must be effected by regulating the *time* of baking, since by prolonging the operation all the water of crystallization can be expelled far below 300°. To secure even baking the mass is kept stirred by mechanical stirrers, a necessary precaution, since the operation is to be carried out in an ordinary kiln. The process is stopped when a portion of the plaster is found to set in the required time, a method of regulation which will probably be found to work well in practice.—*Chem. Trade Jour.*

SPACING THE FRETS ON A BANJO NECK.

By Prof. C. W. MACCORD.

THE amateur performer on the banjo, if he be of a mechanical turn, is often tempted to exercise his skill by making an instrument for himself; and the temptation is the greater because he can confine himself to the essentials. The excellence of a banjo in respect to power and tone depends mainly upon the rim and the neck, that is, supposing the parchment head to be of proper quality; but then the preparation of the heads is a business of itself, and the amateur is no more expected to make the head than to make the strings. So again, all the minor accessories, such as pegs and tail pieces, brackets and bridges, are kept in stock for his benefit, and he may justly claim all the credit if his efforts in connection with the two principal parts first mentioned result in the production of a superior instrument. Among these ready-made items is a "fret wire" of peculiar section, furnished with a flange ready

operation until all the frets were located. But should that be done, the diagram might become inconveniently large, and some of the intersections might not be reliably determined. In order to avoid this, the spacing of the outer arc may be stopped at any convenient division, as L. The vertical by which that point is determined cuts B C at B', and through B' a new arc, B' L', is described. Through the points in which this arc cuts the radial lines already drawn, a new series of verticals is passed, which will divide another portion of A C as required, and by repeating this process the spacing of the whole neck may be effected by a diagram of reasonable size.

GLOVE MAKING.

GLOVE making is almost a century old in this country, having been begun in the neighborhood of Gloversville and Johnstown, N. Y., about 1803. Until 1862 the manufacture of gloves in Fulton County, although even then the chief manufacturing industry, was of comparatively small importance. Gloversville and Johnstown were then quiet villages of from three to four thousand people. The flourishing establishments of to-day, or such of them as then existed, were small and comparatively unimportant. In 1862 the stimulating influence of a high protective tariff showed itself in the increased business at Gloversville, Johnstown, and the adjoining hamlet, Kingsboro. These became at once the leading sources of supply for the home market gloves of a medium grade. The quality

of the gelatinous part, so that it shall become pliable, elastic, and resist decomposition.

There are various methods which produce these results, and they are technically known as tanning, alum dressing, oil dressing, and Indian dressing. Each method produces a leather distinctly different from that produced by any other. All the preliminary processes of these various methods are alike in principle, although they vary somewhat in detail. The object in all is to remove the hair from the hide, separate the fleshy and albuminous matter, and leave only the gelatinous, which alone is susceptible to the chemical action and can be transformed by it into leather.

When the skins are received in the factory they are thoroughly soaked to open out the texture and prepare them for the removal of the hair. Then the skins are placed in vats of lime water, where, for two or three weeks, the lime works into the flesh and albuminous matter, and loosens the hair. The skins having thus been properly softened, the dirty but picturesque operation of beaming for removing the hair ensues. Before each beamer, as the workman is called, is an inclined semi-cylindrical slab of wood covered with zinc. The skin is first spread upon this, and the broad, curved beam of the knife glides across it from end to end, scraping and removing all the loosened hair, the scarf skin, and the small portion of animal matter adhering to the skin.

After the unhairing, kid skins must be fermented in a drench of bran, whose purpose is to completely decompose the remaining albuminous matter, and also to

SPACING FOR BANJO FRETS.

for insertion into fine saw cuts across the neck, which much facilitates his work.

Of course, the correctness of the notes depends entirely upon the accuracy with which the frets are spaced, and the accompanying diagram exhibits a convenient method of determining the spaces by graphic means.

It is to be understood that when the distance from the "nut," N, to the bridge, B, has been determined, the first fret is to be placed at $\frac{1}{18}$ of that distance from the nut, the distance from the first to the second is to be $\frac{1}{18}$ of the remainder, and so on. To determine these distances by computation, then, is a simple enough arithmetical exercise; but it is exceedingly tedious, since the denominators of the fractions involved increase with great rapidity; being successive powers of the comparatively large number 18, they soon become enormous.

In the large diagram, the distance, A C, on the horizontal line corresponds to the distance, N B, on the instrument. At A erect a vertical line, and mark upon it a point B such that B C shall be exactly eighteen times any convenient unit, B I. In the illustration B C is 26 inches, and B I is $1\frac{1}{2}$ inches, so that B C is 27 inches in length. About C as a center describe the arcs, B L, I K, and through I draw a vertical line, cutting B L in D; draw the radius D C, cutting the inner arc, I K, in J, through J draw another vertical, cutting B L in E, and so on.

In the triangles, A B C, 1 D C, 2 E C, we have B I = D J = E F = $\frac{1}{18}$ of the hypotenuse in each case, therefore the bases, A C, 1 C, 2 C, are divided in the same proportion, as required, at the points 1, 2, 3. And we might extend the arcs, B L, I K, and repeat the above

of the product has steadily improved, and the variety has been increased, until now American-made gloves are steadily driving out the foreign gloves. The skill of American glove makers is equal to that of foreign glove makers, and in some respects—notably in the quality of the stitching, and, in some grades, the shape—the American gloves are the best. Foreign expert workmen have been drawn over here from the great glove centers of Europe, so that the greatest skill has been secured here. The annual value of the glove industry in Fulton County has reached about \$7,000,000.

One hundred and seventy-five glove makers and 20,000 people in Fulton County draw their subsistence directly from glove making. Some of the firms have a business reaching from \$100,000 to \$500,000 yearly. The majority, however, have small shops, and do a small but profitable business. Most of the work in Fulton County, as abroad, is done at the homes of the workers. The streets of Gloversville and Johnstown are lined with pretty and tasteful homes, in which the hum of the sewing machine is constantly heard during the working hours of the day, but the workers are exceptionally fortunate in being able while earning good wages to enjoy all the comforts and surroundings of home, and in being practically their own masters and mistresses.

Before the leather can be cut and sewed into the handsome articles that are sold over the counters of the retail dry goods houses and furnishing goods stores as gloves, the skins from which they are made must be specially prepared. The two important points in this preparation are the removal of the albuminous portion of the skin and the retention and chemical changing

remove all traces of the lime. The operation is extremely delicate. While the gelatine is not so sensitive to the decomposing action of the ferment, nevertheless great care is required to prevent overfermentation and resulting damage to the texture of the skin. It is impossible for even the most experienced to tell just how long the fermentation should continue. Sometimes the work is done in two or three hours, and sometimes it requires as many days. Incessant watchfulness both day and night is required to detect the critical moment. With the less delicate skins this bran bath is not necessary. Lime and acid solutions accomplish the same purpose. When the gelatine matter is all removed the skins are ready for the actual curative process.

Oil dressing or Indian dressing—which merely differ in application, but are founded upon the same principle—is the most simple method of curing skins. The principle of each is the soaking of the gelatine fibers of the skin with oil, the union of the latter and the gelatine appearing in the form of oxide, and resulting in the insoluble, undecomposable, pliant, and tough material known to the commercial world as leather. The first step in the oil dressing, after the skins have been duly soaked to render them porous and absorptive, is to cover them with fish oil and place them in the stocks or fulling machines—huge wooden hammers with notched faces working in iron cases—where they are beaten and turned, and subjected to a uniform pressure until the oil is gradually absorbed. After taking them out, hanging them up, and stretching them, the oil and fulling process is repeated according to the thickness of the skin, and until every part of it