if this has no effect, place another sail under the fore-mast and the fore-foot. This simple device is no doubt very ancient and was nrob- ably the process called in the book of Acts "undergirding the ship.” Sails have usually been thrummed ; but that requires much time, and the utility is questionable. If a large hole has been made by collision a spread sail would be burst by the pressure ; but, such a hole being usually at the side and partially visible, a large sail nearly in the form in which it was stowed, having the stops cut, should be thrown over before the hole end downwards, and, when sunk below the supposed depth of the fissure, brought towards it till the bight of the sail enters the vortex, when it will be sucked in violently and either disappear within the ship or block the hole ; if the latter, smaller sails can be spread slack over the hole to be sucked iu. The use of sails for the above purposes has been strangely neglected during late years, though much more frequently needed.

A leak can be stopped from inboard when accessible by placing over it pads of oiled or tarred canvas, tarred coal-sacks, bags of white lead, tallow, paint, clay, or any material which fits close when pressed by boards and shored down firmly,—that or something similar could be done when a ship is on shore. If a ship is on shore with a large hole in one part of her bottom, she might be recovered, especially if ebb-tide recedes many feet, by building a double partition with a space of about 2 feet between on each side of the injured part, filling the space with clay, and shoring it well, —in other words, by improvising two water-tight bulkheads ; the water having been pumped out of the sound parts the rising tide would float her. When a ship is on shore with numerous cracks in her bottom, but not a clear hole, she may be floated by constant pumping, even though at first the expedient should fail to prevent the tide from ebbing and flowing in the hold. By maintaining as much as possible an inward flow the small fissures will gradually choke with weed and sand, till the inflow is so reduced as to be within the power of the pumps ; hay, oakum, or dirt of any kind should be thrown over where it can be sucked into the leak. The ordinary pumps of a ship may be supplemented by nailing together four common deal boards and fitting two square valves weighted with lead, hinged and lined with leather, to rest on seats 2 feet from one end, which must be weighted on the outside as the bottom. A large hole near the top should be provided with a leather lip to shoot the water over the combings. When slung in the bights of two ropes four men jerk it up and down ; the force with which it descends through the water will send a stream up the tube with less labour than baling entails.

Ships on shore should be secured from driving into a worse posi­tion before being freed from any weight. Hard substances such as guns and shot should not be thrown on the lee side or where the ship in hauling off might strike on them. Keep sufficient fresh water for immediate use. An anchor· is usually carried out between two boats, the flukes being hung to a spar across the boats chocked up from the thwarts, while the stock is suspended across the sterns of the boats. The boats should be hauled out to a kedge anchor, while other boats support short bights of hemp cable. Good axes should be used for letting go the anchor.

A wooden rudder when immersed is very little heavier than water and can be shipped and unshipped by seamen with ordinary appliances ; but iron ships have metal rudders sometimes weighing as much as 20 tons. The following remarks apply to wooden rudders only. To unhang a rudder remove the woodlαck,—a chock recessed and nailed to the stern-post close above the upper pintle,— the use of which is to prevent it being unhung by accident. From a beam or chock above the rudder-head suspend two luff-tackles, single blocks, and two leads up, and the double blocks down to strops through the tiller hole. A few men on each luff-fall will easily lift the rudder the length of the pintles ; and as they are drawn from the gudgeons it will swing free and may be lowered between two boats provided with spars across their gunnels ; the bight of a rope avili bring the heel up to a position similar to that of the head,—nearly horizontal. It can then be taken under the main-yard and hoisted in, or be carried for repair to a wharf or suit­able beach at high water. Before a rudder is taken off to be hung, two long guys are rove through holes for the purpose at the fore-part of the heel, one end of each being hitched to the band for the rudder- chains, while the other is in readiness to hand into the ship half­way forward and low down. On the rudder-head being suspended by the luff-tackles a little higher than its position when shipped, the guys will haul it to the exact line with the stern-post ; it is then lowered into the gudgeons, the guys unrove by means of the short ends, and the woodlock replaced. Smooth water is desirable for that operation ; a little tide in a line with the keel will assist. The tiller should be firmly wedged or secured in the rudder-head so as to prevent any jerking motion ; for the same reason, the wheel ropes should be kept moderately taut ; they should also be rove in two parts, lashed together on top of the wheel, for convenience in shift­ing them one part at a time. The rudder-chains are shackled to a band, which embraces the rudder a little above the water, and are attached to a stout rope, usually stopped up round the counter ready

to receive tackles, by which the ship may be steered imperfectly after the rudder-head is disabled.

The construction of a temporary rudder has always been con­sidered an interesting and highly useful piece of seamanship. One easy plan is to pass the end of a large hemp cable out of the rudder- hole or central port, haul it up to the ship’s side, lash to it one or more large spars, sling the whole bundle about the centre of the spars with stout hawsers as guys, throw it overboard, and heave in a part of the cable, leaving the part with the spars lashed to the side of it far enough away not to be lifted out of the water with the pitch of the ship. The guys when rove through blocks on the spare top-sail yard-arms, which are lashed across the gunnel for the purpose, are taken to the capstan ; by this means the ship may be steered with the assistance of her sails. If there be not a hemp cable on board, the largest hawser must be used with a spare top­mast or the largest spar available.

Early in the 19th century Captain Edward Pakenham contrived an efficient rudder with the material in his ship. Part of a top-mast heel up formed the rudder-head and main-piece, the fid-hole becom­ing the tiller-hole. The main-piece passed through the round hole of the lower cap, which was made of elm and lined with leather, and which, being secured by a collar near the lower part, acted for pintles and gudgeons, and was drawn into place by two hawsers A, A, till it embraced the stern-post by the square intended for the mast-head (fig. 39). There should be ropes to the bolts *b, b* to keep it horizontal.

Another top-mast was cut, which with the re­mainder of the first made four parts in all, flat­tened and fitted together, woolded and bolted, and so forming the required width. Three pigs of ballast were let into the lower part and the whole planked over and secured with spike nails.

Fine weather was necessary for shipping it and a collar was built above the rudder-nole to confine the motion and to support the weight The materials carried in modern ships may differ, but a fertile mind will generally find substitutes.

The “Pique” frigate, commanded by the Hon.

II. J. Rous, steered across the Atlantic during sixteen days cf almost continuous gales, a dis­tance of 1500 miles, by means of a cable over the stern and a Pakenham rudder during part of the time. She had been on shore in the Gulf of St Lawrence ; during the voyage she was making 20 inches of water an hour and she had also two masts sprung ; she reached St Helens in the Isle of Wight on the 13th of October 1835.

It is a difficult thing to get a lower yard from the deck into its place without letting go either stays or rigging, and this the fol­lowing instance will illustrate. The “Thunderer,” an eighty-four gun ship, broke her main-yard, which was 112 feet long, completely in two, 5 feet to leeward of the slings. The broken parts were sent down, and a main-top-sail-yard crossed instead, while a reefed top­sail did duty as a course and a mizzen-top-sail over it as a main-top­sail. The parts of the main-yard were placed together on deck ; the two halves of a spare anchor stock were let in on the fore and aft sides and an oak mast fish on top, with some studding-sail-booms to round it off. All parts were bolted, hooped, and woolded together, making it as strong as ever it was, entirely from the material carried in the ship. The sketch (fig. 40)

represents the time of dip­ping the port yard-arm under the main - stay : represents the jeers, which bear the principal weight (total, 5 1/4 tons) ; *f* the two fore-tackles lashed to the mast-head pendants ; *t* a top-burton ; s a sail-tackle to the top-mast-head ; *m, m* main-tackles from the mast-head pendants ; *l* the main-lift ; *y* a yard- tackle secured to an upper-deck beam. The main-yard was entirely rigged before being crossed ; the blocks are not shown. In a long ship the operation would be easier. When a fore-yard has to bo got across from the deck, time and trouble can be saved by letting go, half at a time, all the fore-rigging and back-stays which are on that side.

When feeling the way into harbour during a thick fog, let a boat pretend to tow the ship with the deep-sea lead-line ; by this means a margin of 100 fathoms of safety will be secured. Care should be taken that every running rope in the ship be slacked previous to rain or heavy dew.

For further information and variety of opinions see Captain Francis Liardet, R.N., *Points of Seamanship and discipline;* Robert Kipping, *Masting, Mast- making, and Pigging Ships;* Vanderdecken, *The Yacht Sailor;* R. H. Dana, *Seaman's Manual* (10th ed., 1867); Captain Alston, *Seamanship;* Charles Uushell, *Rigger's Guide* ; Captain Sir George S. Kares, *Seamanship* (6th ed.).