there shall be about two feet shift between the buts of fol­lowing strakes.

Rather an interesting experiment as to the possibility of diminishing the scantling of the timber, to any great ex­tent, which is used for building large ships, is in progress in the French navy. The Surveillante, a large frigate, was built wholly of small timber, about ten years ago, and as yet the reports on the system are favourable.

The following is an outline of the plan on which she was built.

The keel, stem, and stern-post are formed of various pieces of timber combined as in the section, Plate CCCCLVIII. fig. 51.

The several lengths of the centre piece, or core, are scarphed together, while the side or strengthening pieces only but with plain buts ; care being taken that the buts and scarphs give good shift to each other.

There are in this system no other frames than those which form the sides of ports, and the timbers composing these frames are bolted together, without leaving any opening between them, that is, close jointed. The spaces between the frames are filled in with single timbers, or rather with a frame-work of timber fitted together in the manner shown in fig. 52.

The cant-bodies are framed as in the ordinary method, the after-body timbered round to the post without transoms or fashion-pieces.

From the main-deck upwards the scantlings of the frames are not different from those of *a* ship of a similar size built in the usual manner ; but below this line there is a very con­siderable reduction. This reduction commences at the lower edge of the gun-deck clamps, and there a couple of thick strakes are worked up to the lower edge of these gun- deck clamps, to form an abutment for a series of internal timbers, brought on the inner surface of the timbers of the frame, and crossing them at an angle of 45º, the upper ends being placed forward in the fore-body, and aft in the after­body. These timbers but at their heels on the heads of a series of internal floor-timbers, brought on the upper sur­faces of the floors of the frame. These internal floors are laid athwartships. The openings between the timbers of this internal diagonal frame are filled in with wedge-fillings, so that the whole hold presents one smooth surface for stowage.

Wherever there is an athwartship bulk-head, there is a system of riders worked on the inner surface of this diago­nal frame, but taking a vertical direction. The timbers of these bends of riders are not wrought side by side, but one series of timbers is worked on the inner surface of the other, and the bolts pass in and out through both, and through the bottom. These riders run up to the lower deck, and a beam is so disposed with respect to each bend of riders, as to be secured to their heads, and form a part of the system. The bulk-heads which necessarily fill in the space between the beam and the riders run diagonally up on either side the middle from a midship pillar to the beam and riders. Each bulk-head is water-tight.

*On Launching.*

Ships are generally built on blocks which are laid at a declivity of about 5/8ths of an 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 7/8ths of an inch to the foot for large ships, and a slight increase on this 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 the progress of being built, her weight is partly supported by her 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 moveable base ; and a platform must be erected for the moveable 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* (Plate CCCCLVIII. figs. 53, 54), 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 bilgeway, *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 bilgeway 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* tech­nically called slivers, by which means the ship’s weight is brought upon the “ launch.”

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 consequence of this width of sup­port, all the shores may safely be 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, are 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 well-greased in­clined planes. The only preventive now to the launching of the ship is a short shore, called a dog-shore (*g*), on each side, with its heel firmly cleated on the immoveable plat­form or sliding plank, and its head abutting against a cleat (Λ), secured to the bilgeway, or base of the moveable part of the launch. Consequently, when this shore is removed, the weight of the ship forces her down the inclined plane to the water. To prevent her running out of her straight course, two ribbands are secured on the sliding plank, and strongly shored. Should the ship not move when the dog­shore is knocked down, the blocks remaining under the fore part of her keel must be consecutively removed, until her weight overcomes the adhesion, or until the action of a screw against her fore foot forces her off.

Fig. 55 (Plate CCCCLIII.) will give an idea of a method of fitting the launch which is practised in the French yards. It must be observed, that the plan requires a firm foundation to the slipway, and therefore it is not generally applicable.

The two pieces *(a, a)* which are shown in the figure as being secured to the ship’s bottom, are the only pieces which need be prepared for each ship ; the whole of the re­mainder will be available for every launch. These pieces were, in the launch fitted to the bottom of a fifty-gun fri­gate, seven inches thick on their outer edges at the mid­ship bend, and were in length one third that of the ship.

A space scarcely more than half an inch was left between them and the baulk-timber, which was placed beneath them *(b, b),* as it was not intended that the ship should bear on these baulk-timbers in launching ; they are only to support her in the event of her heeling over. The ship was intended to launch wholly on the sliding plank (*c*), which was fitted under the keel. This sliding plank was, in the case in ques­tion, about four inches thick. The groundways were of baulk-timber, laid about four feet apart, extending across the slip ; between these groundways stacks of blocks were built, so that the sliding plank was supported along its whole