away, which appears to he a mistake, as more power is lost by friction. A clump-block should be double the nominal size of the rope. A single strop may be made by joining the ends of a rope of sufficient length to go round the block and thimble by a common short splice, which rests on the crown of the block (the opposite end to the thimble) and is stretched into place by a jigger; a strand is then passed twice round the space between the block and the thimble and hove taut by a Spanish windlass to cramp the parts together ready for the reception of a small round seizing. The cramping or pinching into shape is sometimes done by machinery invented by a rigger in Portsmouth dockyard. The strop may be made the required length by a long splice, but it would not possess any advantage.

*Grummet-Strop* (fig. 30).—Made by unlaying a piece of rope of the desired size about a foot more than three times the length required for the strop. Place tlιe centre of the rope round the block and thimble ; mark with chalk where the parts cross ; take one strand out of the rope ; bring the two chalk marks together ; and cross the strand in the lay on both sides, continuing round and round till the two ends meet the third time ; they are then halved, and the upper halves half-knotted and passed over and under the next strands, exactly as one part of a long splice. A piece of worn or well-stretched rope will better retain its shape, upon which success entirely depends. The object is neatness, and if three or multiples of three strops are to be made it is economical.

*Double Strop* (fig. 31).—Made with one piece of rope, the splice being brought as usual to the crown of the block, *t,* the bights fitting into scores some inches apart, converging to the upper part, above which the thimble receives the bights *a, a* ; and the four parts of the strap are secured at *s, s* by a round seizing doubly crossed. If the block be not then on the right slew (the shell horizontal or vertical) a union thimble is used with another strop, which produces the desired effect ; thus the fore and main brace-blocks, being very large and thin, are required (for appearance) to lie horizontally ; a single strop round the yard vertically has a union thimble between it and the double strop round the block. The double strop is used for large blocks ; it gives more sup­port to the shell than the single strop and admits of smaller rope being used. Wire rope is much used for block-strops ; the fitting is similar. Metal blocks are also used in fixed positions ; durability is their chief recom­mendation. Great care should be taken that they do not chafe the ropes which pass by them as well as those which reeve through.

*Selvagee Strop.—*Twine, rope-yarn, or rope is warped round two or more pegs placed at the desired distance apart, till it assumes the requisite size and strength ; the two ends are then knotted or spliced. Temporary firm seizings are applied in several places to bind the parts together before the rope or twine is removed from the pegs, after which it is marled with suitable material. A large strop should be warped round four or six pegs in order to give it the shape in which it is to be used. This description of strop is much stronger and more supple than rope of similar size. Twine strops (covered with duck) are used for boats’ blocks and in similar places requiring neatness. Rope-yam and spun-yarn strops are used for attaching luff-tackles to shrouds and for many similar purposes. To bring to a shroud or hawser the centre of the strop is passed round the rope and each part crossed three or four times before hooking the “luff" ; a spun-yarn stop above the centre will prevent slipping and is very necessary with wire rope. As an instance of a large selvagee block-strop being used,—when the “Melville” was hove down at Chusan (China), the main-purchase-block was dpuble stropped with a selvagee containing 28 parts of 3-inch rope ; that would produce 112 parts in the neck, equal to a breaking strain of 280 tons, which is more than four parts of a 19-inch cable. The estimated strain it bore was 80 tons.

*Stoppers* for ordinary running ropes are made by splicing a piece of rope to a bolt or to a hook and thimble, unlaying 3 or 4 feet, tapering it by cutting away some of the yarns, and marling it down securely, with a good whipping also on the end. It is used by taking a half-hitch round the rope which is to be hauled upon, dogging the end up in the lay, and holding it by hand. The rope can come through it when hauled, but cannot go back.

*Whipping and Pointing.—*The end of every working rope should at least be whipped to prevent it fagging out; in ships of war and yachts they are invari­ably pointed. Whipping is done by placing the end of a piece of twine or knittle-stuff on a rope about an inch from the end, taking three or four turns taut over it (working towards the end); the twine is then laid on the rope again lengthways contrary to the first, leaving a slack bight of twine ; and taut turns are repeatedly passed round the rope over the first end and over the bight, till there are in all six to ten turns ; then haul the bight taut through between the turns and cut it close. To point a rope, place a good whipping a few inches from the end according to size ; open out the end entirely ; select all the outer yams and twist them into knittles either singly or two or three together; scrape down ; and taper the central part, marling it firmly. Turn every alter­nate knittle and secure the remainder down by a turn of twine or a smooth yarn hitched close up, which acts as the weft in weaving. The knittles are then reversed and another turn of the weft taken, and this is continued till far enough to look well. At the last turn the ends of the knittles which are laid back are led forward over and under the weft and hauled through tightly, making it present a circle of small bights, level with which the core is cut off smoothly. Hawsers and large ropes have a becket formed in their ends during the process of pointing. A piece of 1 to l1/2-inch rope about 11/2 to 2 feet long is spliced into the core by each end while it is open : from four to seven yarns (equal to a strand) are taken at a time and twisted up ; open the ends of the becket only sufficient to marry them close in ; turn in the twisted yams between the strands (as splicing) three times ; and stop it above and below. Both ends are treated alike ; when the pointing is completed a loop a few inches in length will protrude from the end of the rope, which is very useful for reeving it. A hauling line or reeving line should only be rove through the becket as a fair lead. *Grafting* is very similar to pointing and frequently done the whole length of a rope, as a side-rope. Pieces of white line more than double the length of the rope, sufficient in number to encircle it, are made up in hanks called foxes ; the centre of each is made fast by twine and the weaving process continued as in pointing. Block-strops are sometimes so covered ; but, as it causes decay, a small wove mat which can be taken off occasionally is preferable.

*Sheep-Shank* (fig. 32).—Formed by making a long bight in a top-gallant-back-

stay, or any rope which it is desirable to shorten, and taking a half-hitch near each bend, as at *a, a.* Rope-yarn stops at δ, δ are desirable to keep it in place

till the strain is brought on it. Wire rope cannot be so treated, and it is in­jurious to hemp rope that is large and stiff.

*Knotting Yarns* (fig. 33).—This operation becomes necessary when a com­paratively short piece of junk is to be made into spun-yarn, or large rope into small, which is called twice laid. The end of each yarn is divided, rubbed smooth, and mar­ried (as for splicing).

Two of the divided parts, as c, c and *d, d,* are passed in opposite directions round all the other parts and knotted. The ends *e* and *f* remain passive. The figure is drawn open, but the forks of A and B should be pressed close together, the knot hauled taut, and the ends cut off.

*Butt Slings* (fig. 34).—Made of 4-inch rope, each pair being 26 feet in length, with an eye spliced in one end, through which the other is rove before being placed over one end of the cask ; the rope is then

passed round the opposite side of the cask and two

half-hitches made with the end, forming another run­

ning eye, both of which are beaten down taut as the

tackle receives the weight. Slings for smaller casks

requiring care should be of this description, though

of smaller rope, as the cask cannot possibly slip out.

*Bale Slings* are made by splicing the ends of about 3

fathoms of 3-inch rope together, which then looks

like a long strop, similar to the double strop repre­

sented in fig. 31,—the bights *t* being placed under the

cask or bale and one of the bights *a, a* rove through the other and attached to the whip or tackle.

The marks on the lead-line are leather at 2, 3, and 10 fathoms, white at 5 and 15, red at 7 and 17, and blue at 13. The length of the lead is not usually included. The deep-sea line commences with 2 knots at 20, another knot being added for every 10 fathoms, and a single knot at each intermediate 5. Log­lines should have ample stray line (distance between the log-ship and the first mark). The distance of 47 feet and a 28-second-glass were adopted to assimilate the sea furlong to the shore furlong, which was absurd. Fifty feet to half a minute would be more correct and more convenient.

Since space will not allow of a full description of masting and rigging, only a few of the more important points will be noticed. The masts must be stepped before they are rigged ; accordingly we will first describe the manner in which they are put on board in cases where the assistance of shears on hulk or jetty is not available ; at an out-port a seaman is still left to his own resources, just as he was in former times. Fixing the masts in a large frigate, such as that shown in fig. 35 below, is a serious consideration, as the mainmast weighs about twenty tons.

Two suitable spars must be procured about three-fourths the length of the main-mast and about two-thirds its diameter,—the greater the housing the higher the shears. They are towed along­side or under the stern with the thicker ends forward, and par­buckled over the side or hoisted in through the stern-ports by means of a derrick, whichever is most convenient. The smaller ends are rested upon a spar across the gunnel or the break of the poop, crossed, and lashed with strong well-stretched rope (about 41/2 or 5 inches) passed figure-of-eight fashion, commencing at the centre, returning with riding turns as a racking seizing, and crossed again ; the turns at the extreme ends should not be so taut as the others. Care must be taken to place the seizing equidistant from each heel after they have been trimmed to fit flat upon shoes of strong oak planking ; they will remain within their full spread by about 2 feet each side till after the head seizing has been secured. Lash a threefold purchase-block to the horns above the lashings, to hang down clear under the cross, so as to correspond with a twofold block to be lashed to the mast. If such blocks cannot be procured two top-blocks may be substituted for the upper block and one on the mast, reserving the fourth top-block as a lead secured to one of the shear legs or near it. @@1 Two purchases may be used at the same time with advantage, one block hanging on the fore, the other on the after side. A gird-line is also placed on the highest part of the horns to assist in canting the mast, and another for the purpose of hoisting up a man should anything require altera­tion. The lashing at the shear-head must be well protected with old canvas and all the decks must be shored up in the vicinity of the places where the shear-legs stand for each mast. The legs must be lashed together at the desired spread and heel tackles led forward and aft from each. To form the four head-guys the central parts of two hawsers are clove-hitched above the lashing and spread as far as is convenient in four directions and set up by tackles. When all is ready and the purchase rove, the lower block should be secured forward as high as can be ; and, while the purchase is being hove upon, a light derrick or small shears lifting the shear- head will greatly assist ; of course the after heel tackles must be well secured. After the shears are erect and the heels cleated and lashed to the shoes they can be scuffed about by the heel tackles and guys to any desired position,— the hole for the mizzen-mast is first plumbed.

The mizzen-mast should be brought alongside with its head aft, and a sufficiently strong selvagee strop lashed on the fore side if it

@@@1 Top-blocks in large ships are 26 inches, carrying 91/2-inch rope, the break­ing strain of which is 25 tons ; by taking the standing part down to the mast there are three parts lifting, equal to 75 tons,—a sufficient margin over 20 tons. Twenty-two-inch blocks and an 8-inch rope would break at 54 tons. Large ships have one 26-inch and one 24-inch double block for jeers, which would reeve an 8-inch rope. The size of a block implies the length of the shell, of a rope its circumference, and of a chain cable the diameter of the iron.