

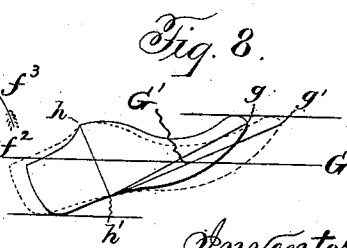
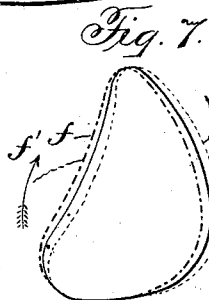
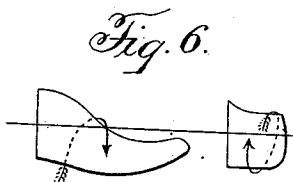
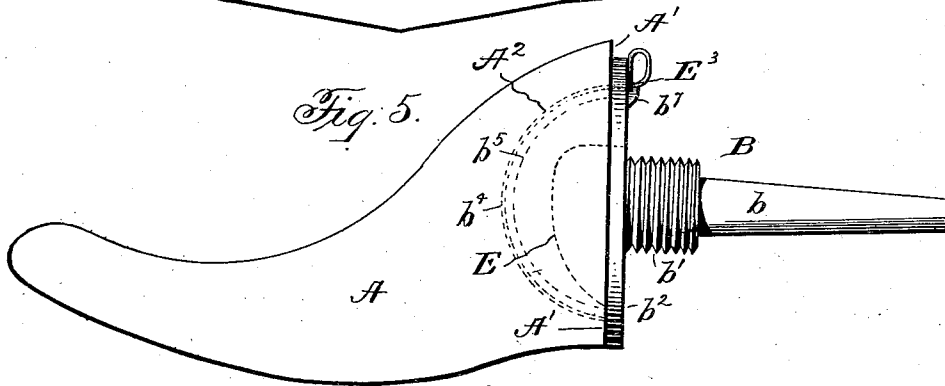
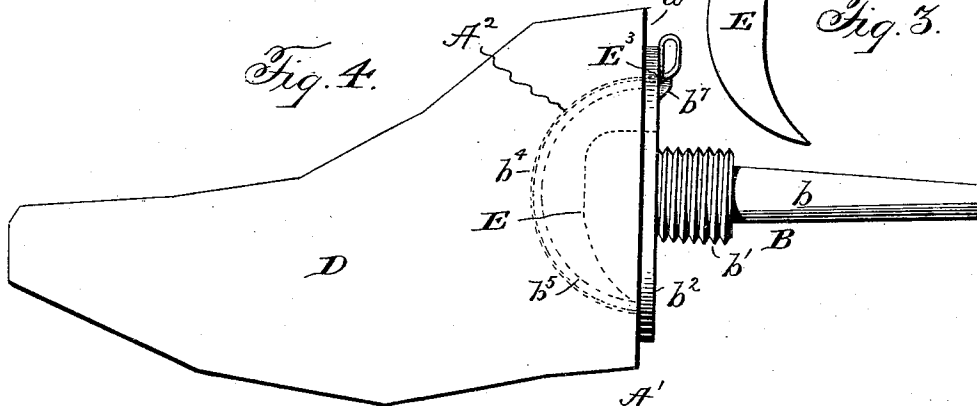
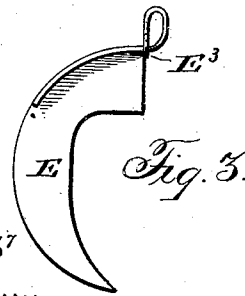
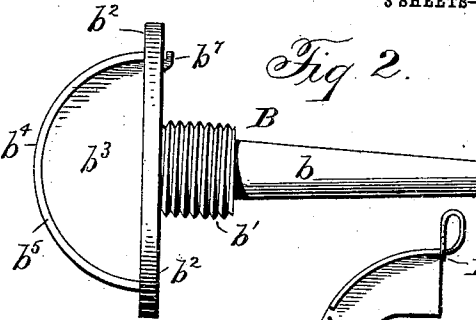
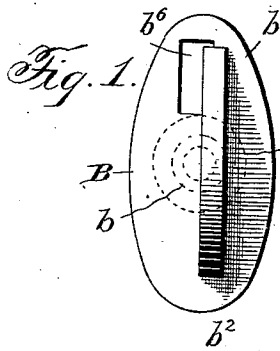
E. J. PRINDLE.
METHOD OF FORMING LASTS.

APPLICATION FILED AUG. 14, 1901. RENEWED JAN. 20, 1910.

968,409.

Patented Aug. 23, 1910.

3 SHEETS—SHEET 1.



Witnesses:
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Henry C. Hazard

Inventor:
Edward J. Prindle, by
Prindle and Russell, his atty.

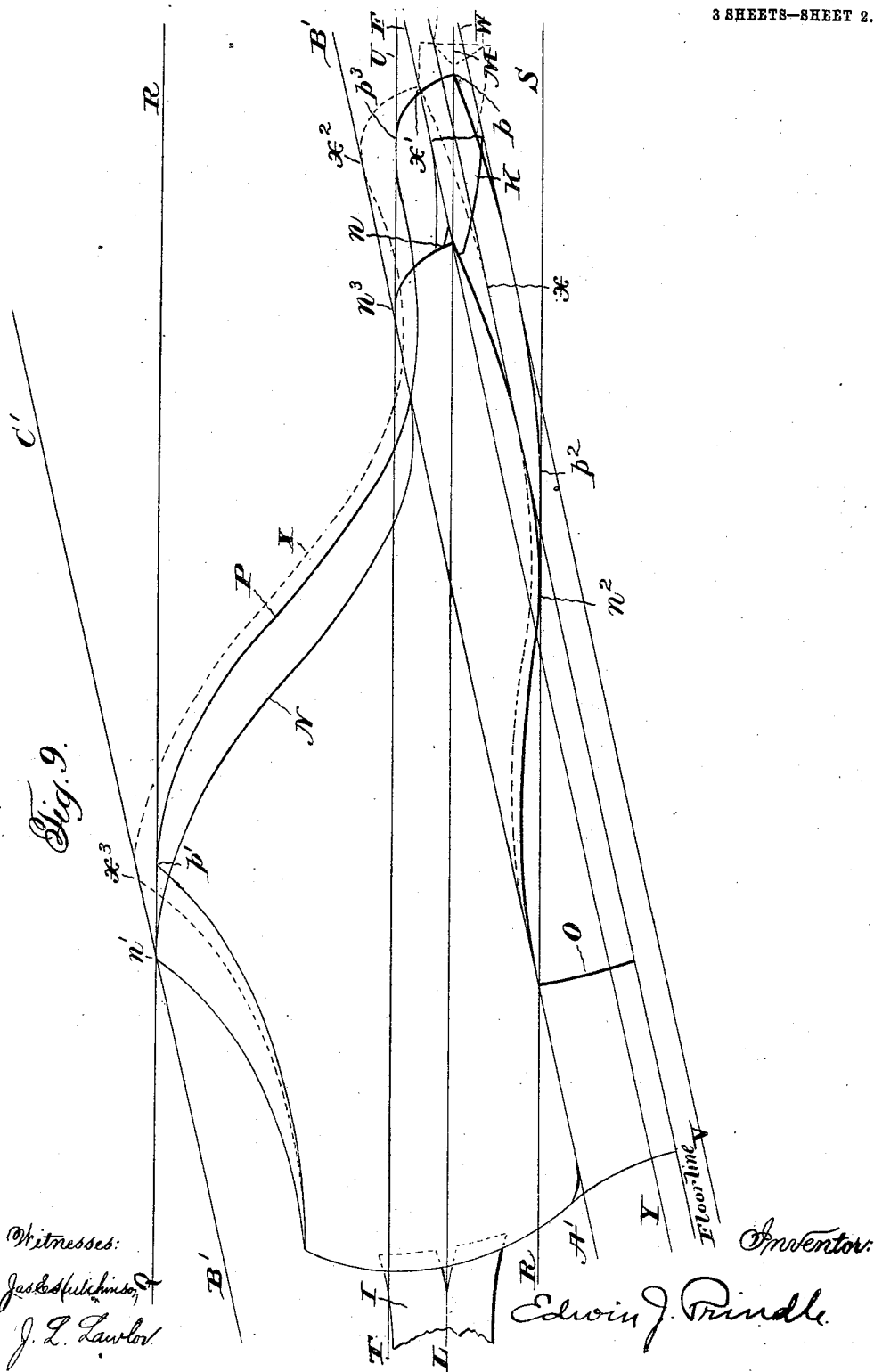
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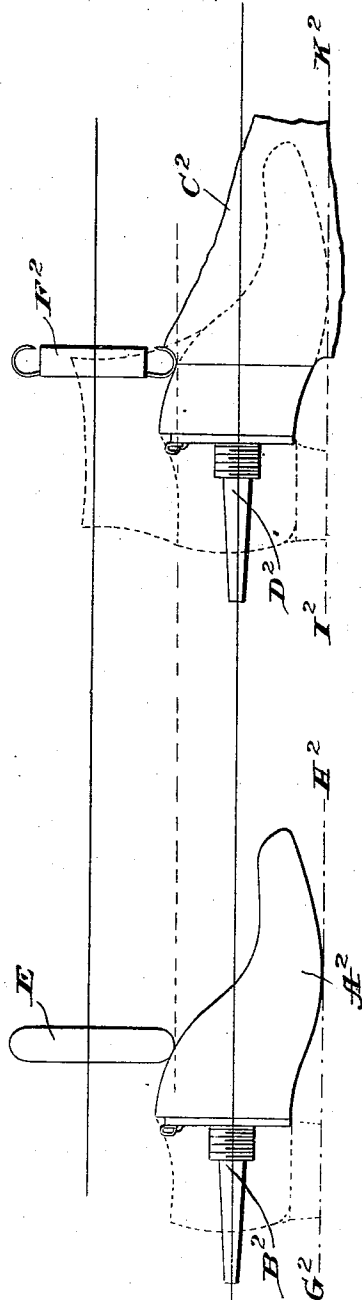
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3 SHEETS—SHEET 3.

Fig. 10.



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UNITED STATES PATENT OFFICE,

EDWIN J. PRINDLE, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF FORMING LASTS.

968,409.

Specification of Letters Patent. Patented Aug. 23, 1910.

Application filed August 14, 1901, Serial No. 72,060. Renewed January 20, 1910. Serial No. 539,140.

To all whom it may concern:

Be it known that I, EDWIN J. PRINDLE, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Methods of Forming Lasts, and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

10 Figures 1 and 2 are respectively a front and a side elevation of a dog adapted for use in practicing my method; Fig. 3 is a side elevation of a wedge which is adapted for use in securing fore parts of lasts or the blocks from which such fore parts are to be formed to the dog illustrated in Fig. 1; Fig. 4 is a side elevation of the dog illustrated in Fig. 1, and a block from which a fore part of a last is to be formed, such block being secured on said dog; Fig. 5 is a side elevation of the dog illustrated in Fig. 1, and a fore part of a last, such fore part being secured on said dog; Fig. 6 is a side elevation of a model fore and heel part showing their relative directions of rotation; Fig. 7 is an end view of a last part illustrating the distortions produced by the last lathe, and—Fig. 8 is a side elevation of a model and a larger last reproduced therefrom, illustrating the error introduced by the incorrect positioning of the model with reference to the axis of the head stock spindle and Fig. 9 is a diagram also illustrating the error shown by Fig. 8 and Fig. 10 is a diagrammatic view of the swing frame of a lathe being used in the practice of my invention.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention has been to devise a method of forming lasts, by the use of which the foot shape contour of lasts, or the parts of lasts, can be readily formed, particularly at the extremities, and by the use of which the surfaces of divided lasts that are within the outlines of the last can be formed in accurate relation to the foot-shape contours thereof, so that the parts of a last, when assembled, shall have precisely the desired relation, and together shall form a last of precisely the desired contour, and to such ends, my invention consists in the method of forming lasts, substantially as hereinafter specified.

While my method is applicable to the

turning of whole lasts in one piece, I prefer to illustrate it by its application to the interchangeable fore-part shown in my Patent No. 648,525, granted May 1st, 1900, to which reference is made for a full description of such part. The model, where the process is used for the manufacture of whole lasts, will, of course, be a whole last. The model for the specific instance which I have chosen will, of course, consist of a fore-part and a heel-part constructed as described in the said patent.

The blanks or blocks D, from which the fore and heel parts are to be turned may be formed by cutting up a rough block so that such blanks shall have all the geometric surfaces which the finished parts are to have, and shall be complete except for their foot-shape contours.

To attach the model fore part to the model head stock spindle of the ordinary last turning lathe, (such for instance, as that illustrated in the patent to J. E. Kimball, No. 546,160, September 10th, 1895,) I provide a dog B, consisting of a tapered shank b having a screw thread b^1 at its larger end, and beyond such thread having a plate b^2 formed thereon, substantially perpendicular to the axis of the shank b . A plate b^3 projects from the face of the plate b^2 in a plane perpendicular thereto, and such plate corresponds to the portion of the fore part plate of the last forming part of a means for uniting the fore-part of the last with the heel part to make a complete last, which is received in the fore part A thereof, past its rear surface A^1 . Such plate b has an arc-shape forward edge b^4 along which extends an arc-shape flange b^5 , said plate being adapted to fit into the slot A^2 of the fore part and to have its flange b^5 received in a corresponding arc-shape groove thereof. In the plate b^2 , an opening b^6 is formed to permit the passage of the wedge E of the last therethrough, and a notched ear b^7 is formed on the rear face of the plate b^2 to engage the spring E^3 of the wedge E of the last.

In forming a fore part according to the method illustrated in the drawings, the model fore part A is passed over the plate b^3 until its rear face A' bears squarely on the front face of the plate b^2 and is then moved laterally until the flange b^5 is seated

in the arc-shape groove of such fore part. The wedge E is then inserted from the rear through the opening b^6 and into the slot A^2 in the fore part until its spring E^3 engages the notched ear b^7 , such action wedging the plate b^3 against a wall of the slot A^2 and fastening the fore part firmly to the dog. If the dog be not already screwed or driven into its socket in the model head-stock spindle, it is secured in such socket, and the fore part is thus firmly mounted on the spindle and in such position that its entire outer surface is exposed to the action of the guide wheel. The block D is then attached to its dog B in the same manner as was the model fore part attached to the dog B. The dog F is then secured to the work head-stock spindle of the lathe, and the block D is thus supported in the lathe so that its entire surface, except the rear surface d , corresponding to the surface A' in the finished last, is exposed to the action of the cutter. Care must be taken to have the dogs parallel on the two spindles in every particular, in order that the geometric surfaces in the new fore part shall have the same relation to the foot shape contour thereof as do the similar surfaces in the model to the foot shape contour thereof.

The cutters of the lathe should be so adjusted that the outermost or finishing cutter will be nearer to the curve of the toe of the last, when operating thereon, than any of the other cutters, so that its work will not be destroyed by the subsequent cutters.

On setting the lathe in motion, the new fore part can be entirely finished, including the toe, since the toe of the model and the portion of the block which is to form the toe of the new fore part are completely exposed to the action of the guide wheel and of the cutter, respectively.

Owing to the spring of the swing frame of the lathe, when the guide wheel rises toward the end of a transverse depression in the last surface, and thus recedes from the axis on which the last is revolving, the lathe will cut away too much from the block being turned. On the other hand, as the guide wheel passes over the crest of the comb or other elevation of the model, and thus approaches the axis on which the last is revolving, inertia tends to throw it away from the surface of the last, carrying with it the cutter wheel, and thus adding to, or building up, the last being formed at such point. This action is illustrated in Fig. 7, in which the full line represents the end of the model fore or heel part, the dotted line f represents the shape which is formed by a right hand rotation as indicated by the arrow f' and dotted line f^2 represents the shape which is formed by a left hand rotation, as indicated by the arrow f^3 . In order to have the foot shape contours of the fore and heel parts come

flush with each other, I cause the fore and heel part models to revolve in opposite directions at the same speed, when attached to the same head-stock spindle as indicated in Fig. 6, which is the same as saying that such parts revolve in the same direction when looking toward the toe of the assembled last. The errors thus occur in the same direction, and are thus rendered unobjectionable as the foot shape contours come flush with each other.

If desired, the model can be cut away where the excesses will occur in the finished last part, and the model can be built up where the cutting away would occur in the finished last, so that the errors of the lathe will produce a perfect last.

The last lathe in forming a last or last part longer or shorter than the model, but of the same width, always reproduces a point in the last in a line passing through the point and parallel to the axis of the spindles. Thus if the tip of the toe of the model be in the said axis, the reproductions of such tip will all occur in said axis, no matter how much longer or shorter than the model the new last may be. For this reason I so position the model on the spindle that as shown in Fig. 6 the axis on which the model revolves will be parallel to the lines on which it is desired to reproduce the points of the model in grading for a longer or a shorter last. The axis on which the last revolves should, for instance, be substantially parallel to a plane tangent to the lower surface of the heel of a shoe on the last and touching the sole of the shoe.

In Fig. 8 is illustrated in full lines a model revolving on an axis G, the axis being oblique to the plane before mentioned, and in dotted lines, a longer last of the same width as it would be reproduced by the lathe from the model when revolved on such axis. As before stated, the points of the model will be reproduced in lines parallel to the axis, and this action results in greatly distorting the new last, causing its toe to be formed too much below its instep and its heel to be formed too much above its instep. This is clearly indicated by lines G—g and G'—g' drawn through the insteps of the lasts and their toes. The angle G G' g' in the last being formed will be seen to be very far from equal to the angle G G' g in the model, which angles should be equal. I am able to position the model and blank fore parts as desired with reference to the axis of the head-stock spindle by forming the surface d and plate b^3 of the dog at the proper angles to the said axes.

The above described action of the last lathe, producing a distorted last, when the model is positioned in the lathe, in the ordinary way, is further illustrated in Fig. 9. In such figure I and K represent, respectively, the ordinary toe and heel-dogs re-

volving on the axis L—M. The model N is supported, as usual, upon the heel-dog I and with its toe n at the toe-dog K, so that the toe is substantially on the axis L—M. A heel O is represented on the model, and the floor line is seen touching the heel and the toe of the model. The floor line represents the position of the floor relative to the model N, when the model is in a shoe standing upon the floor. If it is desired to produce a longer last P, than the model N, the last P being of the same width as the model, all of the points of the model N will be reproduced in the new last at the same distance from the axis L—M, as in the model because the cutter will be the same distance from the axis as the model wheel, in all positions. The result will be that the toe p of the last P will be on the axis L—M, because the toe n of the model is on such axis. The crest p' of the comb of the last P will be in a line Q—R parallel to the axis L—M, and passing through the comb n' of the model. The ball p^2 of the last P will be on a line R—S parallel to the axis L—M and touching the ball n^2 of the model. The top of the toe p^3 of the last P will be on a line T—U parallel to the axis L—M. The result will be, that the floor line V—W of the last P will be very considerably below the floor line of the model, showing that the toe of the last P has been depressed in being reproduced. The normal last X, of a length corresponding to the length of the last P, should be projected forward, so to speak, upon lines parallel to the floor line, instead of upon lines parallel to the axis L—M. For instance, its ball x should rest upon the floor line of the model, its heel also resting upon such line; its toe x' should be the same distance above the floor line as the toe N of the model, the toe x' being in a line Y—U parallel to the floor line and passing through the toe end of the model. The tip x^2 of the toe of the last X should be in a line A'—B' parallel to the floor line of the model, and touching the tip n^3 of the model. The crest of the comb x^3 of the last X should be in a line B'—C' parallel to the floor line of the model, and passing through the crest n' of the comb of the model. From this figure it can be seen, how the inclined position of the model in the lathe, so that its floor line is at an angle to the axis of revolution, results in a serious distortion of lasts which are longer or shorter than the model. The advantage of my mode of procedure, of placing the floor line of the model parallel to the axis of revolution, is also apparent in that it causes the parts of the new last to be projected forward in lines which are parallel with the axis of revolution.

As another means for carrying my method into practice, for the completion of an extremity of the last or last part an ordi-

nary sliding-jaw chuck can be secured to the ordinary model head stock spindle of a last turning lathe. The model, which may be an entire last, can be clamped either by the toe or heel by such chuck to its head stock spindle or by a stub or regular projection formed on or attached at the toe or heel, leaving the opposite extremity exposed, and the block from which the last is to be formed can be secured by its chuck to the work head-stock spindle, leaving its opposite extremity exposed. The model and block can then be revolved, and the guide wheel can travel along the body of the model and over the entire exposed extremity thereof, thus guiding the cutter to form the body of a last from the block and to complete one extremity thereof. The model and the partly finished last can then be removed from the chucks and the unfinished extremity of the last completed in any desired manner.

The practice of my method is further illustrated diagrammatically in Fig. 10. Here the model toe-part A^2 is supported upon the dog B^2 , and the block C^2 is supported upon the dog D^2 , the two dogs being supported in the lathe upon the same axis, as usual. The model wheel E^2 operates against the model, and guides the cutter F^2 in its formation of the new last. The new fore-part is shown as partly shaped from the block. Shoes are shown in dotted lines on the model and on the new last, and the floor line G^2 H^2 of the model is shown parallel to the axis of the dogs. Therefore the floor line I^2 K^2 of the new last will be parallel to the axis of revolution, and when the new last has a shoe heel applied to it of the same height as the one on the model, the heel will set squarely on the floor line when the ball of the new last touches the floor line, as should be the case in a properly made last.

It is obvious that dogs corresponding to other forms of hinge mechanism for lasts can be used to support the corresponding last parts in the lathe, and that such parts can be reproduced by my method.

The generic features in the present application which are common to my applications #19,292, filed June 6, 1900, and #127,931, filed Oct. 20, 1902, are not claimed herein, but are claimed in said applications.

Having thus described my invention, what I claim is—

1. The method of turning from models, lasts which shall be longer or shorter than such models, which method consists in revolving a model on an axis substantially parallel to the floor line of the model, and operating on a revolving block by a cutter guided from such model.

2. The method of turning from models, parts of a divided last, which shall be longer

or shorter than such models, which method consists in revolving a model of such a part on an axis that is substantially parallel to the floor line of the model to form the last
5 part, and operating on a revolving block by a cutter guided from such model.

3. The method of turning divided lasts in a last lathe, which consists in revolving the model fore part and the model heel part
10 in opposite directions in the lathe when viewed from their dividing surfaces toward

their toe and heel, respectively, and shaping blocks from such models, substantially as described.

In testimony that I claim the foregoing 15
I have hereunto set my hand this 14th day of August, 1901.

EDWIN J. PRINDLE.

Witnesses:

HENRY C. HAZARD,
JAS. E. HUTCHINSON.