

have fared like the Oléron sea laws: they have gathered bulk with increasing years.

The question remains to be answered, How did this collection of sea laws acquire the title of the "Wisby sea laws" outside the Baltic? for under such title they were received in Scotland in the 16th century, as may be inferred from extracts from them cited in Sir James Balfour's *System of the more Ancient Laws of Scotland*, which, although not printed till 1754, was completed before his death in 1583. The text of the Wisby sea laws generally current in England is an English translation of a French text which Cleirac published in 1641 in his *Us et Costumes de la Mer*, and is an abbreviated, and in many respects mutilated, version of the original sea laws. This inquiry, however, would open a new chapter on the subject of the northern sea laws, and the civilizing influence which the merchants of Wisby exercised in the 13th century through their factories at Novgorod, linking thereby the trade of the Baltic to that of the Black Sea.

See Pardessus, *Collection de Lois Maritimes antérieures au XVIII. Siècle* (6 vols., Paris, 1828-45); Schlyter, *Wisby Stadslog och Sjörätt*, being vol. viii. of the *Corpus Juris Sueco-Gotorum Antiqui* (Lund, 1853); and *The Black Book of the Admiralty*, ed. by Sir Travers Twiss (4 vols., London, 1871-76).

**SEALING WAX.** In mediæval times, when the principal use of sealing wax was for attaching the impression of seals to official documents, the composition used consisted of a mixture of Venice turpentine, beeswax, and colouring matter, usually vermilion. The preparation now employed contains no wax. Fine red stationery sealing wax is composed of about seven parts by weight of shellac, four of Venice turpentine, and three to four of vermilion. The resins are melted together in an earthenware pot over a moderate fire, and the colouring matter is added slowly with careful stirring. The mass when taken from the fire is poured into oiled tin moulds the form of the sticks required, and when hard the sticks are polished by passing them rapidly over a charcoal fire, or through a spirit flame, which melts the superficial film. For the brightest qualities of sealing wax bleached lac is employed, and a proportion of perfuming matter—storax or balsam of Peru—is added. In the commoner qualities considerable admixtures of chalk, carbonate of magnesia, baryta white, or other earthy matters are employed, and for the various colours appropriate mineral pigments. In inferior waxes ordinary resin takes the place of lac, and the dragon gum of Australia (from *Xanthorrhoea hastilis*) and other resins are similarly substituted. Such waxes, used for bottling, parcelling, and other coarser applications, run thin when heated, and are comparatively brittle, whereas fine wax should soften slowly and is tenacious and adhesive.

**SEALKOTE.** See **STALKOT.**

**SEALS**<sup>1</sup> (Gr. σφραγίς, Lat. sigillum). During the mediæval period the importance of seals was very great, as they were considered the main proofs of the authenticity of all sorts of documents, both public and private.<sup>2</sup> That is much less the case now, the written signature being thought a safer guarantee of genuineness. In order to make illicit use or imitation of a seal difficult, the seal itself was usually locked up and guarded with special care, and in the case of royal personages or corporate bodies was often made a very complicated work of art, which it would have been almost impossible to copy exactly. One very curious precaution that was adopted is still in use with the corporate seal of the monasteries of Mount Athos. The circular matrix<sup>3</sup> is divided into four quarters, each

<sup>1</sup> For antique seals, see **GEMS, JEWELLERY, and RING.**

<sup>2</sup> In some cases, in the presence of witnesses, a seal which did not belong to the signer of a document was used when the right matrix was not at hand. This has naturally caused many archaeological puzzles.

<sup>3</sup> The word "seal" is often used to denote both the impression made

of which is kept by one of the four *epistatai* or ruling monks; the four pieces are joined by a key-handle, which remains in the custody of the secretary. Thus it is only when all five guardians of the various parts of the matrix meet together that the complete seal can be stamped on any document. The device on the Mount Athos seal is a half-length figure of the Madonna and Child, and the imprint is made by blackening the matrix in the flame of a lamp and then pressing it on the paper or vellum itself. Mediæval seals were applied in two different ways: in one the stamp was impressed in wax run on the surface of the document (Fr. *plaqué* or *en placard*); in the other the wax impression was suspended by cord or strips of parchment (Fr. *pendant*). The latter method was necessarily used with metal seals or *bullæ* (see below).

For the sake of greater security in the case of *plaqué* seals, it was a common practice from the 12th century onwards, or even earlier, to make a cross cut in the vellum of the document, the corners of which were then turned back, thus forming a square opening, over which the wax seal was stamped; the turned-up corners helped to hold the wax in its place, and the aperture allowed a second matrix to be applied at the back. This was usually a smaller private seal called a *secretum*. Thus, for example, an abbot would use on the front of a document the large corporate seal of his community, and on the back would stamp his personal seal as a *secretum*.

Till the 12th century pure white beeswax was generally used, after that wax coloured green or red. The use of shellac or other harder materials, such as modern sealing-wax, is of recent date. Thus it was usual to protect the soft wax seals by some sort of "fender," often a wreath of rushes or plaited strips of paper twisted round it; another method much employed in the 15th century was to cover the seal with leaves of oak, bay, or beech. *Pendant* seals were often encased in boxes of wood or *cuir bouilli*, which in some cases are very richly decorated. From the 13th to the 15th century original royal documents are usually on fine vellum and have green seals hung by many-coloured silk and gold thread, while office copies are on coarser vellum and have white seals hung by parchment strips. In England an important official, called the clerk of the chafe-wax, an office which still exists, was entrusted with the duty of softening the wax for state seals over a chafing-brazier. Two different methods of sealing documents, either closed or open for inspection, are recorded in the legal terms "letters secret" and "letters patent."

Owing to the enormous number of mediæval seals which still exist, and their frequently great historical and artistic importance, it is necessary to adopt some method of classification, especially for large collections, such as that of the British Museum, which contains about 25,000 specimens, and the very important one of the Society of Antiquaries.<sup>4</sup> The chief classes are these:—(1) *Ecclesiastical*.—(a) Seals belonging to offices, such as those of popes, bishops, abbots, deans, &c.; (b) common seals of corporate bodies, such as chapters, religious colleges, monasteries, and the like; (c) official seals without the name of the officer; (d) personal seals, with or without a name. (2) *Lay*.—(a) Royal seals, including those of queens and royal princes; (b) official seals in the name of the sovereign or a state official; (c) common seals of corporate bodies, such as towns, universities, guilds, schools, hospitals, &c.; (d) personal seals (not being royal) with effigies, heraldry, merchants' marks, or other devices, with or without a name, or with name only, or with legend only.

and the object that makes the impress. More correctly the latter is called the "matrix," and only the impression is called the "seal."

<sup>4</sup> This valuable collection has been arranged and catalogued by Dr. C. S. Percival, the best modern authority on English seals.

*French Royal Seals*.<sup>1</sup>—The earliest and most complete series of seals is that of the French kings. The Carlovingian and Merovingian monarchs mostly used antique gems or pastes,—portrait heads being selected and a legend added in the metal setting of the matrix. Charlemagne used a head of Jupiter Serapis,<sup>2</sup> Pippin the Short that of the Indian Dionysus. The British Museum possesses a seal of Odo or Eudes, king of France (888-898), impressed from a fine Greek gem of the 3d century B.C., with a portrait of Seleucus IV. The oldest existing matrix is that of Lothaire I. (c. 817), now preserved at Aix-la-Chapelle, attached to an altar-cross. It is an oval intaglio in rock crystal, with a laureated portrait and the legend + XPE. ADIVVA. HLOTHARIVM. REG.; it is not an antique, but is of contemporary Byzantino-Rhenish work. Till the time of Louis VI. (1108-1137) these seals were *plaqué*, but he introduced *pendant* seals about 1108; and counter-seals at the back were first used by Louis VII. (1137-80). The grand series of round seals with an enthroned figure of the king begins with the Capet Henry I. (1031-60). The king holds a sceptre in one hand and a flower in the other. Those of the queens are frequently of a pointed oval form, with a standing portrait figure holding a flower in each hand. In the 13th and 14th centuries the French royal seals were elaborate works of art, with a finely draped figure of the king seated under a rich canopy on a throne, decorated with lions' or eagles' heads; the king holds a sceptre in each hand. The queens' seals, of a round or pointed oval form, are also very beautiful, with a graceful figure standing between two shields under a rich canopy. After the 15th century there was a rapid decadence in the royal seals, and in the 17th and 18th centuries they were of the most tasteless style, far worse than those used in England at the same date.

*English Royal Seals*.—This, which is on the whole the most beautiful of all royal series, begins with the seal of Edward the Confessor (see fig. 1).<sup>3</sup>

The great seal of William the Norman and his successors was not *plaqué*, like the earlier ones, but *pendant*; it has on one side an enthroned figure of a king copied from contemporary French seals, and on the reverse the king on horseback armed with spear and shield. These two ways of representing the sovereign have been used on all the royal seals of England down to the present day. By degrees greater elaboration of ornament was introduced into the throne and its canopy. In Edward III.'s time niches with minute statuettes of saints were added at the sides of the obverse. The climax of magnificence was reached in the reign of Henry V. On the obverse of his seal the king



FIG. 1.—Seal of Edward the Confessor.

sits holding the orb and sceptre; the gorgeous canopy contains statuettes of the Virgin and two saints, and at each side are three rows of statuettes in minute canopied niches, each row two tiers high; about fifteen minute figures of saints and angels are introduced into the design. On the reverse is the king on horseback, bearing a sword and shield; the horse, going at full speed, is clothed with richly embroidered heraldic drapery, and on its head and on the king's is a lion crest. After Henry V. the seals began to decrease in magnificence, and in the reign of Henry VII. the new taste of the Renaissance began to supplant the pure Gothic of the earlier seals. In the time of Philip and Mary both sovereigns appear together, seated under canopies, or riding side by side.<sup>4</sup> The great seal of the Commonwealth is a marvel of ugliness. On the obverse is a perspective view of the interior of the House of Commons, and on the reverse a map of Great Britain and Ireland. Cromwell's seal has an equestrian portrait of himself, and its reverse the arms of the Commonwealth between a lion and a dragon as supporters. Little is noticeable about the seals of succeeding sovereigns; that of Victoria is minutely cut, but is very poor as a work of art.

*Other English Seals*.—Gilt bronze was the commonest material for large seals, but other metals were used, such as gold, silver, and lead, also jet and ivory, especially before the Norman Conquest. Rock crystal, carnelian, and sard were the favourites among the hard stones cut for matrices. Large seals were usually either round or of a pointed oval form (as in figs. 2 and 3); the small *secretæ* were sometimes square, triangular, or hexagonal, as well as round or oval.<sup>5</sup> The most elaborate and beautiful of all were those of religious corporations, such as the chapter seals of monasteries.<sup>6</sup> These are among the most exquisite works of art that the Middle Ages produced, especially during the 14th century, and exceed in delicacy of workmanship and elaboration of design the finest seals of all other classes, not excepting those of the sovereigns. Fig. 2 shows the common seal of Boxgrove priory (Sussex), the matrix of which is now in the British Museum. On one side is a figure of the Virgin enthroned, and on the reverse a representation of the west front of the priory church, with open tracery and niches containing minute statuettes. This elaborate matrix is made up of four distinct pieces of gilt bronze, and to form the perfect seal must have been a work requiring considerable skill and patience. The reverse was formed by two stamps used on two separate plaques of softened wax: one of these formed



FIG. 2.—Fourteenth-century seal of Boxgrove priory; reverse.

the background with the various statuettes, and the second was used to stamp the open tracery work of the front of the church; the latter when hard was fitted on to the

<sup>4</sup> A variety of design is introduced on the reverse of one of Queen Elizabeth's seals; she is represented standing, holding the orb and sceptre, and wears a dress with enormous hoops. Her other seal has the usual equestrian portrait on the reverse.

<sup>5</sup> As a rule, from the 12th to the 15th century, ecclesiastical seals and those of females were of the pointed oval form, most others being circular; there are, however, many exceptions to this rule.

<sup>6</sup> A special English office for the blessing of seals is printed by Maskell. *Mon. Ritualia*, 1882, vol. iii.

<sup>1</sup> See Wally, *Éléments de Paléographie*, vol. ii., pl. A.; by various authors, *Trésor de Num. et de Glyptique*, vol. i., Paris, 1834 (which contains also plates of English royal seals); Douet-d'Arcey, *Coll. de Sceaux de l'Empire*, Paris, 1863-68; *Bulletin de la Société de Spéculative*, Paris, v. y.; D'Anisy, *Recueil de Sceaux Normands*, Caen, 1835.

<sup>2</sup> The monks of Durham also used a gem with a head of Jupiter Serapis, round which was added the legend—CAPVT. S. SANCTI. OSWALDI.

<sup>3</sup> The English kings before the Conquest signed usually with a cross only, but a few, such as Offa, Ethelwulf, and Ethelred, occasionally used seals, especially on documents containing grants to St Denis and other French abbeys, on which they followed the French custom of affixing *plaqués* seals.



impression of the background, and thus a sort of miniature model of the church was made, with its statues and the inner planes of the façade seen through the open tracery work,—the effect being extremely rich and delicate. When the finished obverse, and reverse had been fitted together, the legend was added on their edges by means of the fourth piece of the matrix,—a strip of bronze with letters cut into it on both its edges; first one side and then the other of this strip was pressed against the rim of the wax seal, which thus received the impression of the complete legend all round its edge. The seal of Southwark priory, also of the 14th century, is even more elaborate, as both sides have open tracery separately applied, and thus the matrix consists of five distinct pieces. Many of the bishops' seals, though less complicated in design, are of equal beauty to those of the chapters. The common design has a standing figure under a richly decorated canopy. Fig. 3 shows a very beautiful example, the seal of Richard, bishop of Durham. The standing figure of the bishop in mass vestments is modelled with wonderful skill and shows extreme taste in the treatment of the drapery; the legend is s[igillum] RICARDI . DEI . GRA . DVNELMENSIS . EPI . A great variety of sacred subjects occur on ecclesiastical seals



FIG. 3.—Seal of Richard de Bury, late 14th century.



FIG. 4.—Seal of King's College, Cambridge.

in addition to single figures of patron saints; the most frequent were perhaps the Crucifixion, the Annunciation, the Coronation of the Virgin, and the Virgin enthroned in Heaven; small figures of kneeling worshippers were

often added. Fig. 4 shows one of the most magnificent of this class, with, in the centre, a figure of the Virgin in glory, between St Nicholas and Henry VI., each under a very rich canopy; at the sides are shields charged with England and France, and France (modern) alone, held by two monks.<sup>1</sup> This very beautiful work of art dates about the year 1443. In the 15th century the ecclesiastical seals began to fall off in richness and beauty, and after the Reformation were of little artistic value. Very handsome seals were used by lay corporations, especially the municipalities of towns. These last frequently have a careful representation of the town itself, with its circuit of walls or that of its chief castle or cathedral, and thus often afford valuable evidence as to the form of its defences and principal buildings. Fig. 5 shows a fine example, 3 inches in diameter,—the corporate seal of Rochester, made in the 13th century; it has a minute representation of the keep of Rochester Castle, surrounded by an outer circuit wall and a moat. On one of the turrets of the gateway is a sentinel blowing a signal horn; legend, SIGILLVM . CIVIVM . ROFENSIS. The reverse has the same legend repeated round the scene of the Crucifixion of St Andrew. Other corporation seals are covered with small figures under elaborate canopy work, much like those of the ecclesiastical foundations.

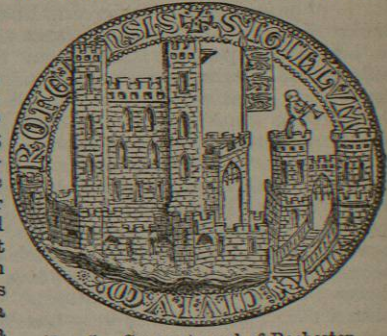


FIG. 5.—Corporate seal of Rochester.

Seals of hospitals are often designed in a similar way, with a representation of the hospital building very minutely treated. In the 15th century seals began to be designed in a rather pictorial style, which, though very graceful, is inferior to the earlier and more architectonic class. Very magnificent seals were used by state officials: those of the lord high admiral of England are especially fine, from the beautiful form of the ship on the obverse. Fig. 6 shows that of the earl of Huntingdon, who was lord high admiral in the reign of Henry VIII. In design it resembles those of the admirals of the previous century. On the sails are embroidered the royal arms of England.



FIG. 6.—Seal of Lord High Admiral Huntingdon.

Among private seals those of powerful barons are often large and very beautifully cut. Fig. 7 shows a silver matrix, now in the British Museum, which is remarkable for the great beauty of its workmanship. Its legend is SIGILLVM . ROBERTI . FILII . WALTERI. On it an armed knight, of the time of Henry III., is riding over a dragon, whose tail ends in a scroll of very beautiful conventional foliage, modelled with the greatest spirit and delicacy.

<sup>1</sup> This class of seal is often a sort of miniature reproduction of some magnificent altar retable, as in fig. 4.

A common and graceful form of private seal in the 13th and 14th centuries has simply a shield with the owner's arms on a diapered background, the whole enclosed within many-cusped tracery. Fig. 8 shows an example of a fine Græco-Roman gem,—a carnelian engraved with a female head, full face. The 14th-century owner of this has added a metal setting with the words CAPVT . MARIE . MAGDALENE, to give it a sacred meaning. The legends of private seals or *secreta* were often chosen in allusion to their use; common phrases are "clausa secreta tego," or "lecta lege, tecta tege." Many ingenious devices were practised to enable the same matrix to give two or more different varieties of impression. In some cases the border with the legend was so contrived as to slide up the handle, so that the seal could be made either with or without an inscription. Others had the border made to revolve on a swivel, so as to supply two different legends; and the magnificent monastic seals (as that shown in fig. 2) were arranged so as to give a perfect seal without the use of the elaborate open tracery. In the 15th and 16th centuries merchants and handicraftsmen frequently employed devices connected with their trade—either some tool or badge or an arbitrary sign used as a trade-mark; or a rebus of the owner's name was used, such as a bolt and a tun (cask) for the name Bolton. The use of seals by the humbler classes was more common in England than abroad; even bondsmen sometimes had seals, both before and after the Norman Conquest. Seals of other countries mostly followed



FIG. 7.—Seal of Robert Fitzwalter, c. 1270.



FIG. 8.—Antique gem used as a private seal.

the same fashions as those of England, though of course varying in design and workmanship with each country. On the whole, the English seals were superior during their best period (the 14th century) to those of any other country, though matrices of great beauty were produced in both Germany and France. In Italy less care and skill were usually spent on seals, partly owing to the greater use of metal bullæ for important charters.

*Metal Bullæ.*—These are necessarily not *plaqués* but *pendant*, and are held usually by cords passed through a hole in the seal. Lead was the metal most commonly used, but some sovereigns had bullæ struck in silver or gold, either as a mark of their own dignity or to confer special honour on the recipient of a charter. An extant letter from Petrarch to Charles IV. thanks that emperor for a diploma of the rank of count, and especially for the honour shown to him by the attachment of gold bullæ to the document. Lead bullæ were also used by various ecclesiastical dignitaries, from patriarchs to bishops, but were rarely used by ecclesiastics of lower rank. In some cases, however, especially in Sicily and Byzantium, bullæ were used by laymen of very moderate rank. A large number of fine papal bullæ exist dating from the 7th century onwards.<sup>2</sup> Since the time of Pope Paschal II. they have borne heads of St Peter and St Paul; previously they had such simple devices as crosses or stars, with the name of the pontiff. Another early series of bullæ begins in the 8th century with the bullæ of the patriarchs of Byzantium. Those of the doges of Venice exist in large numbers, bearing figures of St Mark and the reigning doge kneeling before him. Existing bullæ of Charlemagne have a rude profile portrait crowned with a diadem, and on the reverse the monogram of KAROLVS arranged in the form of a cross.

Consult, in addition to the works named above, Thulemarus, *De Bulla Aurea*, Frankfort, 1724; Bömar-Büchner, *Die Siegel der deutsch. Kaiser*, Frankfort, 1851; Vossberg, *Gesch. der preussischen Siegel*, Berlin, 1843; Melly, *Siegel-Kunde des Mittelalters*, Vienna, 1846; Heineccius, *De Sigillis*, Frankfort, 1709; Lepsius, *Sphragistische Aphorismen*, Halle, 1842-43; Caulfield, *Sigilla Ecclesie Hibernicæ*, London, 1853; and more especially various articles in the *Gaz. des Beaux-Arts*, *Archæologia*, *Archæological Journal*, and *Proceedings* of other antiquarian societies. (J. H. M.)

SEAMANSHIP

SEAMANSHIP is the art of sailing, manœuvring, and preserving a ship or a boat in all positions and under all reasonable circumstances, and thus involves a sound practical knowledge of all the forces by which she may be actuated and the means at command to assist or counteract them; it is a branch of applied mechanics acquired by experience and study. The former can only be obtained thoroughly in many years spent at sea, in personal connexion with the work of the ship and her boats; that such training should commence at an early age is very desirable, if not even imperative. The practical knowledge so gained should be supplemented and improved by reading, conversation, and discussion, as the casualties which befall ships are so varied that a man may pass forty years in sea-going vessels without experiencing one-half of those which might occur. Many of the old maxims are still applicable to every class of vessel and must always remain so.

The terms "ship" and "vessel" are here intended to embrace all classes, though "ship" is generally applied to the larger without reference to form or description unless such is specified. Though the use of sails has been greatly superseded by the introduction of steam-power both in the navies of all nations and in the mercantile marine, it is still generally admitted that seamanship is best acquired

on board a vessel which is dependent upon her sails. The construction and equipment of sailing ships had reached a high point of perfection at the time steam came into general use. The power derived from the steam-engine does not change any of the former conditions, but simply adds another element, confined to propulsion directly ahead or astern (except with reversible wheels or twin screws), which when combined with sails renders a ship much more manageable and safe,—that is to say, assuming all the forces at command to be properly applied. Hence it is very desirable that all ocean-going steam vessels should have sufficient sail-power to turn them round (wear) or to enable them to sail with the wind abeam without steam, especially when fitted with single screws or with paddle wheels which do not work separately. Twin screws, of course, give a double chance as far as the engine is concerned; but even with that advantage the loss of the rudder would leave the ship in a helpless condition if she had not efficient head and after sails to balance her on the desired course.

At present the excessive desire to make quick passages has greatly augmented the danger unavoidably attending a sea voyage, the risk as well as the violence of a collision

<sup>1</sup> The term "bull" for a papal charter comes from its lead *bullæ*.  
<sup>2</sup> See Ficoroni, *Piombi Antichi*. Rome, 1745.



at high speed in thick weather being thereby much increased. Through the want of masts and sails there is a probability of total loss by drifting helplessly on a lee shore during a gale, or by foundering "in the trough of the sea." In spite of her monstrous size (22,000 tons), the "Great Eastern," in 1863 or 1864, with her six comparatively small masts and weak sails was, after the loss of her rudder, very roughly used by the waves striking her full on the side. She was in the position which is expressed by the common sea-phrase "wallowing in the trough of the sea," from which her crew had no power to extricate her. A smaller vessel deeply laden in such a position would most probably have foundered, leaving no one to tell the tale. Too much stress is laid upon the retardation caused by masts and rigging when steaming head to wind; it is the pitching and plunging motion of the ship into a succession of waves that principally retards her speed. If the waves are approaching at the rate of 10 miles an hour and the ship is steaming against them at a similar rate, they will strike the bows with a force equal to 20 miles an hour. When a ship is steaming through comparatively smooth water (sheltered by land) against a gale of wind, her speed is but little reduced by the force of the wind alone, when other circumstances admit of her working full power. Storm-sails only require short masts, but these and the canvas they support should be strong, which is not the case in the merchant service generally.

Every seaman is expected to be thoroughly acquainted with the rigging of the vessel in which he serves, and when in charge he should frequently examine every part, to see that it is efficiently performing the duty assigned to it, being neither too taut nor too slack, nor suffering from chafing, wet, or other injury. He should be capable of repairing or replacing any part with his own hand if necessary and of teaching others how to do so. He need not necessarily be a navigator, though a good navigator must be a seaman; nor is it necessary that a seaman should be a shipbuilder, a mast-maker, a rope-maker, or a sail-maker, but he should possess a general knowledge of each art, especially the last; every able seaman should be able to sew a seam and assist the ship's sail-maker in repairing sails. It is greatly to be regretted that various circumstances have brought about such a change in the system of rigging ships, in both the British navy and the mercantile marine, that those who sail in them seldom see it done. Young officers were in former times frequently entrusted with the charge of day watches, during which they would give the necessary orders for making, shortening, or trimming sails, perhaps even tacking and wearing. That practice gave confidence and quickened the desire to learn more; it was more frequently done in small than in large ships. The general adoption of the steam-engine in ships has not only diminished the value of sail-power but of seamanship also, and has produced such a change in the rig that instead of masts and yards we find only two or three poles. In the British navy so many new sciences have been introduced that seamanship takes but a low place among them at the examination of a midshipman, who has had but little boat duty and probably found the discussion of seamanship in his mess-place contrary to rule. The rapidity with which all sail and mast drill is executed, combined with the perfection of the "station bill," renders it worse than useless as a means of teaching, as it gives a false confidence which fails in the hour of necessity, when the accustomed routine is thrown out by a sail actually splitting to pieces or a spar snapping. The fact that the same men perpetually do the same thing must tend greatly to render each evolution quick so long as every one is in his accustomed place, but sickness or the absence of a party from duty will disorganize the ship for

some time, as the general usefulness of the men has been cramped. Sail drill in harbour is open to grave objections: unless in a tide-way, the ship must be invariably head to wind; for reefing and furling the yards are laid square, consequently flat aback; both earings are hauled out at once, and as it is only for exercise they are only half secured. Even when reefing top-sails at sea either for exercise or of necessity in company with other ships, the yards are laid square to enable the men to get readily on the weather-side; therefore, if on a wind, the sail must remain aback or the ship must be kept away till the wind is on the beam in order to shake the sail.

The foundation of all teaching of seamanship must be a knowledge of the knots, bends, and splices, and their use in the various parts of the rigging and equipment of a ship.<sup>1</sup> Some knots, bends, and hitches are intended to afford security as long as desired, and then to be easily disengaged. Other knots, splices, and seizings are of a more permanent character, generally continuing as long as the rope will last.

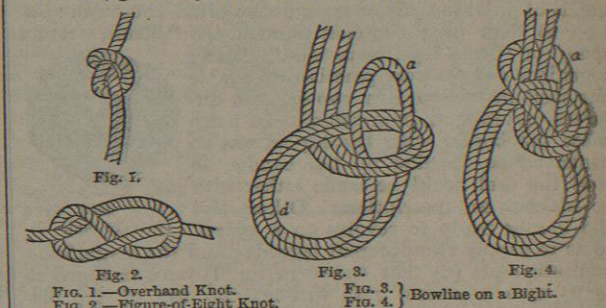


Fig. 1.—Overhand Knot. Fig. 2.—Figure-of-Eight Knot. Fig. 3.—Bowline on a Bight. Fig. 4.—Bowline on a Bight. Fig. 5.—Two Half Hitches. Fig. 6.—Double Blackwall Hitch. Fig. 7.—Cat's-paw. Fig. 8.—Marling-Spike Hitch. Fig. 9.—Fisherman's Bend. Fig. 10.—Strudding-Sail Halyard Bend. Fig. 11.—Timber Hitch. Fig. 12.—Snaking. Fig. 13.—Carrick Bend. Fig. 14.—Inside Clinch. Fig. 15.—Midshipman's Hitch. Fig. 16.—Turk's Head. Fig. 17.—Spanish Windlass. Fig. 18.—Slings. Fig. 19.—Sprit-Sail Sheet Knot. Fig. 20.—Turning in a Dead-Eye Cutter-Stay fashion. Fig. 21.—Turning in a Dead-Eye end up.

**Overhand Knot.**—Used at the end of ropes to prevent their unreeving and as the commencement of other knots. Fig. 1 represents an overhand knot hauled tight; for an illustration of the same not hauled tight see Knor, vol. xiv. p. 128, fig. 7.

**Figure-of-Eight Knot (fig. 2).**—Used only to prevent ropes from unreeving; it forms a large knob.

**Reef Knot (see Knor, loc. cit., figs. 8 and 9).**—First form an overhand knot; then take the end *a* over the end *b* and through the bight.<sup>2</sup> This knot is so named from being used in tying the reef points of a sail, since it will not jam. If the end *a* were taken under the end *b*, a *granny's knot* would be formed.

**Bowline Knot.**—Lay the end of a rope *a* over the standing part *b*; form with *b* a bight *c* over *a*; take *a* round behind *b* and down through the bight *c*. This is a very useful knot, forming a loop which will not slip. **Running bows.** These are formed by making a bowline round its own standing part above *b*. It is the most common and convenient temporary running noose. See Knor, l.c., figs. 11 and 12.

**Bowline on a Bight (figs. 3; 4).**—The first part is made similar to the above with the double part of the rope; then the bight *a* is pulled through sufficiently to allow it to be bent over past *d* and come up in the position shown in fig. 4. It makes a more comfortable sling for a man than a single bight.

**Half-Hitch.**—Pass the end *a* round the standing part *b* and through the bight *c*.

**Two Half Hitches (fig. 5).**—Form a half-hitch; pass the end *a* round the standing part *b* and through the bight *c* again; pass it round *a* again and put the end *a* through the second bight. This hitch is generally used at right angles to the object and is improved by adding a half-hitch with the end *a* round *b*. When pulled in a line with the spar it becomes simply two half-hitches. An illustration is given in Knor, l.c., fig. 15.

**Double Blackwall Hitch (fig. 6).**—Pass the end *a* twice round the hook and under the standing part *b* at the last cross. The ordinary Blackwall hitch only extends to the first cross at *b*, and is quickly formed by passing the hook of a jigger through the bight of a rope so that the end may be jammed between it and the standing part, as from *b* to *a*. Used for setting up top-gallant rigging and similar light work when a slip is of little consequence.

**Cat's-paw (fig. 7).**—Twist up two parts of a lanyard in opposite directions and hook the tackle in the eyes *i*, *f*. A piece of wood should be placed between the parts at *g*. A large lanyard should be clove-hitched round a large toggle and a strap passed round it below the toggle.

**Marling-Spike Hitch (fig. 8).**—Lay the end *a* over *c*; fold the loop over on the standing part *b*; then pass the marling-spike through, over both parts of the bight and under the part *b*. Used for tightening each turn of a seizing.

**Fisherman's Bend (fig. 9).**—Take two turns round a spar, then a half-hitch round the standing part and between the spar and the turns, lastly a half-hitch round the standing part.

**Strudding-Sail Halyard Bend (fig. 10).**—Similar to the above, except that the end is tacked under the first round turn; this is more snug. A *magnus hitch* has two round turns and one on the other side of the standing part with the end through the bight.

**Timber Hitch (fig. 11).**—Take the end *a* of a rope round a spar, then round the standing part *b*, then several times round its own part *c*, against the lay of the rope.

**Snaking (fig. 12).**—This consists of turns and crossings, the latter taken diagonally with a marling hitch each time. Used to keep woodlarks and seizings in place. The same term is applied to lines between the backstays to keep a broken part from falling.

**Carrick Bend (fig. 13).**—Lay the end of one hawser over its own part to form a bight as *d*, *b*; pass the end of another hawser up through that bight near *b*, going out over the first end at *c*, crossing under the first long part and over its end at *d*, then under both long parts, forming the loops, and above the first short part at *b*, terminating at the end *e*, in the opposite direction vertically and horizontally to the other end. The ends should be securely stopped to their respective standing parts, and also a stop put on the becket or extreme end to prevent it catching a pipe or chock; in that form this is the best quick means of uniting two large hawsers, since they cannot jam. When large hawsers have to work through small pipes, good security may be obtained either by passing ten or twelve taut racking turns with a suitable strand and securing each end to a standing part of the hawser, or by taking half as many round turns taut, crossing the ends between the hawsers over the seizing and reef-knotting the ends. This should be repeated in three places and the extreme ends well stopped. Connecting hawsers by bowline knots is very objectionable, as the bend is large and the knots jam.

**Sheet Bend.**—Pass the end of one rope through the bight of another, round both parts of the other, and under its own standing part. Used for bending small sheets to the clews of sails, which present bights ready for the hitch. An ordinary net is composed of a series of sheet bends. See Knor, l.c., fig. 20. A *seaman's knot* is made like a sheet bend.

**Single Wall Knot.**—Unlay the end of a rope, and with the strand *a* form a

This hitch by itself round a large object would not hold and round a small one would jam excessively. See Knor, l.c., fig. 13.

**Two Half-Hitches (fig. 5).**—The half-hitch repeated; this is commonly used, and is capable of resisting to the full strength of the rope. A stop from *a* to the standing part will prevent it jamming.

**Clove Hitch.**—Pass the end *a* round a spar or rope and cross it over *b*, its standing part; pass it round *a* again and put the end *a* through the second bight. This hitch is generally used at right angles to the object and is improved by adding a half-hitch with the end *a* round *b*. When pulled in a line with the spar it becomes simply two half-hitches. An illustration is given in Knor, l.c., fig. 15.

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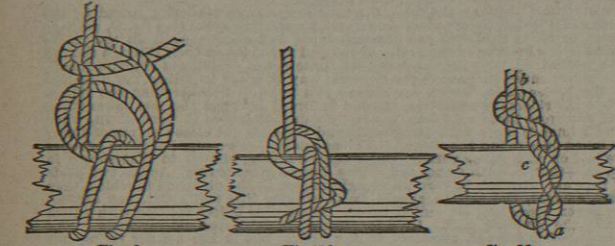


Fig. 9.—Fisherman's Bend. Fig. 10.—Strudding-Sail Halyard Bend. Fig. 11.—Timber Hitch. Fig. 12.—Snaking. Fig. 13.—Carrick Bend. Fig. 14.—Inside Clinch. Fig. 15.—Midshipman's Hitch. Fig. 16.—Turk's Head. Fig. 17.—Spanish Windlass. Fig. 18.—Slings. Fig. 19.—Sprit-Sail Sheet Knot. Fig. 20.—Turning in a Dead-Eye Cutter-Stay fashion. Fig. 21.—Turning in a Dead-Eye end up.

**Turk's Head (fig. 16).**—With fine line (very dry) make a clove hitch round the rope; cross the bights twice, passing an end the reverse way (up or down) each time; then keeping the whole spread flat, let each end follow its own part round and round till it is too tight to receive any more. Used as an ornament variously on side-ropes and foot-ropes of jibbooms. It may also be made with three ends, two formed by the same piece of line secured through the rope and one single piece. Form with them a diamond knot; then each end crossed over its neighbour follows its own part as above.

**Spanish Windlass (fig. 17).**—An iron bar and two marling-spikes are taken: two parts of a seizing are twisted like a cat's-paw (fig. 7), passed round the bar, and hove round till sufficiently taut. In heaving shrouds together to form an eye two round turns are taken with a strand and the two ends hove upon. When a lever is placed between the parts of a long lashing or frapping and hove round, we have what is also called a Spanish windlass.

**Slings (fig. 18).**—This is simply the bight of a rope turned up over its own part; it is frequently made of chain, when a shackle (bow up) takes the place of the bight at *a* and another at *y*, connecting the two ends with the part which goes round the mast-head. Used to sling lower yards. For boat's yards it should be a grummet with a thimble seized in at *y*. As the tendency of all yards is to cant forward with the weight of the sail, the part marked by an arrow should be the fore-side, as easily illustrated by a round ruler and a piece of twine.

**Sprit-Sail Sheet Knot (fig. 19).**—This knot consists of a double wall and double crown made by the two ends, consequently with six strands,—with the ends turned down. Used formerly in the clews of sails, now as an excellent stopper, a lashing or shackle being placed at *a*, and a lanyard round the head at *i*.

**Turning in a Dead-Eye Cutter-Stay fashion (fig. 20).**—A bend is made in the stay or shroud round its own part and hove together with a bar and strand; two or three seizings diminishing in size (one round and one or two either round or flat) are hove on taut and snug, the end being at the side of the fellow part. The dead-eye is put in and the eye driven down with a commander.

**Turning in a Dead-Eye end up (fig. 21).**—The shroud is measured round the dead-eye and marked where a throat-seizing is hove on; the dead-eye is then forced into its place, or it may be put in first. The end beyond *a* is taken up taut and secured with a round seizing; higher still the end is secured by another seizing. As it is important that the lay should always be kept in the rope as much as possible, these eyes should be formed conformably, either right-handed or left-handed. It is easily seen which way a rope would naturally kink by putting a little extra twist into it. A shroud whose dead-eye is turned in end up will bear a fairer strain, but is more dependent on the seizings; the under turns of the throat are the first to break and the others the first to slip. With the cutter-stay fashion the standing part of the shroud gives way under the nip of the eye. A rope will afford the greatest resistance to strain when secured round large thimbles with a straight end and a sufficient number of flat or racking seizings. To splice shrouds round dead-eyes is objectionable on account of opening the strands and admitting water, thus hastening decay. In small vessels, especially yachts, it is admissible on the score of neatness to

round the end of *b* and through the bight made by *a*; haul the ends taut. A double wall against the lay (not crowned) makes a good stopper. A *whale knot* is similar, but made with the lay. Fig. 21 of art. Knor, l.c., represents a single wall knot.

**Single Wall Crowned.**—Form a single wall, and lay one of the ends, *a*, over the knot; lay *b* over *a*, and *c* over *b* and through the bight of *c*; haul the ends taut. See Knor, l.c., fig. 22.

**Double Wall and Double Crown.**—Form a single wall crowned; then let the ends follow their own parts round until all the parts appear double; put the ends down through the knot. A very excellent and generally used cable stopper. See Knor, l.c., fig. 23.

**Matthew Walker.**—Unlay the end of a rope. Take the first strand round the rope and through its own bight; the second strand round the rope, through the bight of the first, and through its own bight; the third through all three bights. Haul all taut. An easily made and useful knot. Illustrations are given in Knor, l.c., figs. 24 and 25.

**Inside Clinch (fig. 14).**—The end is bent close round the standing part till it forms a circle and a half, when it is securely seized at *a*, *b*, and *c*, thus making a running eye; when taut round anything it jams the end. It is used for securing hemp cables to anchors, the standing parts of topsail sheets, and for many other purposes. If the eyes were formed outside the bight an *outside clinch* would be made, depending entirely on the seizings, but more ready for slipping.

**Midshipman's Hitch (fig. 15).**—Take two round turns inside the bight, the same as a half-hitch repeated; stop up the end; or let another half-hitch be taken or held by hand. Used for hooking a tackle for a temporary purpose.

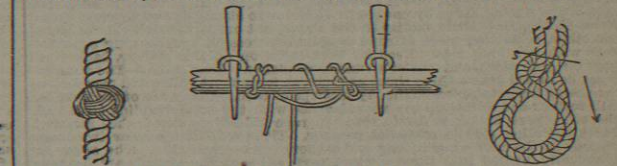


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<sup>1</sup> A person wishing to make sailor's knots need not be deterred by the want of material, as nearly all that are here represented were made for the purpose of sketching them, with the lashing of a packing case.

<sup>2</sup> For an explanation of this and other technical terms, see the glossary on p. 603 below.



