quarter of the whole design, and is repeated four times, being turned upside down for the lower portion of the pattern.

The children, while at work, keep up a song or chorus under the guidance of the forewoman, who changes the words and tune as the pattern alters. Makers say that silent workers are "idlers," and are therefore suspicious of the children when they cease singing.

A peculiarity of Sakai carpets is that, owing to the length of the "nap," they present quite a different appearance when viewed, so to say, against the grain. The quality of carpets depends, to a great extent, upon the number of threads in the warp, woof, and filling.

Thus in a 3 feet by 6 feet rug there may be 100, 135, or 155 pairs of threads in the warp of 3 feet, while in the 6 feet of length the woof threads may be from 300 to 600 in number, and the "filling" from one to six strands of material.

Excessive export of only the cheapest class of goods is greatly to be deprecated, as likely to give the trade a bad name. The better qualities look well and wear satisfactorily, while the cheap kinds do neither.

Provided that strict attention be paid to the quality of the dyes employed and earnest endeavors made to maintain a certain uniformity of standard, there is no reason why the future of the trade should not be assured.

THE PREPARATION OF RHEA FIBER FOR TEXTILE PURPOSES.*

BY PERRY F. NURSEY.

So far the jurors of the Great Exhibition of 1851, whose few years have been lengthened out to nearly fifty, and rhea fiber is not an everyday article of commerce. Going back to 1840, we find that rhea fiber then became, for the second time, the subject of official action on the part of the Indian Government. The first time was in 1803, when Dr. Roxburgh made an effort to utilize the plant. Upon the second occasion Colonel Jenkins took up the matter, but without any practical result so far as the production of the fiber was concerned, the difficulty standing in the way being that of decortication, or removing the bark with its adherent mucilage, containing the fiber, from the woody stem. In 1869 the Indian Government made a third attempt to solve the problem by offering a prize of £5,000 for the best machine for separating the fiber from the stems and bark of the rhea in its green or freshly cut state, which is the most favorable—or rather the proper—condition for the performance of the operation. This offer led to only one machine being submitted for trial, although several competitors had entered their names. This machine is the only one already referred to as having been invented by Mr. Greig, of Edinburgh, but after careful trial by Colonel (afterwards General) Hyde, it was found that it did not fulfil the conditions laid down by the Government, and therefore the full amount of £5,000 was not awarded. In consideration, however, of Mr. Greig having made a *bona fide* and meritorious attempt to solve the question he was presented with £1,500. The reward was still offered, and further attempts were made to obtain it. They, however, proved unsuccessful, and eventually the offer was withdrawn by the Government. But the withdrawal of the prize did not damp invention, for there was a great commercial issue at stake, and the £5,000 was re-offered in 1881. Another competition then took place, at which several machines were tried, but the trials, as before, proved barren of any practical results, no machine being found capable of dealing successfully with rhea stems in the green state. The question of the preparation of the fiber, however, continued to be pursued in many directions. Nor is this to be wondered at when we find that the strength of some rhea fiber from Assam, which was experimented with in 1852 by Dr. Forbes Royle, as compared with St. Petersburg hemp, was in the ratio of 280 to 160, whilst some fibers of the wild rhea of Assam were as high as 343. But above and beyond this, rhea has the widest range of possible applications of any known fiber, as shown by an exhaustive report on the preparation and use of rhea fiber by the late Dr. Forbes Watson, with whom the author has frequently had the pleasure of being associated in his investigations connected with the present subject. The report referred to was published in 1875, at which time Dr. Watson was the reporter to the Indian Office on the products of India. The direction in which practical efforts were being made to solve the rhea fiber problem at the time the author was first consulted, was the very proper one of decortication, that being the initiatory stage of treatment, and its success underlying that of all subsequent proceedings. The rhea and other fiber-producing plants are generally cultivated at long distances from the localities where the fiber is prepared for the market. The stems are cut and transported across the country to the scutching mills. This gives rise to two evils—in the first place, about a ton of raw woody material is transported to produce 1½ cwt. of fiber; and in the second, the gum is liable to become partially, and sometimes wholly, set during transport. This leads to difficulty and waste in the extraction of the fiber, as the author has already shown. In order to remedy these defects, and to cheapen the production of fiber generally, a simple and inexpensive process was devised by M. Favier, and was introduced in this country in 1882 by Messrs Brogden & Co. The principle involved was to steam the fiber producing plants at the place of culture, and to send only the epidermis with the fiber attached across country to the mills. The apparatus employed was simple and inexpensive, consisting merely of a stout deal box or trough, 8 feet long by 2 feet wide and 20 inches deep. This box had a false bottom, under which was a ¾ inch perforated iron steam pipe connected with a boiler. At the bottom of the box at one end was an outlet for the condensed water. In the trial made by the author a number of stems of rhea and other fibrous plants which had been cut several days were placed in the box, and the lid, which fitted tightly, was closed. Low pressure steam was then admitted, and in twenty minutes the specimens were taken out. They were found to be in excellent condition

*From a paper read before the Society of Engineers.