SAIL, SAILCLOTH, SAILMAKING. A sail is a sheet of canvas (or other material of the requisite flexi­bility and strength) by the action of the wind on which, when spread out or extended, a vessel is moved through the water. Sails are supported and extended by means of masts, yards, gaffs, booms, bowsprit—all technically termed “spars”—and stays or slanting ropes. In the first experiments for impelling vessels by sails the least com­plicated form, that of a single square sail erected on a single mast, was no doubt adopted. To the quadrangular the triangular sail would soon be added; and single sails of both these forms are known to have been used at very early periods. Subsequently the trapeziform and trape­zoidal sails also came into use. As vessels increased in size, thereby requiring a greater surface of canvas to impel them, it became necessary to use not only more sails but also an increased number of masts; and the number and disposition of the several kinds of sails could be almost indefinitely varied according to the ideas of navigators, the services required of the vessels, the places in which they were employed, and the size of the crews. Thus a great variety of rig naturally arose. Leaving out of account the many nondescript styles adopted in the case of boats and small craft, all modern vessels may, for general purposes, be considered as belonging to one or other of the following categories—cutter, schooner, three-masted schooner, brig­antine, brig, barquetine, barque, or full square-rigged ship; but the cardinal distinction is that by which they are classified as *square-rigged* or *fore-and-aft-rigged* (compare Seamanship and Ship). These expressions can be easily explained by reference to any three-masted ship. The mast nearest the bow or head is known as the fore-mast, the next abaft or nearest the middle of the ship as the main-mast, and the third or that nearest the stern as the mizzen-mast. Each mast consists of several sections, that attached to the hull being called the lower or standing- mast, the next above that the top-mast, the next the top­gallant-mast, above which may rise a pole or royal-mast. On each of these masts, and at right angles with it, is a yard denominated “ square,” which is hung (slung) by the middle and balanced. These yards are named according to their situation, those placed on the fore and main standing-masts being called respectively the fore and main lower-yards, that on the mizzen the cross-jack-yard; the yards on the top-masts are called the top-sail-yards, those on the top-gallant-masts the top-gallant-yards, and those on the royal-masts the royal-yards. To each of these yards a sail is *bent* or attached, taking its name from the yard; thus the principal sail upon the fore-lower-yard is called the fore-course or fore-sail; the next above, upon the fore-top-sail-yard, is the fore-top-sail; above which, upon the fore-top-gallant-yard, is the fore-top-gallant-sail; and above all, upon the fore-royal-yard, is the fore-royal. In like manner on the main-mast we have the main-course or main-sail, main-top-sail, main-top-gallant-sail, and the main-royal. Similar appellations are given to those on the mizzen-mast; in large merchant-ships, by means of a sky-sail-pole, a sail termed “sky-scraper” is sometimes set above the royals, but not so frequently as formerly. Such square sails can be placed at right angles to the direction of the keel of the ship, a position given to them when going before the wind ; the same sails can also, by means of braces, be placed obliquely to the keel with a side wind, commonly termed by seamen “ on a wind ” or “ by the wind.” In addition to these there are sails between the masts, set either on gaffs (unbalanced) or on stays, also others beyond the extremities of the ship, extended prin­cipally by means of the bowsprit, which, in addition to supporting the fore-mast by a stay, also supports the jib and flying-jib-booms for extending the sails still farther

forwards ; the means for extending the after-sail are the driver or spanker-boom and the gaff. Sails extended or set on gaffs and on stays are called “fore-and-aft,” and are generally or approximately in a vertical plane passing through the keel ; but a certain degree of obliquity can be given them by easing off the sheet or aft lower corner of the sail. A ship fitted as above described would be termed “square-rigged,” the square sails predominating both in importance and in number. A square-rigged line- of-battle ship would be supplied with the following de­scriptions of sails @@1 :—

|  |  |
| --- | --- |
| *Square.* | *Fore-and-Aft.* |
| Fore-course or fore-sail. | Flying-jib. |
| ,, top-sail. | Jib. |
| ,, top-gallant-sail. | Second jib. |
| ,, royal. | Fore-gaff-sail. |
| Main-course or main-sail. | ,, try-sail (storm-sail). |
| ,, top-sail. | Main-gaff-sail. |
| ,, top-gallant-saiL ,, royal.  Mizzen-top-sail. | „ try-sail (storm-sail). |
| Mizzen-try-sail (storm-sail). |
| Spanker. |
| „ top-gallant-sail. | Stay-sail-fore (storm-sail). |
| ,, royal. Studding-sail-fore.  ,, ,, top.  ,, „ top-gallant.  ,, sail-main-top-gallant. | „ „ top. |
| In the fore-and-aft-rig the principal sails are of course | |
| fore-and-aft ; a cutter (vessel | with one mast) when fully |
| equipped carries the following :— | |
| *Fore-and-Aft.* | *Square.* |
| Jib-top-sail.  Jib.  Fore-sail.  Boom-main-sail.  Gaff-top-sail. | Square-sail (set flying). |

The several sides of a sail have separate names applied to them, the upper part or side being known as the “ head,” the lower part as the “ foot ”; the sides in general are called “ leeches,” but the weather or side edge where the wind enters the sail, of any but a square-sail, is called the “luff,” and the other edge the “after-leech.” The two top corners are “earings,” but the top corner of a jib, &c. (triangular, one corner only), is the “head”; the two bottom corners are in general “ clews ”; and the weather clew of a fore- and-aft-sail or of a course while set is the “ tack.”

The relative importance of particular sails in the working of a ship varies according to conditions of weather, and is a matter for the judgment of the officer in command. The following table, however, shows approximately what sails are commonly set “ by the wind,” presuming that the effect on the ship in relation to her stability is safe :—

|  |  |  |
| --- | --- | --- |
|  | winds as commonly distinguished. | Sails commonly set “by the wind.” |
|  | Light airs  Light winds  Light breezes ... Moderate breezes Fresh breezes ...  Strong breezes ...  Moderate gales...  Fresh gales  Strong gales  Heavy gales  Storms. | Courses, top-sails, top-gallant-sails, royals,  spanker, jib, flying-jib, and all light sails.  Royals and flying-jib taken in, in a sea way, to two reefs in the top-sails.  Single-reefed top-sails, and top-gallant-sails, in much sea, two reefs in the top-sails to taking in top-gallant-sails.  Double-reefed top-sails to treble-reefed top­sails, reefed spanker, and jib.  Close-reefed top-sails, reefed courses, to tak- ing in spanker, jib, fore and mizzen top- sail.  Reefed courses, close-reefed main-top-sail, fore-stay-sail, mizzen-try-sail, to taking in the main-sail.  Close-reefed main-top-sail, storm stay-sails, to storm stay-sails or close-reefed main-top­sail only. |

@@@1 Some ships (merchant-liners) have two jibs, inner and outer, and