

The use of astringent tannins—*i.e.*, those of large molecular size—raises the question of how they are to be absorbed by the leather, since it is more difficult for large particles to penetrate the leather. The question of scouring was discussed from the mechanical aspect and also the proper time at which this process should be carried out.

Methods of factory control were discussed in relation to the type of leather being made, the tanning-materials used, and the mechanical methods employed. There are many different methods of producing good sole leather.

The latest types of machines, and older types of machines with improvements, were seen in operation. Often it was found, as has been the case in New Zealand, that machines have to be altered or adapted to meet the requirements of local conditions. In New Zealand this is more difficult, as the mechanics who have specialized in this type of machinery are not available.

Great advances in upper leather have been made in Great Britain in recent years as regards both quantity and quality. From observations made on the trip it appeared to be definitely established that quality bears a direct relation to the care taken in regard to details and to the amount and quality of the work put into the processes. The investigation carried out in New Zealand on the "Tightness of the Grain of the Upper Leather" had aroused great interest in Britain, and discussing the practical application of this enabled much valuable information on the manufacture of upper leather to be obtained.

Climatic and economic conditions have developed the leather industry in America along lines different to those in Great Britain. The huge demand for leather has to be supplied by home production, and consequently methods have been evolved to deal efficiently and economically with large outputs.

One of the most important qualities demanded in American sole leather is flexibility. A system of tanning has been evolved which will produce flexible leather and at the same time maintain a standard of colour that is possibly higher than that required in other countries.

New systems of liming have been tried out with some success. The use of dimethylamine as a depilatory, on a works scale, was investigated. The chief disadvantage appeared to be an economic one.

The methods of stretching upper leather—*viz.*, toggling, tacking, and pasting—were seen, and special attention was given to the last as this method has not as yet been successfully operated in New Zealand.

The use of rubber latex as a component in the finishing-material for upper leather was of great interest in view of the special qualities imparted to the leather.

*Research Institutions.*—The research laboratories of the British Leather Manufacturers, of the Tanners' Council of America, and of the Bureau of Standards were visited, in addition to the research laboratories of many large, well-known leather firms and firms connected with the leather trade.

One of the most important problems confronting the leather industry is the need for the development of physical tests and standards for leather. Chemical tests are valuable guides as to the uniformity and efficiency of processing, but give little or no indication of quality from the user's point of view.

#### RESEARCH WORK.

The programme of research work carried out has of necessity been curtailed during the year. The main investigations are:

*Cracking of Upper Leather.*—An examination of samples of upper leather liable to crack suggested the following causes:

- (1) Disease damage in the hide associated with damaged hair follicles.
- (2) Lack of efficient scudding.
- (3) Lack of softness for special purposes—*e.g.*, slipper work.
- (4) Lack of plasticizer in the finishing-materials in relation to the amount of oil in the leather.

*Factors affecting Absorption of Tannin.*—When astringent tan liquors are being used, it is essential that the large-sized molecules of tannin shall be able to penetrate the leather. If conditions arise in which only the smaller-sized molecules, such as non-tans, can enter, the liquors will gradually become richer in astringent tannins, as was found to be the case under investigation.

*Factors affecting Volume of Leather during Tanning.*—The demand for thicker sole leather has necessitated that, as far as possible, the tanning processes should be such as will give the thickest possible leather. An investigation has been carried out on this problem, and within certain limits factors influencing thickness have been determined.

*Tightness of Grain of Upper Leather.*—The work on this problem has been continued with special reference to the properties of elastin. The results obtained demonstrate that the physical properties of elastin play a very important part in the mechanical treatment of upper leather during the processes of manufacture. It is quite possible, if these properties are not fully appreciated, to damage irreparably the upper leather by mechanical treatment.

#### GENERAL.

The usual routine work of the Laboratory dealing with the current industrial problems and factory control was carried out by the Assistant Director during the absence of the Director.