Rope-Making.

IN modern times, the materials mostly employed for ropes are hemp, the manilla plantain-leaf, and a few other vegetable fibres, and flax for lines. In their manufacture the same general principles are involved whatever fibre is used, and the general description of the process of making hemp ropes may apply to that of the other sorts also. The fibres of hemp not averaging more than three and a half feet in length, they are necessarily overlapped among themselves and compressed together so as not to be drawn apart. The required compression is best obtained by twisting, the fibres being continuously drawn out together from a bundle in the right quantity to produce the suitable size of yarn. The yarns are put together to make strands, and three or four of these twisted together make a rope, and three or four ropes a cable.

The building in which this manufacture is carried on is termed a rope-walk.

Our engraving represents such a rope-walk, with all the details of labor involved in the making of ropes. On the foreground the revolving wheel is seen, which by endless cords rotates the pulleys carrying the hooks to which the end of the rope is attached; at the left the manner of making the first strand is seen, while in the distance the method is shown by which three or four strands, by means of a sliding block and rotating hooks at each end, are united into a single rope. It is also seen that the rope-walk is very narrow, and often several hundreds of feet in length, it averages from one to three stories in height. The first process to which the hemp is subjected is hackling, the object of which is to draw out the fibres in straight lines and remove the short lengths and dust. The hackle is a sort of comb made of an assemblage of long, sharp steel points set upright upon a firm bench. A bundle of hemp held near one end is laid over the points and drawn through, and the operation is repeated, reversing the ends. The short lengths called tow are collected and hackled again by themselves, to be used for inferior sorts of ropes. The hemp is now prepared for spinning into yarns. In the common process of spinning by hand, as shown in our engraving, the large wheel at the end of the walk is kept turning by a boy and carries round all facing up the line of the walk. The spinner having wrapped around his body a bundle of hemp, the middle portion of the fibres in front and the ends behind, draws from it in front a portion sufficient for making a yarn, and twisting this in his fingers he attaches the end to one of the whirls and walks backward. As he proceeds the fibres are continually drawn out from the bundle, the quantity being regulated by the action of his hands; one of them pulling forward or holding back the fibres and the other compressing the yarn as it passes through a thick woolen cloth held around it. He thus endeavors to keep the thread of uniform thickness throughout. As many spinners may thus be engaged at the same time as there are whirls to the wheel at the end of the walk. To keep the yarn out of the way, hooks are provided on the under side of the cross-beams, and as one is passed the spinner jerks the yarn up to make it catch his proper hook. Thus it is held suspended till he has reached the end of the walk. There two spinners fasten their ends together and put them over a stout post on one side, also tying them together with a piece of twine a little in advance of the post. The two next do the same, and thus the ends come to be all collected around this post. The spinners then commence each a new yarn at the wheel where they ended the first one, and return down the walk as they came up. The one who turned the first wheel detaches the ends from his whirls, and securing them to a post in the same way that they were attached at the other extremity of the walk, he runs forward, throwing the yarns out of the hooks on the beams to a row of large hooks in the posts of the building at a convenient height above the ground and on the same side with the two end-posts. The same process is repeated at each turn of the spinners until 300 or 400 yarns come to be collected on the side-hooks, when they are called a haul and are ready for the next process, which is tarring the yarns, unless they are to be spun into strands for untarred ropes, known as white ropes. The length of the yarns in a full-length walk is not less than 200 fathoms or 1200 feet.

The subsequent operations by which the yarns are converted into rope have long been in general use both in this country and in Europe.

The foregoing is the old process of rope-making still in use in many localities in this country. In all the large rope-walks, however, machinery is employed, which accomplishes the work, as a matter of course, far more expeditiously.

After these explanations about rope-making in general, we now give a special description of a modern and highly improved establishment of this kind.

The rope-works of Messrs. Lawrence and Sons, in Brooklyn, N. Y., consist of several three-story substantially-built brick buildings, covering five acres of ground. Three hundred hands are employed, and over sixty tons of various kinds of rope weekly produced, besides large quantities of different grades of bagging. The motive power of the works is obtained from an immense beam-engine built at the Woodruff & Beach Iron-Works at Hartford, Ct. It is of 500 horse-power, has a 42-inch cylinder, with 7-foot stroke, and a 22-foot belt-wheel.

The hemp is received in bales—three kinds, manilla, sisal, and jute, being ordinarily used—and is removed therefrom by women. It is then spread out and oiled with a kind of fish-oil. This substance is kept in a large tank sunk in the ground outside of the main building and warmed by steam. The hemp, after being thus treated, is elevated to the story above, where it is passed through a machine similar in effect to a wool-burring machine, that is to say it separates the fibres and renders them in a measure soft and fleecy. Manilla and sisal hemps undergo a different process from jute, so that we shall follow them through the different manipulations and return afterward to the latter.

After treatment by the combing-machine, the hemp is weighed and tossed fifteen pounds at a time into a lapper, after passing through which, its fibres are found to lie evenly in the same direction. Then it is passed through an apparatus somewhat resembling a carding-machine, from which it emerges in a kind of loose cord. Nine of these cords are led into a drawing-frame passing over a series of teeth which combines them into one larger body. Then nine of these second cords thus formed are combined into a single one, and finally seven of the latter into still another. This last goes to the jennies which spin it into yarn. We found forty jennies in a single room. One girl easily manages eight at a time. As the yarn is spun, it is reeled upon a spindle, which, when full, is removed and an empty one substituted; the manilla and sisal hemp now being ready to make into rope. We enter the part of the factory devoted to jute. This material is first passed through a steel breaker, which cleans and opens it, then through drawing-frames, which smooth it out, and finally, after passing through some thirteen different machines, is finished in the form of yarns; each spinning-machine having some fifty bobbins.

Descending to a lower floor, we find 33 rope-making machines busily at work manufacturing small sizes of rope. Six spindles are put on the ordinary apparatus at a time. These are whirled around, and we can see the yarns made into strands, and then these twisted with incredible rapidity into ropes; no rope-walk is needed for this work—the machines act as if by magic, making and reeling the line, so that it is only necessary to wind it off evenly and sew it up in coarse canvas before sending it to the market.

We then pass to the tarring-house, where the yarn is tarred preparatory to making it into tarred rope. A large number of reels, as they come from the jennies, are set in a frame so as to be easily unwound, and the ends are passed each through its own hole in a guide-plate over one end of a large trough of copper or iron, called the tar-kettle, which contains tar kept by steam pipes at the temperature of boiling water. The yarns are all made to pass through guides placed near the bottom of the trough, one at each end, thence up the further end and through holes in another plate by which the excess of tar taken up is scraped off. The yarns may then be either collected together in sufficient number for a strand in a register-tube, here they undergo a partial pressure and twisting, or they are wound up again each on its own reel to be afterward used as convenient. They are then dried in a close steam-heated room termed a sweat-box.

The rope-walk proper is a very low wooden building extending to the rear of the main edifice. It is 200 fathoms, or 1,200 feet in length, and contains machinery for the manufacture of the largest ropes. Several tracks run along its length, on which are laying-machines. Whenever the yarns are brought together to be twisted into a strand, the proper number for three separate strands are attached to as many spindles, which are affixed to a machine, the rope by which it is drawn causing the machinery it carries to be kept in motion and a strong tension to be kept upon the strands. The yarns are let out as required from the end of the walk at which the spinning commenced. The machine having traversed the length of the walk, the three strands are left behind stretched along upon stake-heads and pins set in the posts of the building, upon which they have been thrown by the man attending it. The machines for twisting the strands and for laying these into ropes are all too complicated to be described without drawings. They are specially designed to give the required twist, and maintain a heavy strain upon the rope. As this is completed, it is wound off upon reels, from which it is slipped off in the form of coils, which, being securely tied together, are ready for the market.

Ropes are designated as to size by their circumference, and as to length by fathoms. Their weight and strength vary with the quality of the hemp and method of manufacture.

The above description shows that the manufactory of Messrs. Lawrence & Sons is very large, in fact it is one of the largest in the United States. Their office is 192 Front Street, N. Y.

OLD STYLE OF MAKING ROPES.