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METHOD OF MOUNTING SAMPLES
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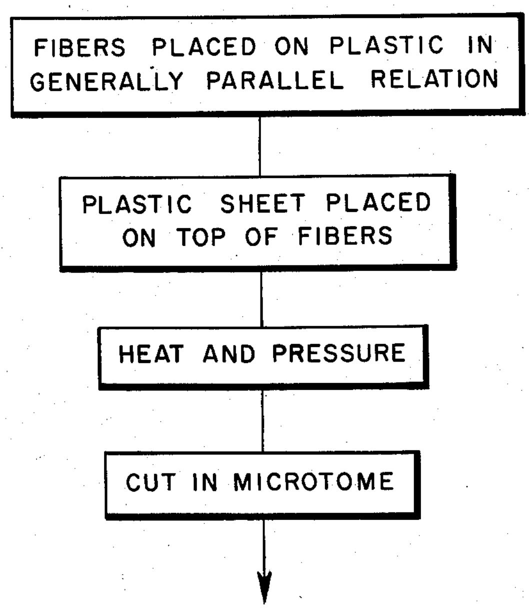

FIG. 1

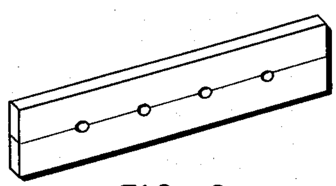

FIG. 2

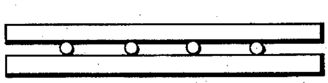

FIG. 3

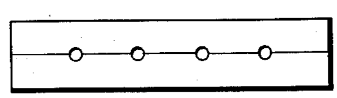

FIG. 4

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METHOD OF MOUNTING SAMPLES

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4 Claims. (Cl. 154—125)

This invention relates to the mounting of samples for examination by cross sectioning. More specifically, it has been found that the present invention is particularly adaptable for use in mounting textile thread samples for cross sectioning in order to determine the amount of dye penetration in the fibers.

While it is understood that the invention may be utilized with many different materials in order to simplify the description, only its use with textile fibers will be described.

In making a cross section of a textile fiber for examination under a microscope, it is essential that the fiber be held in such a manner that the cross sectioning will produce a smooth surface free from irregularities. If this is not done, then the irregularities will make an accurate examination and analysis of the fiber impossible. Because of their inability to consistently produce such a cross section which may be conveniently stored for later reference and because of their tedious and time consuming nature, the present methods have not proved satisfactory.

The best known of these is the paraffin candle method. Here the textile fiber to be examined is dipped briefly into melted paraffin and then into ice water. This procedure is repeated until a "candle" is built up of successive layers of paraffin which has the desired dimensions. The candle is then cut with a razor blade or in a microtome to produce a thin slice of paraffin with a cross sectional segment of the textile fiber embedded therein. In addition to being extremely time consuming, this procedure is not satisfactory because of the lack of affinity of the paraffin for the fiber. This lack of affinity makes it extremely difficult to obtain a cross section of the fiber that does not have any irregularities. Various methods have been tried to overcome this difficulty, one which was proposed by G. H. Hotte in vol. 85 of Textile World, page 1063. Here the fiber was first coated with collodion and then bayberry wax, and finally the candle was finished with paraffin in the regular manner. While this overcomes, to some extent, the lack of affinity of the coating for the fiber, the method is still extremely time consuming.

Another method which has been used is the cork method. Here a small cork stopper is pierced through its whole length with a fine needle. By means of strong thread, a bunch of parallel, straightened fibers are drawn through the hole formed by the needle. Thin slices are then cut from the cork in the same manner as with the paraffin candle method. Although this is more rapid than the paraffin candle method, it is still too tedious to be completely satisfactory.

The metal plate method, while being much faster than either of the two previous methods, is limited in that it can not be utilized for the examination of dyed fibers. In this method, a thin metal plate, the size and thickness of a microscope slide and having a number of very small holes bored therethrough in rows near its center is used. The fibers to be examined are drawn through these holes by means of a thin wire or thread and are

then cut off flush on both sides of the plate. In addition to its lack of utility with dyed fibers, it is very difficult to keep a permanent record of the samples prepared by this method, since each sample must be mounted in a metal plate.

Perhaps the quickest method thus far used is the one described by Hardy in the 1935 Department of Agriculture Bulletin No. 378. However, as in the previous method, it is difficult to maintain a permanent record of the fibers as each cross section must be mounted on a microscope slide for study. In addition, since the fiber is coated with collodion prior to mounting, it is not accessible for additional staining.

It is, therefore, an object of this invention to produce a cross section of a textile fiber which may be kept permanently without the necessity of utilizing metal plates or microscope slides.

It is also an object of this invention to provide a method of mounting fiber samples for cross sectioning which may be used with both dyed and undyed samples and in which the fibers are accessible for additional staining.

Another object of this invention is to provide a method of mounting samples for cross sectioning which may be done rapidly and which will always produce a fiber cross section without irregularities.

Further objects will be apparent from the description which follows and the accompanying drawing in which:

Fig. 1 is a flow diagram of the method of the subject invention;

Fig. 2 is a perspective view showing the cross sectioned fiber mounted in the plastic strip;

Fig. 3 is a cross section through the fiber and the plastic prior to the application of heat and pressure; and

Fig. 4 is a cross section through the fiber and plastic after the application of heat and pressure.

In general, the invention comprises placing the fibers in a generally parallel relationship between two pieces of thermoplastic material, joining the plastic pieces together so as to securely hold the fibers, and then cutting the joined plastic so as to form a thin strip of plastic having the cross section fibers embedded therein.

Referring now to the drawings, more specifically the invention comprises the steps as shown in Fig. 1. The textile fibers are placed individually on a sheet of plastic in a generally parallel relationship to each other. The sheet may be any thermoplastic material which will flow and fuse together upon the application of slight heat and pressure, such as a vinyl resin. Other thermoplastic resinous materials include polystyrene, polyacrylates, polyester, cellulose esters, and the like. Although there is no maximum thickness for the sheets, for optimum practical results the sheets should be at least twice the thickness of the fibers. If thinner sheets are used, the plastic has a tendency to be bent rather than cut by a microtome. Also, when thinner plastic sheets are utilized, there is a tendency for them to become distorted following the application of heat and pressure to fuse them together.

After the fibers are placed on the first plastic sheet, a second sheet, which is substantially identical with the first, is placed on top of the fibers. This is shown in Fig. 3. Next, heat is applied to the plastic along with a slight pressure, to cause the plastic to flow around the fibers and fuse together into a single piece of plastic, having the fibers encased therein. This is shown in Fig. 4. This encasing operation has little effect on the fibers other than a slight flattening.

Following the encasement operation, the plastic sheet piece is placed in a microtome and sections of the desired thickness are cut. A typical section is shown in Fig. 2.

By using this method, the fiber samples can be mounted very quickly without the necessity of any special equipment. In addition, there is an unobstructed view of the fibers, so that either dyed or undyed samples can be examined and the fibers are accessible for further staining or dyeing, if such is desired. Finally, fibers mounted in this manner can be easily filed and stored for future reference.

It is to be understood that although the invention has been described with specific reference to its particular application in mounting textile fibers, it is not intended to be so limited and changes and other applications may be made which are within the full intended scope of this invention as defined by the appended claims.

What is claimed is:

1. A method of preparing fibers for examination with a microcsope by cross sectioning, comprising placing the sample on a piece of plastic, said plastic being a clear vinyl resin, placing a second piece of plastic on top of the sample, said second piece of plastic being substantially identical with said first piece of plastic, applying heat and pressure to the plastic, thereby causing the two plastic pieces to flow around the sample and fuse together, removing the heat and pressure before the flowing plastic can be absorbed by the fibers and cutting the fused plastic in such a manner as to form a thin slice of plastic having a cross section of the fibers contained therein accessible for subsequent dyeing.

2. In a method of preparing fibers for examination with a microscope by cross sectioning, the steps comprising placing several fibers on a piece of plastic in parallel relation to each other, said plastic being a clear polyvinyl resin, placing a second piece of plastic substantially identical with the first on top of the fibers, applying heat and pressure to the plastic, thus causing it to flow around the fibers and fuse into a single piece, removing the heat and pressure before the flowing plastic can be absorbed by the fibers and finally cutting the fused plastic so as to form a thin slice of plastic having a cross section of the fibers contained therein accessible for subsequent dyeing.

3. A method of preparing dyed textile threads for cross section examination with a microscope in order to determine the amount of dye penetration comprising placing several threads in parallel relation on a piece of clear polyvinyl plastic resin, placing a second piece of plastic substantially identical with the first on top of the threads, applying heat and pressure to the plastic, thereby causing it to flow around the threads and fuse into a single piece of plastic, removing the heat and pressure before the flowing plastic can be absorbed by the textile threads and cutting the fused plastic in such a manner as to form a thin slice of plastic having a cross section of each thread contained therein accessible for further dyeing.

4. A method of preparing dyed textile threads for cross section examination with a microscope to determine the amount of dye penetration comprising placing several threads in parallel relation on a piece of plastic, said plastic being a clear polyvinyl resin and having a thickness of at least twice that of the thread, placing a second piece of plastic on top of the threads, said second piece of plastic being substantially identical with said first piece of plastic, applying heat and pressure to the plastic, thereby causing it to flow around the threads and fuse into a single piece, removing the heat and pressure before the flowing plastic can be absorbed by the textile threads and finally cutting the fused plastic so as to produce a thin plastic slice having a cross section of each thread contained therein accessible for further dyeing.

References Cited in the file of this patent

UNITED STATES PATENTS

271,493	McClelland	Jan. 30, 1883
1,351,374	Crowell	Aug. 31, 1920
2,290,386	Schindler	July 21, 1942
2,418,904	Rugeley et al.	Apr. 15, 1947
2,651,236	Kahler	Sept. 8, 1953
2,753,761	Hillier	July 10, 1956
2,758,342	Squires	Aug. 14, 1956
2,776,596	Eigen	Jan. 8, 1957

FOREIGN PATENTS

354,834	Great Britain	Aug. 17, 1931
33,796	Netherlands	Oct. 15, 1934

OTHER REFERENCES

Advance release by National Bureau of Standards, TRG 6104, delivered before Electron Microscope Society of America at Detroit, Michigan, Sept. 16, 1950.