Rope. A general name applied to cordage over one inch in circumference.

Ropes are of hemp, flax, cotton, coir, or wire, and are known by their construction; as,—

Cable-laid; three strands of hawser-laid rope, twisted right hand.

Hawser-laid; three strands of yarn twisted left hand, the yarns being laid up right hand.

Shroud-laid or four-strand; having a central strand slightly twisted and three strands twisted around it.

Hemp is laid up right-handed into yarns.

Yarns are laid up left-handed into strands.

Three strands are laid up right-handed into a hawser.

Three hawsers are laid up left-handed into a cable.

Coir ropes are made of the fiber of the cocoa-nut, and will float in water.

Wire ropes usually consist of six strands laid or spun around a hempen core; each strand consisting of six wires laid the contrary way around a smaller hempen core.

Sash-line; a rope of plaited yarns.

Ropes are known also by their purpose; as,—

<table>
<thead>
<tr>
<th>Awning</th>
<th>Boll</th>
<th>Breast</th>
<th>Crown</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat</td>
<td>Boll</td>
<td>Bucket</td>
<td>Crown</td>
<td>Fall</td>
</tr>
<tr>
<td>Bolt.</td>
<td>Buoy</td>
<td>Deal</td>
<td>Dewit</td>
<td>Gen.</td>
</tr>
</tbody>
</table>
ROPES.

Jeet.

See also ROPE.

A rope is—
Whipped, by winding turns around the end to prevent un-twisting.
Paxed, by painting or tarring to resist wet.
Served, by coiling yarn around it closely and tightly.
Furled, by wrapping with canvas.
Marooned, by making a bulky cushion around a part to prevent chafing.
Stopped, when lashed; as the end to the standing part in a hulk.
Stowed, when a rope is made fast to it to prevent heaving. Rest, when it is secured to an object by a hitch or otherwise.
Hitched, bound, and knotted are forms of fastening. See KNOT.
Bent, by laying a smaller rope or yarn in the lay of a cable. It is preliminary to serving. Link-wrapping is wrapping with chains.
Laid, by placing and twisting the twisted strands together in the operation of rope-making.

Grafting and splicing are modes of uniting one rope to another by interweaving the strands. See GRaFT.

Bowing and tacking are sailors' terms to express respectively the binding of one rope to another by a smaller rope or yarn, and the fusing or welding of one object to another by similar means.

Painting is a mode of finishing the end of a rope by tapering and burial the strands.

To marr a rope is to bind it with spun yarn or twist, with a knot at each turn, so as to secure the wrapping if cut in one or more places.

Galvanizing is applied to iron wire rope. It consists in coating the wire or rope with zinc.

Ropes were made of various materials in ancient Egypt, but especially of the papyrus and of leathern strands. The use of the papyrus in this connection has been described by Pliny, and is cited elsewhere in this work, as is also of the sputum, which was employed extensively, though the particular variety was confined to moderate geographical limits.

The papyrus made a coarse article of cordage, as did the leaf or fibers of the date-tree, which were used for ropes in ancient and in modern Egypt. For a finer article, flax was used. Pieces of ropes of these materials still remain as mementos of the ancient dwellers by the Nile.

The rope-makers of ancient Egypt seem to have been destitute of machinery. One man engaged a hook at the end of his twister, and then walked backward away from another, who paid out the fiber of hemp, flax, papyrus, palm-fiber, sputum, or whatever the material might have been. The weight enabled him to swing the twister, which was mounted on the stem he held in his hand.

In a tomb at Thebes, of the time of Thothmes III., the Pharaoh of the Exodus, is a group representing the process of twisting thongs of leather, which were fastened to the end of a tube, which revolved on a cord slung around the loins of a man who receded backwardly from the person who arranged and paid out the strands. The tube half, in all probability, a collar or sleeve which was grasped by the man, and had a bar and weight which caused it to rotate as it was swung around by the operator. The strands of the rope passed between the legs of the stool and between the feet of the man who arranged the strands and kept the threads from becoming entangled. The character of the material is indicated in the manner which is so peculiarly Egyptian, by the skin hanging up in the shop, and a man is shown cutting a continuous thong with a knife like our modern leather-knife, and by the same means which we adopt, by turning the piece of leather round as he cuts. Two of the coils are represented hanging up in the shop.

The process of preparing the hemp is shown in the tombs of Beni-Hassan and Thebes. Ropes of the palm are found in the tombs, and it was probably almost as common as coir or coco-nut fiber in India.

The ropes which supported the planks of the Hellespont bridge constructed for Xerxes were of papyrus and flax. These were the ordinary materials for the purpose in Egypt, from which country the king had a large contingent. See MILITARY-BRIDGE.

Ropes of goat's hair are mentioned by Aristotle and Virgil.

The famous vessel, the "Syrius," built for Hiero, was furnished with hempen ropes from Rhodes, according to Missouri.

"The ropes of the Tartars are made of cane hull or horse-hair."—Herc. Colr rope is manufactured from the husk or pericarp of the coco-nut.
The nuts are picked a little before the fruit is ripe, and the rind separated by thrusting it upon an iron stake fixed in the ground. The rind is then water-soaked for several months, to separate the fiber from the internal matter, is beaten with a heavy mallet upon a stone, and then rubbed by the hands to rid it of the cellular substance. 40 coco-nut yields 6 pounds of colr, which is twisted into yarns and made into mat or cordage.

Colr rope is more buoyant than hempen, and is an excellent material for hawsers.
Its strength, relatively to hemp, is, for large ropes, 87 to 108; for small ones, 60 to 85. It is not injured by sea-water, and is much used for running rigging, though from its contractibility it is not so suitable for standing rigging.

Wire rope appears to have been first used in the silver-mines of the Harts Mountains, about 1821. They have since come into very general use for ship's rigging, as well as for transmitting power in other situations. Some ropes of this kind employed in the underground levels of the English coal-mines probably have a length of more than 3,000 feet. One constructed at the works of John A. Roebeling, a few years ago, was said to be the longest, largest, and weightiest wire-rap ever made in one piece. It is 4,700 feet in length; its diameter is over 2 1/2 inches, and its weight some 20 tons. The machinery employed is said to be capable of making a rope twice as long and large as this one. This rope is used upon an inclined plane, for the purpose of raising coal out of the Wyoming Valley. See WIRE ROPE.

Various processes have been patented for making wire rope. For some purposes, untwisted wires bound together by hempen cord or inserted within canvas have been employed.

More generally, however, a slight twist is imparted, and they are formed into strands, which are afterward laid up in a manner analogous to that used in making hempen or manilla ropes. The wires are galvanized, or rather nicked, or else coated with a preservative composition.

<table>
<thead>
<tr>
<th>Rope or Chain</th>
<th>Dimensions</th>
<th>Multiplier</th>
<th>Fatigue Endurance</th>
<th>Fatigue Endurance for 1000 Hours</th>
<th>Fatigue Endurance for 5000 Hours</th>
<th>Fatigue Endurance for 10,000 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hempen Rope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawser-laid</td>
<td>Inches</td>
<td>Tons</td>
<td>Tons</td>
<td>Tons</td>
<td>Tons</td>
<td></td>
</tr>
<tr>
<td>Girth squared</td>
<td>0.15</td>
<td>0.03</td>
<td>0.05</td>
<td>0.10</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Cable-laid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girth squared</td>
<td>0.12</td>
<td>0.009</td>
<td>0.012</td>
<td>0.02</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>Wire Rope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(32 wires)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>Girth squared</td>
<td>0.75</td>
<td>0.059</td>
<td>1.923</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel</td>
<td>Girth squared</td>
<td>1.125</td>
<td>0.04</td>
<td>2.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rigging Chain</td>
<td>Diameter of rod</td>
<td>12.00</td>
<td>2.9</td>
<td>414</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The preceding are the ordinary rules for calculating the proof strength and weights of ropes and chains, in English tons (2,240 pounds); the dimensions being in inches.  

The breaking load is from two to three times the above.  

The old rope-makers' rule for hemp rope was to square the girth of the rope in inches, which, multiplied by 4, gave the ultimate or breaking strength of the rope in hundreds of pounds; and it was a good rule for small cableage up to 7 inches in circumference.  

The square of half the circumference was considered to represent the weight of a fathom in pounds.  

What is believed to be the largest rope in the world is a grapnel rope, 10,000 fathoms long without a splice, and has been made for the Siemens Telegraph Company. It is made of three strands, the diameter of the completed rope being 2 inches.  

The table below shows the comparative strength of various kinds of rope and chain, the sizes on each horizontal line being of equal strength.

<table>
<thead>
<tr>
<th>Capacity of the Rope and Chain.</th>
<th>Round Iron Wire Rope</th>
<th>Round Hemp-Rope</th>
<th>Flat Iron Wire Rope</th>
<th>Flat Steel Wire-Rope</th>
<th>Iron Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Breaking Strength</td>
<td>Weight 100 feet</td>
<td>Weight 200 feet</td>
<td>Weight 300 feet</td>
<td>Diameter 100 feet</td>
</tr>
<tr>
<td>Lbs.</td>
<td>24</td>
<td>28</td>
<td>32</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>Lbs.</td>
<td>48</td>
<td>60</td>
<td>72</td>
<td>84</td>
<td>96</td>
</tr>
<tr>
<td>Lbs.</td>
<td>60</td>
<td>72</td>
<td>84</td>
<td>96</td>
<td>108</td>
</tr>
<tr>
<td>Lbs.</td>
<td>80</td>
<td>96</td>
<td>112</td>
<td>128</td>
<td>144</td>
</tr>
<tr>
<td>Lbs.</td>
<td>84</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
</tr>
<tr>
<td>Lbs.</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td>180</td>
</tr>
<tr>
<td>Lbs.</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td>180</td>
<td>200</td>
</tr>
<tr>
<td>Lbs.</td>
<td>128</td>
<td>140</td>
<td>160</td>
<td>180</td>
<td>200</td>
</tr>
<tr>
<td>Lbs.</td>
<td>140</td>
<td>160</td>
<td>180</td>
<td>200</td>
<td>220</td>
</tr>
<tr>
<td>Lbs.</td>
<td>160</td>
<td>180</td>
<td>200</td>
<td>220</td>
<td>240</td>
</tr>
<tr>
<td>Lbs.</td>
<td>180</td>
<td>200</td>
<td>220</td>
<td>240</td>
<td>260</td>
</tr>
<tr>
<td>Lbs.</td>
<td>200</td>
<td>220</td>
<td>240</td>
<td>260</td>
<td>280</td>
</tr>
<tr>
<td>Lbs.</td>
<td>220</td>
<td>240</td>
<td>260</td>
<td>280</td>
<td>300</td>
</tr>
<tr>
<td>Lbs.</td>
<td>240</td>
<td>260</td>
<td>280</td>
<td>300</td>
<td>320</td>
</tr>
</tbody>
</table>

The winding drums or pulleys for wire ropes should be one hundred times the size of the rope, and round ropes should wind fair on to and fit the grooves of the pulleys.  

All the ropes of a vessel composing the standing rigging, running rigging, ground tackle, etc., are distinguished by names corresponding to their uses, without reference to the make or size of the rope; thus, the cable of a vessel may be hawser- laid, or the hawser cable-laid. The following is a list of those technically termed ropes:  

**Bilge-ropes;** attached to the bell, on which the half-hours are struck.  
**Bil scop.** that to which the head-laces and foot of a sail are sewed.  
**Brae-ropes;** a band of canvas, secured at each end to the rigging for supporting the body of the leadsman while heaving the head-laid.  
**Bucket-ropes;** a ladder attached to a bucket for dipping water from alongside.  
**Buoy-ropes;** a rope attached to the crown of the anchor, and to a buoy floating on the surface to show the position of the anchor when in the ground.  
**Cline-ropes;** a rope attached to the claw of a sail, and leading up forward; used in clewing up the sails for furling, and running the claw forward of the bust.  
**Crown-ropes;** used at the corners of the cable tiers to keep the fakes in their places.  
**Entering or moon-ropes;** a rope secured at the upper end and hanging down the ship's side by the ladder for persons going up or down to hold on by. Also by the ladders at the hatch. The former may be termed entering, the latter moon ropes.  
**Foot-ropes.** a. The bolt-ropes at the foot of a sail. b. The rope beneath a yard, or the hawser on which the men stand when furling or reefing sail; the former are also called hares.  
**Gib-ropes;** a rope extending inboard from each leg of the masts, for the purpose of securing it.  
**Grab-ropes;** used to confine the hounds of a small sail in furling.  
**Guest or guess-ropes;** a rope used for towing a boat or vessel.  
**Guy-ropes;** used for steadying a purchase, spar, or other similar object. See Gyr.  
**Head-ropes;** the upper bolt-ropes of a square sail.  
**Heel-ropes;** a rope secured to the heel of a mast or boom to pull it around, out, or in by, or to lash it.  
**Jaw-ropes;** a rope or parrel secured to the jaws of a gaff and passed around a mast; it is often provided with rollers to enable it to slide up and down easily.  
**Man-ropes.** See Running-Ropes.  
**Main-ropes;** a rope used for hoisting and lowering masts.  
**Parallel-ropes;** a single rope secured at the slings or centers of yards, and passed around the mast. Used only on light yards.  
**Ring-ropes;** a rope rove through the ring of the anchor and secured to the end of the cable.  
**Slip-ropes;** used to suspend the hight of a harmer or cable.  
**Top-ropes;** a rope connected to the end of the tiller and wound around the barrel of the steering-wheel.  

**Round-up;** to haul up generally applied to the act of hauling up the slack of a rope through its leading block or a tackles, which hangs loose by its fall.  
**Rouse;** to haul or pull together on a rope.