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Scientific allowance and cost system for upper leather cutting in shoe factories

W. W. (William W.) Russ

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Scientific
Allowance and Cost System
for
Upper Leather Cutting
in
Shoe Factories

W. W. RUSS and F. L. SMALL

Scientific
Allowance and Cost System
for
Upper Leather Cutting
in
Shoe Factories

By W. W. RUSS and F. L. SMALL

OF

Small, Nichols & Co., Incorporated
Boston, Mass., U. S. A.

Member of Society of Industrial Engineers

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OPENING

When the book entitled, "Treatise on Comprehensive Accounting Methods Adapted to Shoe Manufacturing and other Industries," was published in 1914 it was hoped to follow it up with other books of a more technical nature. It was planned to give an exhaustive report of methods of manufacturing of both leather and shoes, with illustrations and suggestions for improvements. A section of this work was to be devoted to a history of Shoe Cutting Cost Allowance Systems. As a result of the "World War" Small, Nichols & Co., Inc., were obliged to postpone the work. So many changes in personnel of the Company took place in those years, that it was finally decided to abandon the project with the exception of that part of the subject with which this book deals. It is a pity that the libraries of the country contain so little upon the great industry of Shoe Manufacturing.

The aim of the authors of this book has been first to establish the proof that Allowances for Cutting Upper Leather can be reduced almost to an exact science. Second to put before the world so clearly, that any student of ordinary ability, whether a cutter or not, can understand our System of Allowances. The system described has been thoroughly tested and found to be as accurate as practical use will allow.

Greater accuracy can be demonstrated by the same principles shown herein, but they are impractical in use.

There are probably other industries where the same principles will be of benefit, notably Glove Manufacturing.

It seems desirable here to mention at least three great fundamental changes that have come about in shoe manufacturing, which makes it more necessary than ever, that exact knowledge of the cost of all Upper Leather Cutting shall be pre-determined, even before patterns have been ordered of the pattern maker.

First. The increased popularity of goat skins with their great variety of quality, size, and shape.

Second. The greatly increased cost of leather.

Third. The ignorance of the purchasing public, which prevents manufacturers of shoes, making "well balanced shoes." The public demands shoes with uppers that outwear soles. It does not so much matter how long the shoes wear, but they must have the satisfaction of seeing the sole wear out first.

TECHNICAL EDUCATION

What a wonderful thing it would be for the Shoe Manufacturing Industry of the United States, if some rich manufacturer or manufacturers would donate a sufficient amount of money to endow a Technical Institution, with a fund to establish a department devoted to scientific research and development of all branches of Shoe Manufacturing. This would stimulate public scientific study of the industry whereas at present, study is mostly confined to individuals or concerns for private reasons only. The industry is of enough importance to warrant the creation of such an institution.

There is even a lack of intelligent technical standards by which to express different kinds of shoes. To illustrate: The word style is used in a general way to express many things which are not clearly defined by the word. It includes all the size runs from baby shoes to man's; patterns from slippers to high boots and all the peculiarities of each.

The National Association of Shoe Manufacturers could appoint a committee to good advantage to investigate the subject and improve the situation.

MATERIAL AND LABOR COSTS

The student of the Shoe Industry should learn at once something that many manufacturers overlook, that is, leather costs are far more important to consider than labor costs. We can say this now with less chance of being condemned as radical than formerly. However, but little will be found in this book about "treating labor better," as thousands of people are now writing and discussing how to satisfy labor, and get the workers to produce a fair day's work. "Better late than never" is our comment. We will quote a little below from some of our efficiency talks of years ago and let it go at that.

"The average cost of the upper stock in a shoe is we will say, 60 cents per pair. The average cost of the labor for cutting the outside of the shoe, will be about three cents per pair. With a material cost of 60 cents, and a labor cost of 3 cents per pair, we find that the labor cost is only 5% of the material cost. There is hardly a manufacturer who would not accept an opportunity of making a saving of 10% of the labor cost of cutting his shoes. In this illustration, a saving of 10% in labor means a saving of three-tenths of a cent per pair. In a factory producing 3,000 pairs of shoes daily, this amounts to \$9.00 per day, and for a period of 300 days, \$2,700.00, not a very large item. Suppose we could effect a saving of 10% in material. This would amount to 6 cents per pair, which with a production of 3,000 pairs per day, means a saving of \$180.00 per day, or for 300 days a saving of \$54,000.00, twenty times the saving of 10% in labor, or 200% of the Total Labor Cost. What is the conclusion and solution? Show labor how to save leather, and pay it to do so."

Where Bonus systems have been introduced to encourage the cutter to save leather, they have been very successful, if founded upon accurate allowances, and fair dealing with the cutters. The basis of the bonus should be as follows:

First. A fixed wage for cutting a given number of pairs for a day's work. This may be either by a day or piece method o

payment. They must be given increased pay for increased production over the task set.

Second. Arrange Bonus to give a cutter a liberal amount of the savings he makes in leather.

It will be found that many cutters will cut shoes of required standard for less than the allowance given them.

The bonus should be paid each week.

Do not dishonestly change the allowances as soon as it is found that some cutters earn a Bonus.

It has been said that the Unions will not allow a Bonus system to be operated in Union shops. Because of this statement, we will enter into full details regarding the principles involved in Chapter 10. However, we will say here that we believe a Bonus System can be installed in any shop, if the management can prove that it is to the benefit of the cutters, as well as the owners of the business. If it is not to their benefit, the cutters are justified in opposing it.

SYSTEMS AND SOME DEFECTS

While great strides have been made in the art of Shoe Manufacturing in recent years, it is deplorable that much waste still goes on in many Cutting Departments. Practically all of the large concerns and many of the small ones have introduced systems of cutting, together with "graded allowances." Still there are a great many small manufacturing plants without any modern system, where great wastes go on. Most of these latter concerns have no Cost Allowance System except an average money allowance. They do not know how much more leather is required to produce a run of sizes on a five wide pattern over the amount necessary to cut the same sizes on a four, three or two wide pattern. Neither do they know before introducing a new pattern into their line of shoes, what it will cost. The cutters are the masters, instead of the manufacturers under these conditions.

In many instances the cutters are given the leather just as it comes from the tanner or leather merchant, without any re-grading either for size of leather or quality.

During the "World War" some manufacturers were greatly astonished when making shoes for the United States Government, because inspectors refused to pass shoes not cut scientifically. In one case no attention was paid to grading skins or in laying patterns to get the "stretch" right, nor the best part of the leather where it would have the most strain and wear. The manufacturer's excuse was "we cut just as we do for our regular trade." He did not know the least thing about good shoe cutting, and his cutters were in a fair way to forget all they knew. Yet this manufacturer has been a "money maker."

Within the last year, we have known of a manufacturer, who has made lots of money in twenty years manufacturing, who realized the fact that he could have saved thousands of dollars, had he sorted and re-graded his leather before giving it to his cutters.

The greatest difficulty that manufacturers and students have experienced in trying to create correct systems, has been the lack of any technical publications covering the subjects.

The first thing necessary is a knowledge of correct pattern values as they relate one to another.

Second, the cutting value of the leather.

At the Shoe and Leather Fair at Cambridge in 1910, Small, Nichols & Co., Inc., or rather its predecessor the Leather & Shoe Audit & System Company, created much interest by showing two long vamp patterns with the area of each marked thereon. They challenged any one to tell the necessary feet of leather required to cut a case of shoes out of some agreed size of leather.

No one could tell, neither could any one tell which pattern would require the greater number of feet, but all "guessed" that the smaller pattern should use less than the larger.

In reality the smaller pattern required more feet to cut than the larger. A student naturally will ask why? The answer is contour of pattern, or to use a cutter's term the "way it runs."

Up to that time, 1910, all cutting systems were based upon area alone, either by measurement of pattern; by using a percent up and down from a given size and width; by weight, or some other equally crude and inaccurate method.

This brings us to a point where it is necessary to start at the beginning and see what the elements are that make up an allowance for cutting that will be accurate.

If a student is to comprehend the problem of getting accurate Cutting Allowances, he must study styles and measurements of lasts. Most lasts are made with so called "Standard" measurements, which are supposed to fit the average feet, as standard clothes are made to fit average figures. However, there are a great many types of lasts, and even if they follow the "standard" measurements they are often varied in other ways to carry out individual ideas and different factory conditions, so that the patterns made to fit the lasts will grade differently, and thus vary in cutting costs.

When the actual area of patterns is used as a basis for allowances, it will be found that, while in some instances a large size of a certain width wastes a greater percentage of leather than a small size of the same width, in others the reverse will be true; that all sizes of any one width may waste the same percentage, but that the percentage for each different width will vary. The shape or contour of a pattern is the cause of these variations and not the

area, thus making it impossible to construct an accurate allowance system based upon a percentage table.

Percentage tables are usually based upon a certain size and width. A fixed variation is then used for each width, and each half size until the table is complete. The rate of increase of an allowance will therefore be incorrect, whenever the patterns fail to grade in the same ratio, which they rarely do. Again and again this inaccuracy has been found to exist, and while sometimes a cutter will find the allowance correct, many other times the allowance will be either more than needed or not enough.

There have been many instances of good cutters, and even foremen of cutting departments being sent to factories with such systems in use to get a job as a cutter, and to find out just how accurate the system was. These cutters thoroughly tested the allowances. They carefully examined the leather given to them to be sure of its quality, and that the footage totals were correct. They used great care in laying the patterns with the results described above.

Another method of weighing up the stock given out, and the cut stock returned, and putting the weight of cut stock against a $\%$ allowance, is a very simple and at the same time a very good check on the ability of the cutter. However, this method is subject to the fact that there may be patterns of the same size, but one will throw more waste than another.

Before the "L & S Method" was developed the originators of that system made a good many percentage charts based upon the average size, and as an illustration we publish two of them herewith. It is admitted that this method is better than the guess method many factories still use.

A
PERCENTAGE ALLOWANCE TABLE
 CLASS—WOMAN'S. AVERAGE SIZE, 4½
 WIDTH C

Size & Width	1	½	2	½	3	½	4	½	5	½	6	½	7	½	8
AAA	.709	.738	.767	.796	.825	.854	.883	.912	.941	.970	.999	1.028	1.057	1.086	1.115
AA	.731	.960	.789	.818	.847	.876	.905	.934	.963	.992	1.021	1.050	1.079	1.108	1.137
A	.753	.782	.811	.840	.869	.898	.927	.956	.985	1.014	1.043	1.072	1.101	1.130	1.159
B	.775	.804	.833	.862	.891	.920	.949	.978	1.007	1.036	1.065	1.094	1.123	1.152	1.181
C	.797	.826	.855	.884	.913	.942	.971	1.000	1.029	1.058	1.087	1.116	1.145	1.174	1.203
D	.819	.848	.877	.906	.935	.964	.993	1.022	1.051	1.080	1.109	1.138	1.167	1.196	1.225
E	.841	.870	.899	.928	.957	.986	1.015	1.044	1.073	1.102	1.131	1.160	1.189	1.218	1.247
F	.863	.892	.921	.950	.979	1.008	1.037	1.066	1.095	1.124	1.153	1.182	1.211	1.240	1.269

Width variation $\frac{22}{1000}$ of one percent

½ Size variation $\frac{29}{1000}$ “ “

Chart marked A was worked out from three test cuttings made on three different widths namely, B, C, D and the sizes used on each are as follows:

Sizes	3	3½	4	4½	5	5½	6
Pairs	2	2	2	2	2	2	2

Result of this test gave a variation between widths of 22-1000 and between one half size and another 29-1000.

Example of finding an allowance for a given shoe by above method.

The average size 4½, C width, we find by a test cutting, requires 2½ feet to cut one pair out of a given leather.

Sizes in lot to cut are	2	2½	3	3½	4	4½	5
Pairs on C width	1	2	2	2	2	2	1
Add the % as	.855	.884	.913	.942	.971	1.000	1.029
		.884	.913	.942	.971	1.000	

The pairs from 2 to 4 inclusive equal 8.275 x 2½ feet or 20.687 feet for the 9 Pairs.

The 2 Pair 4½ Size, 2½ x 2 equal 5.00 feet for the 2 pairs.

The 1 Pair 5 Size, 2½ x 1.029 equal 2.573 feet for the 1 Pair.

Total Allowance 28.260 Feet for 12 Pairs.

B
PERCENTAGE ALLOWANCE TABLE
 CLASS—MAN'S. AVERAGE SIZE, 7½

WIDTH C

Size & Width	.4		½		5		½		6		½		7		½		8		½		9		½		10		½		11		½	
AAA	.743	.766	.790	.813	.861	.884	.908	.931	.955	.979	1.003	1.028	1.053	1.078	1.104	1.129	1.154	1.180	1.205	1.230	1.255	1.280	1.305	1.330	1.355	1.380	1.405	1.430	1.455	1.480	1.505	1.530
	2.224	2.294	2.365	2.435	2.506	2.647	2.718	2.788	2.859	2.931	3.004	3.078	3.152	3.226	3.304	3.380	3.456	3.532	3.608	3.684	3.760	3.836	3.912	3.988	4.064	4.140	4.216	4.292	4.368	4.444	4.520	4.596
AA	.762	.786	.810	.834	.858	.882	.907	.931	.955	.979	1.003	1.028	1.052	1.078	1.104	1.129	1.156	1.182	1.209	1.236	1.263	1.290	1.317	1.344	1.371	1.398	1.425	1.452	1.479	1.506	1.533	1.560
	2.281	2.353	2.425	2.498	2.570	2.642	2.714	2.787	2.859	2.931	3.004	3.078	3.152	3.226	3.304	3.380	3.460	3.538	3.619	3.699	3.782	3.863	3.948	4.031	4.112	4.195	4.278	4.361	4.444	4.527	4.610	4.693
A	.781	.805	.830	.855	.880	.904	.929	.954	.979	1.003	1.028	1.053	1.078	1.104	1.130	1.156	1.182	1.208	1.236	1.263	1.290	1.317	1.344	1.371	1.398	1.425	1.452	1.479	1.506	1.533	1.560	1.587
	2.337	2.412	2.486	2.560	2.634	2.708	2.782	2.856	2.930	3.004	3.078	3.152	3.226	3.304	3.383	3.461	3.540	3.619	3.699	3.782	3.863	3.948	4.031	4.112	4.195	4.278	4.361	4.444	4.527	4.610	4.693	4.776
B	.800	.825	.850	.876	.901	.926	.952	.977	1.002	1.028	1.053	1.078	1.104	1.130	1.156	1.182	1.209	1.236	1.263	1.290	1.317	1.344	1.371	1.398	1.425	1.452	1.479	1.506	1.533	1.560	1.587	1.614
	2.394	2.470	2.546	2.622	2.698	2.773	2.849	2.925	3.001	3.077	3.153	3.229	3.304	3.383	3.461	3.540	3.619	3.699	3.782	3.863	3.948	4.031	4.112	4.195	4.278	4.361	4.444	4.527	4.610	4.693	4.776	4.859
C	.818	.844	.870	.896	.922	.948	.974	1.000	1.026	1.052	1.078	1.104	1.130	1.156	1.182	1.209	1.236	1.263	1.290	1.317	1.344	1.371	1.398	1.425	1.452	1.479	1.506	1.533	1.560	1.587	1.614	1.641
	2.452	2.529	2.606	2.684	2.762	2.839	2.917	2.994	3.072	3.150	3.227	3.305	3.383	3.461	3.540	3.619	3.699	3.782	3.863	3.948	4.031	4.112	4.195	4.278	4.361	4.444	4.527	4.610	4.693	4.776	4.859	4.942
D	.837	.864	.890	.917	.944	.970	.997	1.023	1.050	1.076	1.103	1.129	1.156	1.182	1.209	1.236	1.263	1.290	1.317	1.344	1.371	1.398	1.425	1.452	1.479	1.506	1.533	1.560	1.587	1.614	1.641	1.668
	2.508	2.587	2.667	2.746	2.825	2.905	2.984	3.064	3.143	3.222	3.302	3.381	3.461	3.540	3.619	3.699	3.782	3.863	3.948	4.031	4.112	4.195	4.278	4.361	4.444	4.527	4.610	4.693	4.776	4.859	4.942	5.025
E	.856	.883	.911	.938	.965	.992	1.019	1.046	1.073	1.101	1.128	1.155	1.182	1.209	1.236	1.263	1.290	1.317	1.344	1.371	1.398	1.425	1.452	1.479	1.506	1.533	1.560	1.587	1.614	1.641	1.668	1.695
	2.565	2.646	2.727	2.808	2.889	2.971	3.052	3.133	3.214	3.295	3.376	3.458	3.539	3.620	3.701	3.782	3.863	3.948	4.031	4.112	4.195	4.278	4.361	4.444	4.527	4.610	4.693	4.776	4.859	4.942	5.025	5.108
F	.875	.903	.931	.958	.986	1.014	1.042	1.069	1.097	1.125	1.153	1.180	1.208	1.236	1.264	1.291	1.318	1.346	1.374	1.402	1.430	1.458	1.486	1.514	1.542	1.570	1.598	1.626	1.654	1.682	1.710	1.738
	2.621	2.704	2.787	2.870	2.953	3.036	3.119	3.202	3.285	3.368	3.451	3.534	3.617	3.700	3.783	3.866	3.949	4.032	4.115	4.198	4.281	4.364	4.447	4.530	4.613	4.696	4.779	4.862	4.945	5.028	5.111	5.194

Chart marked B was constructed from Planimeter readings of the actual areas of the patterns causing the following variations between half sizes.

Width	AAA	.0231
“	AA	.024
“	A	.02415
“	B	.025
“	C	.026
“	D	.02615
“	E	.027
“	F	.0277

The upper sets of figures show the percentages. The lower ones the per pair cutting allowance for a man's whole Quarter Blucher out of a certain leather.

It is a long tedious and expensive method to get allowances by actual test cuttings of various leathers and patterns, and it is subject to many inaccuracies, as we have shown. The quality of the skin, or side, as well as the size must be taken into consideration, for it is a well known fact, that other things being equal, the larger the leather the less feet necessary to produce a case of shoes, and the smaller the leather the greater the feet necessary.

While this method of covering sizes and widths is practical in some shops, it is not accurate, as will be acknowledged by any shops cutting solid sized cases, where the top job, and vamp job, are of different leathers.

When new patterns are used for a new sample, estimates must be made of the cost of upper leather and one necessary part of this cost is the foot estimate per pair. This can not be done satisfactorily by guess work, or by comparing with the eye the new pattern with some old pattern which has been in use, so a test cutting is usually made and there must be present a set of new patterns and all the leathers needed. These leathers must be of the proper or standard grades, and of the proper sizes. After this is accomplished the manufacturer has on hand a case of uppers, which must be used up.

Finally we come to the human element in the cutting. Different cutters will give different results, and the same cutter is confronted with different problems. Some of the new patterns to be tested are similar to old patterns, which he has been using, and

he can make a test cutting, which will be as reasonably correct a might be expected by this method. But when he is confronted with a new pattern which has one or more peculiarities which are not present in any old patterns with which he is familiar, he does not get a reasonably low allowance by his test, for no cutter can take an unfamiliar pattern or leather and on his first job get as good results as he will after making several cuttings.

In another system the basic allowances for the patterns are issued from the System Company's Home Office and it is necessary to send patterns or standards to this office in order to get the allowance. This, of course, subjects the manufacturer to delay and is apt to be a source of much annoyance.

Let us look at what may happen where the basic allowance comes from a distant office. The manufacturer receives an allowance which on some leathers he may be able to equal or beat, while on other leathers he may find it impossible to reach it. When this happens it is up to the manufacturer to make the different allowances for his different leathers by tests.

With this system is given a unique method of handling the allowances of a shoe including a tip, or back stay, or both, consisting of an arbitrary extra allowance for these parts which is to be added to the regular shoe allowance for all leathers. The allowance given for the tip is not enough to cut the tip alone. This principle is wrong for if the allowance for the different leathers vary for vamp or quarter, they naturally would vary for the other parts. In addition to this rather crude way of making the pattern allowances, the manufacturer has a rather complicated problem ahead of him in working out the proper allowances for all kinds, qualities and sizes of leather, which he has to cut. This problem is very important for these variations of leather frequently make a difference in the cutting allowance of fifteen percent or over.

PART I

L & S

Cutting Allowance System

CHAPTER I

CUTTING ALLOWANCE SYSTEM

Introduction

The correct cutting allowance for any and all leathers can be pre-determined by a system of mathematics.

For ninety percent of the leather cut, the correct allowance can be pre-determined by a SIMPLE system of mathematics.

It is impractical in the other ten percent to place an allowance, for this small percent is largely culled leather.

To construct this SIMPLE system of mathematics it is necessary first to analyze the problem and distinctly separate it into the different steps, the total of which will when combined produce a correct cutting allowance for any shape, size or combination of patterns, out of any size and quality of skin of this ninety percent of the leather manufactured.

Any one of the above mentioned three peculiarities of patterns, that is, shape, size, or the combination of patterns used in cutting, or the size of the piece of leather and its quality have a direct bearing upon the correct cutting allowance. When these peculiarities appear in different proportions, a different allowance is usually necessary.

No system of allowances can be correct unless all of these different conditions are taken into consideration. Hence the reason that so many cutting allowances are inaccurate, when put to practical use.

The innumerable combinations which will arise have usually puzzled the student or cutter, and they have felt no solution was possible; but by a knowledge of what each peculiarity of pattern or leather means to the cutting allowance, and by the proper application of the knowledge, a solution is easily and practically obtainable.

Mention was made above of the different steps necessary

to create a practical cutting allowance system for ninety percent of the leather manufactured.

They are given below:—

- A. Pattern Scaling.
- B. Waste Percent Chart.
- C. Basic Pattern Allowance Table.
- D. Size and Width Charts.
- E. Basic Leather Allowance Table.
- F. The Practical Use of the above Charts and Tables.

CHAPTER II

A. PATTERN SCALING

Description

Pattern Scaling is the finding of the smallest possible area that may be covered by one (1) pair of patterns of the average size and width.

The average size and width used in this treatise is shown below.

CLASS	SIZE	WIDTH	CLASS	SIZE	WIDTH
Men's	8	5	Women's	5	C
			Growing		
Boys'	5	5	Girls'	3	D
Youths'	2	5	Misses'	1	E
Little					
Gents'	12	5	Children's	11	E
			Infants'	7	E

Numerous illustrations are given herewith explaining the method used which is known as the L. & S. Method. It was originated by the Leather and Shoe Audit and System Co., later changed to Small, Nichols & Co., Incorporated.

Should any student desire personal instruction to clarify any subject matter in this book, he may consult Small, Nichols & Company, Inc., 183 Essex Street, Boston, Massachusetts.

The scale of a pattern is the area plus the absolute necessary waste.

The scaling may be divided into two steps; the first, the drafting of the pattern; the second, the measuring of the patterns drafted and the multiplying the two measurements to obtain the scale.

The following equipment is required:

Equipment

1. Drafting Board about 32 x 40 inches.

2. T square about 40 inches in length.
3. Right Triangle about 12 inches.
4. Paper for drafting; size about 30" x 38", and of a cheap quality and light weight, such as is often used for wrapping bundles.
5. Thumb tacks and hard lead drafting pencils.
6. The Pattern Criticising Machine is not absolutely necessary but very handy, and Scaling can be done much more rapidly and easily with the aid of it.
7. A Scale about two feet long with 200 divisions to a foot, and 400 for two feet. This scale should be read in thousandths of a foot.

Drafting

A person with experience in drafting will find this is very easy work. But, to the inexperienced a word of caution and advice. Keep the pencils sharp and always use a hard lead. Do not draft inside or outside of the edge of the pattern but directly below the edge, so that the draft will be the exact size of the pattern. Be careful in making corners. A soft pencil will make a difference varying as high as $2\frac{1}{2}\%$.

L. & S. SCALING METHOD

The fundamental principle of the L. & S. method of scaling patterns is illustrated by Figures 1 and 2.

FIGURE 1

Here are two squares of the same area, each .250 of a foot x .250 of a foot. One is placed adjacent to the other with no waste, and the scale of this pattern (which is always understood to be two patterns, as two patterns, at least, are always necessary for a pair) is .500 x .250 equaling .125 of a foot, or the lines AB x CB, which is also the area of these two squares.

FIGURE 2

Here are a number of circles, each of the same area as one of the squares of Figure 1. These circles, as is evident, are placed just as closely together as is possible. Now by connecting the centers of the four circles marked A, B, C, D, we have a parallelogram, the area of which is the scale of the circle AB x CB, or .487 x .280 equaling .13636 of a foot. Notice that the scale of the circle is more than the area of two circles, because there is a first waste which is represented in Figure 2 by the unshaded portion of the parallelogram ABCD. The exact area of two circles is represented by the shaded portion of the parallelogram, as is evident, for there is one complete circle within the parallelogram and four one-quarter circles which total two complete circles.

In Figure 1, the scale of the pattern and the area is the same, .125 of a foot. In Figure 2, the scale of the pattern is .13636, and the area, being the same as the square, is .125.

In Figure 2, the difference between the scale and the area, or the first waste is .13636-.125 or .01136 of a foot, or a little over 9% the area of the pattern.

The above demonstration is to bring out the fact that two patterns of different shapes may have the same area, but, in actual cutting one will take more than the other. The great important feature of the L. & S. Scaling System is that the area plus the first, or necessary waste, is shown in the scale.

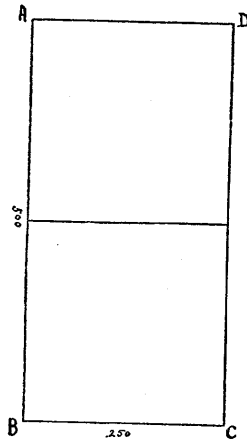


Figure 1

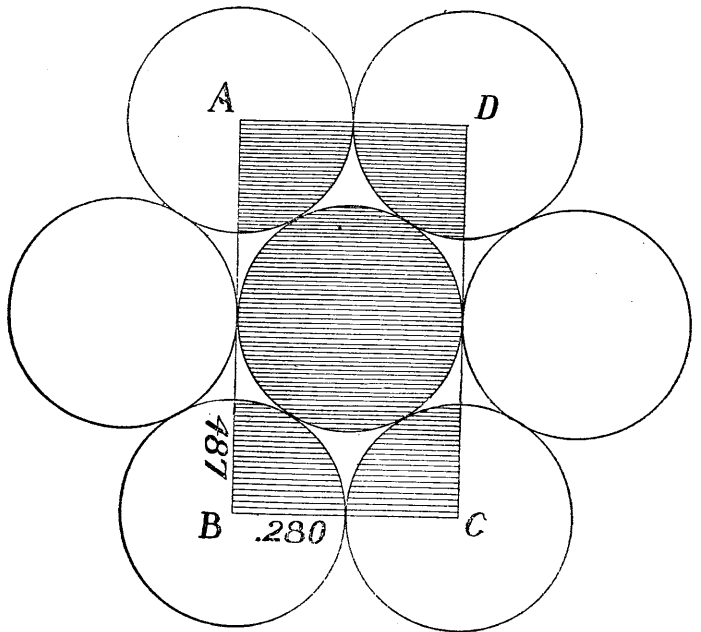


Figure 2

Now, if this pattern is to be cut, using clear stock, and the size of the stock is indefinitely large, then the cutting allowance will be the exact L. & S. Scale. But, stock is not indefinitely large, therefore, the necessity of the second waste. In cutting, the start is made by placing a pattern at an irregular edge of the stock, and it is soon found that in working to the other edge this second waste exists. This waste is taken care of by the Waste Percent Chart.

DRAFTING PATTERNS

Method One

Position 1

Lay the pattern in any position at about the center of the paper. Draft it accurately.

Position 2

Reverse the pattern just 180 degrees. Keeping it in the reversed position, fit it to Position 1, usually at the most irregular outline. Draft it.

Position 3

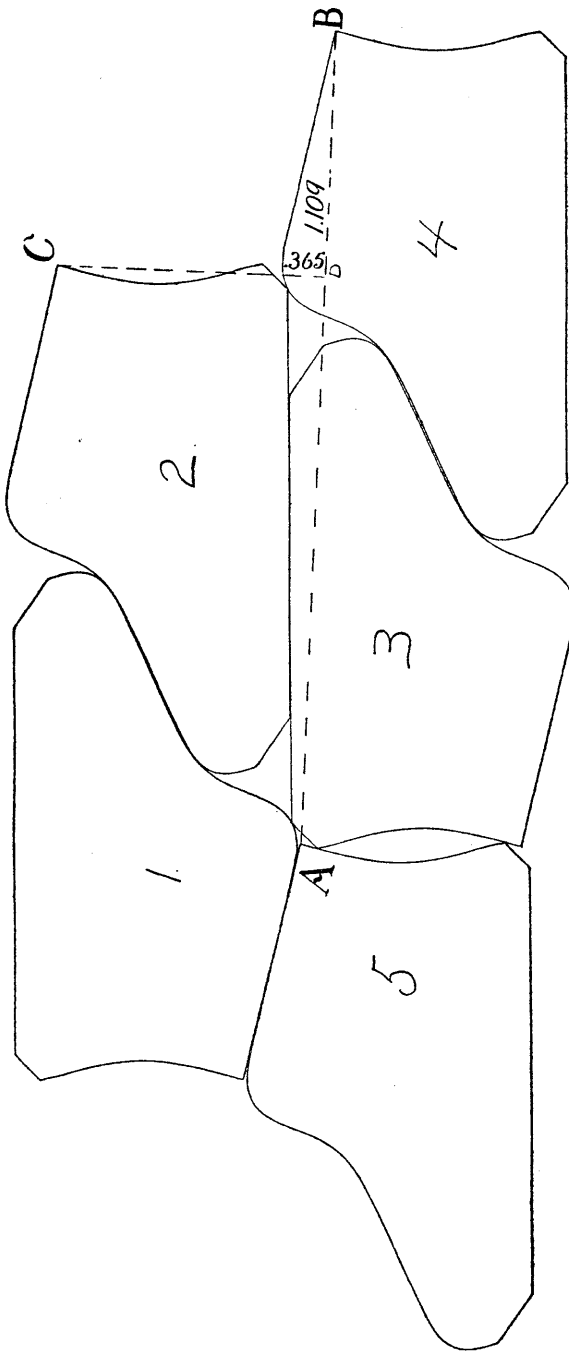
Reverse the pattern to direction of Position 1. Fit it closely against Positions 1 and 2. Draft it.

Position 4

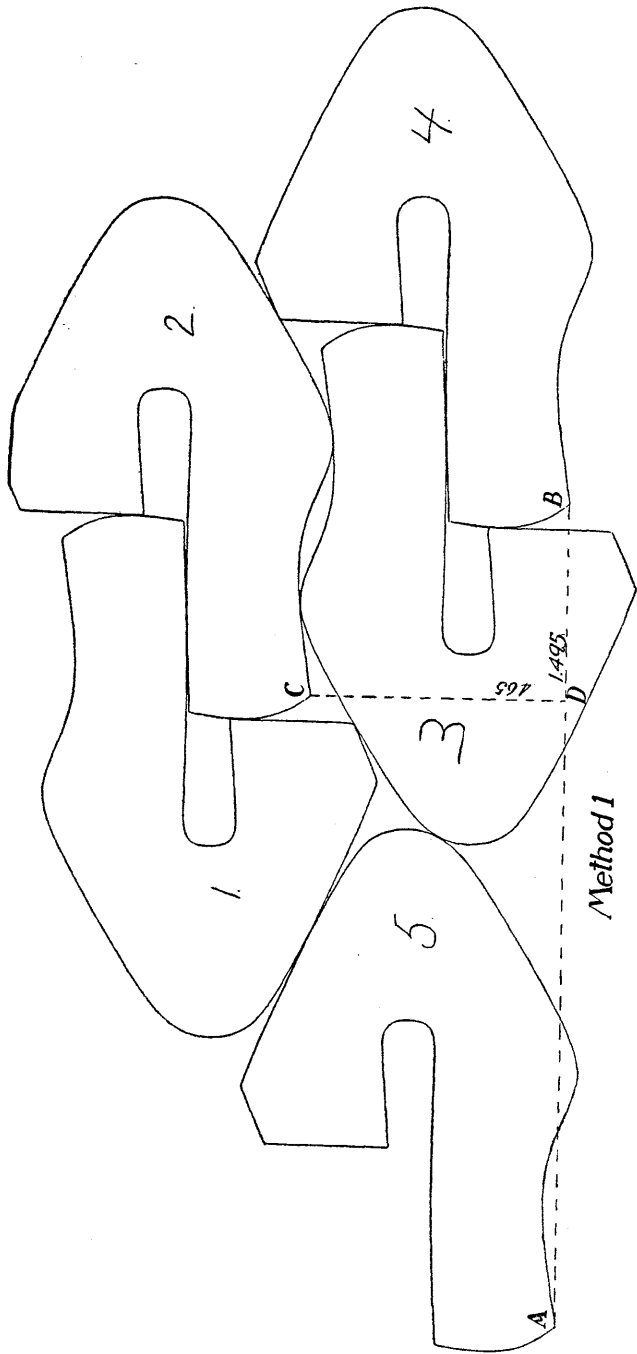
Reverse the pattern 180 degrees in the direction of Position 2. Fit the pattern to the Position 3 just as Position 2 fits upon Position 1 and note that the pattern will also touch another position. Draft it.

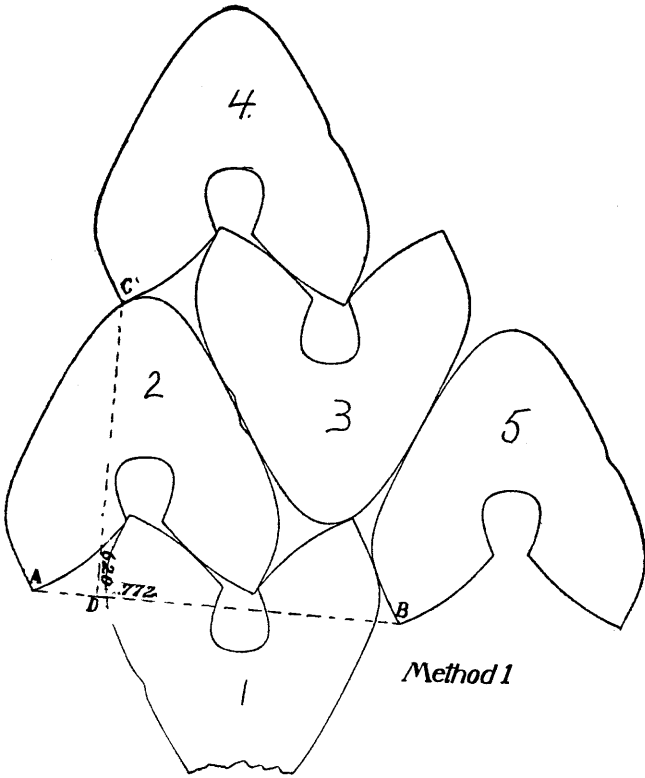
Position 5

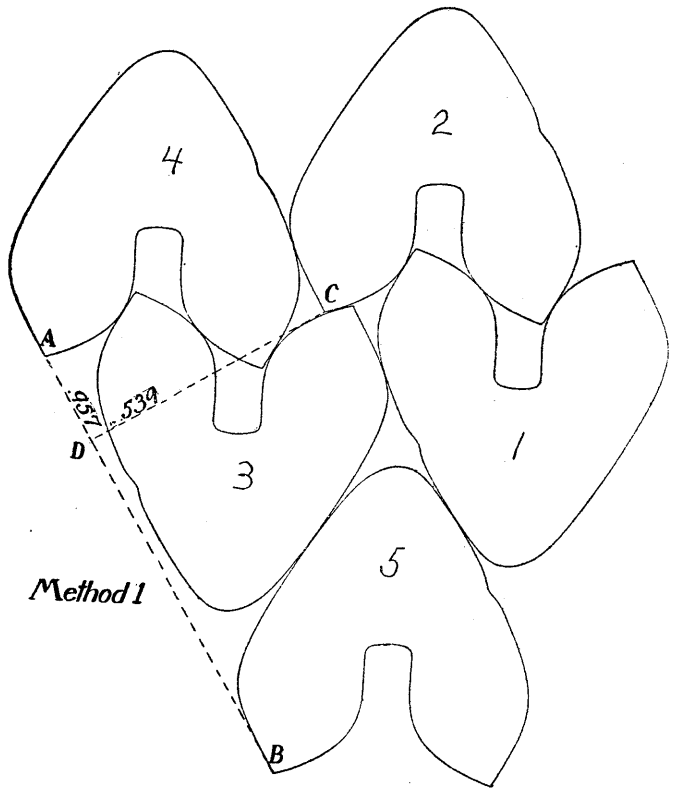
Do not reverse pattern but keep it in same direction as Position 4. On the opposite side of group from Positions 2 and 4 fit the pattern to Positions 1 and 3 so that drafting may be continued in the relative positions of 1 and 2. Draft it.

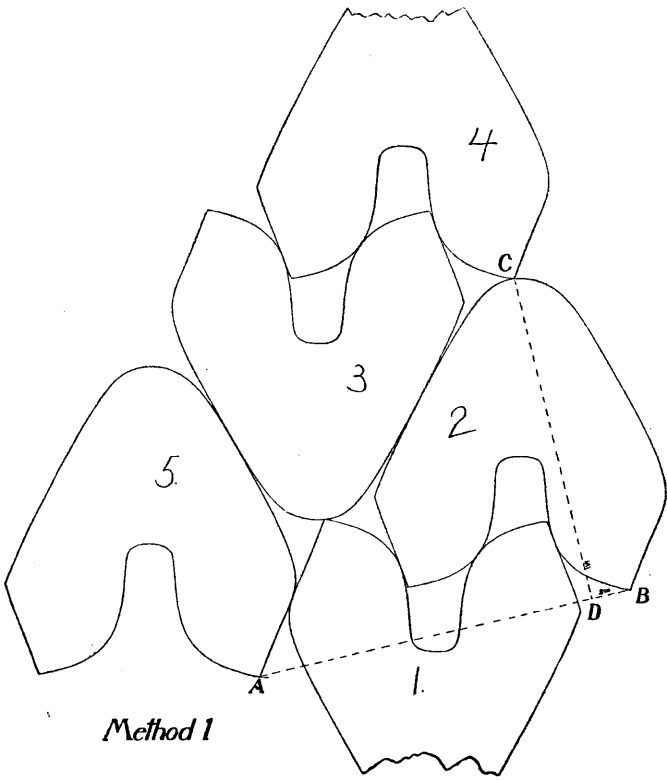


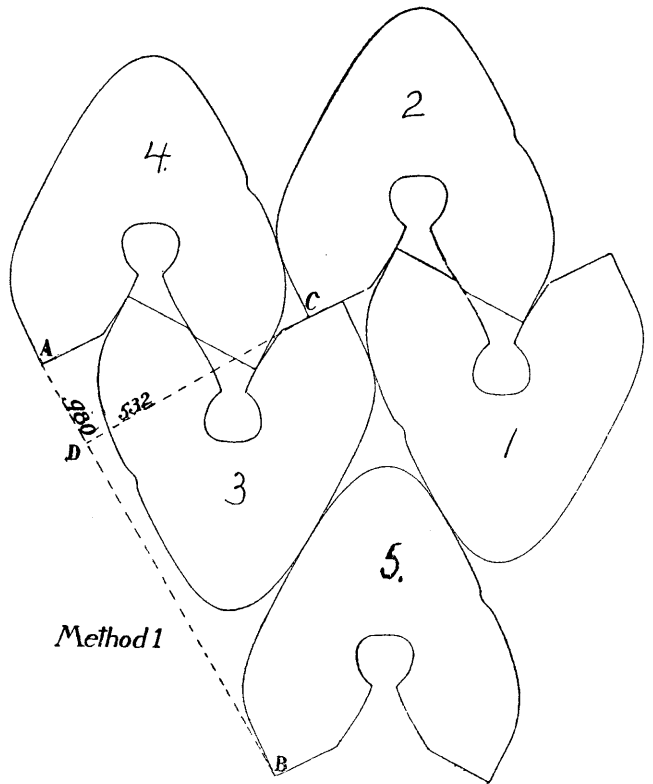
Method 1

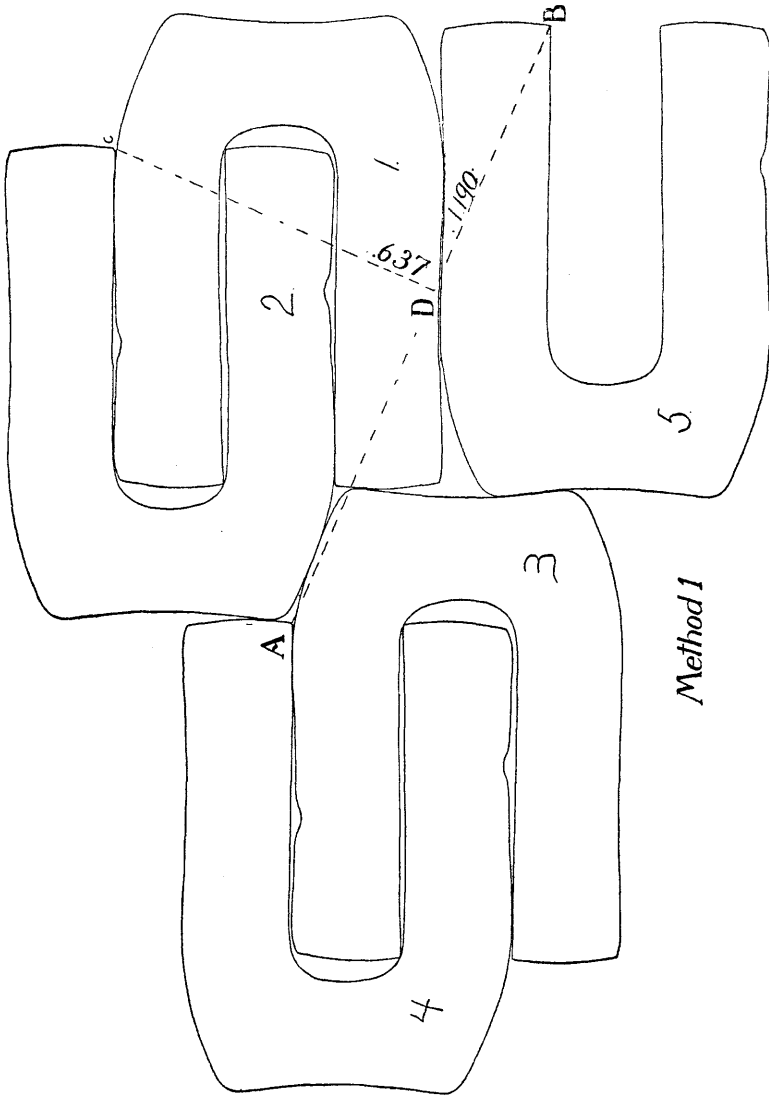


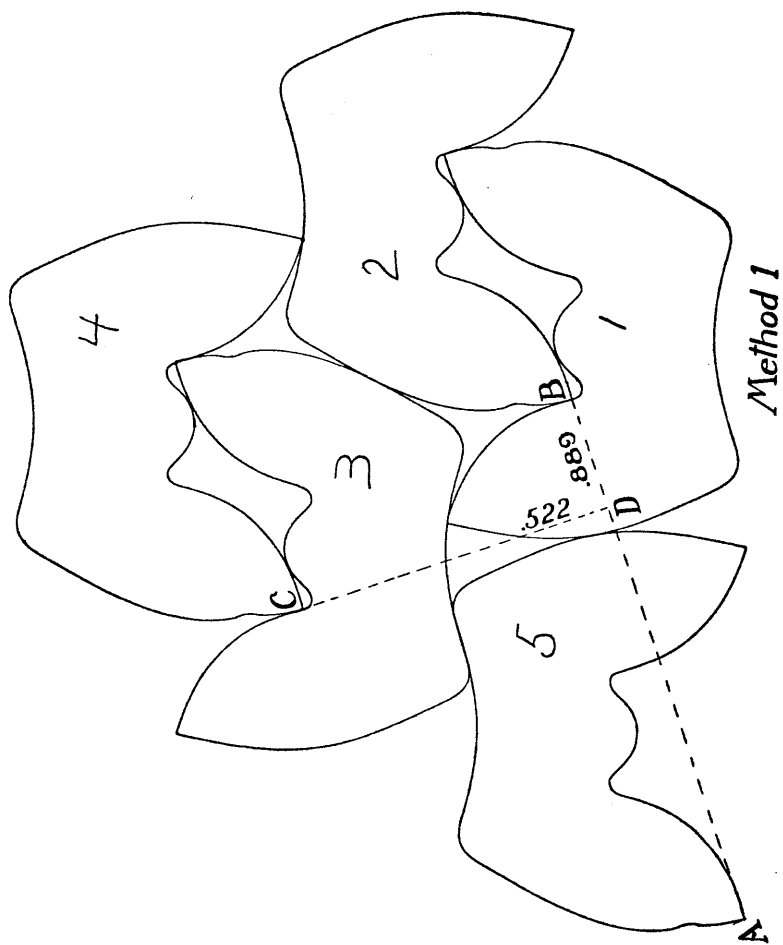


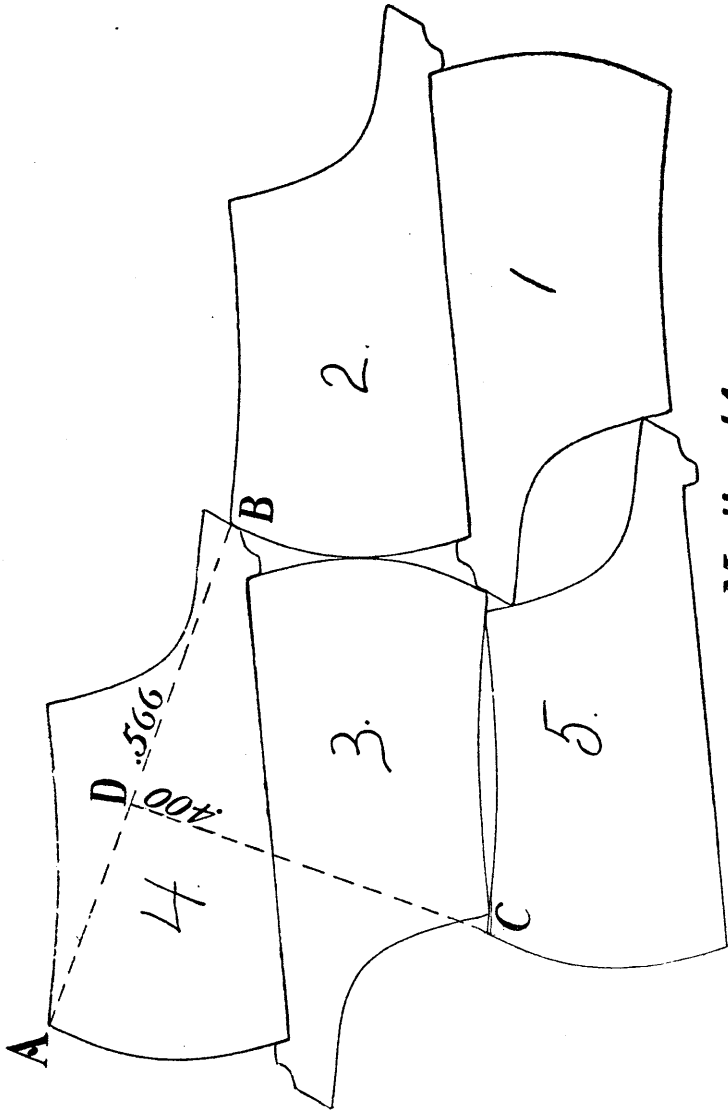




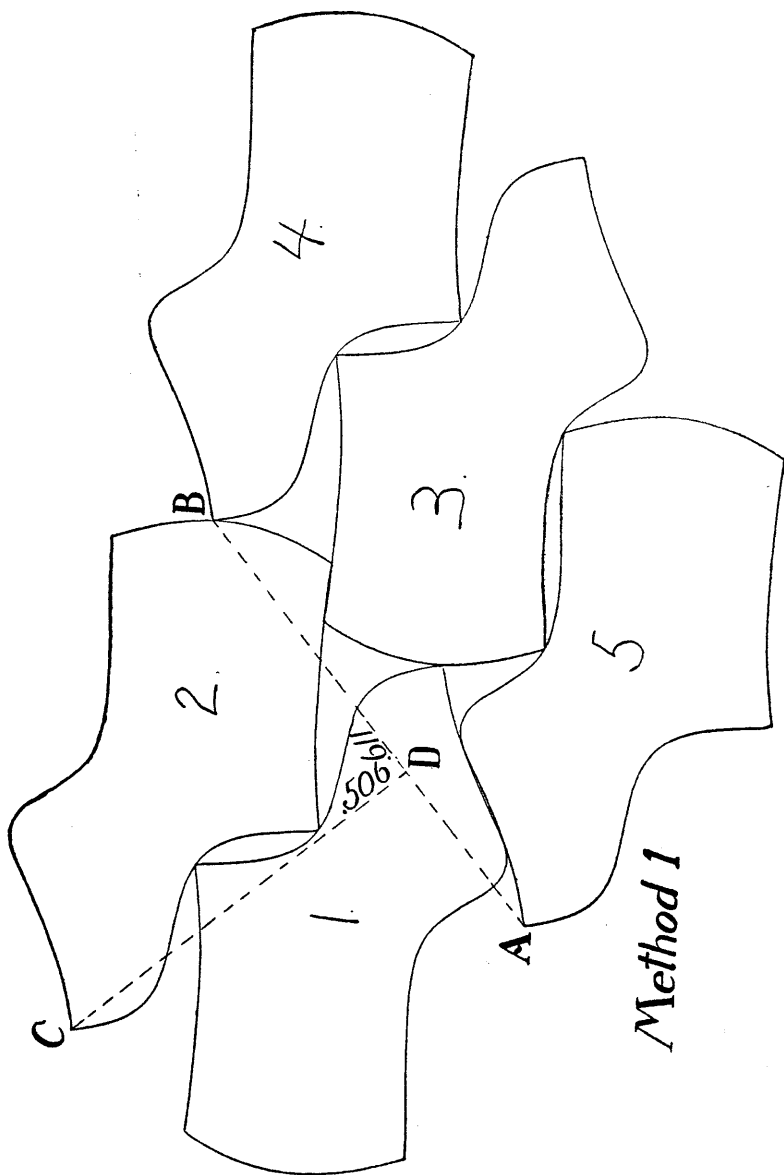


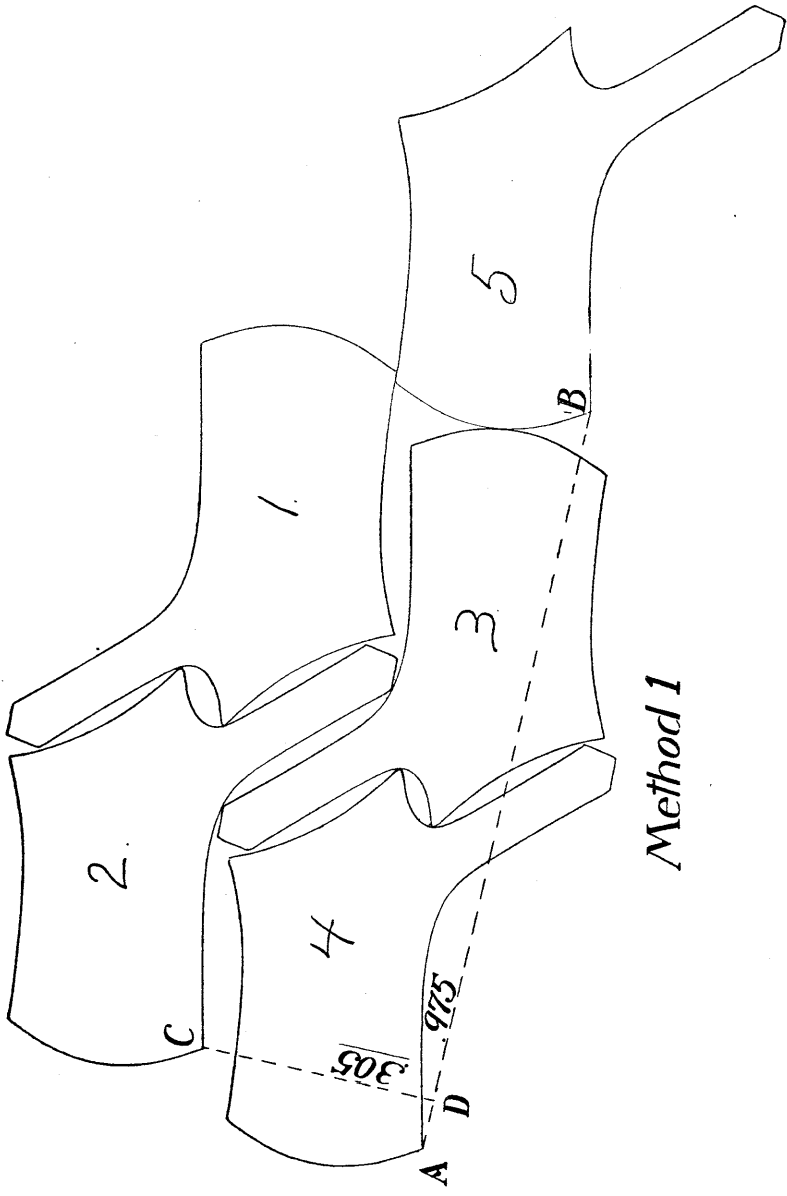




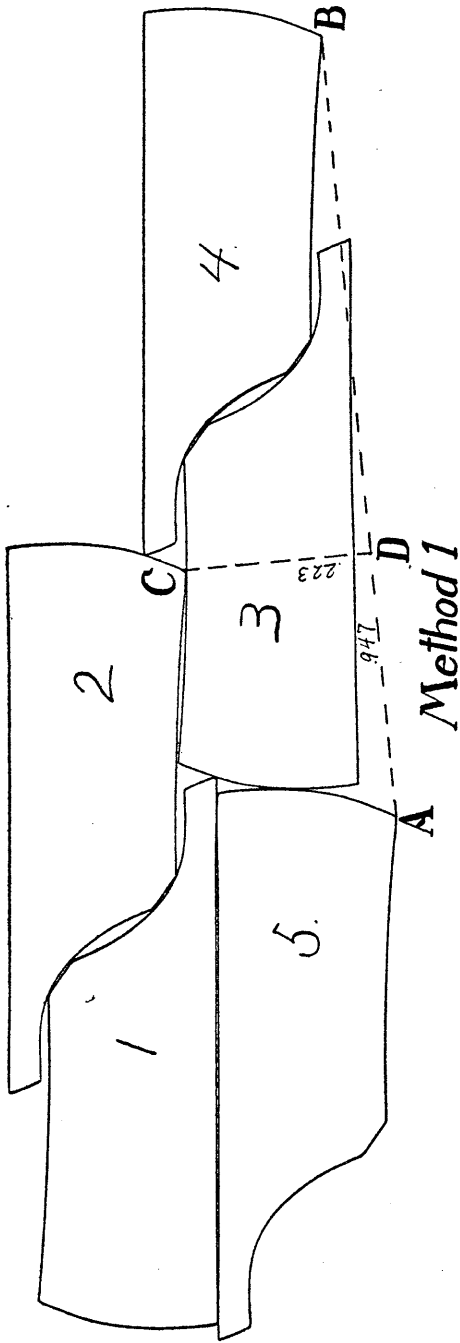


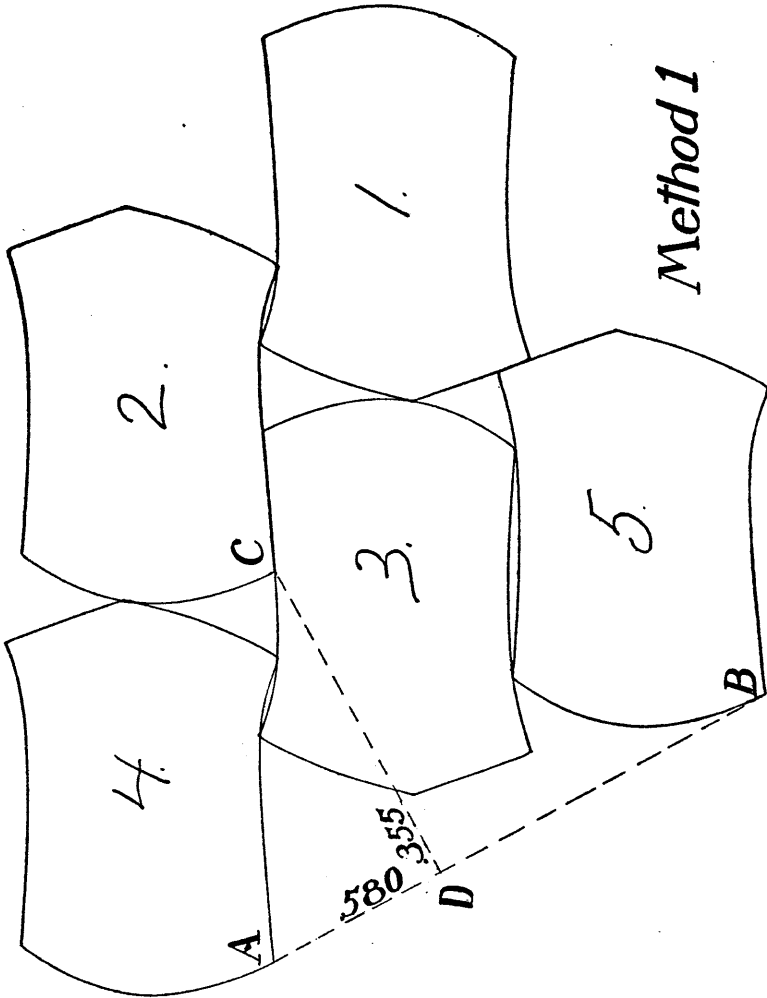
Method 1



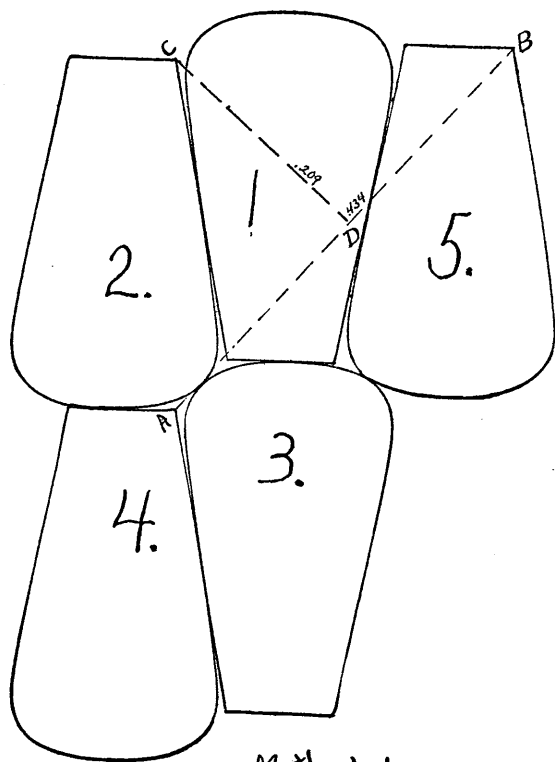


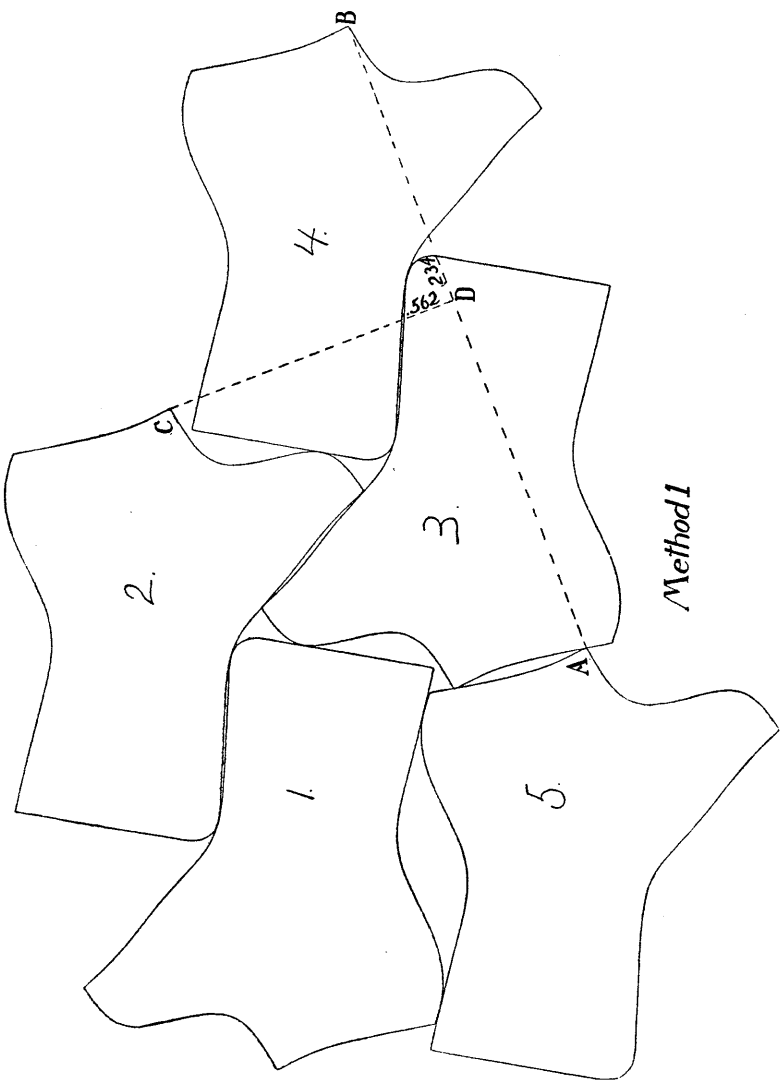
Method 1





Method 1





Method Two

Position 1

Lay the pattern in any position at about the center of the paper. Draft it accurately.

Position 2

Do not reverse pattern. Fit it to Position 1 at the most irregular outline. Draft it.

Position 3

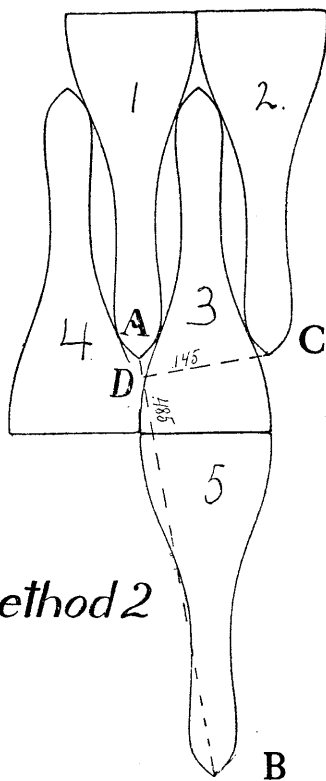
Reverse the pattern 180 degrees. Fit it closely to Positions 1 and 2. Draft it.

Position 4

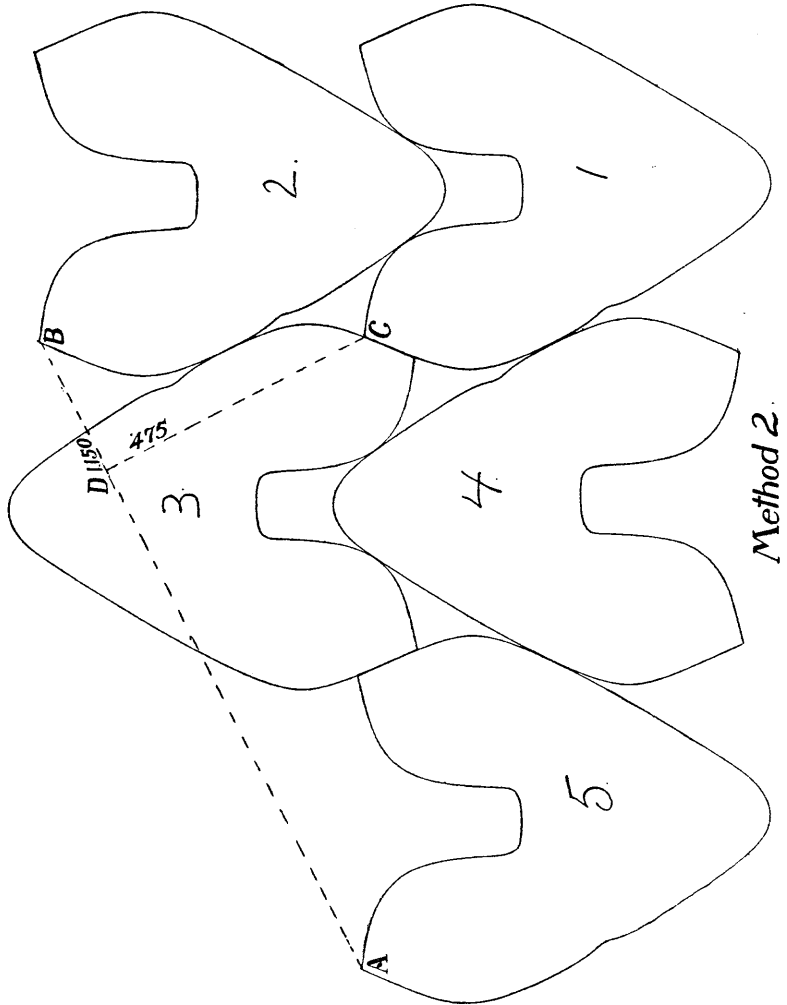
Do not reverse pattern. Fit it to Position 3 just as Position 2 fits Position 1 and note that the pattern will also touch another position. Draft it.

Position 5

Reverse the pattern 180 degrees in the direction of Position 1. On the opposite side of the group from Positions 1 and 2 fit the pattern to Position 3 and 4 so that drafting may be continued in the relative Positions 1 and 2. Draft it.



Method 2



Method 2.

Method Three

Position 1

Lay the pattern in any position at about the center of the paper. Draft it accurately.

Position 2

Reverse the pattern just 180 degrees. Keeping it in the reversed position, fit it to Position 1, usually at the most irregular outline. Draft it.

Position 3

Reverse the pattern in the direction of Position 1. Fit it closely against Positions 1 and 2. Draft it.

Position 4

Reverse the pattern 180 degrees in the direction of Position 2. Fit the pattern to the Positions 1 and 2 on the side opposite Position 3 but in a relative manner. Draft it.

Position 5

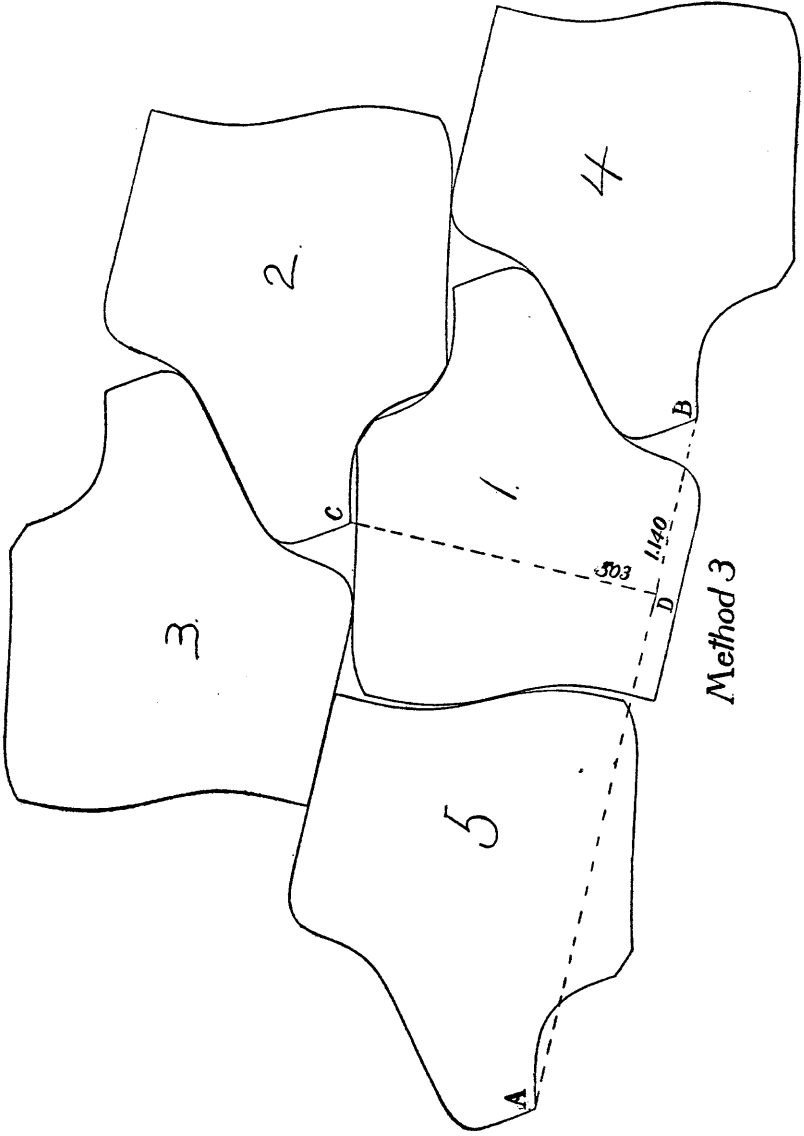
Do not reverse pattern but keep it in the same direction as Position 4. Opposite the group from Positions 2 and 4 fit the pattern to Positions 1 and 3 so that drafting may be continued in the relative position of 1 and 2. Draft it.

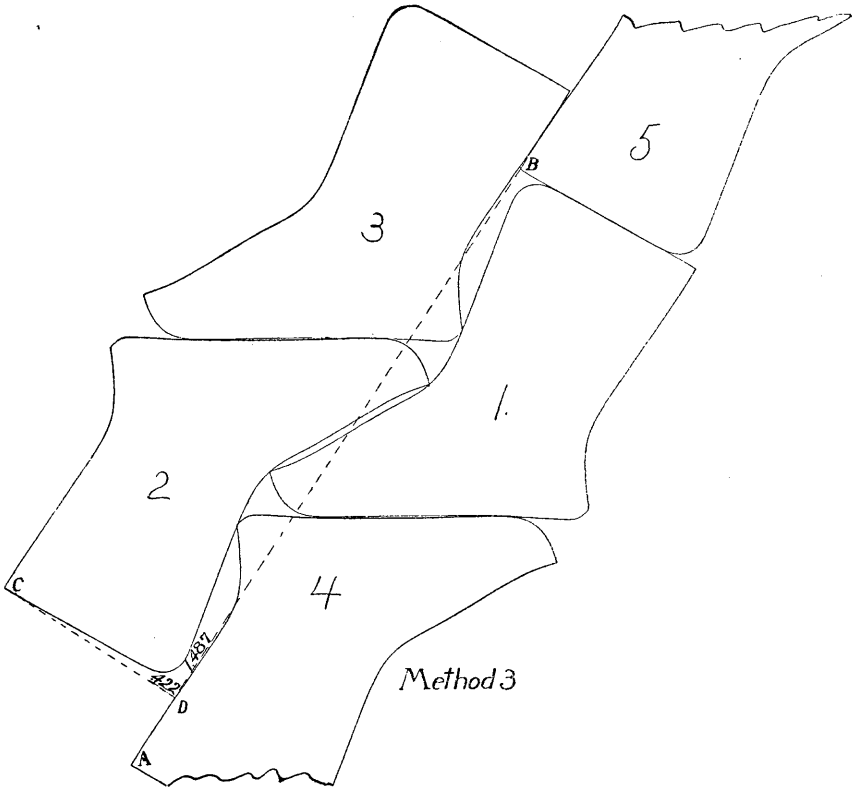
METHOD OF MAKING MEASUREMENTS

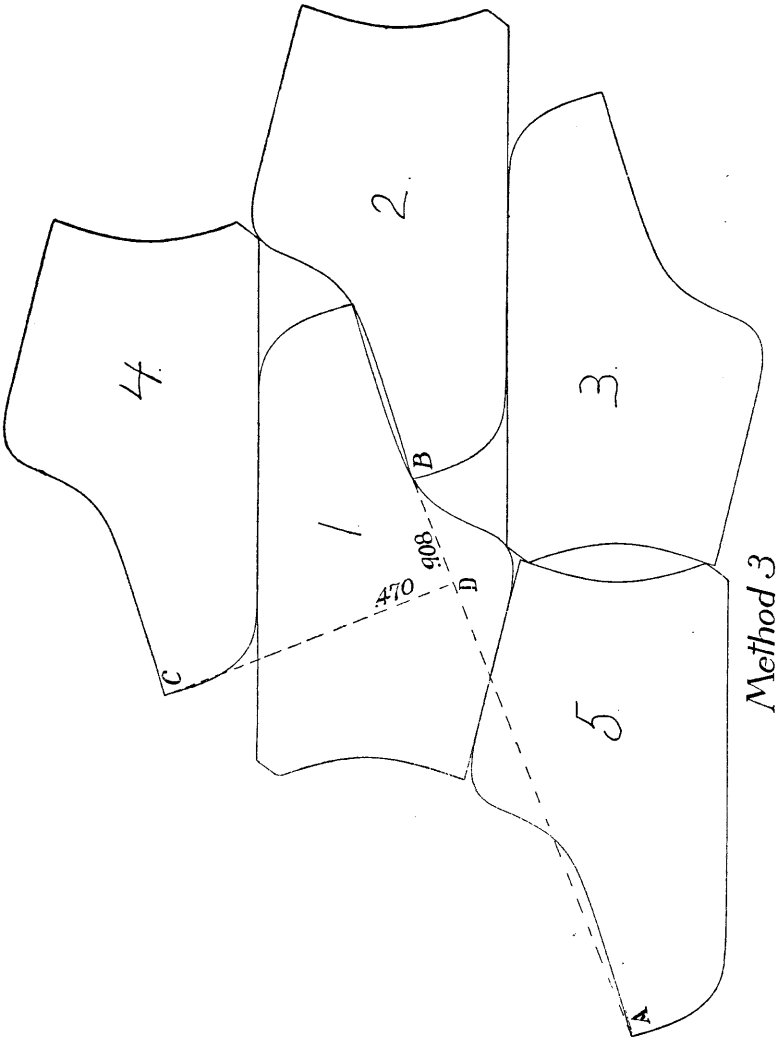
All measurements will be made from a corresponding point on each of the three positions that are facing in the same direction.

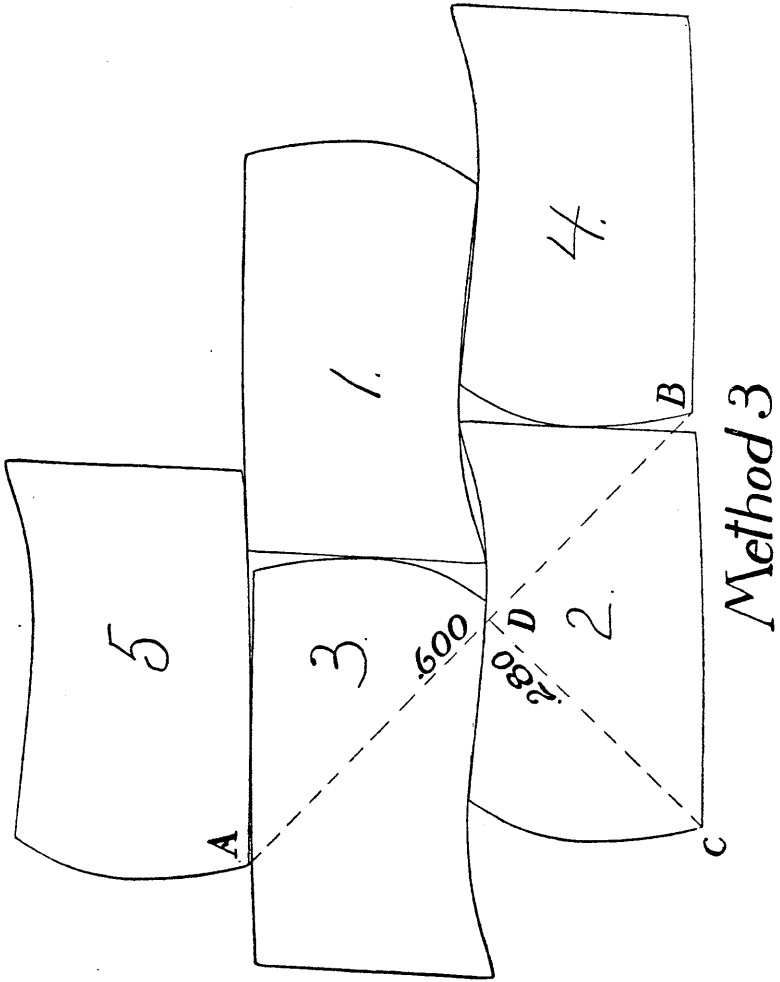
Draw a straight line connecting two of these points which will be called A & B, and from the third point called C, drop a perpendicular to the line AB. The perpendicular is called CD.

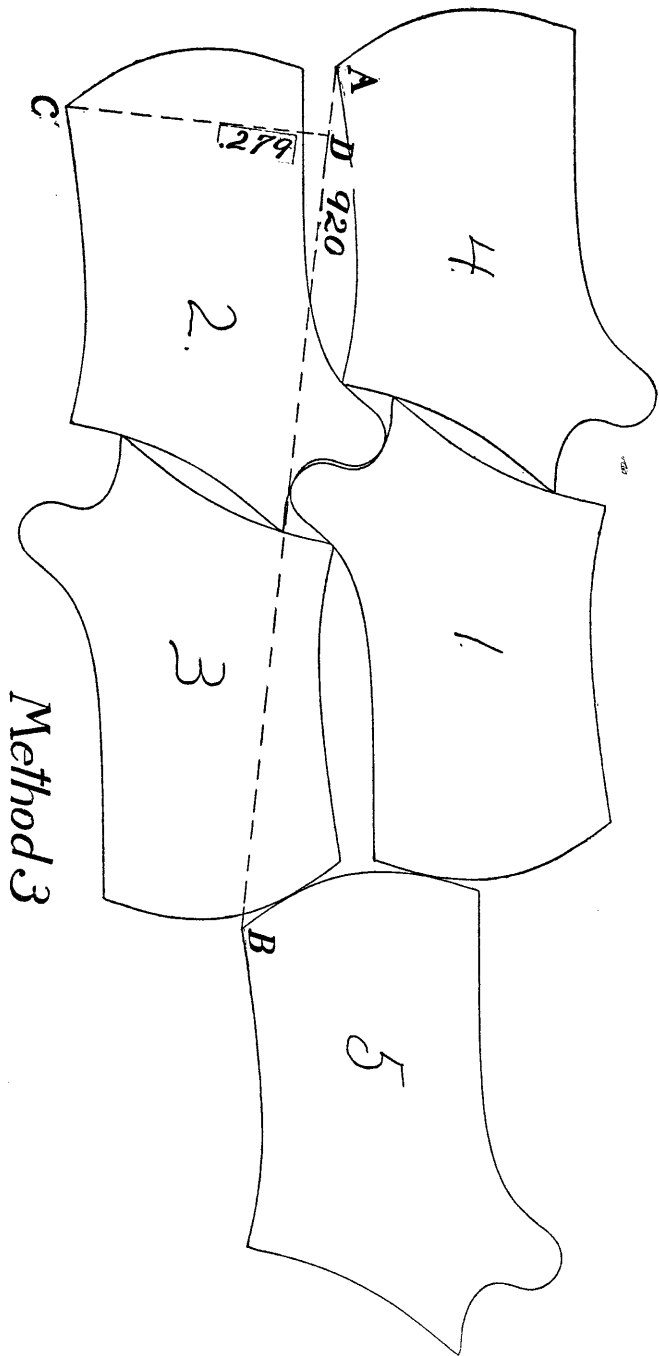
Measure the lines AB and CD and multiply one by the other.

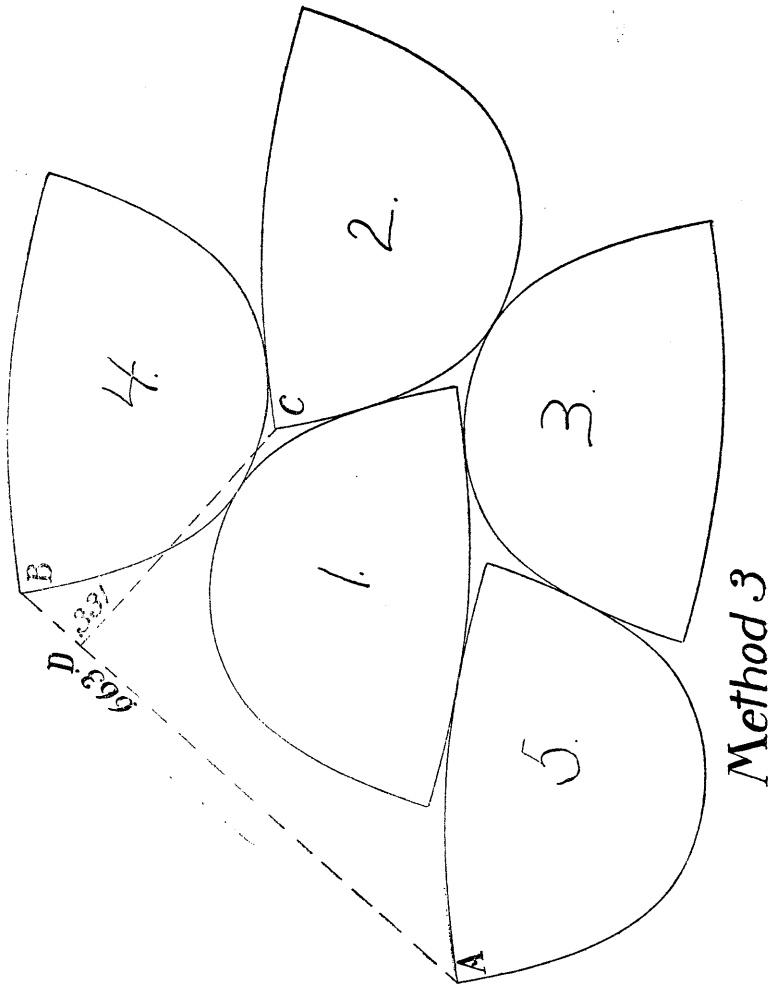


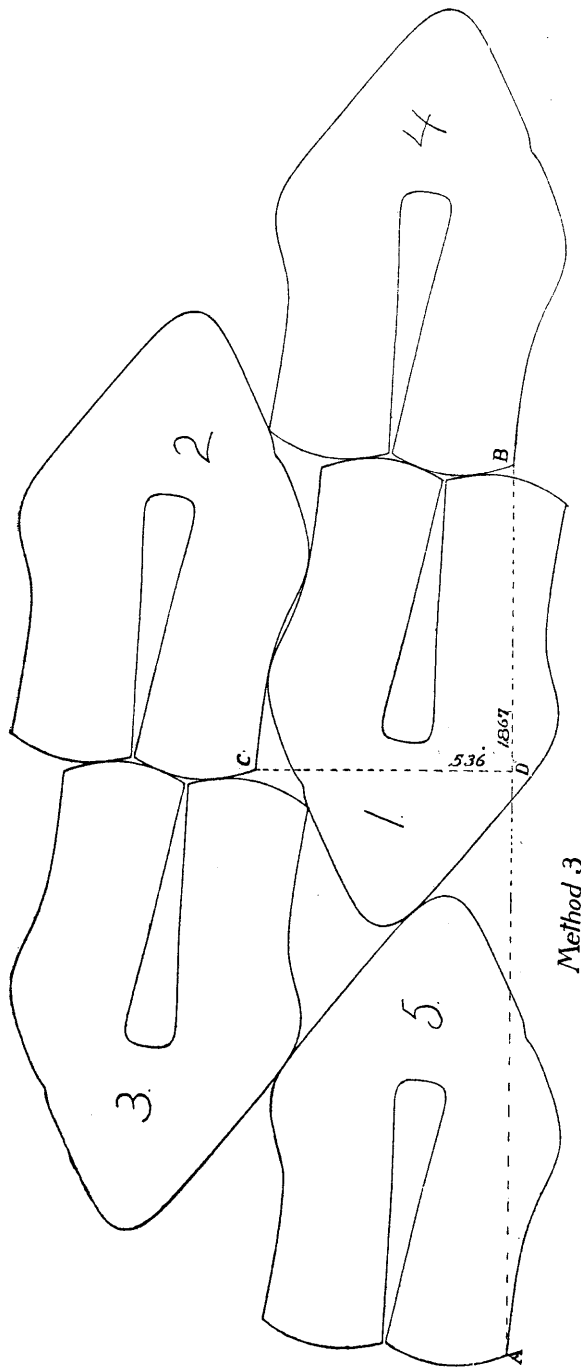












Method 3

The result is the area of two patterns which have been scaled plus the first waste.

This may be easily proven by connecting points A & C and completing a parallelogram by a line from point C parallel to AB, and a line from point B parallel to AC, then continue drafting positions until the parallelogram is filled up as far as possible with positions.

It will then be seen that included in the parallelogram are several parts of patterns. Cut these out, fit them together, and two complete patterns, no more, no less, will be found.

B. WASTE PERCENT CHART

Scale	3	4	5	6	7	8	10	12	15	20	25	30
050	230	218	210	205	201	196	190					
075	243	235	225	219	213	209	202	196	190			
100	264	250	239	230	224	218	210	205	199	190		
125	275	261	250	240	233	227	219	211	205	196	190	
150	283	270	259	250	242	235	226	218	210	202	196	190
175	290	277	266	257	250	243	232	225	216	207	200	194
200	297	283	272	264	256	250	239	230	221	210	204	199
250	308	293	283	275	268	261	250	240	230	218	210	205
300	317	303	291	283	276	270	259	250	239	226	217	210
350	323	310	299	289	283	278	267	258	240	232	223	216
400	332	317	306	297	289	283	272	264	253	239	229	221
450	340	321	311	303	292	288	278	270	259	245	235	226
500	350	330	317	308	300	293	283	275	264	250	239	230
550	360	335	320	312	305	298	288	280	269	254	243	234
600	390	340	326	317	309	303	291	283	272	259	247	239
650	420	348	330	320	313	307	295	287	277	263	252	243
700	450	350	338	324	317	310	299	290	280	267	256	247
750	500	370	340	329	320	313	303	293	283	270	259	250
800	602	390	346	332	323	317	306	297	286	272	265	254
900	650	423	360	339	330	322	311	303	291	278	268	259
1000	750	500	390	350	338	329	317	308	297	283	272	264
1250	930	680	500	410	357	345	329	317	308	293	283	275
1500	1125	800	690	500	415	370	339	329	317	303	291	283

The figures under 3 to 30 should have a prefix of one and a decimal point (1.). These were left off in order to reduce the size of the chart. Example 230 should read 1.230.

CHAPTER III

B. WASTE PER CENT CHART

Description

This is a standard chart and can be used in any Shoe Factory.

1. The top horizontal line represents different sizes of leather from three (3) feet to thirty (30) feet inclusive.
2. The left hand vertical column represents different scales of one (1) pair of patterns from .05 of a foot to 1.5 of a foot inclusive.
3. The balance of figures represent the per cent of waste which it will be necessary to add to the scale of one (1) pair of patterns to give the correct cutting allowance for clear cutting leather. (See E. Basic Leather Allowance Table, 2B-AA.)

Note: The rule for finding the waste per cent whether it be an individual pattern or a combination of patterns is as follows:

Method of Finding Waste Per Cent

Divide the scale of the pattern (See A. Pattern Scaling) by one half ($\frac{1}{2}$) of the number of pieces to the pair and use the result as a Scale.

From the left hand column (B. Chart) select the number nearest to the scale of the pattern desired and opposite it on the horizontal line, under the size of leather nearest the one desired, read the answer.

Example

Vamp Pattern (Two pieces to one pair.)

Scale .4650. Size of Leather 20 feet.

Divide .4650 by 1; result .4650. Find the nearest number which is .450, read under 20. Answer .245.

Were it four (4) pieces to one (1) pair. Scale .4650.

Size of Leather 20 feet. Divide .4650 by 2; result .2325.

Find nearest number which is 250, read under 20. Answer .218.

Notice the result of the two examples. The pattern with two pieces to the pair gives a higher waste percent than the same pattern with four pieces to the pair.

If we use the quarter of this same pattern, the example will work out as follows:

Example

Quarter Pattern (Four pieces to one pair).

Scale 1.0972. Size of Leather 20 feet.

Divide 1.0972 by 2; result .5486. Find the nearest number which is 550, read under 20. Answer .254.

CHAPTER IV

C. BASIC PATTERN ALLOWANCE TABLE

Introduction

The purpose of this Table is to obtain and show the Basic Allowance for each part of a pattern, and also the individual parts of the pattern combined for the whole shoe. Many tables may be needed to provide for all classes, types, and styles of patterns in a shoe factory, but only one is needed here to illustrate the method.

In constructing this Table refer to A. Pattern Scaling for the scale of the pattern, and to B. Waste Per Cent Chart for the per cent to add to the scaling figures, which is here done by prefixing 1. to the waste percent and multiplying the scale of the pattern by it.

In the actual use of B. Chart in a shoe factory it is best to use a size of leather which is as large as any leather that is usually used in the factory.

In all the illustrations in this book, a twenty (20) foot size of leather is the standard for getting the Basic Pattern Allowance.

C. BASIC PATTERN ALLOWANCE TABLE

Combination Number 160

Types of Pattern—Men's Pressed Whole Quarter Blucher,
Cut off Vamp, Pressed Tip, 8 Size, 5 Wide.

PATTERN PARTS	SCALE SEE A.	%	WASTE B CHART	FEET ALLOWANCE
No. 159 Vamp	.4650	X	1.245	= .58
No. 152 Tip	.2161	X	1.210	= .26
No. 159 Quarter	1.0972	X	1.254	= 1.38
Whole Shoe	1.7783	X	1.245	= 2.21
No. 12 Back Stay	.0826	X	1.180	= .10
Whole Shoe with Back Stay	1.8609	X	1.232	= 2.29

Description

1. Combination Number 160 indicates a type of pattern necessary to construct a certain shoe. In this particular case, the type is represented by using parts of three patterns which are shown under Pattern Parts.

2. The left hand column shows the different pattern parts combined to make this type shoe.

3. The second column shows the scale of each part of the pattern which will be the same in any type, but different in total when added together in the various combinations.

4. The third column represents the waste per cent for each pattern as shown in B. Chart opposite the scale of pattern nearest the one desired and under the twenty (20) foot size of leather column plus 1.00.

Note: If there are four (4) pieces to a pair as is the case with the Blucher quarters, use as the scale of the pattern twice the scale of two pieces.

This column also shows the waste per cent (plus 1.00) of the different combinations which is obtained by dividing the sum of the scale by one-half ($\frac{1}{2}$) the number of pieces in a pair and then using the result as a scale for finding the waste per cent opposite it on B. Chart.

5. The fourth column shows the basic pattern allowance for one pair, for each part, and the different combinations, and is obtained by multiplying column No. 2 by column No. 3.

CHAPTER V

D. SIZE AND WIDTH CHARTS

Description

The purpose of this chart is to show the relative size and width value of any size of any width, to the Basic size. The Basic size used here is a man's size 8, width 5.

All the printed matter on these charts is standard and can be used for any shoe factory.

The left hand vertical column represents the number of pairs from one (1) to thirty-six (36) inclusive.

The balance of the printed figures represent the size value of the number of pairs as represented by the figure in the left hand column opposite and for the size directly above.

A separate chart must be made for each width of each class of shoes, whether Men's, Boys', Youths', Little Gents', Women's, Growing Girls', Misses', Children's, and Infants', or any other class of construction.

This information must be filled in at the top as described hereafter for each individual factory and type of shoes.

METHOD OF FILLING IN D CHART WITH CLASS, WIDTH, AND RUN OF SIZES

It has already been decided what size and width of each class and style is to be scaled. In this case a Man's Blucher, Size 8, Width 5.

Select the chart with 0 in the lower right hand corner, and head it Men's, 5 wide.

Then over the vertical column of printed figures under which is * insert the size which has been scaled. In this case it is size 8. Over the next column to the right insert $8\frac{1}{2}$, over the next column 9, and continue until the largest size necessary is entered.

Work from the size 8 to the left in the same manner, entering in the next column $7\frac{1}{2}$, and continue until the smallest size necessary is entered.

Now to fill in the chart for 6 wide, take the chart marked + 1 in the lower right hand corner and fill in the class, Men's, Width 6. Then copy from the 5 Wide Chart the sizes, placing them over the corresponding columns as in the 5 Wide Chart.

For the	6	wide	select	chart	marked	+1.
“	“	7	“	“	“	+2.
“	“	8	“	“	“	+3.
“	“	4	“	“	“	-1.
“	“	3	“	“	“	-2.
“	“	2	“	“	“	-3.
“	“	1	“	“	“	-4.

D. SIZE AND WIDTH CHART

	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12
1	8	8	9	9	9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.3
2	1.6	1.7	1.7	1.8	1.8	1.9	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.5	2.6
3	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.8
4	3.1	3.2	3.3	3.4	3.6	3.7	3.8	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.8
5	3.9	3.0	4.2	4.3	4.4	4.6	4.7	4.9	5.0	5.1	5.3	5.6	5.7	5.8	6.1
6	4.7	4.8	5.0	5.2	5.3	5.5	5.7	5.8	6.0	6.2	6.3	6.5	6.7	7.0	7.2
7	4.4	5.6	5.8	6.1	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2
8	6.2	6.4	6.7	6.9	7.1	7.3	7.6	7.8	8.0	8.2	8.5	8.7	9.0	9.3	9.6
9	7.0	7.2	7.5	7.8	8.0	8.2	8.5	8.8	9.0	9.3	9.5	9.8	10.0	10.3	10.5
10	7.8	8.0	8.3	8.6	8.9	9.2	9.4	9.7	10.0	10.3	10.6	10.9	11.1	11.4	11.7
11	8.5	8.8	9.2	9.5	9.8	10.1	10.4	10.7	11.0	11.3	11.6	11.9	12.2	12.5	12.8
12	9.3	9.7	10.0	10.3	10.7	11.0	11.3	11.7	12.0	12.3	12.7	13.0	13.3	13.7	14.0
13	10.1	10.5	10.8	11.2	11.5	11.9	12.3	12.6	13.0	13.4	13.7	14.1	14.5	14.8	15.2
14	10.9	11.3	11.7	12.0	12.4	12.8	13.2	13.6	14.0	14.4	14.8	15.2	15.6	16.0	16.4
15	11.6	12.1	12.5	12.9	13.3	13.7	14.2	14.6	15.0	15.4	15.8	16.3	16.7	17.1	17.5
16	12.4	12.9	13.3	13.8	14.2	14.7	15.1	15.6	16.0	16.5	16.9	17.3	17.8	18.2	18.6
17	13.2	13.7	14.1	14.6	15.1	15.6	16.1	16.5	17.0	17.5	18.0	18.4	18.9	19.4	19.9
18	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0
19	14.7	15.3	15.8	16.3	16.9	17.4	17.9	18.5	19.0	19.5	20.1	20.6	21.1	21.7	22.2
20	15.5	16.1	16.6	17.2	17.9	18.3	18.9	19.4	20.0	20.6	21.1	21.7	22.2	22.8	23.4
21	16.3	16.9	17.5	18.1	18.7	19.2	19.8	20.4	21.0	21.6	22.2	22.8	23.4	23.9	24.5
22	17.1	17.7	18.3	18.9	19.5	20.2	20.8	21.4	22.0	22.6	23.2	23.9	24.5	25.1	25.7
23	17.9	18.5	19.1	19.8	20.4	21.1	21.7	22.4	23.0	23.6	24.2	24.9	25.6	26.2	26.9
24	18.6	19.3	20.0	20.6	21.3	22.0	22.7	23.3	24.0	24.7	25.3	26.0	26.7	27.4	28.0
25	19.4	20.1	20.8	21.5	22.2	22.9	23.6	24.3	25.0	25.7	26.4	27.1	27.8	28.5	29.2
26	20.2	20.9	21.6	22.4	23.1	23.8	24.5	25.3	26.0	26.7	27.5	28.2	28.9	29.6	30.3
27	21.0	21.7	22.5	23.2	24.0	24.7	25.5	26.2	27.0	27.8	28.5	29.3	30.0	30.8	31.5
28	21.9	22.5	23.3	24.1	24.9	25.7	26.4	27.2	28.0	28.8	29.6	30.4	31.1	31.9	32.7
29	22.5	23.3	24.1	24.9	25.8	26.6	27.4	28.2	29.0	29.8	30.6	31.4	32.3	33.1	33.9
30	23.3	24.1	25.0	25.8	26.6	27.5	28.3	29.2	30.0	30.8	31.7	32.5	33.5	34.2	35.0
31	24.1	24.9	25.8	26.7	27.5	28.4	29.3	30.1	31.0	31.9	32.7	33.6	34.5	35.3	36.2
32	24.8	25.7	26.6	27.5	28.4	29.3	30.2	31.1	32.0	32.9	33.8	34.7	35.6	36.5	37.4
33	24.6	26.5	27.5	28.4	29.3	30.2	31.2	32.1	33.0	33.9	34.9	35.8	36.7	37.6	38.5
34	26.4	27.3	28.3	29.2	30.2	31.1	32.1	33.1	34.0	35.0	35.9	36.9	37.8	38.8	39.7
35	27.2	28.1	29.1	30.1	31.1	32.1	33.0	34.1	35.0	36.0	37.0	37.9	38.9	39.9	40.9
36	27.9	28.9	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0	41.0	42.1
															43.1
															44.1
															45.1
															46.1

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D. SIZE AND WIDTH CHART

	5	5½	6	7	7½	8	8½	9	9½	10	10½	11	11½	12	
1	1.8	1.8	1.9	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3
2	1.6	1.6	1.7	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.6
3	2.4	2.5	2.6	2.7	2.8	3.0	3.1	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8
4	3.2	3.3	3.4	3.5	3.6	3.7	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7
5	4.0	4.1	4.3	4.4	4.5	4.7	4.8	5.0	5.1	5.2	5.4	5.5	5.7	5.8	6.1
6	4.8	4.9	5.1	5.3	5.4	5.6	5.8	6.0	6.1	6.3	6.5	6.6	6.8	7.0	7.1
7	5.6	5.8	6.0	6.2	6.4	6.6	6.7	6.9	7.1	7.3	7.5	7.7	7.9	8.1	8.3
8	6.4	6.6	6.8	7.0	7.3	7.5	7.7	7.9	8.2	8.4	8.6	8.8	9.1	9.3	9.5
9	7.2	7.4	7.7	7.9	8.2	8.4	8.7	8.9	9.2	9.4	9.7	9.9	10.2	10.4	10.7
10	8.0	8.2	8.5	8.8	9.1	9.4	9.6	9.9	10.2	10.5	10.8	11.0	11.3	11.6	11.9
11	8.8	9.1	9.4	9.7	10.0	10.3	10.6	10.9	11.2	11.5	11.8	12.1	12.5	12.8	13.1
12	9.6	10.0	10.2	10.6	10.9	11.2	11.6	11.9	12.2	12.6	12.9	13.2	13.6	13.9	14.3
13	10.3	10.7	11.1	11.4	11.8	12.2	12.5	12.9	13.3	13.6	14.0	14.4	14.7	15.1	15.4
14	11.1	11.5	11.9	12.3	12.7	13.1	13.5	13.9	14.3	14.7	15.1	15.5	15.8	16.2	16.6
15	11.9	12.4	12.8	13.2	13.6	14.0	14.5	14.9	15.3	15.7	16.1	16.6	17.0	17.4	17.8
16	12.7	13.2	13.6	14.1	14.5	15.0	15.4	15.9	16.3	16.8	17.2	17.7	18.1	18.6	19.0
17	13.5	14.0	14.5	15.0	15.4	15.9	16.4	16.9	17.3	17.8	18.3	18.8	19.2	19.7	20.2
18	14.3	14.8	15.3	15.8	16.3	16.8	17.4	17.9	18.4	18.9	19.4	19.9	20.4	20.9	21.4
19	15.1	15.7	16.2	16.7	17.3	17.8	18.3	18.8	19.4	19.9	20.4	21.0	21.5	22.0	22.6
20	15.9	16.5	17.0	17.6	18.2	18.7	19.3	19.8	20.4	21.0	21.5	22.1	22.6	23.2	23.8
21	16.7	17.3	17.9	18.5	19.1	19.7	20.2	20.8	21.4	22.0	22.6	23.1	23.8	24.4	24.9
22	17.5	18.1	18.7	19.4	20.0	20.6	21.2	21.8	22.4	23.1	23.7	24.3	24.9	25.5	26.1
23	18.3	19.0	19.6	20.2	20.9	21.5	22.2	22.8	23.5	24.1	24.7	25.4	26.0	26.7	27.3
24	19.1	19.8	20.4	21.1	21.8	22.5	23.1	23.8	24.5	25.2	25.8	26.5	27.2	27.8	28.5
25	19.9	20.6	21.3	22.0	22.7	23.4	24.1	24.8	25.5	26.2	26.9	27.6	28.3	29.0	29.7
26	20.7	21.4	22.2	22.9	23.6	24.3	25.1	25.8	26.5	27.2	28.0	28.7	29.4	30.2	30.9
27	21.5	22.2	23.0	23.8	24.5	25.3	26.0	26.8	27.5	28.3	29.1	29.8	30.6	31.3	32.1
28	22.3	23.1	23.9	24.6	25.4	26.2	27.0	27.8	28.6	29.3	30.1	30.9	31.7	32.5	33.3
29	23.1	23.9	24.7	25.5	26.3	27.1	28.0	28.8	29.6	30.4	31.2	32.0	32.8	33.6	34.5
30	23.9	24.7	25.6	26.4	27.2	28.1	28.9	29.8	30.6	31.4	32.3	33.1	34.0	34.8	35.6
31	24.7	25.5	26.4	27.3	28.1	29.0	29.9	30.8	31.6	32.5	33.4	34.2	35.1	36.0	36.8
32	25.5	26.4	27.3	28.2	29.1	30.0	30.8	31.7	32.6	33.5	34.4	35.3	36.2	37.1	38.0
33	26.3	27.2	28.1	29.0	30.0	30.9	31.8	32.7	33.7	34.6	35.5	36.4	37.4	38.3	39.2
34	27.1	28.0	28.9	29.9	30.9	31.8	32.8	33.7	34.7	35.6	36.6	37.5	38.5	39.4	40.4
35	27.9	28.8	29.8	30.8	31.8	32.8	33.7	34.7	35.7	36.7	37.7	38.6	39.6	40.6	41.6
36	28.7	29.7	30.7	31.7	32.7	33.7	34.7	35.7	36.7	37.7	38.7	39.7	40.8	41.8	42.8
															43.8
															44.8
															45.8
															46.8

D. SIZE AND WIDTH CHART

	7	7½	8	8½	9	9½	10	10½	11	11½	12	
1	8	8	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3
2	1.6	1.7	2.0	2.0	2.1	2.2	2.3	2.4	2.4	2.5	2.5	2.6
3	2.4	2.5	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	4.0
4	3.3	3.4	3.9	4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.8	5.1
5	4.1	4.2	4.9	5.1	5.2	5.3	5.5	5.6	5.8	5.9	6.0	6.3
6	4.9	5.1	5.9	6.1	6.2	6.4	6.6	6.7	6.9	7.1	7.2	7.4
7	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	7.5	7.7	7.9
8	6.5	6.8	7.0	7.2	7.4	7.6	7.9	8.1	8.3	8.5	8.7	8.9
9	7.3	7.6	7.8	8.1	8.4	8.6	8.9	9.1	9.4	9.6	9.9	10.1
10	8.2	8.4	8.7	9.0	9.3	9.6	9.8	10.1	10.4	10.7	11.0	11.3
11	9.0	9.3	9.6	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0	12.3
12	9.8	10.1	10.5	10.8	11.1	11.5	11.8	12.1	12.5	12.8	13.2	13.5
13	10.6	11.0	11.3	11.7	12.1	12.4	12.8	13.2	13.5	13.9	14.2	14.5
14	11.4	11.8	12.2	12.6	13.0	13.4	13.8	14.2	14.6	15.0	15.3	15.8
15	12.2	12.7	13.1	13.5	13.9	14.3	14.8	15.2	15.6	16.0	16.4	16.8
16	13.1	13.5	14.0	14.4	14.8	15.3	15.7	16.2	16.6	17.1	17.5	17.9
17	13.9	14.3	14.8	15.3	15.8	16.3	16.7	17.2	17.7	18.2	18.6	19.0
18	14.7	15.2	15.7	16.2	16.7	17.2	17.7	18.2	18.7	19.2	19.7	20.1
19	15.5	16.0	16.6	17.1	17.6	18.2	18.7	19.2	19.8	20.3	20.8	21.1
20	16.3	16.9	17.4	18.0	18.6	19.1	19.7	20.2	20.8	21.4	21.9	22.4
21	17.1	17.7	18.3	18.9	19.5	20.1	20.7	21.3	21.8	22.4	23.0	23.5
22	18.0	18.6	19.2	19.8	20.4	21.0	21.6	22.3	22.9	23.5	24.1	24.7
23	18.8	19.4	20.1	20.7	21.3	22.0	22.6	23.3	23.9	24.6	25.2	25.8
24	19.6	20.3	20.9	21.6	22.3	22.9	23.6	24.3	25.0	25.6	26.3	26.9
25	20.4	21.1	21.8	22.5	23.2	23.9	24.6	25.3	26.0	26.7	27.4	28.0
26	21.2	21.9	22.7	23.4	24.1	24.9	25.6	26.3	27.0	27.8	28.5	29.1
27	22.0	22.8	23.5	24.3	25.1	25.8	26.6	27.3	28.1	28.8	29.6	30.2
28	22.8	23.6	24.4	25.2	26.0	26.8	27.6	28.3	29.1	29.9	30.7	31.3
29	23.7	24.5	25.3	26.1	26.9	27.7	28.6	29.3	30.2	31.0	31.8	32.5
30	24.4	25.3	26.2	27.0	27.8	28.7	29.5	30.4	31.2	32.0	32.8	33.6
31	25.3	26.2	27.0	27.9	28.8	29.6	30.5	31.4	32.2	33.1	33.9	34.7
32	26.1	27.0	27.9	28.8	29.7	30.6	31.5	32.4	33.3	34.2	35.1	35.9
33	26.9	27.9	28.8	29.7	30.6	31.5	32.5	33.4	34.3	35.2	36.2	37.0
34	27.7	28.7	29.6	30.6	31.6	32.5	33.5	34.4	35.4	36.3	37.3	38.2
35	28.6	29.5	30.5	31.5	32.5	33.5	34.4	35.4	36.4	37.4	38.4	39.3
36	29.4	30.4	31.4	32.4	33.4	34.4	35.4	36.4	37.4	38.4	39.5	40.5

D. SIZE AND WIDTH CHART

	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12	
1	.8	.9	.9	.9	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3
2	1.7	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.6	2.7
3	2.5	2.6	2.7	2.8	2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
5	3.3	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.4	4.5	4.6	4.7	4.8	4.9	5.1	5.4
5	4.2	4.3	4.5	4.6	4.7	4.9	5.0	5.2	5.4	5.6	5.7	5.9	6.0	6.1	6.3	6.7
6	5.0	5.2	5.4	5.5	5.7	5.9	6.0	6.2	6.4	6.5	6.7	7.0	7.2	7.4	7.5	7.9
7	5.9	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8
8	6.7	6.9	7.1	7.4	7.6	7.8	8.0	8.3	8.5	8.7	8.9	9.2	9.4	9.6	9.8	10.0
9	7.5	7.8	8.0	8.3	8.5	8.8	9.0	9.3	9.5	9.8	10.0	10.3	10.5	10.8	11.1	11.3
10	8.4	8.6	8.9	9.2	9.5	9.8	10.0	10.3	10.6	10.9	11.2	11.4	11.7	12.0	12.3	12.6
11	9.2	9.5	9.8	10.1	10.4	10.7	11.0	11.4	11.7	12.0	12.3	12.6	12.9	13.2	13.5	13.8
12	10.0	10.4	10.7	11.0	11.4	11.7	12.0	12.4	12.7	13.1	13.4	13.7	14.1	14.4	14.7	15.1
13	10.9	11.2	11.6	12.0	12.3	12.7	13.1	13.4	13.8	14.1	14.5	14.9	15.2	15.6	16.0	16.3
14	11.7	12.1	12.5	12.9	13.3	13.7	14.1	14.4	14.8	15.2	15.6	16.0	16.4	16.8	17.2	17.6
15	12.5	13.0	13.4	13.8	14.2	14.6	15.1	15.5	15.9	16.3	16.7	17.2	17.6	18.0	18.4	18.8
16	13.4	13.8	14.3	14.7	15.2	15.6	16.1	16.5	17.0	17.4	17.9	18.3	18.8	19.2	19.6	20.1
17	14.2	14.7	15.2	15.6	16.1	16.6	17.1	17.5	18.0	18.5	19.0	19.4	19.9	20.4	20.9	21.4
18	15.0	15.6	16.1	16.6	17.1	17.6	18.1	18.6	19.1	19.6	20.1	20.6	21.1	21.6	22.1	22.6
19	15.9	16.4	16.9	17.5	18.0	18.5	19.1	19.6	20.1	20.7	21.2	21.7	22.3	22.8	23.3	23.9
20	16.7	17.3	17.8	18.4	19.0	19.5	20.1	20.6	21.2	21.8	22.3	22.9	23.4	24.0	24.6	25.1
21	17.6	18.1	18.7	19.3	19.9	20.5	21.1	21.7	22.3	22.8	23.4	24.0	24.6	25.2	25.8	26.4
22	18.4	19.0	19.6	20.2	20.9	21.5	22.1	22.7	23.3	23.9	24.6	25.2	25.8	26.4	27.0	27.6
23	19.2	19.9	20.5	21.2	21.8	22.4	23.1	23.7	24.4	25.0	25.7	26.3	27.0	27.6	28.2	28.9
24	20.1	20.7	21.5	22.1	22.8	23.4	24.1	24.8	25.4	26.1	26.8	27.5	28.1	28.8	29.5	30.2
25	20.9	21.6	22.3	23.0	23.7	24.4	25.1	25.8	26.5	27.2	27.9	28.6	29.3	30.0	30.7	31.4
26	21.7	22.5	23.2	23.9	24.6	25.4	26.1	26.8	27.6	28.3	29.0	29.7	30.5	31.2	31.9	32.7
27	22.6	23.3	24.1	24.8	25.6	26.4	27.1	27.9	28.6	29.4	30.1	30.9	31.6	32.4	33.2	33.9
28	23.4	24.2	25.0	25.8	26.5	27.3	28.1	28.9	29.7	30.5	31.2	32.0	32.8	33.6	34.4	35.2
29	24.2	25.1	25.9	26.7	27.5	28.3	29.1	29.9	30.7	31.6	32.4	33.2	34.0	34.8	35.6	36.4
30	25.1	25.9	26.8	27.6	28.4	29.3	30.1	31.0	31.8	32.6	33.5	34.3	35.2	36.0	36.8	37.7
31	25.9	26.8	27.7	28.5	29.4	30.3	31.1	32.0	32.9	33.7	34.6	35.5	36.3	37.2	38.1	38.9
32	26.8	27.6	28.5	29.4	30.3	31.2	32.1	33.0	33.9	34.8	35.7	36.6	37.5	38.4	39.3	40.2
33	27.6	28.5	29.4	30.4	31.3	32.2	33.1	34.1	35.0	35.9	36.8	37.8	38.7	39.6	40.5	41.4
34	28.4	29.4	30.3	31.3	32.2	33.2	34.1	35.1	36.0	37.0	37.9	38.9	39.8	40.8	41.8	42.7
35	29.3	30.2	31.2	32.2	33.2	34.2	35.1	36.1	37.1	38.1	39.1	40.0	41.0	42.0	43.0	44.0
36	30.1	31.1	32.1	33.1	34.1	35.1	36.1	37.2	38.2	39.2	40.2	41.2	42.2	43.2	44.2	45.2

D. SIZE AND WIDTH CHART

Men's 4 Wide

	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12	
1	.8	.8	.9	.9	.9	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.3
2	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.5
3	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8
4	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	4.1	4.4	4.5	4.6	4.7	4.8	5.0
5	3.8	3.9	4.1	4.2	4.3	4.4	4.5	4.6	4.8	5.2	5.5	5.6	5.7	5.9	6.0	6.2
6	4.5	4.7	4.8	5.0	5.2	5.4	5.5	5.7	5.9	6.2	6.4	6.6	6.7	6.9	7.1	7.4
7	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	7.5	7.8	8.0	8.4	8.8
8	6.0	6.3	6.5	6.7	6.9	7.2	7.4	7.6	7.8	8.1	8.3	8.5	8.7	9.0	9.6	10.1
9	6.8	7.1	7.3	7.6	7.8	8.1	8.3	8.6	8.8	9.1	9.3	9.6	9.8	10.1	10.3	10.6
10	7.6	7.8	8.1	8.4	8.7	9.0	9.2	9.5	9.8	10.1	10.4	10.6	10.9	11.2	11.5	11.8
11	8.3	8.6	8.9	9.2	9.5	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0	12.3	12.6	12.9
12	9.1	9.4	9.7	10.1	10.4	10.8	11.1	11.4	11.8	12.1	12.4	12.8	13.1	13.4	13.8	14.1
13	9.8	10.2	10.6	10.9	11.3	11.6	12.0	12.4	12.7	13.1	13.5	13.8	14.2	14.6	14.9	15.3
14	10.6	11.0	11.4	11.8	12.2	12.5	12.9	13.3	13.7	14.1	14.5	14.9	15.3	15.7	16.1	16.5
15	11.3	11.8	12.2	12.6	13.0	13.4	13.9	14.3	14.7	15.1	15.5	16.0	16.4	16.8	17.2	17.6
16	12.1	12.5	13.0	13.4	13.9	14.3	14.8	15.2	15.7	16.1	16.6	17.0	17.5	17.9	18.4	18.9
17	12.9	13.3	13.8	14.3	14.8	15.2	15.7	16.2	16.7	17.1	17.6	18.1	18.6	19.0	19.5	20.0
18	13.5	14.1	14.6	15.1	15.6	16.1	16.6	17.1	17.6	18.1	18.6	19.2	19.7	20.2	20.7	21.2
19	14.4	14.9	15.4	16.0	16.5	17.0	17.6	18.1	18.6	19.2	19.7	20.2	20.7	21.3	21.8	22.3
20	15.1	15.7	16.2	16.8	17.4	17.9	18.5	19.0	19.6	20.2	20.7	21.3	21.8	22.4	23.0	23.5
21	15.9	16.5	17.1	17.6	18.2	18.8	19.4	20.0	20.6	21.2	21.8	22.3	22.9	23.5	24.1	24.7
22	16.6	17.2	17.9	18.5	19.1	19.7	20.3	20.9	21.6	22.2	22.8	23.4	24.0	24.6	25.3	25.9
23	17.4	18.0	18.7	19.3	20.0	20.6	21.3	21.9	22.5	23.2	23.8	24.5	25.1	25.8	26.4	27.0
24	18.1	18.8	19.5	20.2	20.8	21.5	22.2	22.8	23.5	24.2	24.9	25.5	26.2	26.9	27.6	28.3
25	18.9	19.6	20.3	21.0	21.7	22.4	23.1	23.8	24.5	25.2	25.9	26.6	27.3	28.0	28.7	29.4
26	19.7	20.4	21.1	21.8	22.5	23.3	24.0	24.8	25.5	26.2	26.9	27.7	28.4	29.1	29.8	30.6
27	20.4	21.2	21.9	22.7	23.4	24.2	24.9	25.7	26.5	27.2	28.0	28.7	29.5	30.2	31.0	31.8
28	21.2	22.0	22.7	23.5	24.3	25.1	25.9	26.7	27.4	28.2	29.0	29.8	30.6	31.4	32.1	32.9
29	21.9	22.7	23.5	24.4	25.2	26.0	26.8	27.6	28.4	29.2	30.0	30.9	31.7	32.5	33.3	34.1
30	22.7	23.5	24.4	25.2	26.0	26.9	27.7	28.6	29.4	30.2	31.1	31.9	32.8	33.6	34.4	35.3
31	23.4	24.3	25.2	26.0	26.9	27.8	28.6	29.5	30.4	31.2	32.1	33.0	33.9	34.7	35.6	36.5
32	24.2	25.1	26.0	26.9	27.8	28.7	29.6	30.5	31.4	32.3	33.2	34.0	34.9	35.8	36.7	37.6
33	24.9	25.9	26.8	27.7	28.6	29.6	30.5	31.4	32.3	33.3	34.2	35.1	36.0	37.0	37.9	38.8
34	25.7	26.7	27.6	28.6	29.5	30.5	31.4	32.4	33.3	34.3	35.2	36.2	37.1	38.1	39.0	40.0
35	26.5	27.4	28.4	29.4	30.4	31.4	32.3	33.3	34.3	35.3	36.3	37.2	38.2	39.2	40.2	41.1
36	27.2	28.2	29.2	30.2	31.2	32.2	33.2	34.2	35.2	36.2	37.2	38.2	39.2	40.2	41.2	42.1
																43.3
																44.4
																45.4

+1

D. SIZE AND WIDTH CHART

	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12	
1	.7	.8	.8	.9	.9	.9	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2
2	1.5	1.6	1.6	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.5
3	2.3	2.4	2.5	2.5	2.6	2.8	2.9	3.0	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7
4	3.0	3.6	3.2	3.3	3.4	3.5	3.8	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.8	5.0
5	3.8	3.8	4.0	4.1	4.2	4.5	4.8	4.9	5.1	5.2	4.4	5.5	5.6	5.8	5.9	6.1
6	4.5	4.6	4.8	4.9	5.1	5.4	5.6	5.8	6.1	6.3	6.4	6.6	6.8	6.9	7.1	7.3
7	5.3	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.9	7.1	7.3	7.5	7.7	7.9	8.3	8.5
8	6.0	6.1	6.3	6.6	6.8	7.0	7.2	7.5	7.9	8.1	8.4	8.6	8.8	9.0	9.5	9.7
9	6.8	6.9	7.1	7.4	7.6	7.9	8.1	8.4	8.6	8.9	9.1	9.4	9.6	9.9	10.2	10.4
10	7.6	7.6	7.9	8.2	8.5	8.8	9.0	9.3	9.6	9.9	10.2	10.4	10.7	11.0	11.3	11.6
11	8.3	8.4	8.7	9.0	9.3	9.6	9.9	10.3	10.6	10.9	11.2	11.5	11.8	12.1	12.4	12.7
12	9.1	9.2	9.5	9.8	10.2	10.5	10.8	11.2	11.5	11.9	12.2	12.5	12.9	13.2	13.5	13.9
13	9.8	9.9	10.3	10.7	11.0	11.4	11.8	12.1	12.5	12.8	13.2	13.6	13.9	14.3	14.7	15.0
14	10.6	10.7	11.1	11.5	11.9	12.3	12.7	13.0	13.4	13.8	14.2	14.6	15.0	15.4	15.8	16.2
15	11.3	11.5	11.9	12.3	12.7	13.1	13.6	14.0	14.4	14.8	15.2	15.7	16.1	16.5	16.9	17.3
16	12.1	12.2	12.7	13.1	13.6	14.0	14.5	14.9	15.4	15.8	16.3	16.7	17.2	17.6	18.0	18.5
17	12.9	13.0	13.5	13.9	14.4	14.9	15.4	15.8	16.3	16.8	17.3	17.7	18.2	18.7	19.2	19.7
18	13.6	13.8	14.3	14.8	15.3	15.8	16.3	16.8	17.3	17.8	18.3	18.8	19.3	19.8	20.3	20.8
19	14.4	14.5	15.0	15.6	16.1	16.6	17.2	17.7	18.2	18.8	19.3	19.8	20.4	20.9	21.4	22.0
20	15.1	15.3	15.8	16.4	17.0	17.5	18.1	18.6	19.2	19.8	20.3	20.9	21.4	22.0	22.6	23.1
21	15.9	16.0	16.6	17.2	17.8	18.4	19.0	19.6	20.2	20.7	21.3	21.9	22.5	23.1	23.7	24.3
22	16.6	16.8	17.4	18.0	18.7	19.3	19.9	20.5	21.1	21.7	22.4	23.0	23.6	24.2	24.8	25.4
23	17.4	17.6	18.2	18.9	19.5	20.1	20.8	21.4	22.1	22.7	23.4	24.1	24.7	25.3	25.9	26.6
24	18.1	18.3	19.0	19.7	20.4	21.0	21.7	22.4	23.0	23.7	24.4	25.1	25.7	26.4	27.1	27.7
25	18.9	19.1	19.8	20.5	21.2	21.9	22.6	23.3	24.0	24.7	25.4	26.1	26.8	27.5	28.2	28.9
26	19.7	19.9	20.6	21.4	22.0	22.8	23.5	24.2	25.0	25.7	26.4	27.1	27.9	28.6	29.3	30.1
27	20.4	20.6	21.4	22.1	22.9	23.7	24.4	25.2	25.9	26.7	27.4	28.2	28.9	29.7	30.5	31.2
28	21.2	21.4	22.2	23.0	23.7	24.5	25.3	26.1	26.9	27.7	28.4	29.2	30.0	30.8	31.6	32.4
29	21.9	22.2	23.0	23.8	24.6	25.4	26.2	27.0	27.8	28.7	29.5	30.3	31.1	31.9	32.7	33.5
30	22.7	22.9	23.8	24.6	25.4	26.3	27.1	28.0	28.8	29.6	30.5	31.3	32.2	33.0	33.8	34.7
31	23.4	23.7	24.6	25.4	26.3	27.2	28.0	28.9	29.8	30.6	31.5	32.4	33.2	34.1	35.0	35.8
32	24.2	24.4	25.3	26.2	27.1	28.0	28.9	29.8	30.7	31.6	32.5	33.4	34.3	35.2	36.1	37.0
33	24.9	25.2	26.1	27.1	28.0	28.9	29.8	30.8	31.7	32.6	33.5	34.5	35.4	36.3	37.2	38.1
34	25.7	26.0	26.9	27.9	28.8	29.8	30.7	31.7	32.6	33.6	34.5	35.5	36.4	37.4	38.4	39.3
35	26.5	26.7	27.7	28.7	29.7	30.7	31.6	32.6	33.6	34.6	35.6	36.5	37.5	38.5	39.5	40.5
36	27.2	27.5	28.5	29.5	30.5	31.5	32.5	33.6	34.6	35.6	36.6	37.6	38.6	39.6	40.6	41.6

D. SIZE AND WIDTH CHART

	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12
1	.7	.8	.8	.8	.9	.9	.9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.2
2	1.4	1.5	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.3
3	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.7	3.0	3.1	3.2	3.2	3.3	3.4	3.5
4	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	4.0	4.1	4.2	4.3	4.4	4.5	4.7
5	3.6	3.7	3.9	4.0	4.1	4.3	4.4	4.6	5.0	5.1	5.3	5.4	5.5	5.7	5.8
6	4.3	4.5	4.6	4.8	5.0	5.1	5.3	5.5	6.0	6.1	6.3	6.5	6.6	6.8	7.0
7	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	7.0	7.2	7.4	7.5	7.8	8.0	8.1
8	5.7	6.0	6.2	6.4	6.6	6.8	7.1	7.3	8.0	8.2	8.4	8.6	8.9	9.1	9.3
9	6.4	6.7	6.9	7.2	7.5	7.7	8.0	8.2	9.0	9.2	9.5	9.7	10.0	10.2	10.5
10	7.2	7.4	7.7	8.0	8.3	8.6	8.8	9.1	10.0	10.2	10.5	10.8	11.1	11.4	11.6
11	7.9	8.2	8.5	8.8	9.1	9.4	9.7	10.0	11.0	11.3	11.6	11.9	12.2	12.5	12.8
12	8.6	8.9	9.3	9.6	10.0	10.3	10.6	10.9	12.0	12.3	12.6	13.0	13.3	13.6	14.0
13	9.3	9.7	10.0	10.4	10.8	11.1	11.5	11.9	12.2	12.6	13.0	13.4	13.8	14.2	14.6
14	10.0	10.4	10.8	11.2	11.6	12.0	12.4	12.8	13.3	13.6	14.0	14.4	14.8	15.1	15.5
15	10.7	11.2	11.6	12.0	12.4	12.8	13.3	13.7	14.1	14.5	14.9	15.4	15.8	16.2	16.7
16	11.5	11.9	12.4	12.8	13.2	13.7	14.1	14.6	15.0	15.5	15.9	16.4	16.8	17.3	17.7
17	12.2	12.6	13.1	13.6	14.1	14.6	15.0	15.5	16.0	16.5	16.9	17.4	17.9	18.4	18.8
18	12.9	13.4	13.9	14.4	14.9	15.4	15.9	16.4	16.9	17.5	17.9	18.4	18.9	19.4	19.9
19	13.6	14.1	14.7	15.2	15.7	16.3	16.8	17.3	17.9	18.4	18.9	19.5	20.0	20.5	21.1
20	14.3	14.9	15.4	16.0	16.6	17.1	17.7	18.2	18.8	19.4	19.9	20.5	21.0	21.6	22.1
21	15.0	15.6	16.2	16.8	17.4	18.0	18.6	19.2	19.7	20.3	20.9	21.5	22.1	22.7	23.3
22	15.8	16.4	17.0	17.6	18.2	18.8	19.4	20.1	20.7	21.3	21.9	22.5	23.1	23.8	24.4
23	16.5	17.1	17.8	18.4	19.0	19.7	20.3	21.0	21.6	22.3	22.9	23.6	24.3	25.0	25.6
24	17.2	17.9	18.5	19.2	19.9	20.5	21.2	21.9	22.6	23.3	24.0	24.7	25.4	26.1	26.8
25	17.9	18.6	19.3	20.0	20.7	21.4	22.1	22.8	23.5	24.2	24.9	25.6	26.3	27.0	27.7
26	18.6	19.3	20.1	20.8	21.5	22.3	23.0	23.7	24.4	25.2	25.9	26.6	27.4	28.1	28.8
27	19.3	20.1	20.8	21.6	22.4	23.1	23.9	24.6	25.4	26.1	26.9	27.6	28.4	29.2	29.9
28	20.0	20.8	21.6	22.4	23.2	24.0	24.8	25.5	26.3	27.1	27.9	28.7	29.5	30.2	31.0
29	20.8	21.6	22.4	23.2	24.0	24.8	25.6	26.4	27.3	28.1	28.9	29.7	30.5	31.3	32.1
30	21.5	22.3	23.2	24.0	24.8	25.7	26.5	27.4	28.2	29.0	29.9	30.7	31.6	32.4	33.2
31	22.2	23.1	23.9	24.8	25.7	26.5	27.4	28.3	29.1	30.0	30.9	31.7	32.6	33.5	34.3
32	22.9	23.8	24.6	25.6	26.5	27.4	28.3	29.2	30.1	31.0	31.9	32.8	33.7	34.6	35.5
33	23.6	24.5	25.5	26.4	27.3	28.2	29.2	30.1	31.0	31.9	32.9	33.8	34.7	35.6	36.6
34	24.3	25.3	26.2	27.2	28.2	29.1	30.1	31.0	31.9	32.9	33.9	34.8	35.8	36.7	37.7
35	25.1	26.0	27.0	28.0	29.0	30.0	30.9	31.9	32.9	33.9	34.9	35.8	36.8	37.8	38.8
36	25.8	26.8	27.8	28.8	29.8	30.8	31.8	32.8	33.8	34.8	35.9	36.9	37.9	38.9	39.9

D. SIZE AND WIDTH CHART

Mens 1 Wide

	7	5½	6	6½	7	8	8½	9	9½	10	10½	11	11½	12	
1	7	8	8	8	9	9	9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.2
2	1.4	1.5	1.6	1.7	1.7	1.8	1.8	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4
3	2.1	2.2	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.3	3.4	3.6
4	2.8	2.9	3.0	3.2	3.3	3.5	3.7	3.8	4.0	4.1	4.2	4.4	4.5	4.6	4.8
5	3.5	3.6	4.0	4.2	4.3	4.5	4.6	4.9	5.0	5.2	5.3	5.4	5.6	5.7	6.0
6	4.2	4.3	4.8	5.0	5.2	5.4	5.5	5.9	6.0	6.2	6.4	6.5	6.7	6.9	7.2
7	4.9	5.1	5.8	5.5	6.0	6.2	6.4	6.6	7.0	7.2	7.4	7.6	7.8	8.0	8.4
8	5.6	5.8	6.0	6.2	6.9	7.1	7.4	7.6	8.0	8.3	8.5	8.7	8.9	9.2	9.6
9	6.3	6.5	7.0	7.3	7.8	8.0	8.3	8.5	8.8	9.0	9.3	9.5	9.8	10.0	10.8
10	7.0	7.2	7.5	8.1	8.6	8.9	9.2	9.5	9.8	10.0	10.3	10.6	10.9	11.2	12.0
11	7.7	8.0	8.3	8.6	9.5	9.8	10.1	10.4	10.7	11.0	11.4	11.7	12.0	12.3	13.2
12	8.4	8.7	9.0	9.4	10.4	10.7	11.0	11.4	11.7	12.0	12.4	12.7	13.1	13.4	14.4
13	9.0	9.4	9.8	10.1	11.2	11.6	12.0	12.3	12.7	13.1	13.4	13.8	14.1	14.5	15.6
14	9.7	10.1	10.5	10.9	12.1	12.5	12.9	13.3	13.7	14.1	14.4	14.8	15.2	15.6	16.8
15	10.4	10.9	11.3	11.7	13.0	13.4	13.8	14.2	14.6	15.1	15.5	15.9	16.3	16.7	18.0
16	11.1	11.6	12.0	12.5	13.8	14.3	14.7	15.2	15.6	16.1	16.5	17.0	17.4	17.9	19.2
17	11.8	12.3	12.8	13.3	14.7	15.2	15.6	16.1	16.6	17.1	17.5	18.0	18.5	19.0	20.4
18	12.5	13.0	13.5	14.0	15.6	16.1	16.6	17.1	17.6	18.1	18.6	19.1	19.6	20.1	21.6
19	13.2	13.8	14.3	14.8	16.4	16.9	17.5	18.0	18.5	19.1	19.6	20.1	20.7	21.2	22.8
20	13.9	14.5	15.0	15.6	17.3	17.8	18.4	19.0	19.5	20.1	20.6	21.2	21.8	22.3	24.0
21	14.6	15.2	15.8	16.4	18.1	18.7	19.3	19.9	20.5	21.1	21.7	22.3	22.8	23.4	25.2
22	15.3	15.9	16.5	17.2	19.0	19.6	20.2	20.8	21.5	22.1	22.7	23.3	23.9	24.6	26.4
23	16.0	16.7	17.3	17.9	19.9	20.5	21.2	21.8	22.4	23.1	23.7	24.4	25.0	25.7	27.6
24	16.7	17.4	18.0	18.6	20.7	21.4	22.1	22.8	23.4	24.1	24.8	25.4	26.1	26.8	28.8
25	17.4	18.1	18.8	19.5	21.6	22.3	23.0	23.7	24.4	25.1	25.8	26.5	27.2	27.9	30.0
26	18.1	18.8	19.6	20.3	22.5	23.2	23.9	24.6	25.4	26.1	26.8	27.6	28.3	29.0	31.2
27	18.8	19.5	20.3	21.1	23.3	24.1	24.8	25.6	26.4	27.1	27.9	28.6	29.4	30.1	32.4
28	19.5	20.4	21.1	21.8	24.2	25.0	25.8	26.5	27.3	28.1	28.9	29.7	30.5	31.2	33.6
29	20.2	21.0	21.8	22.6	25.1	25.9	26.7	27.5	28.3	29.1	29.9	30.7	31.6	32.4	34.8
30	20.9	21.7	22.6	23.4	26.0	26.8	27.6	28.4	29.3	30.1	31.0	31.8	32.6	33.5	36.0
31	21.6	22.4	23.3	24.2	26.8	27.7	28.5	29.4	30.3	31.1	32.0	32.9	33.7	34.6	37.2
32	22.3	23.2	24.1	25.0	27.6	28.5	29.4	30.3	31.2	32.1	33.0	33.9	34.8	35.7	38.4
33	23.0	23.9	24.8	25.7	28.5	29.4	30.3	31.3	32.2	33.1	34.1	35.0	35.9	36.8	39.6
34	23.7	24.6	25.6	26.5	29.4	30.3	31.3	32.2	33.2	34.1	35.1	36.0	37.0	37.9	40.8
35	24.4	25.3	26.3	27.3	30.2	31.2	32.2	33.2	34.2	35.1	36.1	37.1	38.1	39.1	42.0
36	25.1	26.1	27.1	28.1	31.1	32.1	33.1	34.1	35.1	36.1	37.2	38.2	39.2	40.2	43.2

ILLUSTRATION OF THE USE OF THE CHART

1. To find size and width value of eight (8) pairs, size six (6), four (4) wide, men's.

Turn to D. Chart *men's 4 wide* and opposite 8 in left hand column and under 6 in top line, read 6.9. This is the answer.

2. To find the basic cutting allowance of *Men's Whole Quarter Blucher Pressed Tip, 8 pairs, size 6, 4 wide.*

Find the basic pattern allowance on C. Chart, which is 2.21 and multiply it by above size value 6.9 and the result is 15.25 feet, the basic cutting allowance for a twenty (20) foot leather of first quality (AA, E. Chart.)

3. There are two ways of finding the size and width value and basic cutting allowance for men's, 4 wide, 24 pairs, size run as follows:

Size	6	$\frac{1}{2}$	7	$\frac{1}{2}$	8	$\frac{1}{2}$	9	$\frac{1}{2}$	10	$\frac{1}{2}$	11
Pairs	2	2	2	2	4	2	2	2	2	2	2

The long way is to find the sum of the size values of each different size and half size as in the example above.

The shorter and better way is to note that pairs under the sizes 6 to $7\frac{1}{2}$ inclusive, exactly offset the pairs under sizes $8\frac{1}{2}$ to 10 inclusive.

Sizes 6 to 10 inclusive are equivalent to 20 pairs, 8 size, or in other words, the two pairs of $7\frac{1}{2}$ and the two pairs of $8\frac{1}{2}$ are equivalent to four pairs of 8 size; the two pairs of 7 size and the two pairs of 9 size are equivalent to four pairs of 8 size; the two pairs of $6\frac{1}{2}$ size and the two pairs of $9\frac{1}{2}$ size are equivalent to four pairs of 8 size; the two pairs of 6 size and the two pairs of 10 size are equivalent to four pairs of 8 size. Or sizes 6-10 inclusive are equivalent to 20 pairs of 8 size.

Find the size and width value of 20 pairs, 8 size, which is 19.6, add the size value of two pairs of $10\frac{1}{2}$ which is 2.2 and two pairs of 11 which is 2.3 as follows:

19.6 plus 2.2. plus 2.3 equals 24.1 the size
and width value of the entire run of sizes.

To find the basic cutting value allowance for this size run and width of Men's Whole Quarter Blucher Pressed Tip, multiply the

basic pattern allowance 2.21 (See C. Basic Pattern Allowance Table) by the size value 24.1, thus:

2.21 x 24.1 equals 53.26 feet
the basic cutting allowance.

Note: This D. Chart is only carried to one decimal place and therefore, the larger the number of pairs for which the size is obtained at one time, the less the error.

CHAPTER VI

E. BASIC LEATHER ALLOWANCE TABLE

Leather Sorting Basis

In describing a simple method of sorting leather into different cutting grades, it is assumed that the quality of the leather is good enough to produce shoes of the desired standard.

There are three points to be considered in sorting as follows:

1. Weight of Leather.
2. Pattern Value.
3. Cutting Value.

To assist in the understanding of this description, we will illustrate its use in a factory making the following Classes, Types and Styles. Classes: Men's, Boy's and Youth's. Types and Styles; Plain Toe Bals, Cap Toe Bals, Whole quarter Bluchers, Foxed Bluchers and Whole Quarter Oxfords.

1. Weight of Leather

There will be three assortments.

- | | | |
|----|-----------------------|----------|
| H. | Proper weight for the | Men's. |
| M. | “ “ “ “ | Boy's. |
| L. | “ “ “ “ | Youth's. |

2. Pattern Value

By Pattern Value is meant the assortments of leather best adapted to certain patterns or combinations of patterns in order to cut the leather to the best advantage. To illustrate, a skin that has several breaks in it is much better adapted to a pattern with a number of small parts, than it is to a pattern with a few large parts.

There will be three assortments for Pattern Values as follows:

X. This assortment should be used when cutting a Plain Toe Bal. This will be leather with a very clean surface. However, the heads may be too rough, and the pockets unfit to cut into the shoes.

Y. This assortment should be used when cutting Cap Toe Bals, Cap Toe Whole Quarter Blucher and Cap Toe Whole Quarter Oxfords. This Leather will have a few breaks, but not enough to cause a loss in cutting, provided these patterns are used properly. There may or may not be bad heads or pockets or both.

Z. This assortment should be used when a Cap Toe Foxed Blucher is to be cut, rather than a pattern with larger pieces and a few of them. There will be breaks and bad spots. Small patterns must be used to avoid these to advantage. There may or may not be bad heads or pockets or both.

3. Cutting Values

By Cutting Value is meant the relative value of one assorting to another, in the footage required to cut a given number of pairs of shoes.

There will be four assortments as follows:

AA. This standard will take leather in the cutting of which a good cutter should be able to produce shoes at the Basic Allowance. The leather which is not fit to put under the patterns should not exceed $2\frac{1}{2}\%$ of the area of the skin.

A. This standard will take leather in the cutting, of which 5% must be added to the Basic Allowance. The leather which is not good enough to go under the patterns on account of breaks, etc. will be over $2\frac{1}{2}\%$, but must not exceed $7\frac{1}{2}\%$ of the area of the skin.

B. This standard will take leather in the cutting of which 10% must be added to the Basic Allowance. The leather which is not good enough to go under the pattern on account of breaks, etc., will be over $7\frac{1}{2}\%$, but must not exceed $12\frac{1}{2}\%$ of the area of the skin.

C. This standard will take leather upon which it is not practical to attempt to place an accurate $\%$ that will be required over the Basic Allowance. This assortment is made up of leather, of which $12\frac{1}{2}\%$ or more can not be used under the patterns. It may be assumed that on the average, 20% will be sufficient additional allowance to the Basic Allowance. However, the facts must control, and this $\%$ increased or decreased in accordance therewith.

CONSTRUCTION OF E BASIC LEATHER ALLOWANCE TABLE

This table must be constructed for each particular factory.

E. BASIC LEATHER ALLOWANCE TABLE

	1 Leathers	2. Additional per cents of feet allowance								3 Money estimates									
		2A. Because of variations of size of leather size. In 1st line below are feet size. In 2nd line below are per cents.								2B. Because of different grades of sorting				3A. For the basic size of leather		3B. For different grades of actual size of leather			
		20	16	12	9	7	5½	4½	3½	3	AA	A	B	C	AA	A	B	C	
		0	1	2	3	4	5	6	7	8									
	<i>Vici</i>						5				0	5	10	20	105	100	95	91	84

This Table contains the following features:

1. Leathers
2. Additional per cents of feet allowance.
 - 2A. Because of variations of size of leather
 - 2B. Because of different grades of sorting.
3. Money estimates.
 - 3A. For the basic size of leather.
 - 3B. For the different grades of actual size of leather.

Each of these headings is described below.

1. Leathers

In this column are listed all the different leathers used in a shoe factory under its own names and grade marks.

2. Additional per cents of feet allowance.

2A. Because of variations of size of leather.

The upper heading shows different sizes of leather from twenty (20) feet down to three (3) feet.

The lower heading shows the per cent necessary to add to the basic cutting allowance for the leather size shown directly above these figures are compiled from B waste per cent chart assuming the patterns of the factory average to scale 500.

On other lines below, opposite each leather, appears the per cent of cutting allowance which it is presumed will be the average

per cent to add to the basic cutting allowance on account of the size of that particular leather in order to give the leather size allowance.

Note: The average size of leather is obtained by careful observation of sizes of leather as they are used and an estimate should be made for the size to be used from this experience.

If in putting up the jobs for cutting, the leather is found to be of some other size than the one opposite the leather, it is then necessary to correct the leather size allowance per cent by adding or subtracting the per cent equal to the difference in the per cents appearing in the second line of the heading, under the size of leather it was estimated to use, and the per cent under the size actually used.

2B. Because of different grades of sorting.

The headings AA, A, B, C, represent the different sorting grades established with reference to cutting qualities of the leather.

AA is a grade of leather that in cutting does not have an actual waste of over $2\frac{1}{2}\%$ of the size of the leather on account of imperfect quality caused by breaks or bad spots.

A is a grade of leather that has a waste in cutting of over $2\frac{1}{2}\%$ but not over $7\frac{1}{2}\%$.

B is a grade of leather that has a waste in cutting of over $7\frac{1}{2}\%$ but not over $12\frac{1}{2}\%$.

C is a grade of leather that has a waste of over $12\frac{1}{2}\%$ and is of such a variable cutting quality that it is not practical to attempt to put a just cutting value thereon. For this reason the waste per cent is a rough estimate and not a staple per cent of waste as are grades AA, A. & B. This waste per cent is usually made appropriate for the particular leather, to be cut as it is found by observation.

Under each heading and opposite each leather is the per cent necessary to add to the Basic Cutting Allowance, because of the cutting qualities of the different grades.

It is seen that under AA grade, O always appears, because the Basic Cutting Allowance is always based on this grade.

3. Money Estimates.

3A. For the Basic Size of Leather

Under this heading should be entered the estimated money value per foot of each different leather of the best cutting grade (AA) and of the Basic Size (in this instance 20 foot), or what it would be for that particular leather if it could be obtained in that size.

3B. For different Grades of actual Size of Leather.

Under the headings AA, A, B, C, is shown the estimated money value per foot of each grade of each leather.

As it appears in this table that the basic foot allowance must be increased for both the variations in size of the leather and the grades of sorting, it is natural that the money estimate per foot, for the same reasons, should be reduced from the basic size price in just about the same proportions as the feet allowance is increased.

DESCRIPTION OF METHOD FOR OBTAINING THE MONEY. ESTIMATE OF THE DIFFERENT GRADES OF LEATHER AND THE BASIC LEATHER SIZE

The problem shown below is the simplest that can be used. Assume that the skins or sides of leather being used are the same average size as the Basic Size.

Assume that the leather is sorted into grades as follows: one third falls into AA, one third into A, and one third into B. As the leather averages to be of A. Grade, the price paid for the leather will be the Money Estimate of the A. Grade.

The feet allowance for the A. Grade of $5\frac{1}{2}$ foot leather is 10% greater than the Basic Size Allowance, (5% for size of leather and 5% for A grade), therefore, the Money Estimate of the Basic Size will be 10% more than the Money Estimate of the A. Grade.

Vici leather is purchased at 95c per foot. The average size is $5\frac{1}{2}$ feet. This leather sorts into $\frac{1}{3}$ AA. Grade, $\frac{1}{3}$ A. Grade, and $\frac{1}{3}$ B. Grade.

As the leather averages to sort into A. Grade, the price paid per foot, 95c, is the Money Estimate of the A. Grade.

The Basic feet allowance of the Basic Size may be represented by 100%. The feet allowance for a $5\frac{1}{2}$ foot leather of the A.A. Grade will be represented by 105%.

The feet allowance of a $5\frac{1}{2}$ foot leather of A. Grade will be represented by 110%.

The feet allowance of a $5\frac{1}{2}$ foot leather of B. Grade will be represented by 115%.

The Money Estimate of the A. Grade has been established above at 95c per foot.

The feet estimate of the A. Grade is 110% of the Basic Size. The Money Estimate of the Basic Size will be 10% more than the A. Grade, or 10% of 95c equals .095. This added to 95c equals \$1.045, which may be taken as \$1.05. Now, as the feet estimate of the AA. Grade of $5\frac{1}{2}$ foot leather is 5% more than the Basic Size foot estimate, the Money Estimate of the AA. Grade will be the Money Estimate of the Basic Size divided by 1.05 or \$1.00. The Money Estimate of the B. Grade will be the Basic Size estimate 1.05 divided by 1.15 or 91 cents.

The Money Estimate of the C. Grade will be Basic Size estimate 1.05 divided by 1.25 or 84 cents.

The point is that the Money Estimate of any grade multiplied by its feet allowance will be equal to the money allowance of any other grade, multiplied by its feet allowance. Thus:

	Price per foot	Foot Allow- ance		Money Value
Basic Allowance	1.05	X 100	=	105.00
Vici AA	1.00	X 105	=	105.00
“ A	.95	X 110	=	104.50
“ B	.91	X 115	=	104.65
“ C	.84	X 125	=	105.00

LEATHER WASTE FEET SORTING GUIDE

Size	AA	A	B
4	1/8	1/4	1/2
5	1/8	3/8	5/8
6	1/8	3/8	3/4
7	1/8	1/2	7/8
8	1/4	5/8	1
9	1/4	5/8	1 1/8
10	1/4	3/4	1 1/4
11	1/4	7/8	1 3/8
12	1/4	7/8	1 1/2
13	3/8	1	1 5/8
14	3/8	1	1 3/4
15	3/8	1 1/8	1 7/8
16	3/8	1 1/4	2
17	3/8	1 1/4	2 1/8
18	1/2	1 3/8	2 1/4
19	1/2	1 3/8	2 3/8
20	1/2	1 1/2	2 1/2
21	1/2	1 5/8	2 5/8
22	1/2	1 5/8	2 3/4
23	5/8	1 3/4	2 7/8
24	5/8	1 3/4	3
25	5/8	1 7/8	3 1/8

1st	Column	Size of Skin or Side.
2nd	"	Limit of Waste in feet for AA Selection
3rd	"	" " " " " " A "
4th	"	" " " " " " B "

The feet allowance of a $5\frac{1}{2}$ foot leather of B. Grade will be represented by 115%.

The Money Estimate of the A. Grade has been established above at 95c per foot.

The feet estimate of the A. Grade is 110% of the Basic Size. The Money Estimate of the Basic Size will be 10% more than the A. Grade, or 10% of 95c equals .095. This added to 95c equals \$1.045, which may be taken as \$1.05. Now, as the feet estimate of the AA. Grade of $5\frac{1}{2}$ foot leather is 5% more than the Basic Size foot estimate, the Money Estimate of the AA. Grade will be the Money Estimate of the Basic Size divided by 1.05 or \$1.00. The Money Estimate of the B. Grade will be the Basic Size estimate 1.05 divided by 1.15 or 91 cents.

The Money Estimate of the C. Grade will be Basic Size estimate 1.05 divided by 1.25 or 84 cents.

The point is that the Money Estimate of any grade multiplied by its feet allowance will be equal to the money allowance of any other grade, multiplied by its feet allowance. Thus:

	Price per foot	X	Foot Allow- ance	=	Money Value
Basic Allowance	1.05	X	100	=	105.00
Vici AA	1.00	X	105	=	105.00
“ A	.95	X	110	=	104.50
“ B	.91	X	115	=	104.65
“ C	.84	X	125	=	105.00

LEATHER WASTE FEET SORTING GUIDE

Size	AA	A	B
4	1/8	1/4	1/2
5	1/8	3/8	5/8
6	1/8	3/8	3/4
7	1/8	1/2	7/8
8	1/4	5/8	1
9	1/4	5/8	1 1/8
10	1/4	3/4	1 1/4
11	1/4	7/8	1 3/8
12	1/4	7/8	1 1/2
13	3/8	1	1 5/8
14	3/8	1	1 3/4
15	3/8	1 1/8	1 7/8
16	3/8	1 1/4	2
17	3/8	1 1/4	2 1/8
18	1/2	1 3/8	2 1/4
19	1/2	1 3/8	2 3/8
20	1/2	1 1/2	2 1/2
21	1/2	1 5/8	2 5/8
22	1/2	1 5/8	2 3/4
23	5/8	1 3/4	2 7/8
24	5/8	1 3/4	3
25	5/8	1 7/8	3 1/8

1st Column Size of Skin or Side.
 2nd " Limit of Waste in feet for AA Selection
 3rd " " " " " " A "
 4th " " " " " " B "

LEATHER WASTE FEET SORTING GUIDE

The method of using this Guide should be readily understood.

In the first vertical column the sizes of leather from 4 to 25 feet are shown.

The second column shows the maximum feet that may be unfit to go under the patterns in the AA Standard.

The third column shows the maximum feet that may be unfit to go under the patterns in the A standard.

The fourth column shows the maximum feet that may be unfit to go under the patterns in the B Standard.

SUMMARY OF SORTING

Weight of Leather	Pattern Value	Cutting Value
H	X	AA.
M	Y	A.
L	Z	B.
		C.

From these combinations 36 different grades are possible, but are seldom all found necessary.

They have been thoroughly described and should be used whenever required.

The C. Cutting Value is not considered, when figuring the cutter's efficiency.

The marking to designate these assortings should be as follows: M for weight with an X Pattern Value, and a B Cutting Value is written **MXB**.

CHAPTER VII

F. METHOD OF FINDING CORRECT CUTTING ALLOWANCES

1. Find the Size and Width Value, using D. Chart.
2. Find Pattern Allowance, using C. Table.
3. Find Basic Cutting Allowance by multiplying 1 by 2.
4. Find Extra per cent of Leather Size Allowance, using E. Table which appears opposite the leather to be used, and add the per cent of the Basic Cutting Allowance to the Cutting Allowance which will give the Leather Size Allowance.

5. If the leather is of any other sorting Grade than one quality of AA, refer to E. Table, and opposite that leather under the quality used will be found the per cent of Basic Cutting Allowance necessary to add to the Leather Size Allowance in order to give the Grade Allowance.

6. If, after putting up the Cutting Job, the leather is found to average in size more nearly with some other size which appears on E. Table, than with the size indicated opposite the leather, it will then be necessary to correct the Basic Sorting Grade Allowance by adding or subtracting a per cent of the Basic Cutting Allowance. This is represented by the difference of the per cent which is noted under the size of the leather nearest the average size used and the per cent of the leather indicated on the E. Table. This gives the correct cutting allowance.

EXAMPLE OF FINDING ALLOWANCE IN FEET

Sizes—Men's—4 wide:

Sizes	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10	$10\frac{1}{2}$	11
Pairs	2	2	2	2	4	2	2	2	2	2	2
Pattern—Number 160 Pressed Whole Quarters, Blucher Cut off Vamp, Pressed Tip.											
Leather—Vici, average size 7 feet, sorting Grade A. on E. Table.											

1. Size values are found, as instructed under D. Chart, to be 24.1.
2. Pattern allowance is found to be 2.21 feet on C. Table.
3. 24.1×2.21 equals 53.261 feet basic cutting allowance.
4. Extra percent for Vici leather equals .05.
 $.05 \times 53.26$ feet equals 2.7 feet.
 2.7 feet + 53.3 feet equals 56.0 feet, leather size allowance.
5. Extra percent for Grade A. Sorting equals .05.
 $.05 \times 53.26$ feet equals 2.7 feet.
 2.7 feet + 56.0 feet equals 58.7 feet, sorting allowance.
6. As leather is found in putting up job to average 7 feet instead of $5\frac{1}{2}$ feet, there is 1% to be deducted as follows:
 1% of 53.26 feet equals .5 of a foot.
 $.5$ from 58.7 feet equals 58.2 feet, correct cutting allowance.

PART TWO

A Practical Method of Organizing a Cutting Department

CHAPTER VIII

ORGANIZATION METHODS

It is of course impractical to use one system in all cutting departments, because the problems faced are not the same.

There must be considered the factory making few shoes in number, but in great variety for the retail trade; and also the factory making shoes in large quantities, but of very few types or styles for the jobbing trade.

In the former factory it will be more profitable to cut the uppers directly from tags into cases, and hold the cutters responsible for quality and count; while in the latter factory we find that cutting several tags of the same kind, from Size Detail Slips made in the office, is the better method to use. The uppers should be inspected and cased by a cheaper grade of help. Using this method, a material saving in labor may be made, and the cases will be uniform in quality.

There may be factories where it is still practical to use one pattern to cut from certain leathers all possible uppers of one quality, and use other patterns for other qualities.

There are a few factories where, owing to the peculiarities of their problems, it will not perhaps be practical to follow closely the organization outline which follows; but, it can be applied very closely to the majority of factories making 1,000 pairs, or more, per day.

A Cutting Department should be subdivided into the following Divisions.

1. Stores Division.
2. Putting Up Division.
3. Cutting Division.
4. Assembling Division.
5. Office Division.

1. Stores Division will receive, sort, and store all stock until issued to the Putting Up Division.

2. Putting Up Division keeps very little stock on hand (1 or 2 days' supply) and its principal function is to put up jobs for the Cutting Division.

3. Cutting Division attends to the cutting.

4. Assembling Division has charge of the casing, the inspection while casing, the assembling of all parts of the uppers, and the delivery of same to the Stitching Department.

5. The Office Division will do all the figuring and the compiling of all the statistics.

STORES DIVISION

Duties in Detail

1. It will make a Tally Slip Form 1 in duplicate for all stock received, and assign the lot number. It will have the stock inspected by the proper person for quality, and have him O. K. the Tally Slip, and will make Stock Tag Form 8 and attach to stock. The original and duplicate Tally Slips will then be sent to the Factory Accounting Office for price and amount O. K. and for the filling in of the price and date of Invoice. The Factory Office will then return the original to the Office Division.

2. It also attends to sorting and making out the Sorting Slip Form 2. After sorting, it sees that the details of the sorting are properly entered on Sorting Slip; and then, after making Stock Tag Form 8 for each lot, sends Sorting Slip to the Office Division.

3. Upon Receipt of Requisition Slip Form 3 from the Putting Up Division it fills requisition and delivers stock, with correct notations on the Requisition Slip, to the Putting Up Division.

PUTTING UP DIVISION

Duties in Detail

1. It receives, from the Office Division, the Tags assembled into cutting jobs, accompanied by Cutting Slips Form 4 made out as far as possible.

2. It makes Requisition Slip Form 3 for stock required for 1 to 2 days supply, anticipating the needs by a day or two and delivers it to Stores Division.

3. Upon receipt of stock with Requisition Slip from Stores

Division, stock is placed in racks and Requisition⁵ Slip is passed to the Office Division.

4. It puts up stock for each Cutting Slip, listing the stock on back of Cutting Slip, makes corrections in allowances to cover cutting quality of stock, and on account of size of leather, and enters on slip the amount and description of the stock given out.

5. It delivers jobs put up to the Cutting Division on schedule time.

6. It receives from Assembly Division stock left over together with Cutters Slip. Enters the credit and sends slip to Office Division.

CUTTING DIVISION

Duties in Detail

1. It gives out jobs to cutters. Enters on Cutting Slips Form 4, cutter's name, time job was started and finished. If the cutter has not been continuously employed on this job, the lost time must be entered in Time-Out Space.

2. If the cutter finds any leather in his lot, which, in his judgment can not be cut to figures, he must call the foreman's attention to it, and the foreman must decide whether to have the cutter use this skin or not. If he decides to use it he must show the cutter how to cut it to allowance figures. If in the foreman's opinion this skin can not be cut to figures, he marks upon it his opinion as to the grade marks it should have, and returns the skin, with the Cutting Slip, to the Putting Up Division, where he obtains credit for same and other leather is issued in its place. The final disposition of this leather is decided upon by the Foreman Cutter, Foreman Sorter, and their Superior.

3. Jobs finished including cut stock, remnants, and remaining whole stock, with Cutting Slip Form 4, are sent to the Assembly Division.

4. It replaces any damages and shortages required by Assembly Division, or other departments of the factory. This requirement must always be accompanied with a slip definitely stating parts required, why, and for whom.

ASSEMBLY DIVISION

Duties in Detail

The cut stock, remnants, and remaining whole stock having been delivered by the Cutting Division, the Assembly Division will proceed as follows:

1. Method, where uppers are cased by cutters.
 - a. Determines value of remnants and enters same on the Cutters Slip Form 4. Returns the remaining whole stock and Cutters Slip to the Putting Up Division.
2. Method, where uppers are to be sorted.
 - a. Determines value of remnants and enters same on the Cutting Slip.
 - b. Marks on the whole stock left over, the Leather Lot number and the Cutting Slip number, and holds same until the Slip Form 4 is returned from inspector.
 - c. Inspector takes the uppers and Cutting Slip and inspects the work as he cases up.
 - d. Enters record of any damages or shortages on Inspectors Cripple Form 6.
 - e. This form, together with Cutting Slip Form 4 and the whole stock, if any was left, will be returned to the Cutting Division for the original cutter to cut the needed parts.
 - f. Examines parts returned and places them in the case.
 - g. Returns the Cutting Slip with stock left over to Putting Up Division.
3. This Division will assemble the outsides, trimmings and linings, and check them when complete. After making a record of case numbers and pairs it delivers the uppers to the Stitching Department.

OFFICE DIVISION

Duties in Detail

1. This Division will do all the figuring on the various slips.
2. It will arrange the tags into cutting jobs, make cutting

slips, Form 4, and if to be cut in bulk, make size detail slips, Form 5. It will enter the allowances in feet, total same, and deliver on schedule time to Putting Up Division.

3. It will figure sorting slips, requisition slips, and cutting slips, and enter same on proper records and summaries.

4. It will make up the Pay Roll Report Form 19.

5. It will keep all records and summaries, make up all reports, and deliver them promptly to the proper executives.

SAMPLE CUTTING

In this treatise, until now, sample cutting has not been mentioned. The conditions vary so much in factories making many different classes, types and styles of shoes that it has not seemed wise to mention the subject before. At best, samples cause many difficulties, and it is thought wise not to mention them except in establishing cutting allowances.

The most economical method to use in cutting and figuring samples is to give out the sample work with regular work. Care must be taken to give the cutter at least three times as many regular shoes as sample shoes. They will pass through the cutting department and be treated in the same manner as regular goods. When this method is pursued, there will be no extra cost considered for samples either for material or labor.

However, in some factories it is impossible to use the above described method for the reason that no regular goods of the same material, as the samples require, are being produced. When this condition exists, the samples must be cut separately out of special leather suited to their requirements.

The cutter in order to obtain the desired quality of sample will be obliged to use a larger allowance per pair than when cutting regular goods. This loss above the regular allowance is usually considered as an extra cost of sample uppers and may run 20 to 30% over the allowance for regular shoes. Such loss may be kept separate from the loss arising in producing regular work.

After the job has been cut, any whole stock or skins not used should be credited on the cutting slip in the regular manner. The large pieces or "sample skirts" must be credited on the cutter slip at a proper valuation. An inventory of sample skirts should be set up.

In order to use these sample skirts it may be well to hold them until regular or case work requiring such stock are received in the department. When the jobs for same are being put up a certain per cent of sample skirts should be included with the whole stock. The per cent of the sample skirts used will vary in accordance with size of skirts, type, and styles of patterns. In case the job is for a Man's Tip Bal. and the skirts are of medium size, 25% is perhaps an average amount to allow.

In keeping the sample skirts, it is often found advantageous to have each lot as they come from the original cutter, tied up in neatly folded bundles and marked with a sticker, showing the lot number together with amount and value.

When this method of cutting is in use, it is, of course, always a question whether the original cutter of the samples causes the loss or the next cutter who uses up the sample skirts. The proper place to put the loss is on the original or sample cutting. This may be done by setting the value of the sample skirts at a figure low enough to allow their being cut without any loss when using them with other stock.

CHAPTER IX

DESCRIPTIONS OF FORMS

The purpose of these forms is to show where the entries are to be made, and how the figuring shall be done in order that a perfect knowledge of this Department may be obtained.

These forms are divided into:

1. Slips
2. Records
3. Summaries
4. Reports

1. Slips carry the original entries of all transactions, and when a gain or loss is made by the transaction, it is figured and noted on the slip.

2. Records are made from slips, and show a perpetual inventory of material in different stages, as well as gain or loss up to and including that particular transaction.

3. Summaries show the same results as the Records, but under different classifications.

4. Reports are the totals of recapitulations and summations by days, months, and the business period called season, and are made for the benefit of the Executives, Accounting and Cost Managers.

A COMPLETE LIST OF FORMS

Form No.	Name	Size of Form
1	Tally Slip	10½ X 8½
2	Sorting Slip	10½ X 8½
3	Requisition Slip	4½ X 5¼
4	Cutting Slip	10½ X 8½
5	Size Detail Slip	5¼ X 8½
6	Inspector's Cripple Slip	4½ X 5¼

Form No.	Name	Size of Form
7	Work Slip	10½ X 4¼
8	Stock Tag	10½ X 4¼
9	Unsorted Stock Record	5¼ X 8½-10½ X 8½
10	Sorted Stock Record	5¼ X 8½
11	Leather Cutting Record	10½ X 17
12	Monthly Sorting Summary	10½ X 8½
13	Monthly Cutting Summary by Leathers	10½ X 17
14	Employees' Efficiency Summary	10½ X 8½
15	Daily Sorting Report	5¼ X 8½
16	Daily Cutting Report	5¼ X 8½
17	Recapitulation of Sorting Sum. Report	10½ X 8½
18	Recapitulation of Cutting Sum. Report	10½ X 17
19	Weekly Pay Roll Report	10½ X 8½
20	Employees' Efficiency Summary Report	10½ X 8½

Form 1

TALLY SLIP

Serial No. 1

Consignor <i>L Bean & Co</i>		Containers / case		Date Received <i>Jan 3 '20</i>			
Dozens	Feet	Consignors Marks Kind of Leather	Grade Marks	Price	Lot No. Invoice Date	Quality OK	Price + Amt. OK
<i>50</i>	<i>3984²</i>	<i>Vici</i>	<i>2/2 X</i>	<i>88 %</i>	<i>507 Jan 230</i>		
Invoice Checked			Debited to Unsorted Stock Record		Figures Vouched for by		

DETAILS

Fac. Marks <i>LL Mkd</i>			Fac. Marks			Fac. Marks			Fac. Marks		
Lot No. <i>501</i>			Lot No.			Lot No.			Lot No.		
Contain. no.	Dozens	Feet	Contain. no.	Dozens	Feet	Contain. no.	Dozens	Feet	Contain. no.	Dozens	Feet
	<i>2</i>	<i>80</i>		<i>2</i>	<i>79³</i>		<i>2</i>	<i>80³</i>		<i>2</i>	<i>79</i>
		<i>79¹</i>			<i>81¹</i>			<i>80³</i>			<i>81³</i>
	<i>2</i>	<i>79²</i>		<i>2</i>	<i>78³</i>		<i>2</i>	<i>79¹</i>			<i>160³</i>
		<i>78³</i>			<i>81¹</i>			<i>79²</i>			
	<i>2</i>	<i>78²</i>		<i>2</i>	<i>79²</i>		<i>2</i>	<i>78³</i>			
		<i>79²</i>			<i>78²</i>			<i>78²</i>			
	<i>2</i>	<i>79³</i>		<i>2</i>	<i>78³</i>		<i>2</i>	<i>80³</i>			
		<i>81¹</i>			<i>79²</i>			<i>79¹</i>			
	<i>2</i>	<i>81¹</i>		<i>2</i>	<i>79¹</i>		<i>2</i>	<i>79²</i>			
		<i>79³</i>			<i>80</i>			<i>78³</i>			
	<i>2</i>	<i>79²</i>		<i>2</i>	<i>78²</i>		<i>2</i>	<i>78²</i>			
		<i>78²</i>			<i>78³</i>			<i>79²</i>			
	<i>2</i>	<i>78³</i>		<i>2</i>	<i>79²</i>		<i>2</i>	<i>81¹</i>			
		<i>79²</i>			<i>79¹</i>			<i>79³</i>			
	<i>2</i>	<i>79¹</i>		<i>2</i>	<i>80³</i>		<i>2</i>	<i>81¹</i>			
		<i>80</i>			<i>79²</i>			<i>79³</i>			
		<i>1274</i>			<i>1274²</i>			<i>1275¹</i>			

TALLY SLIP, FORM 1

RECEIVING CLERK

Purpose

The purpose of this Form 1, is to identify the stock by means of Factory Marks and Lot Numbers, to furnish the necessary information for the proper vouching of the invoice, and to furnish a record to the Cutting Department Office of stock received.

This slip is made out in duplicate, and originates in the Stores Division. The Receiving Clerk of the Stores Division will, upon receipt of a shipment of stock, fill out the following items on the

Tally Slip: Consignor, Containers, and Date Received. He will open the containers and on the Tally Slip fill in factory marks and lot number, and enter the numbers of the containers, if they are numbered, the quantity in dozens, and the quantity in feet, which is marked on the outside of each dozen. Then add dozens and also feet and enter under Dozens, Feet, Kind of Leather, Grade Marks, and Lot Number, and initial "Figures Vouched for by—". The Clerk will then have the buyer or some authorized person initial the quality O. K. He next makes out and attaches to the stock, a Stock Tag, Form 8. Then he sends the original and duplicate Tally Slip to the Factory Accounting Office.

PURCHASING AGENT

The Purchasing Agent, or his clerk, fills in the price and terms, and initials price and amount O. K. He then finds the Invoice and compares it with the Tally Slip. If found O. K. he fills in Date of Invoice, attaches the duplicate to invoice, initials Invoice Checked and sends original Tally Slip to the Cutting Department Office.

OFFICE CLERK

The office clerk will enter the Tally Slip in Unsorted Stock Record Form 9, and file Tally Slip for reference.

Form 2

SORTING SLIP

Serial No. 2

Lot No 507 Fac. Marks *Gl. Kid* Consignor *L. Bean - Co.*

Labor				Material								
Sorter	<i>G Jones.</i>			Rate	<i>.85</i>		Date	<i>Jan 3 20</i>		Gain	<i>243.02-</i>	
Time Start	<i>7:00 am 1/4</i>			Cost	<i>6.38</i>		Feet	<i>3984 3/4</i>		Loss		
Time Finish	<i>3:30 pm 1/4</i>			Allow.	<i>5.98</i>		Given			%	<i>6.5-</i>	
Total Time	<i>7 1/2</i>			Gain			Cost per	<i>.88</i>		Total Net Gain	<i>242.62</i>	
Time Out	<i>-</i>			Loss	<i>.40</i>		Total Cost	<i>3506.58</i>		Total Net Loss		
Net Time	<i>7 1/2</i>			%	<i>7.-</i>		Sorted Value	<i>3749.60</i>		%	<i>6.5-</i>	

Lot No	Fac. Marks			Feet	Sorted Price Per	Sorted Value
	WT	Pat Value	Cut Value			
507	H	X	a	113 ²	.95	107.83
	H	Y	a	1888'	.95	1793.84
	H	Z	a	1278 ²	.95	1214.58
	H	Z	B	473 ²	.91	430.39
	H	Y	B	156'	.91	142.19
	Corner	C		71 ²	.84	60.27
				<u>3981²</u>		<u>3749.60</u>
	note: 3ft unaccounted for in sorting					

Credited to	Debited to	Quality Vouched
Unsorted Stock Record	Sorted Stock Record	for

SORTING SLIP FORM 2

Stores Division

The Sorting Slip originates in the Stores Division. When a lot of stock is selected to be sorted, a Sorting Slip is made out to accompany it. The feet are taken off the original bundles and the following information recorded on the Slip: Lot Number, Factory Marks, Consignor, Date, Feet Given.

When the sorter starts on the job his name is entered as Sorter and the time he started is entered. When sorting is finished time he finished is entered, and if he was not continuously employed on this job the Time Out is entered.

The amount in feet of the stock sorted is then entered under Lot number and Factory Marks. The Slip is initialed by the Sorter's Foreman in Quality-Vouched-For space. The slip is then passed to the Cutting Division Office.

Office Division

A clerk in the office fills in Cost Per, and Sorted Price per

foot, figures the sorted value for each sorting and adds same. Also adds the feet, figures the total cost, finds the gain or loss, and the per cent, the same is of the Sorted Value.

The Clerk also enters under Labor the Net Time, and the rate; figures the cost, the allowance, which in this instance is 15c per 100 feet, and figures the gain or loss and the per cent.

Finally figures the total net gain or loss and the per cent.

Then the slip is credited on the Unsorted Stock Record, Form 9; debited on the Sorted Stock Record, Form 10; and entered on Daily Sorting Report, Form 15, and Monthly Sorting Summary, Form 12.

Putting Up Division

The Head Man initials the slip at Received and Signed by, marks his stock for identification, and delivers slip to the Office Division.

Office Division

The clerk enters the price and figures the value. Then enters credit on the Sorted Stock Record Form 10, and the debit on Leather Cutting Record Form 11.

Form of
Date Jan. 9

CUTTING SLIP

Serial No. 3

Lot No	Fac. Marks	Feet Given	Feet Returned	Feet Used	Value per ft	Value Used	Consignee	Offal			
007	El. Mad. H. Ya	258 ²	22 ²	236 ²	.95	224.68	L. Bean & Co	Kind 12m			
								Am't 2.00			
								Value per .15			
								Total Value .30			
Extra stock required		Foreman									
Cutter J Adams	Time Out	Feet		Money		Labor		Total			
Time Start 9:20 1/10	Net Time 7 $\frac{1}{2}$	Allow 233	Allow 235.59	Allow 2.72	Allow 242.22						
Time Finish 7:50 1/11	Rate .90	Used 236 $\frac{1}{2}$	Value Used 224.68	Cost 4.75	Cost 231.43						
Total Time 7 $\frac{1}{2}$	Cost 6.75	Gain	Gain 10.82	Gain	Gain 10.79						
Credit to Lea. Cutting Removed		Loss 2 $\frac{1}{2}$	Loss	Loss .03	Loss						
Entered Monthly Cutting Summary		% 1 $\frac{1}{2}$	% 4+	% .4	% 4+						
Case Nos.	Pys	Qual	Pat Nos	Patterns	Summ. Value	Feet Per Py	Allow Per Case	Money Per Py	Allow Per Case	Labor Per Py	Allow Per Case
210910	24		194	St. Iron Blue Boot	246	2.19	56.3	2.40	576.0	.05	1.92
210915	24		211	C.S. Lace Oxford	23.8						
6	24		"	"	23.8						
7	24		"	"	23.8						
8	24		"	"	23.8						
					96.2	1.76	167.6	1.85	177.60	.05	4.80
				add 5% for cutting quality			223.9		235.20		6.72
				Take off 1% for wear of leather			223.9		231.50		
							232.9				
Notes				quantity sizes & widths							
Checked											
Applied											
Inspected by	E.J.S.		Date	Jan 12							

REVERSE SIDE OF CUTTING SLIP

7^*	$6\frac{1}{2}$
$6\frac{1}{2}$	7
$6\frac{3}{4}$	7
7	$6\frac{1}{2}$
$6\frac{3}{4}$	$6\frac{3}{4}$
$6\frac{3}{4}$	$7\frac{1}{2}$
7	$6\frac{3}{4}$
$6\frac{1}{2}$	$6\frac{1}{2}$
$6\frac{3}{4}$	$6\frac{1}{2}$
7	$6\frac{3}{4}$
$6\frac{3}{4}$	$7\frac{1}{2}$
$6\frac{1}{2}$	7
7	$6\frac{1}{2}$
$6\frac{3}{4}$	$6\frac{3}{4}$
$6\frac{3}{4}$	$6\frac{3}{4}$
7	$6\frac{1}{2}$
$6\frac{1}{2}$	$7\frac{1}{2}$
$6\frac{3}{4}$	7
$6\frac{3}{4}$	$7\frac{1}{2}$

$258\frac{3}{4}^*$

CUTTING SLIP FORM 4

Office Division

This slip originates in the office. After tags are assembled into jobs, the Cutting Slips are made out by the clerk who enters Case Number, Pairs, Quality, Pattern Number, Pattern, Size and Width Value, and Feet allowed Per Pair and Per Case, and then adds up the per case allowance. If the Size Detail Slip Form 5 is to be used, it is made out at this time, and attached to the Cutting Slip. The Cutting Slip with tags is then sent to the Putting Up Division.

Putting Up Division

A listing adding machine is of great benefit in this division to list the stock, on the back of the Cutting Slip, when putting it up. The man in charge will decide from the stock on hand what is best adapted to cut this job. Then, if the stock he decides upon is not of AA cutting quality, he will have the additional percentage added to the feet allowance. For instance, if the stock he is to use is of A cutting quality, he has 5% of the AA cutting quality allowance added to itself to give the A cutting allowance. When he has taken off stock enough for the A allowance, he averages the size of the leather, and if larger or smaller than the standard allowance he corrects it by the per cent of AA allowance necessary. For example if he is putting up Glazed Kid, the standard size of which is $5\frac{1}{2}$ feet and he finds his stock averages $7\frac{1}{4}$ feet, he will deduct 1% of AA allowance from the A allowance, and the result is the net allowance. It may be necessary now to deduct or add a skin or two to the stock already taken off to make the correct number of feet for the job. The feet given for a job should always be as large as the net feet allowed but never a whole skin more.

He then enters at the top of the Cutting Slip, Lot Number, Factory Marks, Feet Given Consignor.

The job is now ready to go with the Tags and Cutting Slips to the Cutting Division.

Cutting Division

The Foreman when he gives out these jobs to the Cutter, enters the Cutter's Name and Time started. When the Cutter finishes the job, the Foreman enters Time Finished, and if it is necessary the Time Out.

When extra stock is necessary to complete the job, the Foreman makes entry of the same at Extra Stock Required and signs his name after Foreman. He sends slip to the Putting Up Division. Extra stock will then be put up, charged on the Cutting Slip, directly under the original charge, and returned at once to the Cutting Division.

The Foreman sends cut stock, remnants, and stock left over, with tags and cutting slips to the Assembling Division.

Assembling Division

Here the whole stock left over is marked with Lot Number, Grade Marks, and Cutting Slip Number, and held in a rack until Cutting Slip initialed by the Inspector is returned. The remnants are weighed and credited under offal. Then the cut stock, accompanied by the Cutting Slip, will be cased up. If any imperfect cuts or a shortage is discovered, the Inspector makes out an Inspector's Cripple Slip Form 6, and sends it with the original whole stock left over, to the Cutting Division. When the required parts have been cut and returned with stock to the Assembling Division, the cut stock is examined and placed in the proper cases. The Inspector's Slip is then attached to the Cutting Slip. The Cutting Slip is initialed and dated by the Inspector. Then the stock returned is found, and, with the Cutting Slip, is sent to the Putting Up Division.

Putting Up Division

Here the feet returned are credited on the Cutting Slip, and the slip sent to the office.

Office Division

The office clerk figures the feet used. The value per foot is entered and the value used is figured. The net time, rate, and cost of labor, are figured and entered. The offal value per and total value of remnants are figured, entered, and added to total money allowance. The extra feet allowance added or deducted are checked. The money allowances per pair and per case are entered and figured. The labor allowances per pair and per case are entered and figured.

The recapitulations are made under Feet, Money, Labor, and Total. Notice that the percentage of gain or loss is always figured on the allowance. The Cutting Slip figures are credited on the Leather Cutting Record Form 11, and slip initialed for same by clerk. The results are next entered on the employee's efficiency Summary Form 14, and slip initialed for same by clerk. Finally all Cutting Slips for the day are assembled and totaled on the adding machine to make up the figures on Daily Cutting Report Form 16.

Form 5

SIZE DETAILED SLIP

To be attached to Cutting Slip when it can be used to advantage.
Cutter's Slip No.

Wd	1	2	3	4	5	6	7	8	9	10	11	12	13	-
5						2	2	2	2	4	2	2	2	2
						2	2	4	4	2	2	2	2	
						2	2	4	4	2	2	2	2	
						2	2	4	4	2	2	2	2	
						2	2	4	4	2	2	2	2	
					Total	8	8	16	16	8	8	8	8	

SIZE DETAIL SLIP FORM 5

This slip is used when cutting is done in large quantities or in bulk and is made up in the Office Division by the clerk, who makes Cutting Slips. It is attached to the Cutting Slip. Care should be taken when copying the tags on the Cutting Slip to have them in the same order as they are entered on the Size Detail Slip. From this Size Detail Slip, the cutter takes his sizes and widths. Care should be taken to assemble all tags of same pattern, size, and width, so that a total may be made of the same. This is done by the office clerk.

Form 6 **INSPECTOR'S CRIPPLE SLIP**

Cutting Slip No. 3 Cutter--J. Adams. Inspector I. N. S.

Time Issued 2 Pm 1/11		Time Returned 3 Pm 1/11				
Pat No	Pattern	Part	Left	Right	Size	Width
194	St Fox Blue Boot	Fox	1		8	5

INSPECTOR'S CRIPPLE SLIP FORM 6

This slip originates in the Assembling Division and is made out by the Inspector when casing the cut uppers, if additional

Form 7

WORK SLIP
 Employees No 20 Rate .90 Date Jan 16
 Name J. Adams Craft O.S. Cut

Date	Kind of Work	Case No	Prs.	Rate	Earned
1/10	Out Side Cut	210910	24	.08	1.92
		15	24	.05	1.20
		16	24	.05	1.20
		17	24	.05	1.20
		18	24	.05	1.20
1/11	"	211007	24	.08	1.92
		08	24	.05	1.20
		09	24	.05	1.20
		10	24	.05	1.20
		11	24	.05	1.20
1/14	"	211122	48	.08	3.84
		23	48	.05	2.40
		24	48	.05	2.40
		25	48	.05	2.40
		26	48	.05	2.40
1/15	"	211361	24	.05	1.20
		62	24	.08	1.92
		63	24	.05	1.20
		64	24	.05	1.20
		65	24	.05	1.20
1/16	"	211431	48	.05	2.40
		32	48	.08	3.84
		33	48	.05	2.40
	at Piece Rate				42.24
	Earned taken from Pay Roll Form 19				43.20
	Less				.96

parts are needed. He fills in the Cutter's name, his own initials, the Time Issued, the Pattern Number, Pattern, Part, Size, Width, and the number of cuts of Lefts and Rights.

This slip is taken to the Cutting Division with the stock that was left over after cutting. (This stock is being held in the Assembling Division marked with the Cutting Slip number.) The Cutting Foreman has the original cutter cut the desired parts, enters Time Returned, and sends them back to the Assembling Division.

Then the stock still remaining is held as before and the Cripple Slip with cut parts is sent to the Inspector, who, after inspection, places parts in proper cases and attaches Inspector's Cripple Slip to Cutting Slip.

WORK SLIP FORM 7

This Slip should be kept by all Piece Work Employees and by all Hour Workers, where a record of their work can not be more economically obtained from some other slip, or the variety of their work is of such a nature that it is too expensive to keep a detail of the work performed.

This Work Slip is usually filled in by the employee. The Piece Worker fills out the slip completely to the amount earned, while the Hour Worker leaves the Rate and Earned Columns vacant.

These slips are handed either daily, or weekly, as the conditions may require, to the Office Division where the Hour Workers Slips are figured by the clerk for the amount earned. The Piece Worker Slips are checked up and verified.

These slips totaled for the week are then entered on the Weekly Pay Roll Report Form 19.

From the Hour Worker's Slip Form 7 is entered in the Day Column on Form 19, the amount, and if this amount is less than that in the Earned Column on Form 7, the difference is a gain and, if more, a loss. This must be entered on Form 7 and also transferred to Form 19.

Form 8



STOCK TAG

Lot No *507*

Consignor *L. Bean & Co*

Fac Marks *Glazed K'd*

Dozens *50 Feet 3984²*

Slip No	Issued	Returned	Net Issued

STOCK TAG FORM 8

This Tag is made out by the Receiving Clerk in Stores Division after stock is O. K'd for quality and attached to the stock to identify it in the future. It is also used by the stock man to identify stock after it is sorted. It may be used by either, or both, of the above for keeping a Perpetual Inventory in feet.

Form 3 **REQUISITION SLIP** Serial No 6

Deliver to Put Up Div. on Jan 7
 Feet 1000 Fac Marks Glazed Kid H.Y.A.
 Signed by P.W.C. Date Jan 6

Delivered on Jan 7 date by SC
 Received + signed for by P.W.C.

Consignor L. Bean + Co

Lot No	Fac Marks	FEET	PRICE	Value
507	Gl Kid H.Y.A.	1120	.95	1064.00

Credited to
Sorted Stock Record

Debited to
Lea. Cut Record

REQUISITION SLIP FORM 3

Putting Up Division

This slip originates in the Putting Up Division, and is made up in duplicate by filling in under the following headings: Deliver to Division, On Date, Feet, Factory Marks, Signed by, Date, all above the double line, the original is then delivered to the Stores Division.

Stores Division

The Stores Clerk gets out the stock as near like the stock requisitioned as possible, lists the feet by dozens, enters same on lower portion of slip under Feet, fills in Lot Number, Factory Marks, Delivered on Date, initials after By, and delivers Slip with stock to the Putting Up Division.

Form 9

UNSORTED STOCK RECORD

Invoice Date Jan 2, 20 Consignor L. Bean & Co
Fac Marks

Lot No. 527

Receipts from Consignor						Disbursements by Sorting					
Date Received	Tally Slip No	Dozens	FEET	Cost per	Total Cost	Date Sorted	Sorting Slip No	FEET	Total Sorting Value	Gain	Loss
Jan 3 20	1	50	3984 2	88	350658	Jan 3	2	3984 2	3749 60	256 02	

Front Side

FINAL RECAPITULATION OF LOT NO.

Fac. Marks	FEET			Money				Labor				Total	
	Allow	Used	Gain Loss	Allow	Used	Gain	Loss	Allow	Used	Gain	Loss	Gain	Loss
Total Cutting Gain + Loss													
Total Sorting Gain + Loss													
NET Gain + Loss												Gain	Loss

Back Side

UNSORTED STOCK RECORD FORM 9

Purpose

This Unsorted Stock Record shows the inventory of unsorted stock, and the gain or loss of stock as fast as sorted. It also shows the final results of both sorting and cutting, and should be of value to the buyer in judging the true value of his purchases.

This Form is so printed and ruled that it may be used as one sheet, or, as front and back. The top or front side is for the receipts and disbursements of stock, while the bottom or back side is for the recapitulation of final figures of this lot. The Unsorted Stock Record is kept in the Office Division. A clerk makes it out as far as possible from the Tally Slip, filling in Invoice Date, Consignor, Lot Number, Factory Marks, Tally Slip, Number, Dozens, Feet, Cost Per and figures Total Cost.

Upon receipt of the Sorting Slip Form 2, the same is first figured and results entered under Disbursements by Sorting. Fill in Date Sorted, Sorting Slip Number, Feet, Total Sorting Value, and Gain or Loss.

As each different lot sorted from this original lot is cut and the figures are completed on the Monthly Cutting Summary, the results are entered on the bottom of Form 9, or the back side, under Final Recapitulation of Lot Number.

When all the Lot numbers are entered, they are summed up, and the Total Cutting, Total Sorting, and Net Gain or Loss are noted at the bottom. The Record is then passed on to the buyer for his consideration.

Receipts from Sorting				Disbursements by Requisition Slips					
Date Sorted	Sorting Slip No	Feet	Value	Date Requil.	Requil. No	Feet	Value	Balance	
								Feet	Value
Jan 3	2	1888 ¹	1793.84	Jan 7	6	1120	1064.00	768 ¹	729.84

SORTED STOCK RECORD FORM 10

This form should be ruled on the back with the same heading as the front, with the exception that there must be two columns for disbursements and no column for receipts.

This Sorted Stock Record is kept in the Office Division. A clerk makes out the heading and enters the receipts from the Sorting Slip. There is a separate Sorted Stock Record for each different sorting of stock as shown by the Sorting Slip.

The clerk enters the disbursements from the Requisition Slip and then figures the balance for feet and value.

This of course shows the Perpetual Inventory of the sorted stock.

LEATHER CUTTING RECORD FORM 11

In some factories it is customary to use only one kind and selection of leather in a cutting job, and, therefore, a different sheet must be used for each different sorting of stock. In other factories the custom is to use two or more different sortings of stock in one cutting job. In these factories different sortings of the same lot must all be entered upon the same Leather Cutting Record.

One may ask then, "What is the use of carefully sorting all stock and then using some or all selections in one job?" The answer is that the jobs for similar shoes should have the same per cent of each sorting in order that the jobs may be uniform. A cutter will soon become familiar with the conditions and thus be able to get the best results.

The Leather Cutting Record is kept in the Office Division by a clerk, who makes out the heading and fills in under Stock Received, copying from the Requisition Slip Form 3.

After the Cutting Slips Form 4 are figured they are entered on the Record filling up the remainder of the columns.

This Record shows a perpetual inventory of uncut stock in the Putting Up Division, and the cut stock in the Cutting, or the Assembling Divisions.

At the end of each month, all the entries in the different columns, with the exception of the per cents, Requisition Number, Date, and Slip Number, are totaled, and the entry with the date made in black ink.

All future entries from slips are made under this black total. At the end of the subsequent month, the current month entries are totaled and entered in black. Directly under this last black total, should be entered in red ink the total of the two black totals, which will be the continuous total for the season.

The totals are used each month to build up the Monthly Cutting Summary Form 13.

When the stock of this sorting is all figured the final red ink totals are entered on the back of Unsorted Stock Record.

Form 12

MONTHLY SORTING SUMMARY

By Leather Kind of Leather Glazed Kid

	Date Sorted	Sorting Slip No	Feet Sorted	Sorted Value	Gain	Loss	%	For the Month		
								Gain	Loss	%
	Jan 3	2	3984 ²	3749.60	243.02		6.5-			

MONTHLY SORTING SUMMARY FORM 12

This form is kept in the Office Division and is filled in from the Sorting Slips Form 2 as soon as they are figured.

There should be a sheet for each leather, as for instance one for Glazed Kid, one for Smooth Calf, etc. At the end of each month the entries are totaled in black, and under this total all future entries are made.

A continuous total for the season is also carried in red directly under the monthly black totals.

These monthly and season totals are used in building up the monthly and season recapitulations of Sorting Summary Report Form 17.

The object of this Summary is to show the combined results of the sortings of all leathers of a kind.

MONTHLY CUTTING SUMMARY FORM 13

There is a separate sheet used for each kind of leather, viz: one for Glazed Kid, one for Smooth Black Calf, one for Black Ooze Calf, one for Patent Chrome sides, etc.

On each sheet are entered the Monthly Summaries taken from the Leather Cutting Record Form 11 of each different grade and lot number of each kind of leather. These are summed up showing the total results, for the month, of each kind of leather. The monthly totals are made in black, and the season's totals are made directly under in red.

This Summary is kept in the office and shows the results of each different leather. For instance, the results of all Glazed Kid for each month, and for the season are shown on this summary. From these figures the Monthly and Season's Recapitulation of Cutting Summary Reports Form 18 are made.

Form 14 **EMPLOYEES EFFICIENCY SUMMARY** Folio
 Employee J. Adams Craft Outside Cutter Rate 90

Cutting Slip				Feet			Money	Effi	Labor		
Fac. Marks	Date	Slip No	Allow.	Gain	Loss	Allow	%	Allow	Gain	Loss	
Bl Kid 144a	Jan 10	3	233		2	235.52		672		.03	
Sm Back 144a	Jan 11	27	253		1	197.20		650		.15	
" " 144a	Jan 12	52	280		2	216.00		675		.10	
Box side 226	Jan 13	75	240	1		120.00		630		.05	
			1006	1	5	762.72	49	26.27		33	
					1						
					45						
							.0045%			.0126%	

EMPLOYEES' EFFICIENCY SUMMARY FORM 14

This is kept in the Office Division and is filled in from Cutting Slips Form 4. This sheet is totaled monthly in black and the continuous season's totals should be shown directly under in red. These totals are used to make up the Monthly and Season's Employees' Efficiency Reports, Form 20. This form is usually used only for cutters of the different crafts such as Outside, Trimming, and Lining Cutters, a separate sheet being used for each employee.

FINDING THE EFFICIENCY PER CENT

Find what per cent the Labor Allowance is of the Money Allowance. This is considered the relative value of labor to stock. Find the net gain or loss on feet, and also on labor. Then note the per cent of gain or loss of each compared with the allowance.

Next find the per cent of the relative value of labor to stock of the per cent gain or loss of labor, and combine this final per cent with the per cent gain or loss of feet, and the result is the Efficiency per cent which should be entered under this heading

Example

The total Money Allowance is \$762.72

The total Labor Allowance is 26.27

$$\frac{26.27}{762.72} = .0344 \text{ or } 3.44\%$$

The loss on Labor is .0126 or 1.26%.

Then .0344 X .0126 = .0004 or .04%.

The loss on Feet is .0045 or .45%.

Then, $.0045 + .0004 = .0049$ which is the Efficiency Per Cent and is written $.49\%$, the two prefixed ciphers are omitted. As it is a loss the minus sign must be prefixed, thus $-.49$. When it is a gain the plus sign must be prefixed.

Form 15

DAILY SORTING REPORT

Date Jan. 10

Date Sorted	Sorting Slip No.	Fac. Marks	Consigment	Feet Sorted	Sorted Value	Gain	Loss	%
Jan. 3	2	Bl Kid	L Beam r-C	3984 $\frac{3}{4}$	3749.60	243.02		6.5

DAILY SORTING REPORT FORM 15

The purpose of this report is to keep the proper executive in close touch with the results of sorting.

This report is made by the Office Division daily, and handed to the proper executive. It is made by copying the totals of each of the Sorting Slips Form 2 which were turned into the office on that date.

It is added up, the net gain or loss shown, and the per cent figured and entered.

DAILY CUTTING REPORT

Date Jan. 10

	Allowance	Used	Gain	Loss	%
FEET	11291 \downarrow	11402		110 \downarrow	1.-
MONEY	10161.90	9653.80	508.10		5.
LABOR	335.80	368.40		32.60	1.-
TOTAL	10497.70	10022.20	508.10	32.60	
		net	•475.50		4.7-
Cutting Slips for Cripples					
Feet		48 \downarrow			
Money	52.49	43.40	9.09		18.-

DAILY CUTTING REPORT FORM 16

The object of this Report is to keep the executive, in charge of costs, to whom it is sent, in close touch with the Cutting Results.

This Report is made daily from the Cutting Slips Form 40. The totals are best obtained by assembling all Cutting Slips of regular work and then adding totals on an adding machine.

Notice. Stock given for cutting cripples which occur beyond the Inspectors, is issued to a cripple together with a Cutting Slip Form 4. When the cripple cutter is in need of more stock he returns Cutting Slip Form 4 to Putting Up Division and receives the stock with a new Cutting Slip. The idea is that an accumulation of the Cripple Cutters' Cutting Slips per day will show about the average amount of stock used for cripples per day.

The Cripple Cutters' Cutting Slips Form 4 are handed to the Office Division by the Putting Up Division with the regular Cutting Slips (Form 4) where they are entered in the same manner as the other cutting slips, but with no allowances and as an entire loss. Finally, they are separated from the regular slips to find the day's cost of leather for cripples.

Form 17 **RECAPITULATION of SORTING SUMMARY REPORT**
 For the ^{Month} Season Date Feb. 1

Date	Kind of Leather	Feet Sorted	Sorted Value	Gain	Loss	%
Feb. 1	Bl. Kid	38934	38739.33	193671		5.

MONTHLY RECAPITULATION OF SORTING SUMMARY REPORT
 FORM 17

This report is compiled in the Office Division on the first of each month, and delivered to the proper executive.

The same form is used for the Season's Report, therefore, used as described here, cross off at the top of sheet "For the Season."

The figures shown on this report are copies of the black monthly totals of the Monthly Sorting Summary by Leathers Form 12.

This report must be totaled, the net gain or loss found, and the percentage of the same figured and entered.

SEASON RECAPITULATION OF SORTING SUMMARY REPORT
 FORM 17

This report is compiled in the Office Division on the first of each month and delivered to the proper executive.

The same form is used for the Monthly Report, therefore, when used as described here, cross off at the top of sheet "For the Month."

The figures shown on this report are copies of the red season's totals of the Monthly Sorting Summary Form 12. It may, at times, have more leathers entered on it than the Monthly Report, for the reason that there may be months when certain leathers may not be cut.

This report must be totaled, the net gain or loss found, and the per cent of the same figured and entered.

MONTHLY RECAPITULATION OF CUTTING SUMMARY REPORT
FORM 18

This report is compiled in the Office Division the first of each month, and delivered to the proper executive.

The same form is used for the Season's Report, therefore, cross off "For the Season" at the top of the sheet.

The figures shown on this report are copies of the black monthly totals of the Monthly Cutting Summary Form 13. When all leathers cut for the month have been entered, the report must be totaled, the net gain or loss found, and the per cents of the same figured and entered.

SEASON RECAPITULATION OF CUTTING SUMMARY REPORT
FORM 18

This report is compiled in the Office Division the first of each month and delivered to the proper executive.

The same form is used for the Monthly Report, therefore, cross off "For the Month" at top of sheet.

The figures shown on this report are copies of the red season totals of the Monthly Cutting Summary Form 13. It may, at times have more leathers entered on it than the Monthly Report, for the reason that there may be months when certain leathers may not be cut. This report must be totaled, the net gain or loss found, and the per cent of the same figured and entered.

Form 19 **WEEKLY PAY ROLL REPORT**

Dept *Cutting* Foreman *A.L. Cross* Output *7212 prs.* Date *Jan. 16, '20*

Emp. No.	Employee	Craft	Rate	Total Hours	Loss	Gain	%	Earned		Bonus	Total Pay	Deduct
								Productive Piece	Non-productive Hour			
23	<i>J. Adams</i>	<i>Witch</i>	<i>90</i>	<i>48</i>	<i>96</i>			<i>43.20</i>			<i>43.20</i>	
26	<i>S. Case</i>	"	<i>90</i>	<i>47 1/2</i>	<i>1.02</i>			<i>42.75</i>			<i>42.75</i>	
27	<i>A. Burgin</i>	"	<i>90</i>	<i>48</i>	<i>.60</i>			<i>43.20</i>			<i>43.20</i>	
28	<i>E. Jones</i>	"	<i>90</i>	<i>48</i>		<i>.50</i>		<i>43.20</i>			<i>43.20</i>	
25	<i>B. Smith</i>	"	<i>90</i>	<i>44</i>	<i>.86</i>		<i>.50</i>	<i>39.60</i>			<i>39.60</i>	
					<i>3.44</i>		<i>.50</i>				<i>21.95</i>	
					<i>2.94</i>							
20	<i>A. Bomer</i>	"						<i>47.25</i>			<i>47.25</i>	
21	<i>B. Carter</i>	"						<i>50.20</i>			<i>50.20</i>	
22	<i>M. Bow</i>	"						<i>49.70</i>			<i>49.70</i>	
24	<i>E. How</i>	"						<i>36.40</i>			<i>36.40</i>	
											<i>183.53</i>	
31	<i>A. Smartt</i>	<i>Inst</i>	<i>1.00</i>	<i>48</i>						<i>48.00</i>	<i>4.80</i>	<i>52.80</i>

WEEKLY PAY ROLL REPORT FORM 19

This form shows the total pay which includes the amounts earned, and the bonus, if there is such. The amount earned includes productive labor and non-productive labor. The productive labor includes piece and hour labor.

The Pay Roll Report is compiled in the Office Division and is made from time clock cards, or other original time keeping slips, and from Work Slips Form 7.

The clerk will assemble all the employees' cards and slips into groups by crafts, such as Outside Cutters, Trimming Cutters, Lining Cutters, etc. Each group will be subdivided into piece workers, hour workers, and non-productive workers. The names of the employees shall be entered on Form 19 in alphabetical order leaving two lines between each sub-group. To enter the details of each, proceed as follows:

PIECE WORKERS

Enter from Work Slip Form 7, employee's number, employee, craft, and total earned in the piece column. If this employee has

done any hour work, the total hours of hour work must be entered in the total hours column; and the amount earned by the hour must be entered in the hour column. Any bonus will be entered in the bonus column. The total pay will be sum of the earned columns plus the bonus.

HOURLY WORKERS

Enter from Work Slip Form 7, the employee's number, employee, craft, rate, and total hours. Multiply rate by total hours and enter in day column. Any bonus will be entered in bonus column. Total pay will be the sum of day and bonus columns. From Work Slip Form 7 enter the gain or loss in the proper column.

NON-PRODUCTIVE

Enter from Work Slip Form 7, employee's number, employee, craft, or classification of labor, rate, and total hours. Multiply rate by total hours to give the amount earned and enter in non-productive column. If any bonus, enter in bonus column. The total pay is the sum of earned and bonus.

RECAPITULATION

Sum up each group and make a total of all groups which will be the total weekly pay roll for the Department.

The last column is for any deductions which are to be made from the employee's pay.

Form 20 EMPLOYEES' EFFICIENCY SUMMARY REPORT

For the ^{Month} Season

Date Feb. 1

Rank	No.	Name	Craft	Feet				Eftl.		Labor		
				Allow.	Gain	Loss	%	%	Gain	Loss	%	
1	20	J Adams	cut cutter	1006		4	48	-	49		33	128
2	28	E Jones	"	9815					1.21		9.03	4.

**EMPLOYEES' MONTHLY EFFICIENCY SUMMARY REPORT
FORM 20**

This Form is compiled in the Office Division from the employee's Efficiency Summary Form 14, and sent to the proper executive.

The same form is used for the Season's Report, therefore, when used as described here, cross off at the top of the sheet "For the Season." The clerk who compiles this report will take the Employee's Efficiency Summary Form 14, for all cutters who worked during the month, and sort them as to crafts. Then taking the monthly totals, as a guide, sort in the order of the efficiency per cents. The largest plus per cent will be No. 1, the next largest No. 2, etc., until the minus per cents are reached. The lowest minus is next in order the highest minus comes last.

Then enter each group on Monthly Employees' Efficiency Summary Report Form 20 in the order of the Employee's Efficiency monthly totals in black.

The position of each employee in regard to his rank numbers shows his relative efficiency.

EMPLOYEES' SEASON EFFICIENCY SUMMARY REPORT FORM 20

This form is compiled in the Office Division from the Employee's Efficiency Summary Form 14, and sent to the proper executive.

The same form is used for the Monthly Report, therefore, cross off at the top of the sheet "For the Month."

Take the Employee's Efficiency Summary Sheet Form 14 for all cutters who worked during the season. Sort first by crafts,

then taking the season's red totals as a guide, sort in the order of efficiency per cents. The largest plus per cent will be No. 1, the next largest No. 2, etc., until the minus per cents are reached. The lowest minus is next in order and the highest minus comes last.

Then enter in the order sorted on the Season Employees' Efficiency Report Form 20, the season totals in red.

Cutter No. 1 in each group is the most efficient in his class, and No. 2 is next, etc.

CHAPTER X

BONUS SYSTEM

Under the day-wage method of payment, it is difficult to get the cutters to set a reasonable limit for the amount of work which is to be delivered as a day's work. It does not matter how competent the foreman is this limit of production is almost, without exception, much less than it should be.

This statement has been proven, time and again, by making a piece rate based upon the average wages which had been paid under the day method, with the result that production is materially increased, without any reduction in quality, or increase in feet used.

The piece-rate method encouraged the cutter to greater efforts in order to increase his production, and thereby increase his wages; now, a bonus that will induce him to reduce the footage, necessary to produce a given lot of uppers, will be attractive to him if it increases his wages still more. One of the reasons why cutters do not take kindly to a bonus system is, that in times past, manufacturers have tried by one method or another to induce cutters to increase production, and thus decrease costs. Unfortunately, when the manufacturers saw possibilities in savings realized, and, at the same time, the wages of the cutters greatly increased, they decided that the workers were getting more than their share and cut them down. This policy has made the cutters very suspicious of any system having an extra inducement by which they will earn more money for the manufacturer. Therefore, to make a bonus system a lasting success great care must be taken in setting fair and just standards. After having set such standards any change in them will jeopardize the bonus system. A *just bonus* system places no hardship upon any employee, and is of financial aid to any workman of average ability, who will work for the interest of his employer. To establish a *just bonus* system, three fundamental steps are necessary; first, a standard of quality;

second, a standard of quantity of output; third, a standard of feet allowance.

The standard of quality is usually already set, but, if not, it must be definitely set.

The standard of output is definitely set by the cutters, in some shops, and by the management in others. This standard should have a thorough examination as to its justice. There are two points here which will be the subject of much controversy. One of them is, what shall be the day's pay for an average cutter, the other, what shall be the average day's work. The average day's pay may well be considered as the average for similar classes of work in that locality. The average day's work shall be what a good cutter working intelligently, industriously, and without exhaustion, is able to accomplish in a day. This day's work can only be decided upon after much intelligent study. If only one leather and only one type of pattern were used the problem would be greatly simplified, but this is seldom, if ever, the case. Therefore, a day's work for each different type and style of pattern and leather must be worked out. This is best accomplished by "Time Study" directed by a competent man familiar with this work. There have been so many books published on this subject, we do not consider it expedient to enter into it in detail. When this has been done, a piece-rate may then be readily made from the day's wage and the day's work.

The method of finding the standard of feet allowance, which is very important, has already been shown in detail in this book.

Having established these three standards, it can be assumed that the standard of quality is not changed. There are then two standards which must be considered: the day's work, and the feet allowance. An increase in the day's output of work, or a decrease in the feet allowance is of monetary value to the manufacturer. Both of these can be secured by the proper use of a bonus system which will divide the monetary gain between the employee and the employer. The standards having once been set must not be changed. If the employees' earnings in bonuses are more than the employer thinks they should be, any change will tend to arouse in the minds of the employees suspicion that they are being used unfairly. As the piece-rate and feet allowance standard may not, on the average, be reached, prior to the installation of the bonus system, it is well to establish the average efficiency of the cutters

as illustrated in this book—Chapter 9 entitled Employee's Efficiency Report Form 14. After securing this information, any improvement in the average efficiency shown previous to the installation of the bonus system should be rewarded with a small bonus, increasing it as the efficiency approaches the standards established. Whenever the efficiency passes standards set, 50% of the savings should go to the employee as a bonus. The bonus earned should be paid weekly.

The method of figuring the bonus should be clearly explained to the cutters. The employees should feel that there is no mystery about the workings of the bonus system. If they show interest in how it is figured, explain to them, arouse their interest, secure their confidence, pay the bonus cheerfully, and thus, by obtaining their co-operation and good will, cheaper and better uppers and a smooth running department will be the result.