame which it crosses ; or, again, the fastenings may be “double and single,” meaning that the fastenings are double and single alternately in the frames as they cross them. The fastenings of planks consist generally either of nails or treenails, excepting at the butts, which are secured by bolts. Several other bolts ought to be driven in each shift of plank as additional security. Bolts which are required to pass through the timbers as securities to the shelf, waterway, knees, &c., should be taken advantage of to supply the place of the regular fastening of the plank, not only for the sake of economy, but also for the sake of avoiding unneces­sarily wounding the timbers.

The decks of a wooden ship must not be considered merely as platforms, but must be regarded as performing an important part towards the general strength of the whole fabric. They are generally laid in a longitudinal direction only, and are then use­ful as a tie to resist extension, or as a strut to resist compression. The outer strokes of decks at the sides of the ship are generally of hard wood, and of greater thickness than the deck itself ; they are called the waterway planks, and are sometimes dowelled to the upper surface of each beam. Their rigidity and strength is of great importance, and great attention should be paid to them, and care taken that their scarphs are well secured by through-bolts, and that there is a proper shift between their scarphs and the scarphs of the shelf.

When the decks are considered as a tie, the importance of keep­ing as many strokes as possible entire for the whole length of the ship must be evident ; and a continuous stroke of iron or steel plates beneath the decks is of great value in this respect. The straighter the deck, or the less the sheer or upward curvature at the ends that may be given to it, the less liable will it be to any alteration of length, and the stronger will it be. The ends of the different planks forming one stroke were made to butt on one beam, and, as the fastenings are driven close to the ends, they did not possess much strength to resist being torn out. The shifts of the butts, therefore, of the different strokes required great attention, because the transference of the longitudinal strength of the deck from one plank to another was thus made by means of the fasten­ings to the beams, the strokes not being united to each other sideways. The introduction of iron decks or partial decks under the wood has modified this.

These fastenings have also to withstand the strain during the process of caulking, which has a tendency to force the planks sideways from the seam ; and, as the edges of planks of hard wood will be less crushed or compressed than those of soft wood when acted on by the caulking-iron, the strain to open the seam between them to receive the caulking will be greater than with planks of softer wood, and will require more secure fastenings to resist it. It may also be remarked that the quantity of fastenings should increase with the thickness of the plank which is to be secured, for the set of the oakum in caulking will have the greater mechani­cal effect the thicker the edge.

When the planks are fastened, the seams or the intervals between the edges of the strokes are filled with oakum, and this is beaten in or caulked with such care and force that the oakum, while undisturbed, is almost as hard as the plank itself. If the openings of the scam were of equal widths throughout their depth between the planks, it would be impossible to make the caulking sufficiently compact to resist the water. At the bottom edges of the seams the planks should be in contact throughout their length, and from this contact they should gradually open upwards, so that, at the outer edge of a plank 10 inches thick, the space should be about 10/16 of an inch, that is, about 1/16 of an inch open for every inch of thickness. It will hence be seen that, if the edges of the planks are so prepared that when laid they fit closely for their whole thickness, the force required to compress the outer edge by driving the caulking-iron into the seams, to open them sufficiently, must be very great, and the fastenings of the planks must be such as to be able to resist it. Bad caulking is very injurious in every

way, as leading to leakage and to the rotting of the planks them­selves at their edges.

Ships are generally built on blocks which are laid at a declivity of about 5/8 inch to a foot. This is for the facility of launching them. The inclined plane or sliding plank on which they are launched has rather more inclination, or about ⅝ inch to the foot for large ships, and a slight increase for smaller vessels. This inclination will, however, in some measure, depend upon the depth of water into which the ship is to be launched.

While a ship is in progress of being built her weight is partly supported by lier keel on the blocks and partly by shores. In order to launch her the weight must be taken off these supports and transferred to a movable base ; and a platform must be erected for the movable base to slide on. This platform must not only be laid at the necessary inclination, but must be of sufficient height to enable the ship to be water-borne and to preserve her from striking the ground when she arrives at the end of the ways. For this purpose an inclined plane *a, a* (fig. 14), purposely left unplaned to diminish the adhesion, is laid on each side the keel, and at about one-sixth the breadth of the vessel distant from it, and firmly secured on blocks fastened in the slipway. This

inclined plane is called the sliding-plank. A long timber, called a bilge way *b, b,* with a smooth under-surface, is laid upon this plane ; and upon this timber, as a base, a temporary frame-work of shores *c*, *c*, called “ poppets, ” is erected to reach from the bilge-way to the ship. The upper part of this frame-work abuts against a plank *d,* temporarily fastened to the bottom of the ship, and firmly cleated by cleats *e*, *e,* also temporarily secured to the bottom. When it is all in place, and the sliding-plank and under side of the bilgeway finally greased with tallow, soft soap, and oil, the whole framing is set close up to the bottom, and down on the sliding plank, by wedges *f, f,* called slivers or slices, by which means the ship’s weight is brought upon the “ launch ” or cradle.

When the launch is thus fitted, the ship may be said to have three keels, two of which are temporary, and are secured under her bilge. In consequcnce of this width of support, all the shores may be safely taken away. This being done, the blocks on which the ship was built, excepting a few, according to the size of the ship, under the foremost end of the keel, arc gradually taken from under her as the tide rises, and her weight is then transferred to the two temporary keels, or the launch, the bottom of which launch is formed by the bilgeways, resting on the well-greased inclined planes. The only preventive now to the launching of the ship is a short shore, called a dog-shore on each side, with its heel firmly cleated on the immovable platform or sliding-plank, and its head abutting against a cleat secured to the bilgeway, or base of the movable part of the launch. Consequently, when this shore is removed, the ship is free to move, and her weight forces her down the inclined plane to the water. To prevent her running out of her straight course, two ribands are secured on the sliding- plank, and strongly shored. Should the ship not move when the dog-shore is knocked down, the blocks remaining under the fore part of her keel must bo consecutively removed, until her weight overcomes the adhesion, or until the action of a screw against lier fore-foot forces her off.

A different mode of launching is sometimes practised in British merchant-yards, and has been long in use in the French dockyards,

allowing the keel to take the entire weight of the vessel. The two pieces *a, a,* which arc shown in fig. 15 as being secured to the