The Identification of Textile Fibers

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One of the most important chemical points to be observed by those following micro-chemical work with fibers, is to make a positive distinction between cotton and flax. Many directions for distinguishing cotton and flax have been published, but one of the most important is to employ olive oil or two dyestuffs, methylene blue or safranine. If threads of cotton and flax are immersed at the same time in a weak solution of methylene blue for a few minutes, it will be found after washing, that the flax has taken up a much greater depth of color than the cotton. On the other hand, if some threads are placed in a solution of ammoniacal fuchsine, the flax fibers will be found more heavily stained than the cotton.

The olive oil test for cotton and flax is based upon certain physical characteristics that have to do with the transmission of light through cotton and linen mixed cloth, or with the reflection of light from such cloth.

If a piece of clean cloth, containing both cotton and flax is slightly saturated with olive oil, the excess of oil removed, the cloth covered with a cover-glass, and examined under a low-power microscope and with transmitted light, that is, light projected through the instrument from the mirror, the *cotton fibers* will appear very non-transparent and dark, while the *flax fibers* will appear almost clear. On the other hand, if the light is reflected down upon the specimen on the glass, the *cotton* will appear quite white and brilliant, while the *flax* will appear dark.

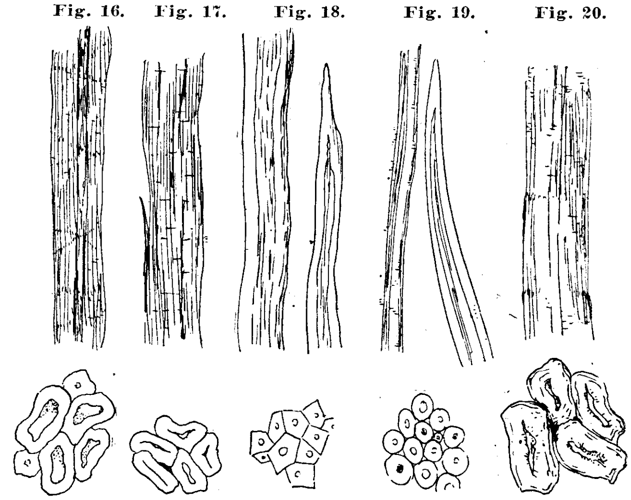
Another test for cotton and flax is to soak a clipping of the fabric in a few drops of 66° sulphuric acid for one to two minutes, and then wash well in water and dry. By this treatment the *cotton* becomes disintegrated, while the *flax* fibers remain almost intact.

Observe first with low power and afterwards with the higher power, noting all the characteristics of the outline of the section and particularly of the canal or "lumen" in the center of the fiber section. Observe particularly whether this canal contains or is free from deposits of granules. Observe also any distinctive coloration, and if possible make comparisons with authentic drawings of the cross section of the fibers of known origin and identity.

The cross section of the *flax fiber* is, roughly, hexagonal in shape, but not strictly so. The center canal is very small and the cell wall is very thick. The canal is quite centrally located and is more or less circular. The fiber viewed longitudinally shows the canal somewhat yellowish and when very much enlarged appears to contain granules that do not completely fill. The surface of the fiber has certain distinctive, cross-like markings which are bluish, Fig. 16.

Hemp fiber is scored crosswise with fine markings, but also carries more or less distinct markings longitudinally. Hemp is characterized by certain small "spicules" that branch off from the outside of the fibers. The fiber tips are more or less blunt. In cross section, after treatment with Vetillard's reagent, the fiber wall is bluish, but the central portion,—that portion next to the canal—has a very much deeper coloration, Fig. 17.

Fig. 16. Fig. 17. Fig. 18. Fig. 19. Fig. 20.



Characteristic Points of Bast Fibers.

Jute, on the contrary, has a large canal and when viewed in cross section, the shape is very angular. Lengthwise the canal appears very distinct. The tips of the fibers are somewhat blunt, but not nearly as blunt as hemp. The color reaction with the iodine solution is yellow, Fig. 18.

New Zealand hemp, occasionally met with in the manufacture of cordage, is a fiber that is small in diameter. In cross section it is devoid of any angular shape. The cell wall is moderately thick. Many of the fibers appear to contain granules in the central canal. The fibers do not appear to have been compressed together as the other previously mentioned fibers have been. There are transferred scorings on the fiber. The tips are somewhat pointed and resemble the flax fiber in this particular. The color reaction with Vetillard's reagent is yellow, while the granules in the canal, when present, are brownish, Fig. 19.

Ramie or *China Grass* differs very materially from the other fibers when viewed in cross section. The fiber appears to be somewhat compressed together and shows distinct layer markings. The center canal is not smooth, but rather rough, and contains granules. The tips of the fibers are blunt. The coloration, due to the action of Vetillard's reagent is bluish, inclining somewhat to a gray. The canal contents, when present, are brownish. Ramie is distinguished by its large cross section, Fig. 20.

POWER TRANSMISSION IN TEXTILE MILLS.

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condition to be avoided in textile mills so far as possible. With the enclosed collar, this is avoided, thus making it especially adapted to this class of work. When used on line-shafts it is best located at or near the main driving pulley.

In the bearing shown in Fig. 39 the oil is supplied to the journal through wicks by capillary attraction. With this arrangement oil should be supplied about once a month, nearly to the bottom of the journal, and the reservoir cleaned and

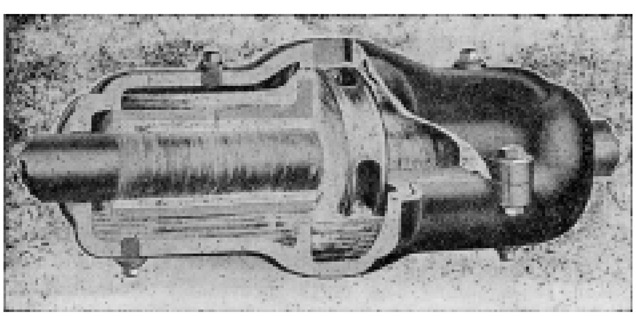

Fig. 38. Split Collar Bearing.

refilled every three to six months, according to speed and surrounding conditions. The wicks used for this purpose are constructed of various material including felt, wood and metal and must be sufficiently porous to produce the necessarily capillary attraction. Certain forms are provided with means for moving them up against the shaft automatically as the upper end becomes worn or the shaft is pulled away slightly from the bottom of the bearing.