

inches, leaving a number of bare threads. The mats are finally cut apart, finished on the edges with braid, and sheared on the surface by a machine resembling a cloth shearer. Coir mats are made in a similar manner, but, instead of loose fiber, the weaver has a large ball of yarn from which he forms the tufts. The weaving requires less time than it does for a fiber mat. The weaver, after springing the harness, passes the end of the yarn through from one side, while from the other, on the top of the warp, he pushes forward a flat iron rod, grooved on the edge, upon which he winds the yarn, bringing up the loops between successive warp threads, while pushing the rod along. When the yarn is thus wound across the warp, a straight thread is run through for a binder, the rod is turned, with the groove uppermost, and the threads are cut by running a knife along the groove. The harness is then changed, the filling well beaten up with the lathe and the operation of winding the yarn on the rod repeated as before.

Straw.—The straw matting, which comes from China, is manufactured from a species of reed or grass having culms which grow as high as 6 feet. When it has acquired the proper height, the grass is cut, spread out in the open air to dry, then roughly sorted, packed in bales, and delivered to the matting manufacturer, who sorts it again according to its fineness, uniformity, and color. The freshest, greenest looking straw is taken for white matting, and the rest is put aside to be dyed. In the familiar red and white check matting the red color is given by sapanwood. For all other colors coal tar dyes are used. In Japan the matting manufacturers use a straw, like the Chinese, from which they make what is called the Bungo weave, but a large proportion of the matting which comes from China is made of straw which is smaller than the Chinese, and this makes what is called the Bingo matting. This kind of straw is easier to manipulate, and can be woven in designs much more elaborate and handsome than is possible with the Chinese reed; but it is not so durable.

In both China and Japan the loom on which the matting is woven is of the same pattern, consisting merely of an upright bamboo framework, with cylindrical crosspieces above and below, over which the warp runs, the weft being woven in without a shuttle. The movement of the warp is governed by the weaving beam or bar, a piece of wood 2 in. square and about a foot longer than the width of the matting which is to be woven. The bar is pierced with thirty-nine small holes to receive the warp threads, the front row of holes being about three-sixteenths of an inch to the right or left of those on the opposite face, through which the other row of warp is threaded. The warp threads are made of hemp, and are oiled to make them smooth. When the warp becomes loose, it is tightened by driving wedges between the upright and crosspieces of the loom. The weaver handles this bar by means of a peg inserted midway in it. With this peg held at a right angle to the weave the warps are in normal position. When the peg is turned up the front row of warp threads moves back, and when the movement of the peg is reversed, the back row of thread moves forward. Between each upward and downward turn of the bar, the weaver's assistant, who kneels at his right with bundles of straw for the weft on the ground before him, draws from a bundle a straw of the color called for by the pattern, catches it in a notch cut in the end of a slender piece of bamboo, about 4 feet in length and holding the straw in this way places it horizontally between the two rows of warp threads. The weaver seizes the end of the straw, which passes beyond the left-hand selvage and twists it round the selvage cord, while the assistant twists the right hand end in the same way. Then the beam is brought down with sufficient force to press the warp straws closely together. When the loom has woven a piece of matting 2, 4, or 5 yards in length the selvage is cut

down clean with a knife, and the matting or mat is taken off the loom, which is then provided with another warp. As the straw is always wet before the weaving, the woven pieces are dried in the sun or over slow-burning wood fires. To make the ordinary roll of matting a number of these pieces sufficient to measure altogether 40 yards are joined, this being done by running the warp ends of each two pieces in opposite directions under the weft, a smooth, flat bamboo needle being used for this purpose. The roll is then ready for packing.

Jointless matting is made on a loom which differs but slightly from that which is used in making the joined goods, the only change consisting in arrangements for loosening the warp and pulling it over wherever about two yards of matting have been woven, the finished part being passed back under the loom. As the beam cannot beat up the weft so closely with this arrangement, the texture of the jointless goods is quite loose. To remedy this the roll is made somewhat longer than 40 yards, and is then stretched tightly over a tall box-like structure, open at the top, and containing in its centre a charcoal fire. Two coolies, one standing at one selvedge of the roll, the other at the opposite selvedge, then apply their hands to both sides of the matting, loosening and then forcing down the straw to the firmness desired. While this raking, as it is called, is going on the heat from the charcoal fire is removing the moisture from the matting.

FIRE SERVICE IN FACTORIES, WORKS, ETC.*

BY HAROLD SUMNER

(Concluded from September Issue).

Smaller appliances, such as buckets, hand pumps or chemical "extincteurs," can be judiciously distributed about the works. The buckets should be painted red, or some distinctive color, and should always be kept three-quarters full of water. A few drops of glycerine spread over the surface of the water in a thin film, will materially prevent evaporation. Workpeople should be distinctly forbidden to use these buckets for any other purpose than extinguishing of fire. A hand pump in conjunction with the buckets will be found of more utility than the small chemical "extincteurs." The "extincteurs" have the advantage that they can be called into instant use, but, even then, present in this respect no real advantage over a hand pump and two or three buckets full of water. On the other hand, "extincteurs" require a certain amount of special knowledge as to their use, and necessitate frequent examination. Moreover, as the charges are comparatively expensive, frequent trials or use for instruction purposes are seldom thought of, and, further, they present the great disadvantage of being quickly exhausted and requiring considerable time for recharging. "Hand grenades," it should be added, are generally useless unless in the hands of specially-trained men fully conversant with grenade throwing. In chemical laboratories, a box of slightly moist sand should be kept handy for dealing with outbreaks of fire where water cannot be successfully employed.

The other accessories, such as branch pipes, stand pipes, and so forth, should be of the best type and sufficient in number. The couplings should be preferably the same as those of the nearest fire brigade, and all accessories should be of the same size and type throughout the place. A certain number of ladders should be stored at a given place, and be of such a size that access to the roofs can easily be obtained. In addition to the stationary fire pump and system of fire mains, or in place of them, it may be found desirable to have either a manual or a steam fire engine or both. Either of these appliances will be found useful in case of a breakdown of the fire pump, or

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