of the latter—to subject the stems, or the fibre, dealt with, to a nibbing as well as a crushing process. In details, the machines are very different.

1. *Collyer's Machine* has a cylinder, 30-inch diameter, set horizontally in a frame; and into the coarse flutings of the cylinder, the like flutings of four rollers, each 7-inch diameter, are geared. The rollers are fixed in a quadrantal frame, and secured by strong spiral springs, each held by a screw. Thus, free play, to accommodate inequalities of thickness in the substance passed through, is secured, without a loss of effective pressure in any part.* The machine is somewhat complicated in its motive portions; and it does not seem strongly designed. But I saw the first that was made, and there have been slight modifications of details. The roller frame is supported by a rocker; and, by a motion exactly similar to that first used in Whitworth's "shaping" machine, a crank is acted on, and a "quick return" is given to the frame, instead of its being allowed an "equal throw" in each direction. The frame and the cylinder thus work six inches forward and four inches backward, thence the reciprocating or rubbing action. The cost of the machine is £110, and a common scutcher would cost £15 more. A man to feed, and a boy to receive the fibre, are usually employed, or two lads can do the work. Of hemp, such as the sample marked A, the machine will produce from 25 cwt. to 30 cwt. per day of ten hours; and each machine used requires about one horse-power to drive it. As possibly affecting the appearance of sample A, it must be added that the machine was not driven as quickly as it should have been, the gearing having been affixed hastily, in order that the action of the machine might be shown. The sample was only lightly shaken before being wrapped up.

2. *Lawson's Machine with Fiskin's Motion,*—The principal motion of this machine was invented by the Rev. Mr. Fiskin, a Presbyterian minister in Leeds; but he failed to get it into practical shape, and he consequently consulted Mr. Lawson, who improved its arrangement and designed the machine. There is not a central cylinder used in this case; but there are six pairs of rollers, or an upper and a lower set, each of six, their diameter being 4½ inches, and the fluting being finer than in Collyer's machine. The rollers are set in a segmental frame, and held by highly tempered spiral springs, fastened by screw-heads. It is not easy to describe Fiskin's motion technically. In general language, it may be said that a toothed wheel is set within a rim, upon the inner edge of which teeth are cut. By means of an eccentric driven by a crank shaft, there is secured an alteration of motion; the wheel being thrown into and out of gear with the toothed rim; both having a forward motion while the gearing continues, but the wheel remaining stationary while out of gear, and the rim having a backward motion during that period. Thus, the reciprocating action of the pair of rollers is secured. The following advantages over Collyer's machine (and also over Hodgkins's) are claimed:—(1.) There not being a central cylinder, refuse can fall away freely, thus avoiding risk of clogging.—(2.) If desired, the fluting of the pairs of rollers might be graduated, the finest being on the delivery side, so that while there would not be difficulty in feeding, the fibre would, before delivery, be subjected to sharper, or intensified, action.—(.3) The forward throw of the machine as now made is 5 inches, and the backward throw 3 inches; but an alteration of one shaft only would enable the backward throw to be made greater, and thus a more prolonged action on the fibre would be secured. The cost of the machine is £110, without scutcher; and it requires the same attendance and power as Collyer's. It can, however, be driven much faster than (it is said) would be possible with Collyer's, and, with the same material would, with the present proportions of the throws, produce proportionately more fibre. Sample B. is fibre of Italian hemp, the stalks being taken from the same bundle as those used with Collyer's machine. This sample was lightly shaken before being packed.

3. *Hodgkins's Machine.*—This struck me as about a medium between the two already described. I was unable to see it in Leeds, but I saw it on the premises of the Yorkshire Fibre Company, Balne Lane, Wakefield. There, however, it was being used for softening the fibre of China grass; and the Company have never used it for any other purpose. The machine has a central cylinder; with six medium-fluted rollers in a frame above it, each held by a spiral spring. By a simple arrangement, a rocking (or backward and forward) motion is given to the cylinder, into the flutings of which those of the rollers are geared. There is a travelling platform for feeding and delivering. The machine can be worked at a high speed, and seems substantial. Its cost is £110 or £120.

This machine, as a "softener," has answered excellently, except that it sometimes fails effectively to deal with the ends of the fibre. In twelve months it saved its cost, as compared with what had been paid to boys and girls for "beating" the fibre by hand.

Has the "softening process" ever been applied to New Zealand flax? Is it likely, if the process was adopted, that the added market value of the fibre would be less than the added cost?

It is difficult to form an opinion whether the machines now described, or any of them, would prepare the fibre from the leaves of *Phormium tenax*. I think that the principle of the machines is a good one for the purpose; but I am not aware whether it has, in any form, been tried. I have not had an opportunity of seeing Booth's machine. If the principle is applicable, I believe that Lawson's machine with Fiskins's motion, or Hodgkins's machine, would do better than Collyer's, in the form in which I saw it; but the last-named, I feel sure, would do good work with flax proper, hemp, &c.

Samples of the China grass fibre, in its several stages, were given to me by Mr. Christian Berridge, the manager of the Yorkshire Fibre Company's works. They are interesting, and they will be taken to the Colony for the Flax Commissioners, or Dr. Hector.

In conversation with Mr. Berridge, I learned that the Company, some time ago, submitted New Zealand flax to their process, which includes steeping in a very strong chemical mixture, and that they found it useless for their particular purposes. In fact, Mr. Berridge said it became mere "pulpy stuff." Mr. Berridge showed me, as lumber, two or three bales of what was originally a good average sample of the flax. He said that while the Company was a limited liability Company, some shareholder caused the flax to be consigned for trial, with the result stated, and the bulk of what was

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* Mr. Lawson has used vulcanised india-rubber journals and bearings; but he has now discarded them, as being certainly inferior to springs.