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Standard Pattern-Cutting:

AN EASY AND ACCURATE METHOD

OF

CONSTRUCTING, DRAFTING, and GRADING

Standard Patterns.

BY

CHARLES J. WARD.

First Honours Medallist, 1890.

Bronze Medallist, 1889, *and Registered Instructor of the City and Guilds of London Institute, Instructor of Boot and Shoe Manufacture at the Borough of Stafford and Stone Technical Schools.*

ILLUSTRATED WITH FULL-SIZE DIAGRAMS OF ACTUAL WORKING PATTERNS.

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PREFACE.

TO THE STUDENTS OF
THE STAFFORD AND STONE TECHNICAL CLASSES.

Gentlemen,

At the request of a number of students, I have arranged the system I have been teaching you into the form here presented. Many of you complain that the books published on Pattern-Cutting give general instead of specific information on this important part of Pattern-Cutting, and that the small diagrams used are unsatisfactory to work from.

I have endeavoured to overcome this objection by means of diagrams the size of patterns in actual use. You have seen the system tested, and its accuracy demonstrated in our lectures and practical classes, so I need say nothing on that point.

For the chapter dealing with draft I ask your careful consideration, as comparatively few pattern-cutters understand the underlying principles. The majority of pattern-cutters come from the clicking-boards, and have few or no opportunities of becoming acquainted with draft and its effect. Being a practical laster, I have no hesitation in recommending the system advocated.

Nothing original is claimed for the section dealing with grading, it being only the best-known methods thoroughly explained.

I would especially urge upon you the necessity of careful and continuous practice. It is not enough to listen to a lecture or read a book on the subject; nothing but constant practice will enable you to become proficient.

Yours faithfully,

CHAS. J. WARD.

PREFACE TO FOURTH EDITION.

Finding my effort to arrange the system I teach in the Technical Classes has met with a demand outside the Classes, I have submitted the present edition to the Trade.

It is an effort to teach the important subject of Standard Construction thoroughly by means of diagrams the size of working patterns, showing all the stages of progression, with as little explanation as is compatible with lucidity, instead of using small diagrams, and thus necessitating an excessive amount of verbal explanation.

Yours faithfully,

CHAS. J. WARD.

PLATE I

CONSTRUCTION FORMS

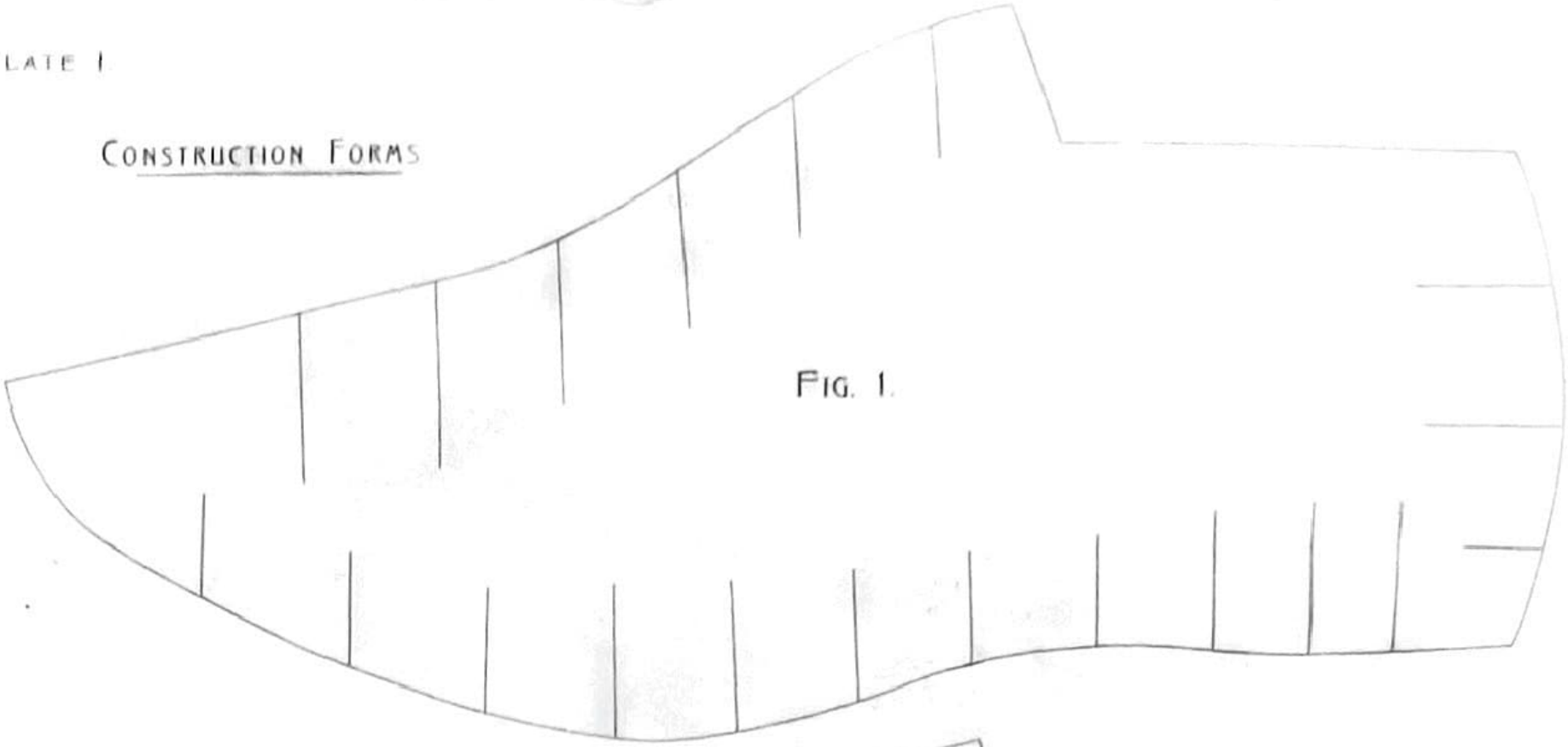


FIG. 1.

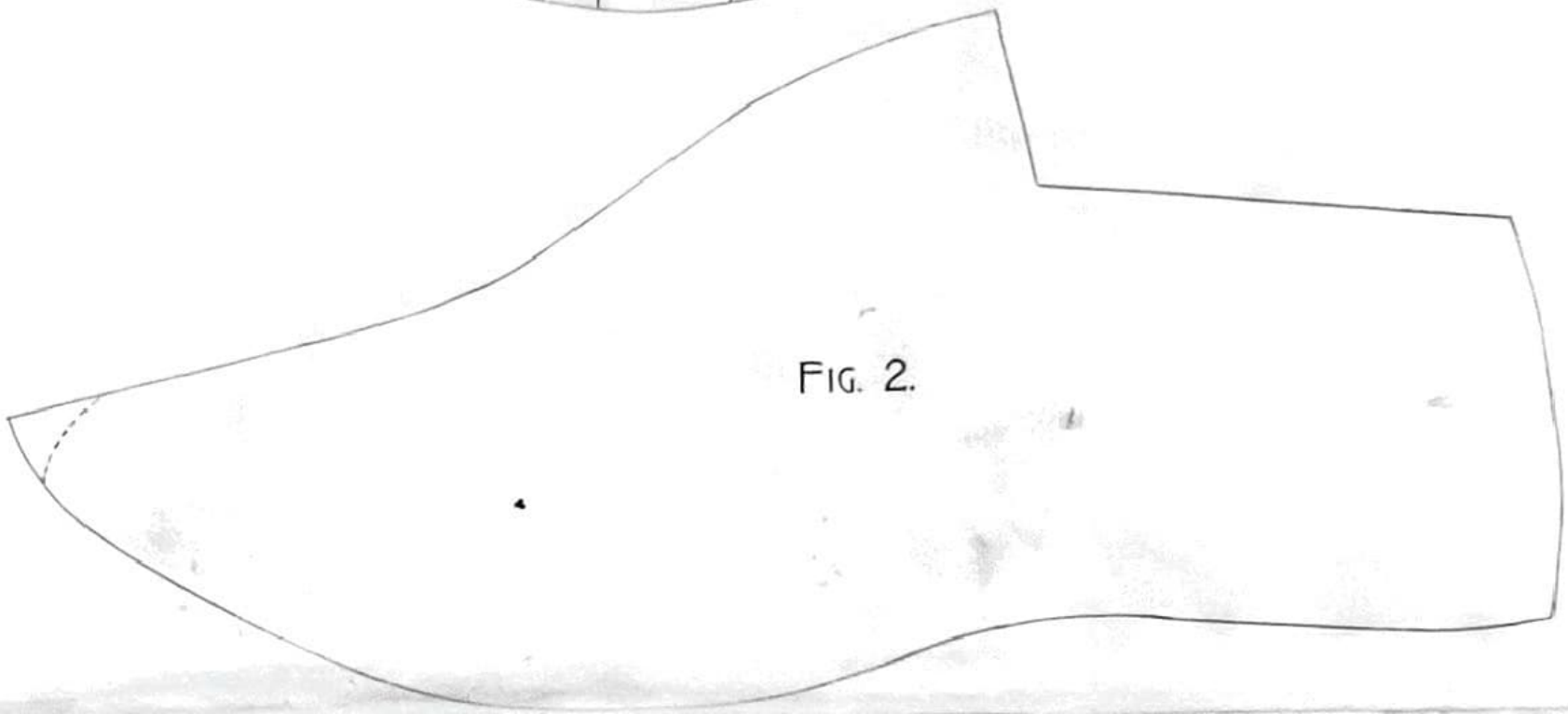


FIG. 2.

STANDARD CONSTRUCTION.

STANDARD CONSTRUCTION has now become well-nigh mechanical, little or no art being required; therefore, as there are no abstruse problems to deal with, all explanation will be given as we proceed. We require a level board; a straight-edge, about eighteen inches long, with the sizes on one side and fractions of an inch and inches marked on the other side; a set square, with one side at least eleven inches long; a pair of spring compasses; two fine awls; tape measure; a knife; an H lead-pencil, and some stout cartridge or drawing paper (the stout paper is preferable for learners).

THERE are two methods of obtaining a form of the last. The simplest method, and at the same time a perfectly infallible one, is as follows: Take a sheet of paper; lay a last on this, resting on its side; take a pencil and mark round the last, commencing an inch above and beyond the end of the toe; mark up to the instep, gradually working to the last until the line touches the last at the top of the block; now mark along the top, down the back, keeping the pencil about half-an-inch away from the last; now mark along the bottom of the last, keeping half-an-inch away; cut round to the pencil mark—it may not be very true, but it does not matter; using this as a pattern, cut out two pieces of roan or basil, and have them machined up the front to the top of the instep and down the back.

Place an insole on the last you are using; round it if required, so that it will fit; now have the form you have cut thoroughly wetted and then lasted; dry this by a fire, or leave it until dry; now cut this off to the last, by inserting the point of a knife through the form between the insole and the last, run the knife right round, and lift off the form. You will now have an exact copy of the last. Those of you who have attended the lasting class will be able to do this for themselves. The others must get a laster to do it for them. In the case of a pattern-cutter in the factory, of course the laster is always at hand, and no employer will object to him using this method, as it makes failure an impossibility: crease up the seams, and place the leather form on a sheet of paper; secure it at the toe and heel by means of awls, mark round this, allow for the drop at the toe, and you have a mean form that must be correct; allow on this the lasting allowance required, and the pattern will assume the shape of Fig. 4, Plate 2.

The other system advocated is that introduced by Mr. T. BROPHY, of Dublin, to obtain a form of the last. Lay the last sideways on a sheet of paper; cut all round the last at a distance of one-and-a-half inches; nick this all round with your knife like Fig. 1, Plate 1. It is unnecessary to mitre the form, and the straight cuts have the advantage of giving a better outline.

Mark a line up the middle of the last, from the top to the instep, then down the middle of the back of the heel. These lines can be drawn by using a flexible rule, or if you cut a strip of cardboard with your straight-edge that will do as well.

Now fasten the form to the last—if a wood last by means of drawing pins, if an iron last by a few dabs of elastic glue; the advantage of elastic glue lies in the fact that it dries quickly, and is easily detached by warming, or by lifting the form carefully it can be cut with a knife.

Having secured the paper to the last, crease or double the paper where it crosses the lines marked on the last; also along the bottom edge of the last, using care to obtain the correct shape in the waist.

Now detach the paper, cut off at the creases, allow for the drop at toe, and you have the form of one side of the last—see Fig. 2, Plate 1. Repeat for the other side, and you have what are termed outside and inside forms.

PLATE 2

CONSTRUCTION FORMS.

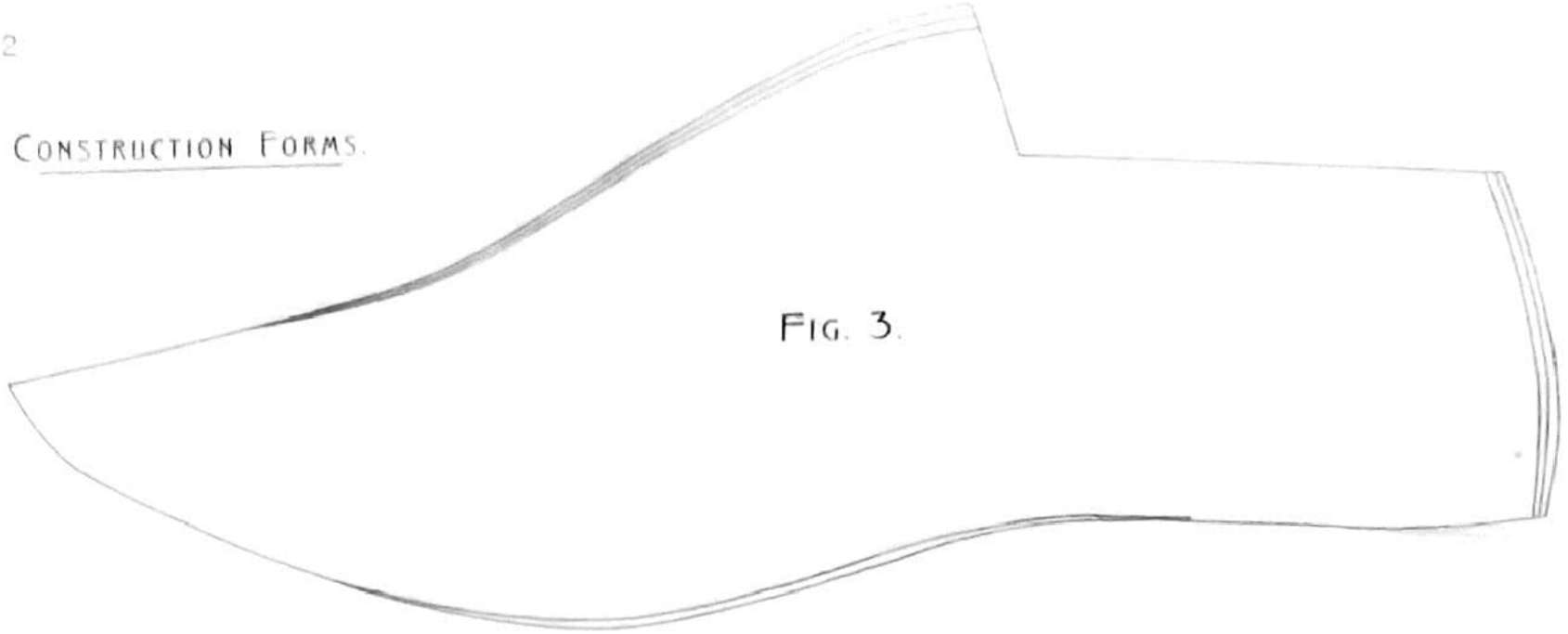


FIG. 3.

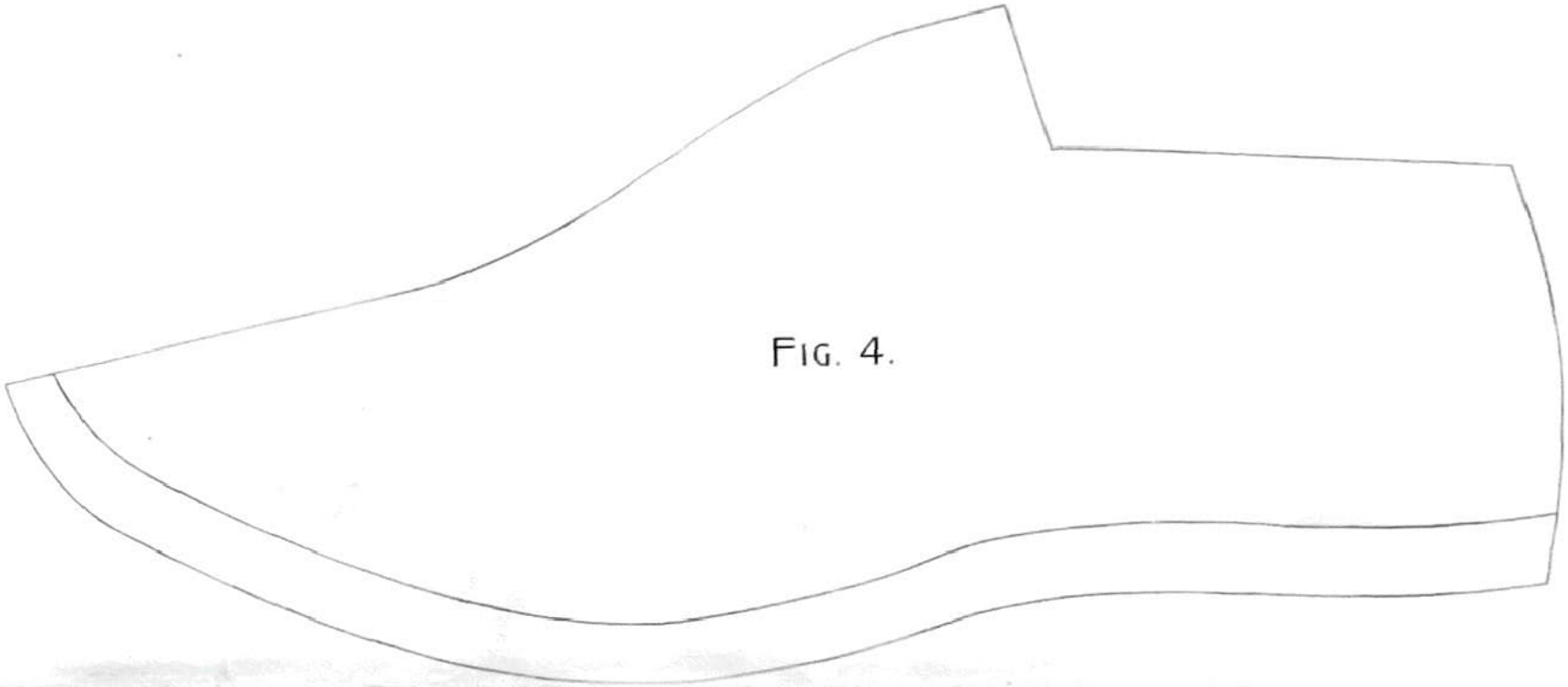


FIG. 4.

Get a fresh sheet of paper, lay the outside form upon it, and mark round; inside this place the inside form, placing it level at the toe and heel (Fig. 3, Plate 2). Now strike the mean between the difference up the front and down the back, as shown by the middle line in the diagrams; leave the bottom lines untouched; now cut this out to the larger bottom line, and to the middle lines you have just drawn. This is called the mean form.

Place the mean form thus obtained on a sheet of paper; mark all round it; now allow on for lasting. For light work such as the general run of the Stafford trade, half an inch along the bottom, tapered to three-eighths of an inch at the toe, will be sufficient (Fig. 4, Plate 2). The reason for allowing less for lasting at the toe is, that the upper in lasting will stretch in length more than in width, and by giving an eighth less in length this is made even. This will be correct as regards the allowance for machine-sewn work; for hand-sewn or pumps a quarter of an inch will be the lasting allowance; for stouter ladies' work or light men's, five-eighths will be required for M.S.; very stout work with heavy insoles will require three-quarters of an inch. A quarter of an inch less for hand-sewn work will be about correct. This form is now *tested to see if correct* by cutting out two covers in some light leather, and having it lasted. The advantage of the first-mentioned process is that the trouble of cutting forms is avoided.

PLATE III

To construct the standard, draw the base line A B (see Plate 3) with the set square erect the perpendicular line B C at right angles to A B. Upon this perpendicular line mark off the lasting allowance—in this case, half an inch at L. Three inches from L mark the point 3; mark a point quarter of an inch in; at four and a half inches from L mark B; then mark off the height of leg required.

Take your form with the lasting allowance on, place it on the base line A B, touching at the joint and heel, with the swell of heel just touching the perpendicular line B C. Mark round the form and then remove it. Join the top of the form at the top to B', and from there to 3. From B' set off the ankle measure to G; now measure three inches from the corner of the heel to H. This will give the position of the breast of the heel. If you measure from the heel seam of a boot round to the breast or front of the heel, it will be found to be about three inches. We measure the height of heels at the breast, so we must take the same position on the pattern. If we take the distance at the extreme end of the pattern, and measure the heel at the breast, the pattern will be over-pitched, as the heel will be considerably higher at the back than at the breast.

From the height of heel deduct the probable sole substance—in this case, one quarter of an inch—taking the height of heel at one and a half inches. That gives us the point E at one and a quarter inches from B.

Draw the line F F, touching the pattern at the joint, and also touching E. This gives you a base line that represents the ground line when the heel is on the boot. Place the set square parallel with the line F F, and touching the ankle point G. Draw the line G G, continuing it to the required height. This will give the inclination of the leg, and the front line of the pattern. Now set off the required leg measure and join it at the back with B'. Now set off the heel measure H K. No rule can be given for the angle of this line that will apply in every case; it is to a great extent a matter of judgment, as the angle will vary with every height of heel. Join the top of the instep with the ankle point G, touching the heel measure at H with as graceful a curve as possible, being careful not to make the curve too sharp, or choke it as it is termed, or to make it too straight. Cut this out and you have the standard required, but not drafted.

The rule for the construction of the heel curve is to raise or lower the positions B' and E' one-sixteenth of an inch for each size; to raise them for the larger sizes and lower them for the smaller; also to raise or lower the position B' in proportion to the height of heel, thus taking the position B' as three inches from L, and B' at four and a half inches from L, which has been proved correct for a fours size boot with an inch and a half heel. For an inch and a quarter heel, the position of B' would be four and three-quarter inches from L; and for a one and three-quarter inch heel only four and a quarter inches, thus pitching the leg further forward for a low heel, and backward for a higher heel.

Contrary to the opinion published in a recent work, pitch has nothing to do with the throat of the pattern. Of course, it affects the pattern at that point, but its real meaning is the pitching of the pattern for the height of heel, and is so defined by last-makers. Inclination is self-explanatory, referring to the backward or forward inclination of the leg, which is ruled by the pitch of the last and pattern.

STANDARD CONSTRUCTION.

DIMENSIONS.

JOINT	} FROM THE LAST	
INSTEP		
HEEL	11¼	INCHES
ANKLE	7¼	"
LEG	9	"

TO CARRY ½ INCH HEEL

WITH ¼ INCH SOLE SUBSTANCE

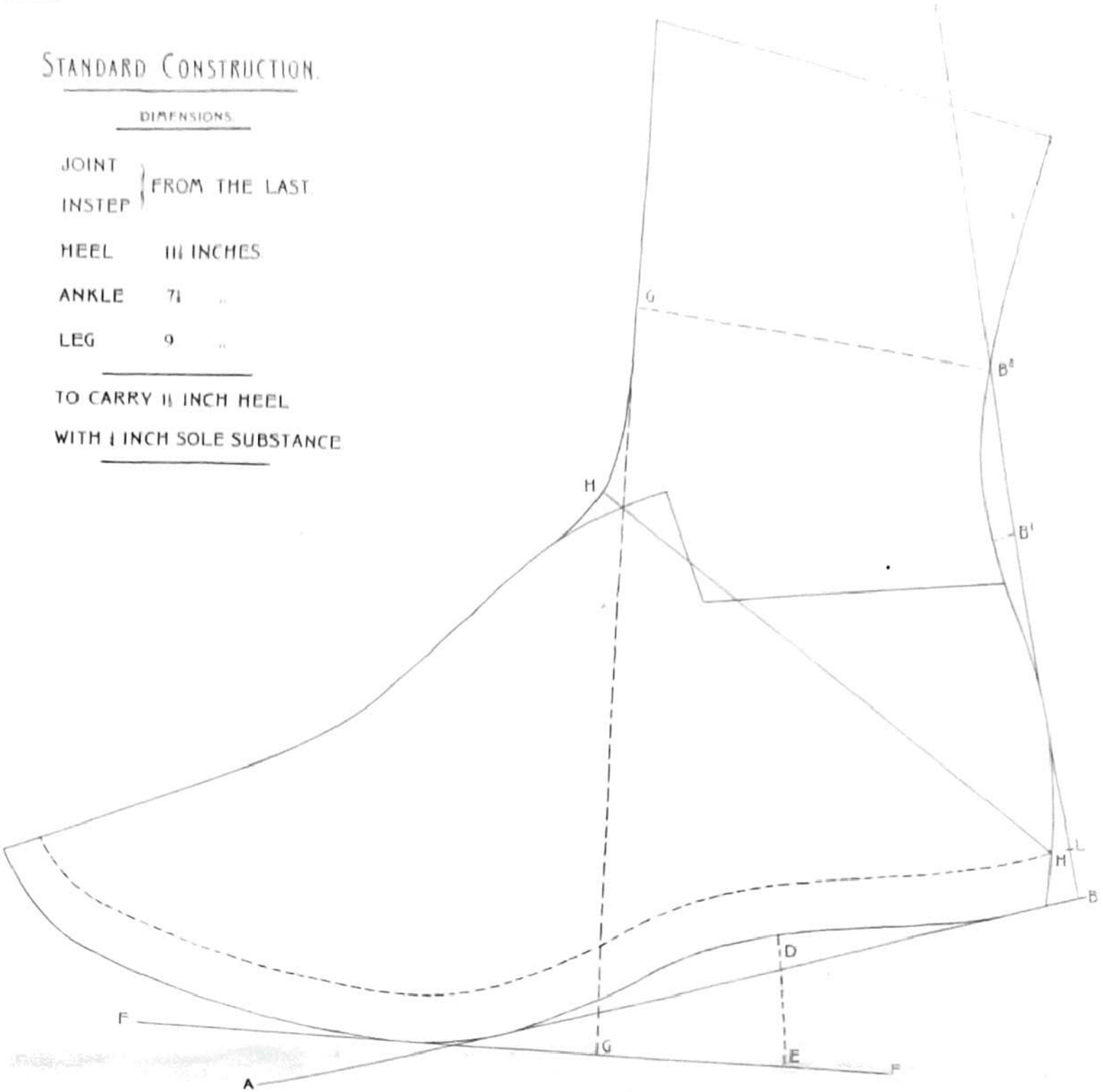


Plate IV. is a man's 7 pattern cut on the same principle, but, being cut with five-eighths lasting allowance, L is five-eighths from the base line A B. As stated, it is cut for an inch and a quarter heel. This gives us the point B' at four and fifteen-sixteenths from L, and B' at three and three-sixteenths of an inch, allowing three-sixteenths for the three sizes from four to sevens, and a quarter of an inch extra at B' for the lower heel, at the same time deadening the curve at B' a little for the lower heel.

PLATE 4

STANDARD CONSTRUCTION.

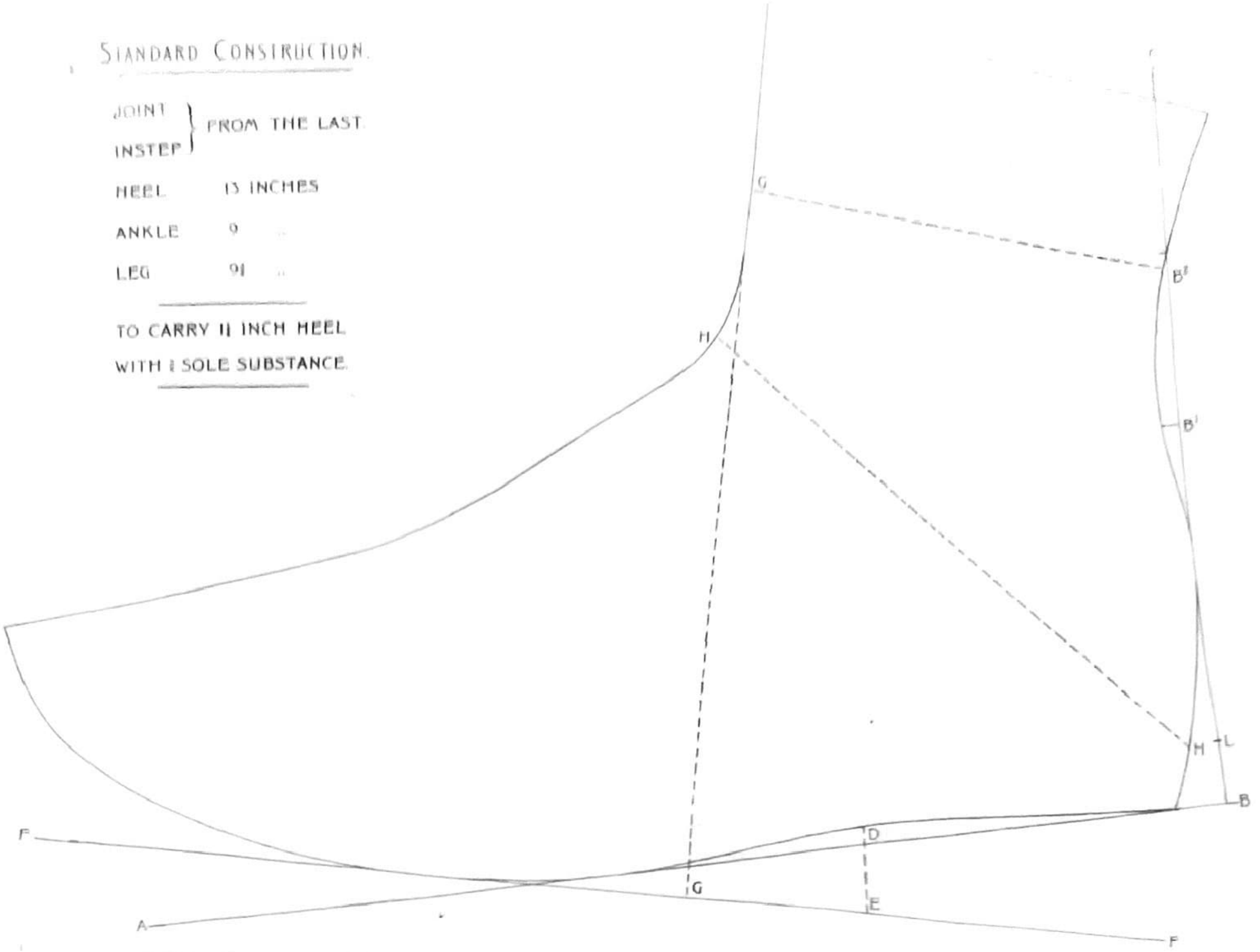
JOINT } FROM THE LAST
INSTEP }

HEEL 13 INCHES

ANKLE 9 "

LEG 9½ "

TO CARRY 1½ INCH HEEL
WITH ¼ SOLE SUBSTANCE.



DRAFTING.

THIS is a subject which is not so generally understood as it should be. It is a thing which formerly was considered to belong to the laster, and to a certain extent this was correct, for, provided the upper fits the last, a good laster can draft the boot without any aid from the pattern-cutter. It has been found, however, preferable to draft the upper or pattern, in order to aid the laster in his endeavour to obtain a clear-fitting boot. Many ways are tried, but in order to be able to judge of their good or bad effect let us see what draft really is. I have already said that draft belongs to the laster, but that the pattern-cutter can aid him. That being so, it is only logical to see how a laster drafts his boot, and to work on the same lines.

In lasting, the shoemaker elevates or hoists the upper at the back, pulls well over at the toe, then pulls at each side of the toe, and puts in what are called draft tacks. The next chief point in drafting the joints, which can be done either before or after the heel is pulled down. The direction of all these pulls has been from the heel to the toe, to produce a forward strain. The elevating the heel of the upper at the back was to get it on the thinnest part of the last, and so get more over at the toe, thus causing a tighter strain on the upper. Do not, however, fall into the error that the best laster is the one who pulls the hardest. The direction of the pulls mentioned, and their positions, are shown in Fig. 2, Plate 5. No cross strain whatever is permissible, and the upper when drafted should sit clear, and without any wrinkling or fulness round the edge of last, except at the toe, where it is unavoidable; in fact the upper should have the appearance of a lasted boot, only requiring the leather between the tacks to be turned over, without having to work out a lot of pleats.

Keeping this in mind, you will see how false in principle is the plan of springing the pattern at the toe, shown in Fig. 3, Plate 5. This plan shortens the front seam, and causes the required strain from heel to toe, but it lengthens the bottom line of the pattern, and causes foul stuff to accumulate all round the forepart, especially at the toe, that renders it difficult for the laster to get the upper to sit clear—in fact, with patent vamps or goloshes it is sometimes almost impossible to last the toe without wrinkles.

Fig. 4, Plate 5, shows another plan, resorted to by many to obtain draft—viz., by dropping, or, as it is termed, deadening the pattern at the toe. This system lengthens the front line and shortens the bottom line of the pattern. The fault of this system is in the fact that instead of tightening the upper when on the last from heel to toe through the thin part of the last, it tightens the upper all round the edges of the last, thus frequently making it difficult to last in the waists through the upper being drawn too tight round the edges. In many cases the laster has to nick the upper between the tacks to enable it to lie on the insole. This is of course undesirable.

Another system is shown in Fig. 5, Plate 5, by taking a piece off the back of the pattern. Usually three-eighths or a quarter of an inch are taken off at the back and tapered to nothing in the waist. In the case of a shoe this is often allowed on at the top, so as not to interfere with the height of the pattern at the back. This is the worst system of all, as it makes the heel measure too small, thus causing a cross strain from the top of the instep to the heel, effectually preventing draft, and causing no end of trouble to the laster. The laster is short of material at the back. He either strains the upper, and risks breaking the lining, or loosens the upper at the instep if a bal. or button boot; if it is an elastic-side boot the elastic stretches, and when the boot is slipped it goes back to its original form, causing the upper to wrinkle on the corners of the stiffener, or at the seams in the waist. Again, this affects the inclination of the leg unless the pattern has been overpitched to allow for it, as the upper catches at the instep, which then forms a pivot, and when the laster pulls the upper down, in order to obtain the required lasting allowance, the leg is pulled backwards in exact proportion to the amount cut off the bottom of the pattern. Also this excessive strain across the instep and heel causes a gathering in the waist that is difficult for the laster to last out. To do this at all he has to pass it forward to the joints, and do the best he can with it there.

The system of elevating the pattern at the back is undoubtedly correct, but nothing must be cut off the standard. The lasting allowance must not be diminished, or a cross strain will ensue, which will minimise the effect it is desired to obtain, and, as drafting affects the inclination of the boot, it is absolutely necessary, if correctness is desired, to make allowance for this contingency.

Fig. 1, Plate 5, shows an easy method of obtaining a perfectly drafted upper without any of the before-mentioned drawbacks, and in which the allowance for the inclination is made automatically. If the covering pattern really fits the last, it cannot fail to produce a clear fitting boot. Take your standard pattern and lay it on a sheet of paper; pierce an awl through at the full swell of the instep indicated with a cross; now mark up the front of pattern to the awl, and along the bottom to the joint, and thence to the back of the heel. Pivot the pattern on the awl, letting the toe go where it likes until the pattern is elevated a quarter of an inch at the heel. Now mark from where the pattern crosses the line at the joint to the heel, and from where the pattern crosses the line at the instep, up to the top of the leg, along the top, and down the back to the ankle measure. Now remove the awl; place the patterns level at the toe, and at the new heel line; now mark from the ankle to the heel. Cut this out, and you have your standard drafted.

PLATE 5

DRAFT

METHODS IN GENERAL USE

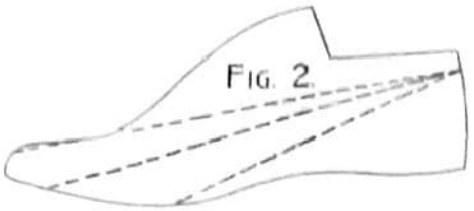


FIG. 2.

FIG. 3.

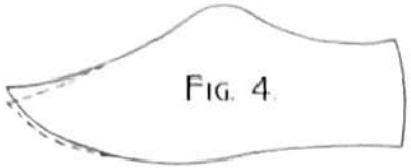


FIG. 4.

FIG. 5.

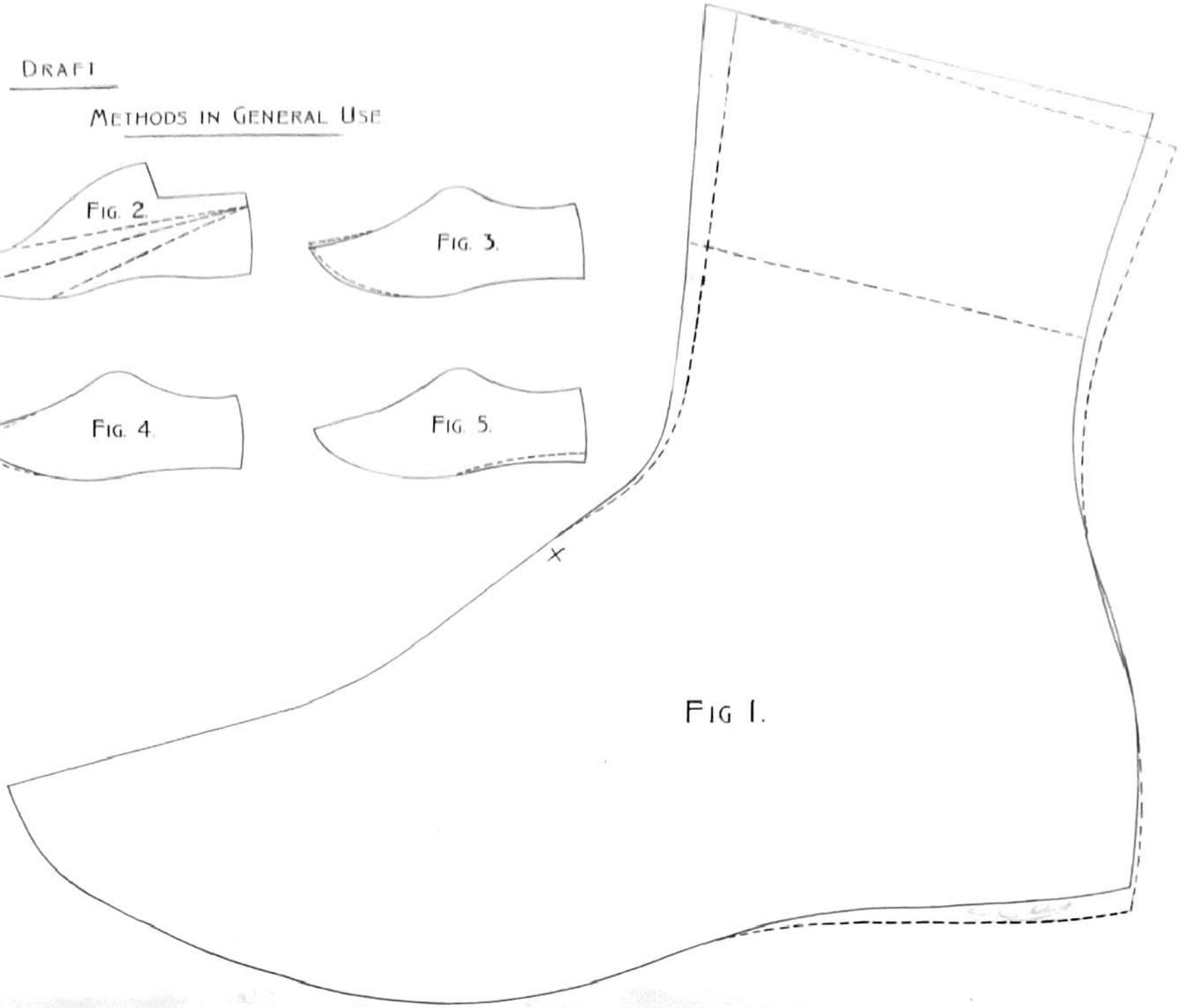


FIG 1.

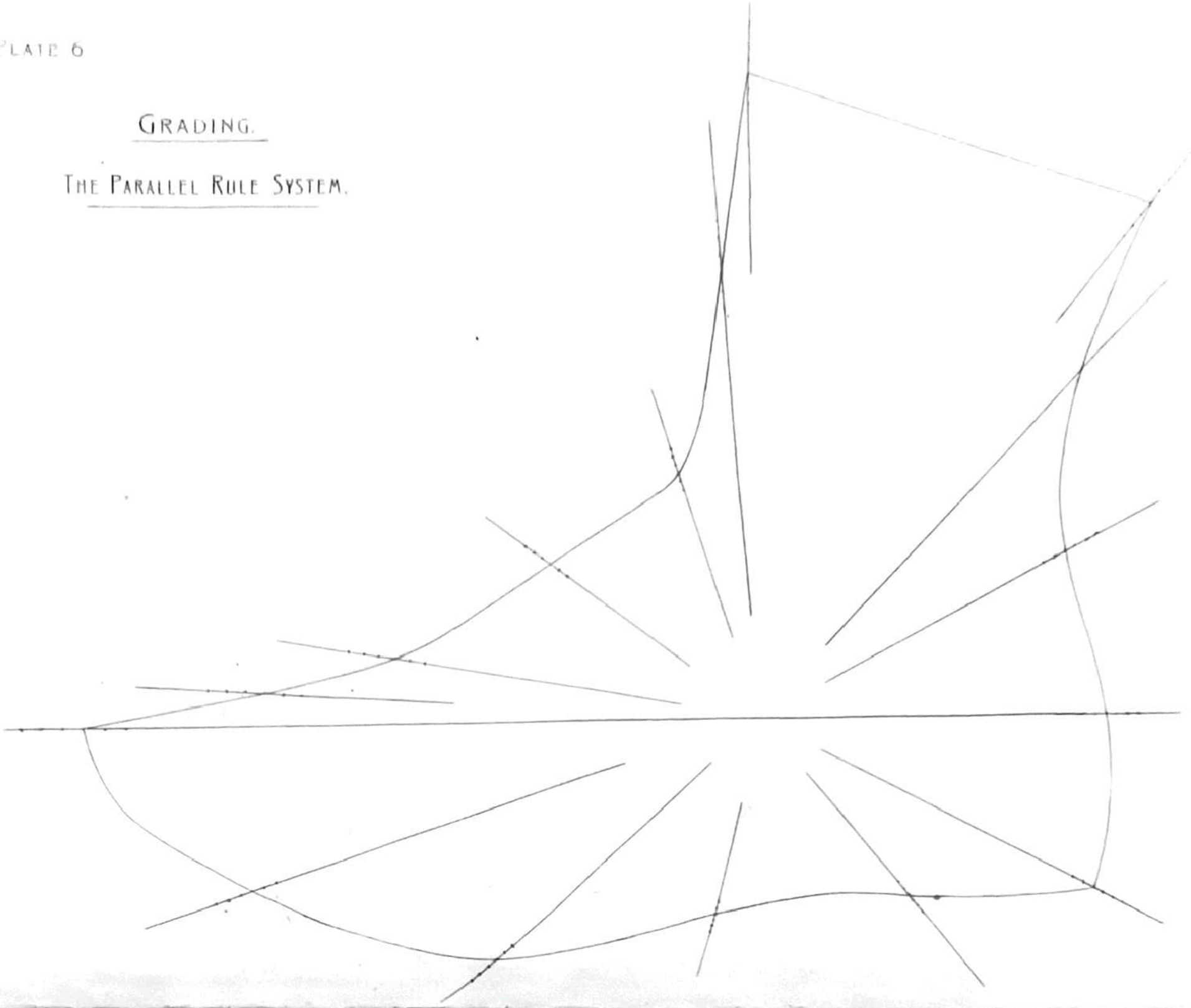
GRADING.

THERE are three methods of grading that I shall explain, taking the parallel rule first, as being the simplest. Place your drafted standard on a sheet of paper, and mark round with a fine-pointed pencil. Now draw a line from the toe, right through the standard to the heel, as in Plate 6, allowing it to project at each end. Divide this line into three parts, and make a mark one-third from the heel; on this point pierce a fine awl; then with a straight-edge mark radiating lines from this point, cutting the outline of the standard in all the principal positions as indicated in the diagram. More lines can be ruled if desired, but when a large number is used it becomes tedious to mark off the grade. Be careful that the lines at the corners run exactly through the apex or point of the angles. Divide a size into three equal parts; put one-third at the heel on the line first drawn, and two-thirds at the toe. Add as many points as sizes desired—larger sizes outside the form, smaller sizes inside. Take your parallel rules; having slightly opened them, place the top rule level with the end of the toe and pattern, and where the next radial line crosses the standard. Move the top rule until it touches the next point at the toe, and pierce with the awl where the rule crosses the next radial. Move the rule to meet all the points, and pierce at each move. Now place the rule parallel with the point on the outline of the standard on the radial line just marked, and where the next radial line crosses the standard. Again move the rule to meet each point on the last radial line marked, and mark where it crosses the next radial line. One way is to mark one size on all round by the rule; then take a pair of compasses and set them to the distance on each radial line; then mark all the required sizes up or down. This saves so many shifts of the rule, and is a little quicker. When completed, your pattern will present a similar appearance to Plate 6. This is called the stencil. To obtain a pattern from this stencil, place it on a sheet of paper and pierce through the holes representing the size required. Supposing this to be a fives, this will be the first larger than the standard. When you have pierced through the first point on each radial line, remove the stencil. You will then have a number of points. Connect these by means of the standard, commencing at the toe, and moving the pattern to meet the points, and you have the pattern a size larger. Repeat this process for all your sizes, always using the next size patterns to meet the points.

PLATE 6

GRADING.

THE PARALLEL RULE SYSTEM.



The radial system is probably the next simplest (see Plate 7). First construct the radial tool (Fig. 1). To do this, draw a line the exact length of the standard, from the point of the toe to the full swell of the heel. At the end of this line erect a line at right angles by means of a set square. On this line set off as many distances of a size each as there are sizes in the set of patterns. Connect these points with a dot at the other end of the line as in the diagram. (The diagram is half scale.) Now mark round your standard on a sheet of paper. Draw a line right through the pattern from the toe to the heel, allowing it to project at each end. On this line mark the radial centre. This point theoretically may be placed anywhere within the area of the pattern, but in practice it will be found preferable to place it in the position in the diagram (Plate 7), so that the radial lines will cut the outline at as great an angle as possible. Pierce an awl through the point thus marked, and with a straight-edge touching the awl mark the radial lines, using the edge of the rule which touches the awl. Having marked the radial lines, withdraw the awl.

Now take the radial tool. Place the tool on the paper, with the marks underneath. Lay the straight edge of the tool along the radial line—that is, the line you drew first, A B. Now where the radial line crosses the standard, crease or fold the tool, being careful to keep the folded edges level on the straight edge of the tool, so that the creases will be at right angles to the base line A B. Now place the folded edge of the tool parallel to the radial line. Place the third line from the straight-edge A B, touching the outline of standard. Now mark off the two sizes inside and the three sizes outside. This gives you the grade for all the sizes at that point. Repeat this on all the radial lines, creasing the tool wherever it crosses the outline of the standard, and marking on the grade thus obtained. This will give you the stencil, as in the case of the parallel rule grading. Pierce through the points for each size you want, and meet the points with the next size pattern. It is needless to grade the patterns on the stencil. This has been done to show the grade.

The drawback to the radial system is that it gives a larger grade from size to size on wide fittings than on narrow fittings, owing to the greater distance from the radial centre. It will be noticed that this system gives a greater grade in the height of the leg than is generally allowed. Many manufacturers object to this, but this is easily remedied by grading the legs separately, allowing whatever difference is required at either corner of the leg, and connecting the points with a straight-edge.

Use great care in constructing the tool, or the grade will be unequal.

If lines are drawn at right angles to the base line A B at frequent intervals, it will prevent the necessity of creasing the tool, but it will be necessary in drawing the radial lines to see that they cross the outline of the standard at the exact spot where the cross lines on the tool will touch.

Mr. W. Lewis, of the Northampton Technical School, is the inventor of a metal radial tool, which is invaluable to those who may adopt this system, which is undoubtedly the best yet introduced.

GRADING.

THE RADIAL SYSTEM.

FIG. 1. THE RADIAL TOOL.

PLATE VIII

Plate 8 is a variation of what is known as the one-sixteenth system. By this system we can grade any set of patterns in just the same manner as the lastmaker—that is, to obtain just the same increase.

It is a certain fact, whatever may be said to the contrary, that the majority of lastmakers work on the quarter-inch scale; that is, a quarter of an inch rise from joint to joint and instep to instep from one size to the other. Thus, taking a fours 3-fitting last, it would probably measure 7¾ at the joint and 8¼ at the instep, now giving the quarter-inch rise that would make the fives joint 8¼ and the instep 8½ inches. Now, a quarter of an inch on the last means one-eighth on the patterns, as that only covers half of the last. Divide this into two equal parts, and one-sixteenth is placed at the front line of pattern, the other on the bottom.

There is one other point, however, that is generally overlooked: that, as the last increases in girth, so does the bottom of the last increase in width—generally one-sixteenth for each size. Dividing this in half for the pattern, we get one-thirty-second of an inch—not much on one pattern but it is twice that on the upper. Continuing this to the sevens, the upper becomes three-sixteenths too large, and, going downwards to the twos, this size will be two-sixteenths too small, thus giving a ready explanation of what is often noticed by lasters, that the sevens are generally too large, while the twos are quite tight.

There is one other point with regard to last grading, and that is, there is less difference from size to size in waist of the last bottom than at the joints. The difference here is usually one-twenty-fourth. This means on the pattern one-forty-eighth difference in the waist to one-thirty-second at the joint. Now, if we turn the original sixteenth into forty-eighths, we shall have three-forty-eighths; deduct the one-forty-eighth from this—that is the difference of grade in the waist—and we get two-forty-eighths left; reduce this to twenty-fourths, and we get one-twenty-fourth of an inch. Now, if we allow this one-twenty-fourth all along the bottom, instead of one-twenty-fourth in the waist, and one-thirty-second in the forepart, we shall be close enough for all practical purposes.

It has been proved by experience that a quarter of an inch is too great a difference at the ankle measure. One-sixth has been proved to be more generally correct. This will give us one-twelfth on the pattern, and, divided equally, will be one-twenty-fourth for each side of the leg—the same distance as we use along the bottom. Having decided this, take your standard and mark round it. Draw the line running right through the pattern so that it has a little upward inclination at the toe, as in the diagram. Mark off the principal positions, and draw the lines as shown. On these lines mark the allowances, one size all but a sixteenth at the toe on the long line, the remaining sixteenth on the line at the heel. At the other points mark off the distances decided on—that is, one-sixteenth at the joint and instep up the front line, and one-sixteenth at the bottom corner of the heel and the top of the leg. More may be placed at the top of the leg if required, and two-thirds of a size may be placed at the toe, and one-third at the heel if so desired. In that case, one-third must be placed at the corner of the heel also. At all the other points mark one-twenty-fourth. When all the distances have been marked, you have the stencil. Prick through for all the sizes you require, one size at a time. Join the points thus obtained by the next size pattern.

This last described system is the most difficult, and requires a little arithmetic, but it has the advantage of grading accurately any required fitting.

To find the grade on any set of lasts, measure the twos and sevens: divide the difference by the number of the sizes—in this case it will be five, as we must not reckon one of the outside sizes—and the result is the grade from size to size; deduct from this the one-twenty-fourth to allow for width of bottom; place one-sixteenth of this on the front line, the remainder on the bottom of the pattern.

PLATE 8

GRADING.

TO GRADE PATTERNS WITH A FIXED AMOUNT OF DIFFERENCE IN ANY FITTING.