

(No Model.)

G. W. WILLEY,  
METHOD OF AND MEANS FOR MAKING PATTERNS FOR INDIVIDUAL  
LASTS.

No. 486,607.

Patented Nov. 22, 1892.

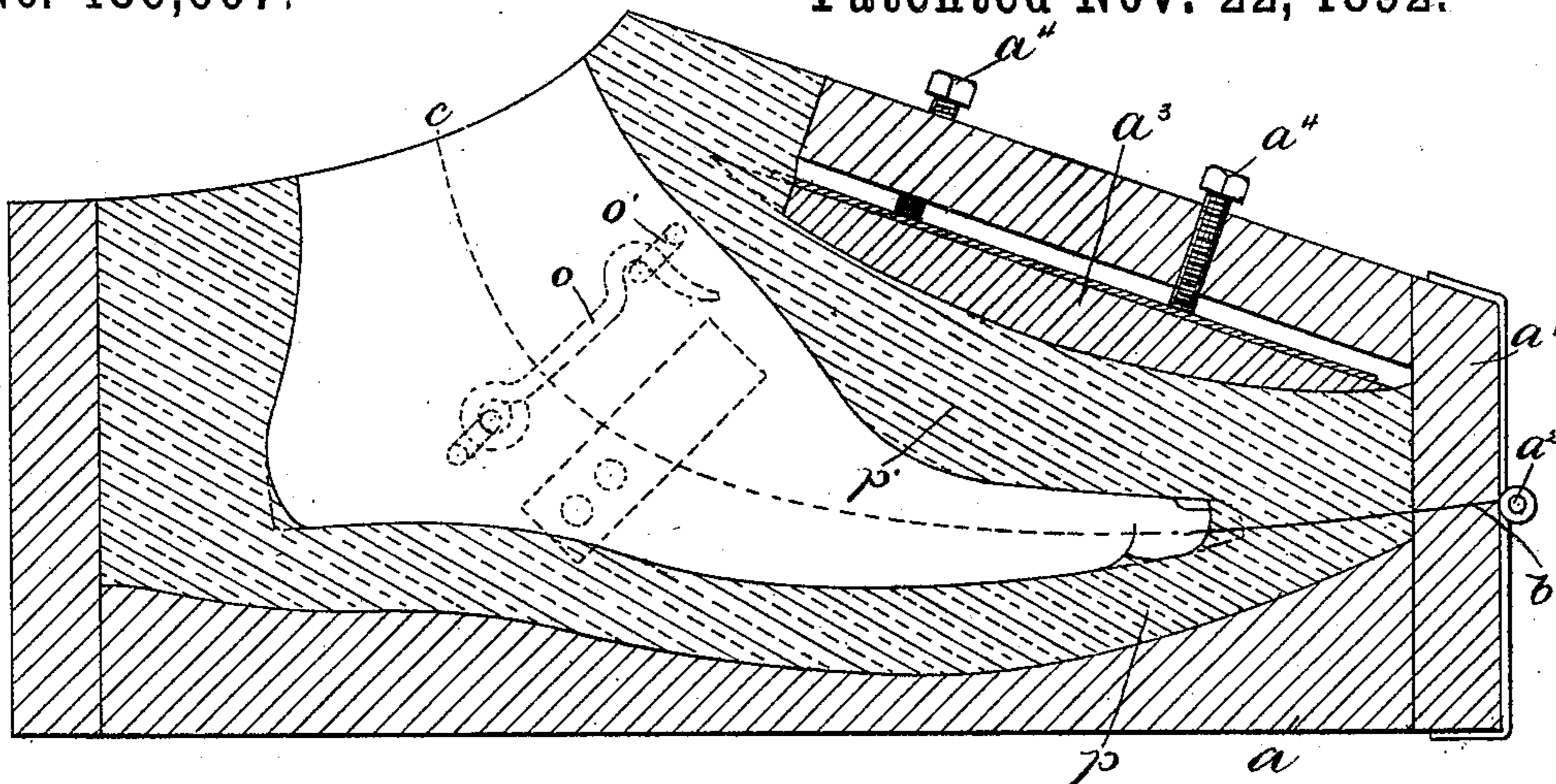


Fig. 1.

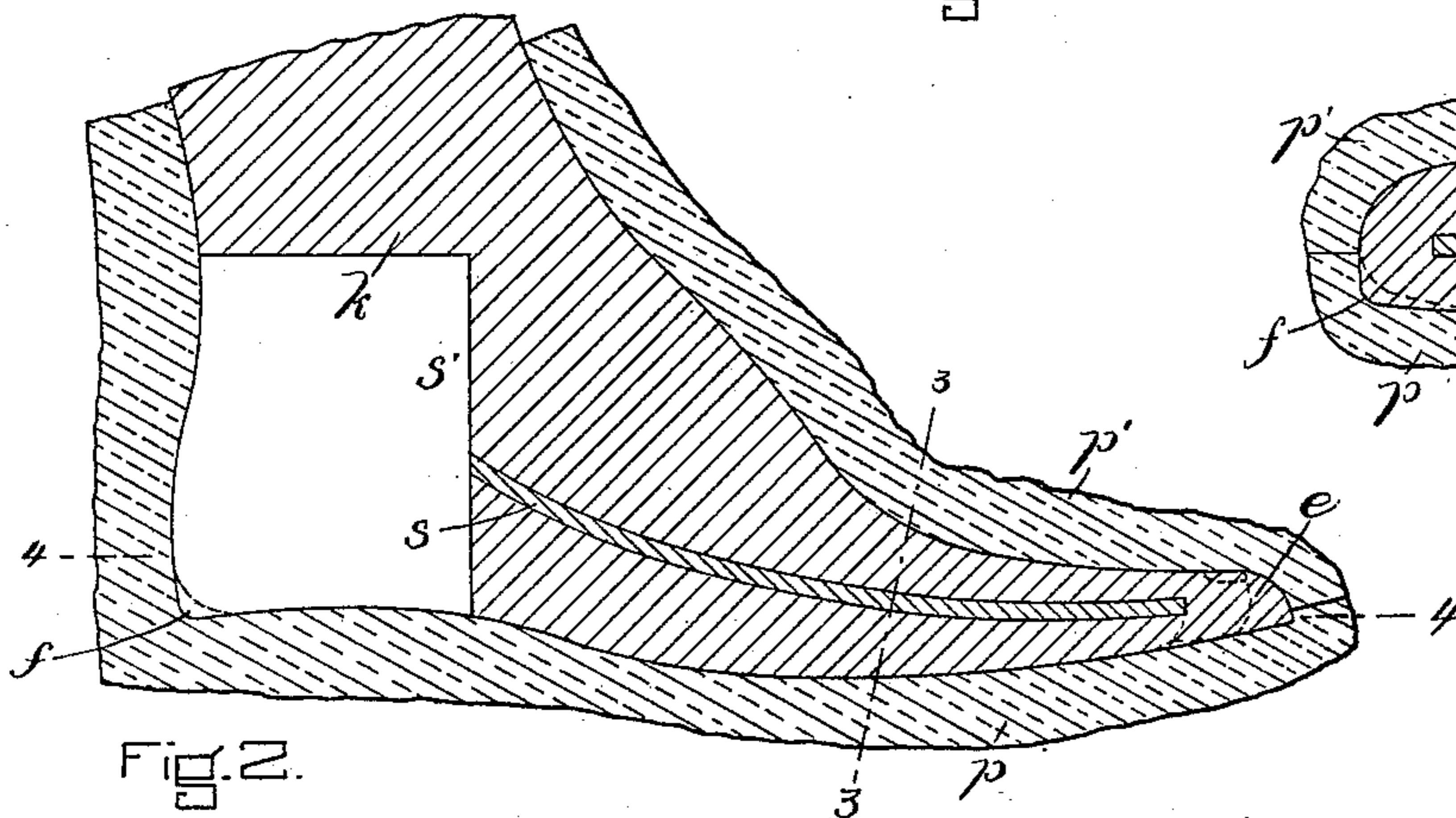


Fig. 2.

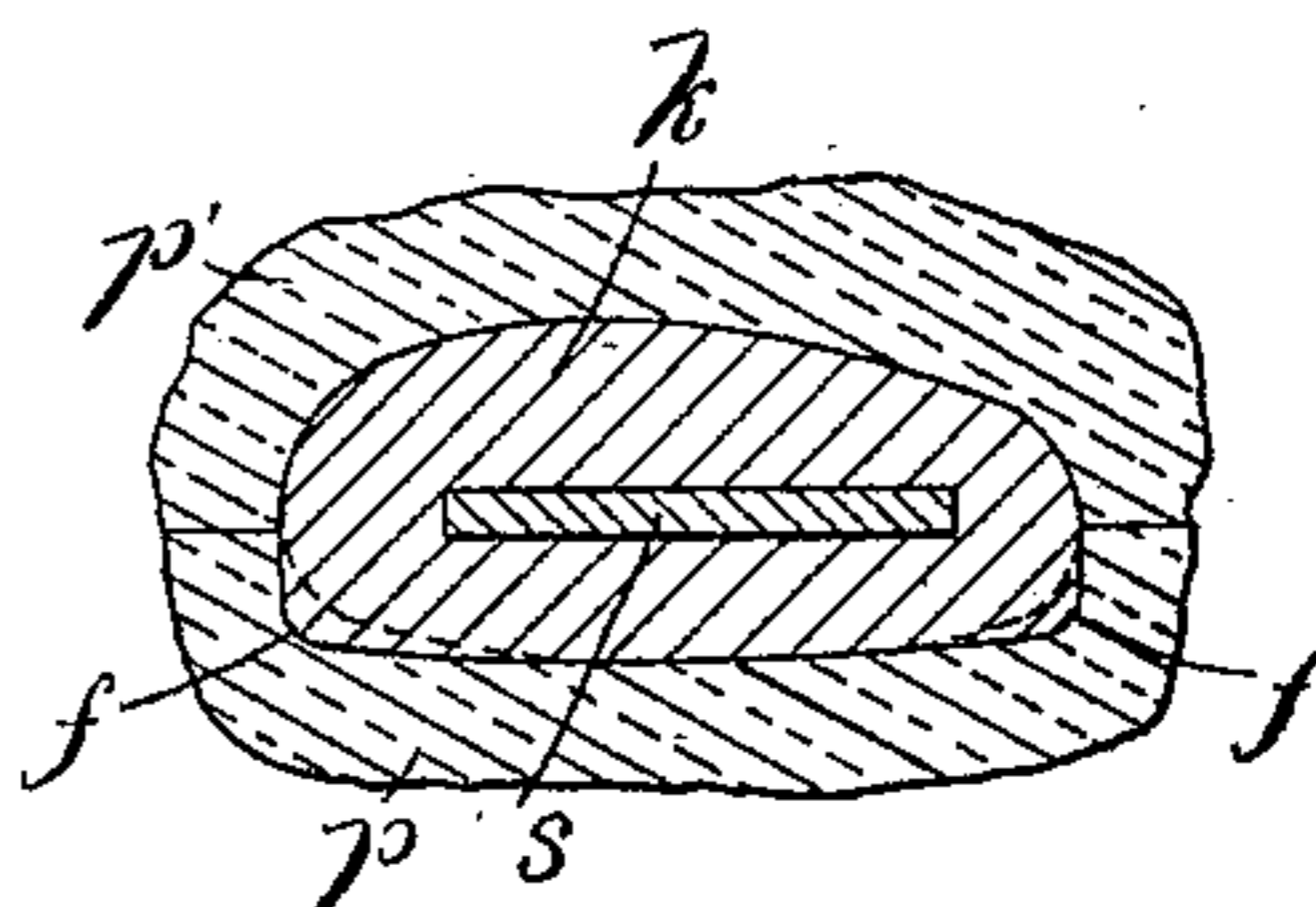


Fig. 3.

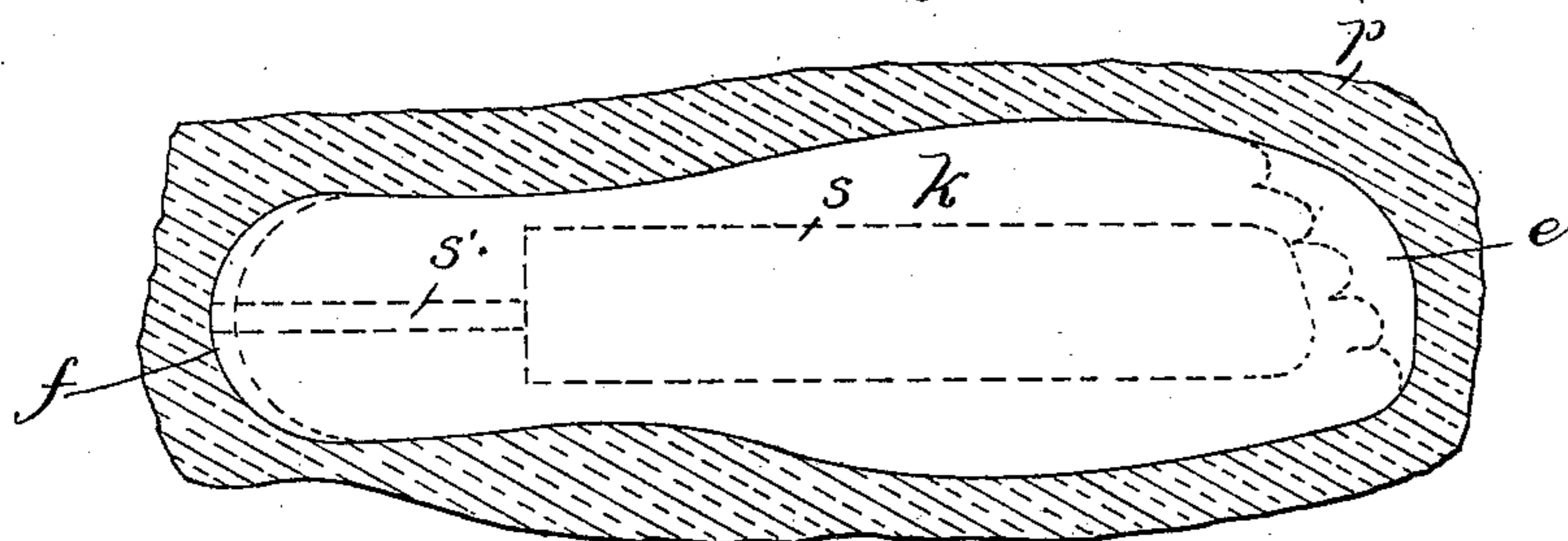


Fig. 4.

WITNESSES.  
A. D. Harrison,  
B. A. McShane.

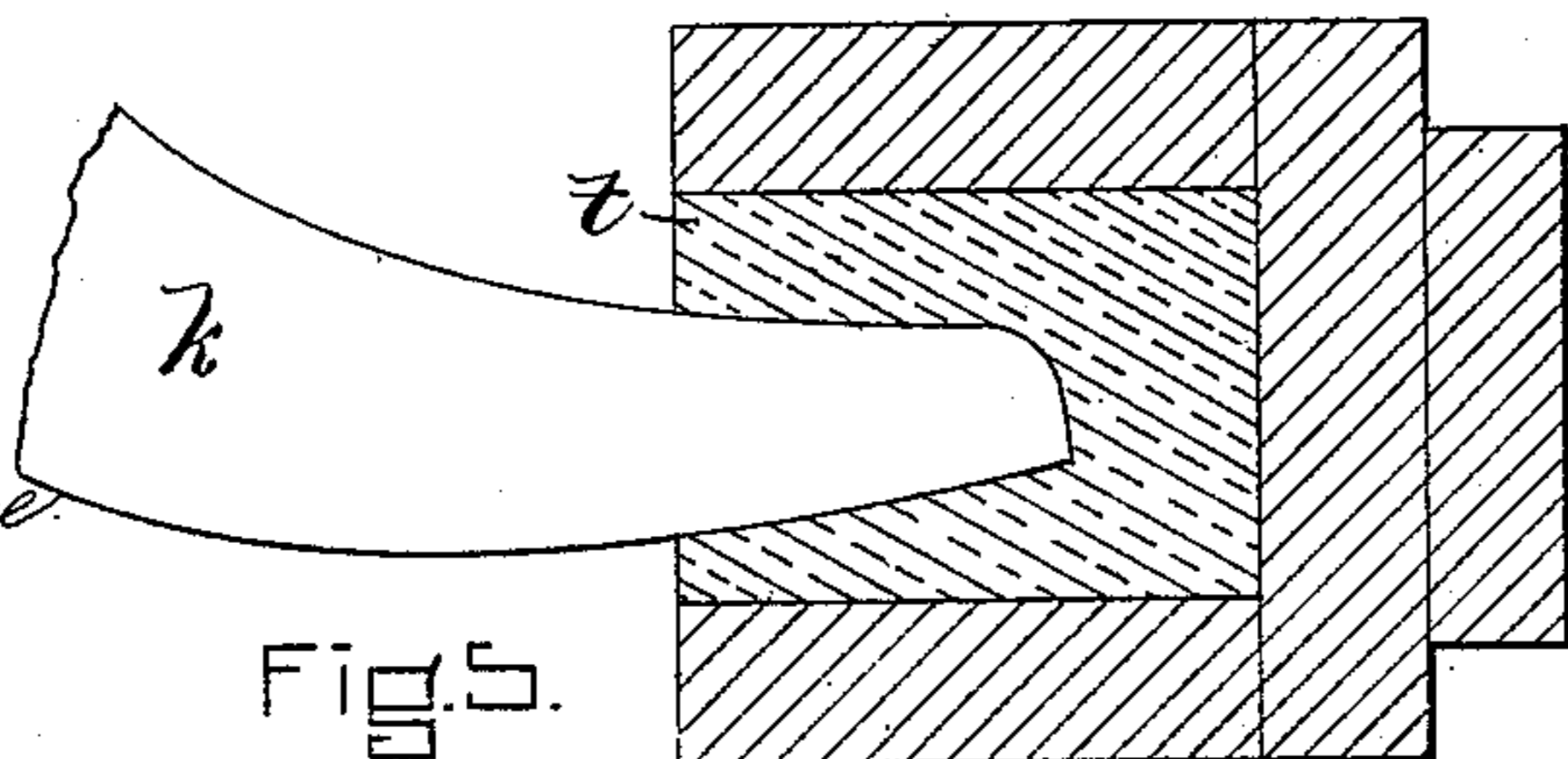


Fig. 5.

INVENTOR.  
G. W. Willey  
Wright Brown Connelley  
Atty

# UNITED STATES PATENT OFFICE.

GEORGE W. WILLEY, OF BROCKTON, MASSACHUSETTS.

METHOD OF AND MEANS FOR MAKING PATTERNS FOR INDIVIDUAL LASTS.

SPECIFICATION forming part of Letters Patent No. 486,607, dated November 22, 1892.

Application filed March 25, 1892. Serial No. 426,424. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. WILLEY, of Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in the Methods of and Means for Making Patterns for Individual Lasts, of which the following is a specification.

This invention has for its object to enable individual lasts, or lasts conforming to the peculiarities of individual feet, to be accurately and economically manufactured; and to this end it consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal section of a human foot, the matrix of the mold being of the exact form imparted to it by the foot. Fig. 2 represents a similar section, showing the matrix enlarged at certain points in accordance with my invention and also showing a cast in the matrix. Fig. 3 represents a section on line 3 3, Fig. 2. Fig. 4 represents a section on line 4 4, Fig. 2. Fig. 5 represents a view showing the manner of changing the form of the toe portion of the cast or model formed in the matrix.

The same letters of reference indicate the same parts in all of the figures.

In carrying out my invention I make a matrix  $p$   $p'$  of the foot for which a last is to be made. Said matrix is constructed by placing a quantity of plaster-of-paris in a flask or box  $a$ , so formed as to support the part of the matrix which forms the bottom portion of the foot, the heel, and the rear portion of the ankle. The bottom of the flask is curved to give the bottom portion of the matrix a suitable curvature, substantially as shown, and particularly the upward curvature from the ball of the foot to the toes, this curvature enabling the foot when placed in the flask to assume a position with its forward portion curved upward. This curvature of the bottom of the flask is important in forming the human foot or flexible pattern after it is inserted in the flask, and thus giving the matrix such shape that the toe portion will be curved upwardly, thus avoiding the flatness of the bottom of the foot which would be caused if the bottom of the flask was flat. It will be seen that a flat-bottomed last would be ob-

jectionable for various reasons, particularly because of the liability of "stubbing" the toe of the boot made on such a last. The plaster-of-paris is formed around the said portions of the foot while the latter is in the flask  $a$ , and then powdered French chalk or other suitable material is placed upon the portion of the matrix already formed to prevent the portion of the matrix subsequently formed, and including the upper portion of the foot, from adhering to the lower portion, the object being to produce a matrix in two separable sections. To this end the first-formed portion  $p$  of the matrix is trimmed away before it hardens, along the line  $b$   $c$ , and French chalk is placed upon the trimmed edges, so as to cover the same. The flask is provided with a section  $a'$ , hinged at  $a^2$  and having its lower edge formed to fit the line  $b$   $c$ . The section  $a'$  is now brought into the position shown in Fig. 1, and the foot being still in place a filling of plaster-of-paris is inserted in the section  $a'$  to form the upper portion  $p'$  of the matrix. The section  $a'$  is provided with a presser or follower  $a^3$ , which is backed by screws  $a^4$ , said presser and screws enabling the filling  $p'$  to be compressed against the foot, and thus conform closely thereto, the pressure being applied before the hardening of the filling. After the last-formed portion  $p'$  of the matrix has sufficiently set or hardened the two parts  $p$   $p'$  are separated along the line  $b$   $c$ , the interposed French chalk permitting the free separation of said parts. I then, by the use of a suitable cutting tool or tools, enlarge the matrix thus formed at various points, so that the cast made from the matrix will serve, as hereinafter described, as a guide or former from which an operative last adapted to form a boot or shoe to fit the foot used in making the matrix may be made.

One of the enlargements referred to is at the toe portion of the matrix, the same being elongated, as indicated at  $e$ , Figs. 2 and 4, the dotted line at one side of the space marked  $e$  in said figures indicating the original contour of this portion of the matrix, while the full line indicates the extent to which the matrix is enlarged. The matrix is also enlarged by cutting it away along the margin of the sole portion to form an angle at  $f$ , Figs. 2 and 3, said angle extending around the sole and de-

fining the contour thereof, so that the sides of the last, instead of curving inwardly and meeting the sole portion gradually, as in the human foot, meet the sole at the angle *f*.

5 The matrix may be enlarged at other points to suit the peculiarities of the foot and to accommodate tender places or protuberances.

After the enlargement of the matrix has been completed I bring its parts *pp'* together, 10 as shown in Figs. 1 and 2, and then fill it with a composition which is softened and rendered plastic by heat and becomes rigid when cooled, and is free from liability to expand or contract. A suitable composition for this 15 purpose is gutta-percha and sawdust, although I do not limit myself to this particular composition. The matrix is closely packed with this composition, the result being a cast or form *k*, which is a fac-simile of the foot 20 with the additions caused by the enlargements of the matrix. I prefer to strengthen the cast or form by embedding wooden stiffening-strips *s s'* in the composition while it is being packed in the matrix. After this 25 cast or form has sufficiently hardened it may be placed in an ordinary lathe for turning irregular forms and used as a pattern or former by which to turn a last. In case it is desired to vary the form of the toe portion of the cast or pattern, said portion may be heated 30 until it is sufficiently plastic and then inserted in a supplemental toe-forming mold *t*, formed to change the original contour of the toe portion of the cast.

35 The sections *a a'* may be secured together while the cast is formed by fastening devices such as hooks *o* and staples *o'* on the exterior of said sections, as shown in dotted lines in Fig. 1.

40 My improved method and devices may be used in making a treeing foot or frame for use in treeing the upper of a boot or shoe, such treeing-foot being simply a last made as above indicated and divided so that the heel 45 and fore-part portions can be separated to enable the foot to be readily inserted in a boot or shoe.

If it is desirable to make a pattern of a foot which is deformed so that the heel is higher 50 than the toe, the bottom of the flask may be heightened at the heel by inserting a supplemental bottom-piece.

I claim—

55 1. The improved method hereinbefore described of making individual lasts for boots

and shoes, the same consisting in first making a divided matrix conforming to the shape of the foot and composed of separable sections, enlarging the matrix at the toe and at the margin of the sole to form an angle defining 60 the contour of the sole, and filling the matrix with a composition substantially such as gutta-percha and sawdust, the same when hardened constituting a cast or form which is a fac-simile of the foot with the additions caused 65 by the enlargement of the matrix, as set forth.

2. The improved method hereinbefore described of making individual lasts for boots and shoes, the same consisting in first making a divided matrix conforming to the shape of 70 the foot and composed of separable sections, enlarging the matrix at the toe and at the margin of the sole to form an angle defining the contour of the sole, filling the matrix with a composition substantially such as gutta- 75 percha and sawdust, the same when hardened constituting a cast or form which is a fac-simile of the foot with the additions caused by the enlargement of the matrix, and finally softening the toe portion of the cast and re- 80 forming the same by inserting it in a supplemental mold or matrix, as set forth.

3. The improved foot-matrix flask, consisting of a bottom section and a top section separable from the bottom section, said flask having 85 sides and being thereby formed to contain a mass of material surrounding the foot and provided with an unyielding curved bottom or pattern-former adapted to impart the desired curvature to the bottom of the human foot 90 and to the material interposed between said curved bottom and the bottom of the foot, whereby said flask is adapted to retain the pattern so formed in proper position for casting, substantially as and for the purpose set 95 forth.

4. In a foot-matrix flask, the combination of the bottom section, the top section hinged to the bottom section, the presser or follower in the top section, and means for operating 100 said presser, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 17th day of March, A. D. 1892.

GEORGE W. WILLEY.

Witnesses:

C. F. BROWN,  
A. D. HARRISON.