but moderately fulled, are acceptable as a shoddy material. This class of stock usually arrives at the shoddy mill in a clean condition, and, therefore, does not require an elaborate preparation previous to subjecting it to the action of the grinding and separating or picking machinery. The clean woolen clippings from the tailor's shop never call for any other preparation than a little oiling, while the knit stock probably needs both washing and oiling. These processes being completed, the material is ready for the grinding operation, which is accomplished by a system of powerful steel-pointed cylinders and rollers.

The method of operation is as follows: The rags or material to be ground are fed on to a table or feed sheet which conveys them to two fluted rollers, on emerging from which they are forcibly seized by the rapidly revolving teeth of a main cylinder. This cylinder contains about 1,500 strong, sharp, steel teeth, frequently turning at the rate of 750 revolutions per minute. This high speed of the teeth of the cylinder results in tearing the rags apart and separating the threads and fibres in such manner that the whole is finally reduced to a soft, woolly condition, and apparently possessing many of the qualities of a good textile fibre. The result of this violent action of the steel teeth upon the tender fibres of the material, however, has already been shown.

The shoddy picker is so arranged that it discharges the product from the cylinder as fast as it is ground. The discharge or receiving pipe is connected with a stock house The action of the cylinder is such that it creates a strong current of air, which carries the light substance along to its final destination. From this point the stock is taken to the carding machine and submitted to its action. It is essential that the clothing be coarse and open in order to secure the best results. This operation greatly tends to give a softer and more wool-like feel to the staple.

FINISHING MATERIALS.

The demands made of the finisher are numerous and varied. Some goods he is required to make very stiff and at the same time lustrous, while others are wanted with quite an opposite finishing effect. Endeavors have been made of late years to impart a woolly feel to cotton, in fact, the fabric is required to have the feel and appearance of wool, which it does not naturally have. Expert finishers are constantly trying experiments in this direction, and in many instances have been highly successful. It cannot be said, however, that heavily starched fabrics are no longer wanted. Quite the reverse, for in many instances they are becoming indispensable, says the *Textile Mercury*. It is not the present purpose to enter fully into the subject of finishing, but to briefly mention the general merits of several of the more important agents or materials used in the finishing processes.

The starches have always been the most important finishing agents, and of these there are several kinds—potato, corn and wheat starch, etc. Potato starch imparts a hard feel to the fabric, and, owing to its containing some quantity of gluten, it is generally employed for filling with china-clay, and is always used by the finisher when he desires a greater degree of stiffness in the cloth. Corn starch also imparts a full hard feel, but wheat starch produces a full, mild feel. The finishing characteristics of flour resemble those of starch. Dextrine, glucose, and glue are agents of the second grade, and are only occasionally employed. China-clay is principally used as a filling agent for light cloths.

Of the agents used for neutralizing the rough feel of china-clay and starch alone, and which besides producing hardness, are also intended to produce lustre, the animal fats (especially tallow and lard) are the most important; then come palm oil, cocoanut oil, bees'-wax, paraffin oil and soap. Tallow makes a full, mild feel, with lustre. Palm oil may be had bleached or unbleached; and if in the latter condition it is orange-colored, and increases the mildness and lustre of the fabric. Cocoanut oil imparts an appearance similar to that obtained with palm oil, although it is less effective when the quantities are compared. Lard gives a silky, soft feel, but must be used only in small quantities and with great care. The thorough boiling of the starch and the lard are indispensable. Soap produces mildness and lustre, wax and its several products harden and gloss the fabric; and stearine produces a nice, agreeable feel.

Chloride of magnesium is used with china-clay, especially in England; and, on account of its property of absorbing moisture from the atmosphere, it prevents the dusting of those fabrics containing an extra quantity of china-clay, but it is not safe to use it for linings, such as moire, which are to retain their watered effects. It must be employed carefully, because the fabrics finished with it are inclined to become soft and limp, and lose their finish almost entirely when kept in a moist storeroom.

Of the artificial finishing agents to be recommended in small quantities as additions to the different finishing masses, there is senegaline, which is starch disintegrated by soda-lye and again neutralized by hydrochloric acid. This preparation is extensively used in Germany, where it enjoys a great reputation. Under normal conditions senegaline is a transparent substance, which dissolves completely when boiled in water for five minutes. It unites readily with all finishing agents, is neutral, and does not attack the colors. A continued storing and low temperature make it harder and opaque, and when in this condition it requires to be boiled a little longer than usual. When incorporated in the fabric, senegaline is distinguished by a nice, elastic and soft feel, and does not dust. It imparts an excellent lustre, and is used to great advantage in fabrics that require finishing in the calender. It prevents the breaks in goods strongly filled with china-clay.

Of the oils used for finishing, turkey red oil is preferred to all others, and it answers well for softening the fabric. A point of the greatest importance is the process of boiling the starch, and yet the opinions of many finishers differ widely, some advocating the continuance