March 25, 1941. J. S. KAMBORIAN 2,235,887

MANUFACTURE OF FOOTWEAR

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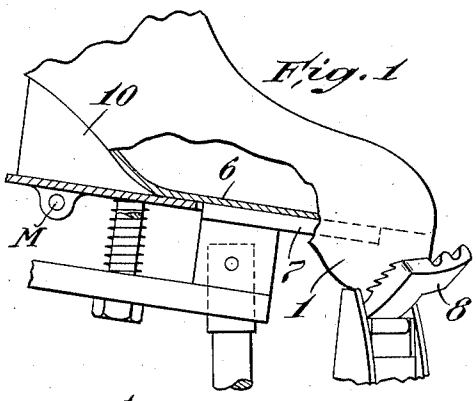


Fig. 1

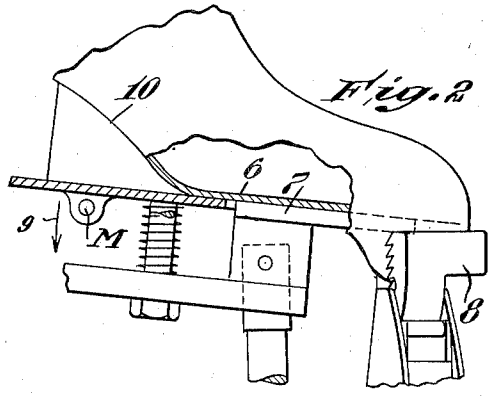


Fig. 2

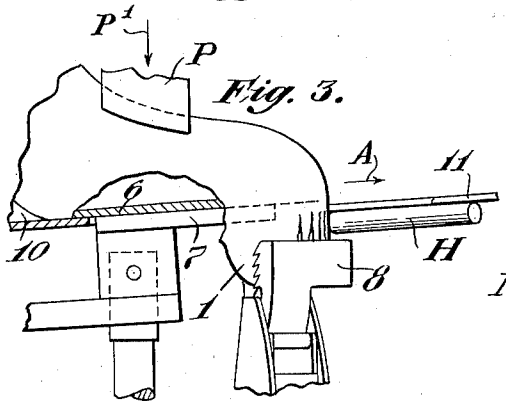


Fig. 3.

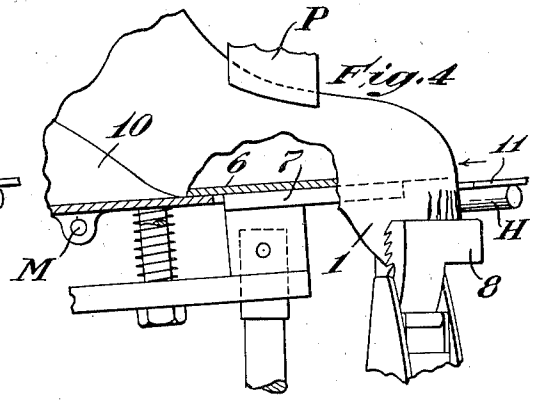


Fig. 4

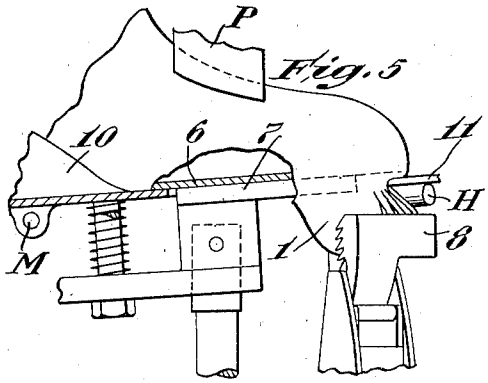


Fig. 5

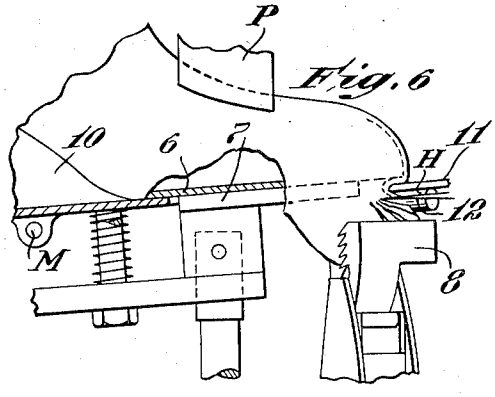


Fig. 6

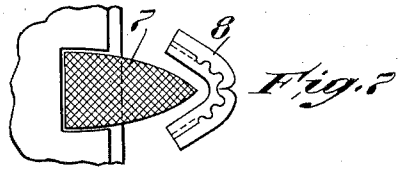


Fig. 7

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Fig. 11.

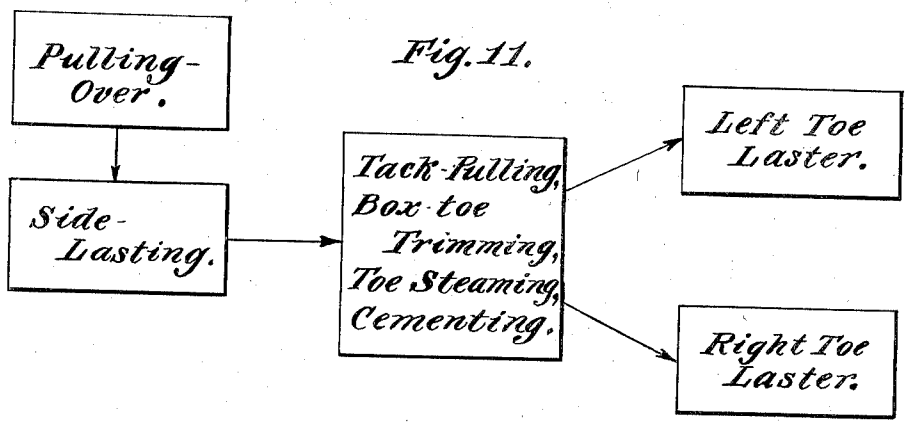


Fig. 9.

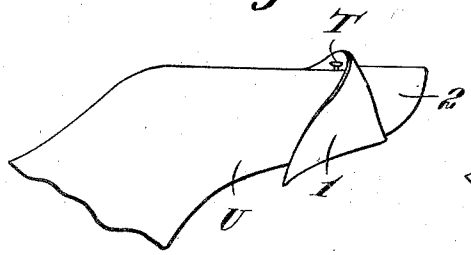


Fig. 8.

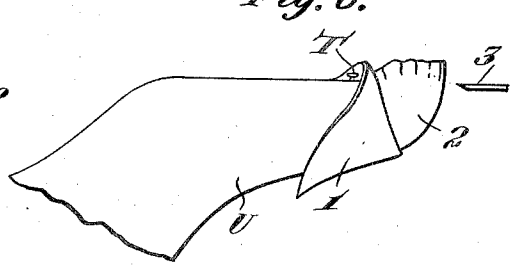


Fig. 10.

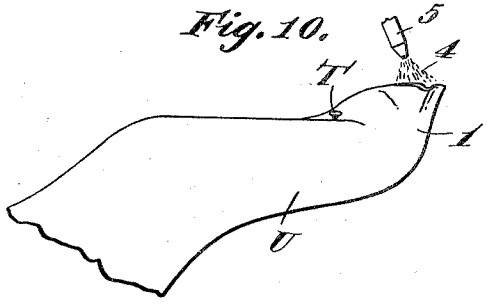
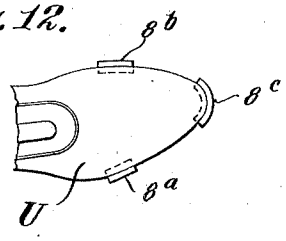


Fig. 12.



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UNITED STATES PATENT OFFICE

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MANUFACTURE OF FOOTWEAR

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Application September 27, 1938, Serial No. 231,939

12 Claims. (Cl. 12—145)

This invention pertains to the manufacture of footwear, and relates more particularly to an improved method of lasting the toe portions of shoes.

In accordance with the usual prior practice the insole and upper are first assembled on the last, and after the spindling, pulling-over and side-lasting operations, the last, together with the assembled shoe parts, is mounted in a bed-lasting machine wherein the toe portion of the upper is first smoothed about the sides of the last by an upward movement of the wiper members and is then wiped in over the bottom of the insole by repeated in and out movements of the wipers. At some intermediate point in the operation, the surplus stock at the toe, particularly the projecting edge of the toe box, is usually trimmed away.

In ordinary bed-lasting, the upward movement of the wipers is principally relied upon to draw the upper snugly and smoothly about the toe portion of the last, but during this wiping action the shoe is upside down so that the worker is unable to observe the operation and the upper is not always tensioned as much or as evenly as might be desired.

One principal object of the present invention is to provide an improved method of lasting the toe portions of shoes such that the upper may be stretched as snugly as desired about the tip of the last, the degree of stretch being wholly within the control of the operator, and wherein the operation of stretching the upper over the tip of the last is observable at all stages by the worker.

A further object of the invention is to provide a method of lasting the toe and, if desired, the forepart portions of shoes in which a positive pull exerted on the margin of the upper is substituted for the more or less uncertain frictional action customarily depended upon in drawing the upper about the toe and arch of the last, and whereby damage to the outer finished surface of the upper, such as is often occasioned by the rubbing action of the upwardly moving wipers, is avoided.

A further object of the invention is to provide an improved method of lasting in which the upper material is held under adequate tension so that it cannot relax and draw back, as sometimes happens when the surplus stock is being trimmed away during the usual bed-lasting operation.

A further object of the invention is to provide a toe lasting process which may be performed more quickly than the usual bed-lasting operation and which may be carried out successfully by a relatively unskilled operator.

Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings, in which:

Fig. 1 is a fragmentary diagrammatic side elevation of the forepart portion of a shoe illustrating an early step in the operation of toe lasting in accordance with the present invention;

Figs. 2 to 6 inclusive are views generally similar to Fig. 1, but illustrating further successive steps in the toe lasting process;

Fig. 7 is a fragmentary plan view showing a work support and upper-gripping means useful in the performance of the toe lasting operation in accordance with the present invention;

Figs. 8 to 10 inclusive are diagrammatic side elevations of the forepart portion of a shoe, illustrating several desirable steps preliminary to the toe lasting proper;

Fig. 11 is a diagrammatic view illustrating a desirable sequence of operations concerned in the lasting of the toe portions of shoes; and

Fig. 12 is a diagrammatic view illustrating a modified procedure by which both toe and forepart may be properly lasted.

Referring first to Fig. 11, a preferred sequence of operations in lasting the toe ends of shoes comprises pulling over all shoes, whether rights or lefts, in accordance with usual procedure; the delivery of the pulled-over shoes to a single operation or operating station where the front three pulling-over tacks, at least, of each shoe are usually removed, and where the upper is turned back at the toe to expose the projecting lower edge of the toe box, and where this projecting edge, and commonly any surplus backing or lining material, is trimmed away, and where the upper is then turned down again over the tip of the last, the toe is steamed, and adhesive, for example rubber latex, is applied. This adhesive is conveniently applied, for instance, in the form of a spray, and preferably is applied both to the inner surface of the upper material at the toe and to the toe end of the exposed surface of the insole.

In Fig. 8 the toe portion 1 of the upper U is shown as having been turned back to expose the toe box 2—the foremost of the pulling-over tacks T having first been removed. A trimming knife 3 is shown in Fig. 8 in readiness to trim off the surplus toe box material in a plane just above the bottom surface of the insole. In Fig. 9 the shoe is shown substantially as it appears after the toe box trimming operation has been completed. In

Fig. 10 the toe portion 1 of the upper U is shown as having been turned back over the tip of the last and adhesive 4, for example latex, is being applied to the inner surface of the upper material and to the toe end of the insole, for example, by means of a spray nozzle 5.

Having completed the preliminary steps illustrated in Figs. 8, 9 and 10, the right and left shoes respectively preferably are presented to different operators who proceed to toe-last the shoes, whether rights or lefts, as now about to be described, it being understood, however, that all shoes, whether rights or lefts, may, if desired, be toe-lasted by the same operator.

In lasting the toe, the operator first rests the bottom of the insole 6 (Fig. 1) upon a work support 7 of suitable size and shape, for example, as illustrated in Fig. 7. The shoe is first arranged in a forwardly and downwardly inclined position (Fig. 1) with the work rest engaging the insole at the forepart of the latter but rearwardly of the toe tip. In this position the upper material 1 at the toe projects downwardly into the field of operation of gripping means 8 which is incapable of moving upwardly to any substantial extent relatively to the work support. Preferably the gripping means 8 is of such character that in gripping the upper material the latter is formed into crimps or folds which extend substantially perpendicular to the bottom of the insole, such folds being thus regularly formed and evenly distributed, thereby to facilitate the smooth lasting of the upper about the toe. When the shoe has been positioned as above described, the gripping means is manipulated so as firmly to grip the marginal portion of the projecting upper material at the toe of the shoe. After the gripping means has seized the margin of the upper material at the toe, the heel end of the shoe is rocked downwardly by the operator in the direction of the arrow 9 (Fig. 2), the shoe and last rocking upon the work support as a fulcrum. Preferably the work support is pivoted to rock about a horizontal axis extending transversely of the shoe, thereby to facilitate such rocking of the shoe.

In thus rocking the heel end of the shoe downwardly, the toe end of the shoe is raised, thus stretching the upper material (which is held by the gripping means) first in a direction substantially perpendicular to the last bottom and then, as the toe rises further, to some extent at least wrapping the upper material rearwardly about the edge of the insole. The upper material is thus drawn snugly about the tip of the last, the stretching of the upper about the tip of the last being in full view of the operator and the degree of stretching stress applied depending entirely upon the force with which the operator presses the heel end of the shoe downwardly. Since the gripping means is such as to define definite regularly spaced undulations or crimps at the margin of the upper, the latter tends to distribute itself uniformly and without bunches about the tip of the last.

While the toe portion of the upper is thus held tautly stretched, the work support and gripper means preferably are caused to move forwardly in the direction of the arrow A (Fig. 3) so as to bring the toe of the shoe into the field of operation of wiping means 11. The work support may be provided with a stop or abutment 10 arranged to engage the shank portion of the shoe rearwardly of the ball, although any equivalent means may be employed. Preferably, the entire work support, including the abutment 10, is heated, as by means of an electrical heating device M, so that the bottom of the shoe at the forepart and shank undergoes smoothing and ironing while the toe is being lasted, this effect being assured by the application of downward pressure of considerable intensity, for instance 1000 pounds or more, applied for example by means of a presser foot or saddle P designed to engage the vamp portion of the upper at a point substantially above the ball of the foot. This presser foot is moved downwardly in the direction of the arrow P (Fig. 3) into contact with the shoe after the latter has been rocked rearwardly from the position of Fig. 2 to that of Fig. 3.

With the parts positioned as shown in Fig. 4, the wiper means 10 (such, for example, as the toe wipers commonly used in bed-lasting shoes) is caused to approach the toe of the shoe, the wiper means being so disposed as to move in a plane substantially parallel to but slightly below the level of the bottom of the insole. The edges of the wipers contact the upper material between the point where it engages the edge of the insole and where it is gripped by the gripping means 8. The continued advance of the wiper means, as shown in Fig. 5, wipes-in the upper material against the bottom of the insole, it being noted that the wiping means is not called upon to stretch the upper about the tip of the last but only to wipe it inwardly over the bottom of the insole, and that the upper is stretched by a positive pull and is not subjected to any rubbing or frictional action such as might cause damage to its finished surface. Preferably while the upper material is still held against the insole by the wiping means 11, a suitable trimming means, for instance a blade 12 (Fig. 6), is caused to advance and to trim off the surplus upper material extending from the inner edges of the wipers 11 to the gripping means 8. The wiping means is retained in its inner position sufficiently long to permit the adhesive firmly to unite the upper to the insole. If desired, the wiping means may be heated by heating means H disposed to heat the wipers while in retracted position so as to facilitate heating of the adhesive, it being noted that the wiping means may safely be heated without danger of occasioning damage to the upper, since the wiping means does not engage the portion of the upper which is exposed in the finished shoe.

When the upper material has thus been firmly united to the insole, the wiping means is withdrawn and the shoe removed from the work support.

Fig. 12 illustrates a modified procedure in which the margin of the upper is gripped at opposite sides of the forepart as by grippers 8^a and 8^b, respectively, as well as by the grippers 8^c at the toe so that when the shoe is rocked about the work support as above described the upper is tensioned across the arch of the last as well as at the toe. Appropriate wiping means (not shown), preferably heated, operate at the toe and along the sides of the forepart so as to wipe-in the tensioned upper material, after which the surplus material may be trimmed away, as above described.

While certain desirable appliances have herein been illustrated as useful in the performance of a novel method, it is to be understood that such specific appliances are not necessary to the proper practice of the method as herein disclosed and claimed, but that any other equivalent means may be employed and that the various operations involved in this method may be carried out

by means of appropriate implements actuated by the hands of the operator, although preferably carried out in part at least by the use of an organized machine. It is further to be understood that the particular sequence of operations herein disclosed is merely the preferred sequence and that the several steps may individually be varied and that the sequence of steps may be changed, all within the scope of the appended claims.

I claim:

1. Method of toe lasting shoes which have already been prepared, as for the usual bed-lasting operation, characterized in bringing the forepart portion of the under surface of the inner sole into contact with a work support, gripping the margin of the upper material at the toe and, while so gripping such margin, so manually rocking the shoe about a transverse axis at the region of the work support as to stretch the upper material snugly about the tip of the last to a degree dependent upon the force exerted by the hand of the operator, while maintaining the upper so stretched, relatively moving the shoe and wiping means so as to bring the shoe into the field of action of said wiping means, and wiping-in the upper material at the toe so as to cause it to lie against the under surface of the insole.

2. Method of lasting shoes which have already been prepared, as for the usual bed-lasting operation, characterized in supporting the forepart portion of the inner sole so that it may rock about a transverse axis but leaving its heel end unsupported, gripping the margin of the upper material at opposite sides of the forepart, and, while so gripping the upper material, manually depressing the heel end of the shoe thereby to rock the shoe about said transverse axis and stretch the upper material snugly across the arch of the last to a degree dependent solely upon the force exerted by the hand of the operator, and then uniting the marginal portion of the upper to the bottom of the inner sole.

3. Method of lasting shoes which have already been prepared, as for the usual bed lasting operation, characterized in supporting the forepart portion of the inner sole so as to permit the shoe to rock about a transverse axis but leaving the heel end unsupported, gripping the margin of the upper material at the toe and also at opposite sides of the forepart, and, while so gripping the upper material manually depressing the heel end of the shoe so as to rock the shoe about said transverse axis and stretch the upper material snugly about the tip and across the arch of the last, and uniting the marginal portion of the upper to the bottom of the inner sole.

4. Method of toe lasting shoes which have already been pulled over, characterized in supporting the forepart portion of the shoe so that it may rock about a transverse axis, engaging gripping means with the edge portion of the margin of the outer element of the upper at the toe, rocking the shoe about said transverse axis so as to stress said outer element of the upper about the tip of the last, relatively moving the shoe and wiping means thereby to bring the shoe into the field of action of said wiping means while keeping the outer element of the upper under stress, wiping the margin of said outer element of the upper inwardly against the bottom of the insole, and severing said outer element of the upper at a point between the gripping means and the insole.

5. Method of toe lasting shoes which have already been pulled over, characterized in resting the forepart portion of the under surface of the insole upon a heated work support, engaging gripping means with the edge portion of the margin of the upper material at the toe, manually rocking the heel end of the shoe downwardly thereby to stretch the upper material snugly about the tip of the last to a degree dependent upon the force exerted by the hand of the operator, causing the wiping means to wipe-in the stretched marginal material against the under surface of the insole, severing the edge portion of the margin from that part thereof which contacts the insole, and uniting such wiped-in material to the insole.

6. Method of toe lasting shoes which have already been pulled over and side lasted, characterized in resting the forepart portion of the under surface of the insole upon a work support, engaging gripping means with the margin of the upper material at the toe, and causing such relative movement of the shoe and gripping means as to stress the upper material thereby to stretch it snugly about the tip of the last, applying heavy pressure to the vamp portion of the upper substantially above the ball of the shoe thereby to compress the bottom of the shoe against the work support so as to smooth and iron the bottom, moving the shoe as a whole in a longitudinal direction while keeping the upper still under stress thereby to bring the toe portion of the shoe into the field of action of wiping means, wiping-in the marginal material at the toe against the under surface of the insole and uniting such wiped-in material to the insole.

7. Method of toe lasting shoes wherein, after trimming away surplus toe box material, adhesive is applied to the inner surface of the upper at the toe and to the toe portion of the insole, characterized in seizing the margin of the upper material at the toe, first stressing such material in a direction substantially perpendicular to the bottom of the insole thereby to stretch it about the tip of the last, moving the shoe with the toe portion of the upper still stressed into the field of action of wiping elements, then moving the wiping elements inwardly in a plane substantially parallel to the bottom of the insole thereby to wipe the tensioned upper material inwardly over the insole bottom, and trimming off the tensioned material extending from the wiping elements to the gripping means.

8. Method of toe lasting shoes wherein, after trimming away surplus toe box material, adhesive is applied to the inner surface of the upper at the toe and to the toe portion of the insole, characterized in so gripping the margin of the upper material at the toe as to form substantially uniform crimps therein extending substantially perpendicular to the bottom of the insole, forcibly pulling the upper material in a direction substantially perpendicular to the bottom of the insole thereby to stretch it about the tip of the last, then moving wiping elements inwardly in a plane substantially parallel to the bottom of the insole thereby to wipe the tensioned marginal material inwardly over the insole bottom, and trimming off the tensioned material which extends from the wipers to the gripping means.

9. Method of toe lasting shoes wherein, after trimming away surplus toe box material, adhesive is sprayed against the inner surface of the upper at the toe and against the toe portion of the insole, characterized in first seizing the margin of the upper material at the toe in such a way as to form crimps therein extending substantially perpendicular to the bottom of the insole, pulling

the marginal material in a direction substantially perpendicular to the bottom of the insole thereby to tension it about the tip of the last, then, while maintaining such tension, wiping-in the marginal material against the bottom of the insole and maintaining it in contact with the bottom of the insole until the adhesive has set.

10. Method of toe lasting shoes which have already been prepared, as for the usual bed lasting operation, characterized in supporting the forepart portion of the insole so that it may rock about a transverse axis but leaving the heel portion unsupported, gripping the margin of the upper material at the toe, and, while so gripping such margin, so manually depressing the heel end of the shoe as to rock the latter about said axis thereby to stretch the upper material snugly about the tip of the last to a degree wholly dependent upon the force exerted by the hand of the operator, wiping in the margin of the upper material while it is held in stretched condition against the bottom of the insole, and uniting the marginal portion of the upper to the bottom of the insole.

11. Method of toe lasting shoes which have already been pulled over and in which the inner surface of the upper material at the toe has been caused to become adhesive, characterized in first gripping the edge portion of the marginal material at the toe, moving the shoe as a whole in a longitudinal direction to bring the shoe into the field of action of wiping means, stressing such marginal material in a direction substantially perpendicular to the bottom of the insole while substantially maintaining such tension, and wiping in the tensioned material against the bottom of the insole.

12. Those steps in the method of toe lasting shoes which comprise seizing the margin of the upper material at the toe by means of gripper devices in such a way as to form substantially uniform crimps therein extending substantially perpendicular to the bottom of the insole, and forcibly pulling such crimped upper material in a direction substantially perpendicular to the bottom of the insole thereby to stretch it about the tip of the last, and, while the upper is maintained in stretched condition, wiping-in the crimped marginal material of the upper so as to form substantially uniform folds against the bottom of the insole, the wiping in operation being initiated before the margin is released by the gripper devices.

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