The Manufacturer and Builder.

Rope-Making.

In modern times, the materials mostly employed for ropes are hemp, the manilla plant-coded, and a few other vegetable fibres, and flax for linen. 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 three or four fibres longitudinally drawn out together from a bundle in the requisite quantity to produce the suitable size of yarn. The yarns are put together to make strands, and three or four of these together make a rope, and two 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 twisting 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 hundred feet in length, it averages from one to three stories in height.

The floor process to which the hemp is subjected is backing, the object of which is to draw out the fibres in straight line and remove the short lengths and dust. The back is a sort of comb made of an assemblage of long, sharp steel points set upright upon a box bench. A bundle of hemp held near one end is held over the points and drawn through, and the operation is repeated, reversing the end. The short lengths called tow are collected and backed again by themselves, to be used for interior 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 handle 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 whiteless and walks backward. As he proceeds the fibres are continually drawn out from the handle, the quantity being regulated by the action of his hands; one of them pulling or feeding back the fibres and the other compressing the yarn as it passes through a thick woolen cloth held around it. He thus endeavours to keep the threads of uniform thickness throughout. As many spinners may thus be engaged at the same time, from 30 to 40, while other wheels are at the wheel at the end of the walk. To keep the yarns out of the way, hooks are provided on the under side of the board, and as one passes the spinner jerks the yarn up to make it catch his proper hook. Thus it is held unspliced till he has reached the end of the walk. These two spinners finish 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 next two 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, and return down the walk as they come up. The one who turns the first wheel descries the ends from his whirl, and securing them to a post in the same way that they were attached at the other extremity of the walk, he runs forward, drawing 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 ends and post. 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 bundle and are ready for the next process, which is twisting the yarns, as less they are to be spun into strands for untwisted ropes, known as white ropes. The length of the yarns in a full-length is not less than 300 feet, or 1000 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 thirty-five story, substantially built brick buildings, covering five acres of ground. Three hundred hands are employed, and every ten tons of various kinds of rope are produced, besides large quantities of different grades of bagging.

The motive power of the works is obtained from an immense steam-engine built at the Woodruff & Schechter Iron-Works at Hartford, Ct. It is of 500 horse-power, has a 48-inch cylinder, 7-stroke stroke, and a 10-foot belt-wheel.

The hemp is received in hales—three kinds, manilla, and jute, being ordinarily used—and is removed thence from by women. It is then spread out and tied with a kind of flaxen. This substance is kept in large tanks 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 wood-working machine, that is to say it separates the fibres and renders them in a mass so soft and floity. Manilla and some hemp undergo a different process from this, as we shall follow these through the different manipulations and return afterward to the latter.

After treatment by the carding-machine, the hemp is weighted and tied fifteen pounds at a time into a hopper, after passing through which, its fibres are found to lie evenly in the machine. Then it is passed through an apparatus somewhat resembling a carding-machine, from which it emerges in a kind of loose card. Nine of these cards are led into a drawing-frame passing over a series of teeth which comb them into one larger body. Then nine of these second cards thus formed are combined into a single one, and finally seven of the latter into still another. This goes to the drawing-wheel and it into yarn. We find forty to sixty in a single rope. One girl easily manages eight at a time. As the yarns are spun, it is reeled upon a spindle, which, when full, is removed and an empty one substituted; the manilla and deal hemp now being ready to make into rope. We enter the part of the factory devoted to rope. This material is first passed through a steel breaker, which cleans and separures it, then through drawing-frame, which smooths it out, and finally, after passing through some fifteen different machines, is finished in the form of yarns; each spinning-machine having some fifty bobbins.

Descending to another floor, we find 30 rope-making machines loosely at work, manufacturing smaller sizes of rope. Should we place a more detailed description of this work, the machines act as if by magic, making and twisting the lines, so that it is only necessary to wind it off evenly and saw it up in coarse canes before sending it to the market. We then pass to the twisting house, where the yarn is twisted preparatory to making into twisted rope. A large number of rods, as they come from the proces, are act in a frame so as to be easily unwound, and the ends are passed each through its own hole in a guide-plate on 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 mass to form 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 a constituent. They are then dried in a close steam-hated room termed a sweat-
The rope-walk proper is a very low wooden building extending to the rear of the main edifice. It is 800 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 these separate strands are attached to so many spindles, which are affixed to a machine, the rope by which it is drawn causing the machinery to rotate 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 splining commenced.

The machine having traversed the length of the walk, the three strands are left behind stretched along upon stakes and pins set in the posts of the building, upon which they have been thrown by the men attending it. The machines for twisting the strands and for laying those into ropes are all 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 manufacture of Hones, 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.