*scuppers,* or leaden tubes, that carry the water off from the decks, are then placed in holes cut through the ſhip’s ſides ; and the *ſtandards* repreſented in the Mid­ship Frame, Plate CCCXIV. bolted to the beams and ſides above the decks to which they belong. The poop lanthorns are laſt fixed upon their cranes over the stern, and the *bilge-ways* or *cradles* placed under the bottom to conduct the ſhip ſteadily into the water whilſt launching.

As the various pieces which have been mentioned above are explained at large in their proper places, it is therefore ſuperfluous to enter into a more particular deſcription of them here.

Chap. VII, *Of Improvements in the Masts and Rudder.*

Since the article Mast was printed, an account of a method for reſtoring maſts of ſhips when wounded, or otherwiſe injured, in an eaſy, cheap, and expeditious manner, by Captain Edward Pakenham of the royal navy, has been publiſhed in the tenth volume of the Tranſactions of the Society for the Encouragement of Arts, &c. Captain Pakenham introduces his invention with the following obſervations :

“ Among the various accidents which ſhips are liable to at ſea, none call more for the attention and exertion of the officer than the ſpeedy refitting of the maſts ; and having obſerved, in the courſe of laſt war, the very great deſtruction made among the lower maſts of our ſhips from the enemy’s mode of fighting, as well as the very great expence and delay in refitting a fleet after an action, particularly acroſs the Atlantic—a very ſimple expedient has ſuggeſted itſelf to me as a reſource in part ; which appears ſo very ſpeedy and ſecure, that the capacity of the meaneſt ſailor will at once conceive it. I therefore think it my duty to ſtate my ideas of the advantages likely to reſult from it ; and I ſhall feel myſelf exceedingly happy ſhould they in anywiſe con­tribute to remedy the evil.

“ My plan, therefore, is, to have the heels of all lower maſts ſo formed as to become the heads : but it is not the intention of the above plan to have the ſmall­eſt alteration made in the heels of the preſent lower maſts ; for as all line-of-battle ſhips maſts are nine inches in diameter larger at the heel than at the head, it will follow, that by letting in the treſſel-trees to their pro­per depth, the maſt will form its own cheeks or hounds ; and I flatter myſelf the following advantages will reſult from the above alteration.

Firſt, I must beg to obſerve, that all line-of-battle ſhips bury one-third of their lower maſts, particularly three-deckers ; it therefore follows, that if the wounds are in the upper third, by turning the maſt ſo as to make the heel the head, it will be as good as new ; for, in eight actions I was preſent in laſt war, I made the following obſervations :

“ That in the ſaid actions fifty-eight lower maſts were wounded, and obliged to be ſhifted, thirty-two of which had their wounds in the upper third, and of courſe the ſhips detained until new maſts were made. And when it is conſidered that a lower maſt for a 90 or 74 ſtands government in a ſum not leſs, I am informed, than 2000 l. to 2300 l. the advantages acroſs the At­lantic reſulting from the aforeſaid plan will be particu­larly obvious ; not to mention the probability of there being no fit ſpars in the country, which was the caſe in

the inſtances of the Iſis and Princeſs Royal; and as I was one of the lieutenants of the Iſis at that time, I am more particular in the circumſtance of that, ſhip. The Iſis had both her lower maſts wounded above the cathar pins in her action with the Cæſar, a French 74 ; and as there were no ſpars at New York, the Iſis was detained five weeks at that place.— Now, if her maſts had been fitted on the plan I have propoſed, I am confident ſhe would have been ready for ſea in 48 hours ; and as a further proof, I beg leave to add, that the whole fleet, on the glorious 12th of April, had not the leaſt accident of any conſequence ex­cept what befel their lower maſts, which detained them between eight and ten weeks at Jamaica.

“ The delay of a ſhip while a new maſt is making, and probably the fleet being detained for want of that ſhip, which frequently occurred in the courſe of laſt war, the taking of ſhipwrights from other work, with a variety of inconveniences not neceſſary to mention here, muſt be obvious to every officer that has made the ſmalleſt obſervations on ſea actions.

“ You will further obſerve, that this ſubſtſtute is formed on the most ſimple principle, fitted to the meaneſt capacity, and calculated to benefit all ſhips, from a firſt-rate down to the ſmalleſt merchantman, in caſes of an accident by ſhot, a ſpring, a rottenneſs, particularly as theſe accidents generally happen in the upper third of the maſt and above the cheeks.

“ It might probably be objected, that a difficulty and ſome danger might ariſe from the wounded part of the maſt being below ; but this will at once be obviated, when it is remembered, that as the wounded part is be­low the wedges, it may with eaſe be both fiſhed, caſed, and ſecured, to any ſize or degree you pleaſe, with the addition of its being wedged on each deck.”

Fig. 41. repreſents a maſt of a firſt-rate in its proper ſtate, the figures repreſenting its thickneſs at the diffe­rent divisions.

Fig. 42. the ſame maſt inverted, the heel forming the head, and the tressel-trees let into their proper depth, the additional thickneſs of the maſt forming its own cheeks.

Fig. 43. the propoſed maſt, the figures repreſenting the thickneſs of the maſt in the propoſed alterations ; *a,* the heel made ſquare ; *b,* the letting in of the treſſel- trees ; *c,* the third proportion of thickneſs continued up to where the fourth is in the preſent maſt, or at leaſt ſome little diſtance above the lower part of the cheeks, which is always looked upon as the weakest part of the maſt ; and by its being ſo proportioned, the maſt, when turned, will be nearly as ſtrong in the partners as before.

As the expence of a maſt is much greater than is generally imagined, it is therefore thought proper to ſubjoin the following ſtatement of the ſeveral articles uſed in making a 74 gun ſhip’s mainmaſt.

@@@[mu] Papers on Naval Architecture, Part 2.

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| --- | --- |
| Fishes for a spindle, 21 inches, 2 nails of *Value.*  two maſts, - - L. 101 3 11  Two side fiſhes, 22 inches, 2 ditto, 133 10 9  Fore and aft fiſhes, 22 inches, 2 nails of  one maſt, - - 66 13 10  Fish 21 *1/2*inches, 1 nail of half a maſt, 29 8 5  On the fore part.  Iron 3 qrs 19 lbs 1 5 9  Aries load baulk, 2 loads 22 feet, - 12 2 5 | |
| 3 F Carried over L. 344 | 5 1 |