M. HILGERT.

PROCESS OF MANUFACTURING SHOES.

APPLICATION FILED JUNE 8, 1914.

1,120,489.

Patented Dec. 8, 1914.

2 SHEETS—SHEET 1.

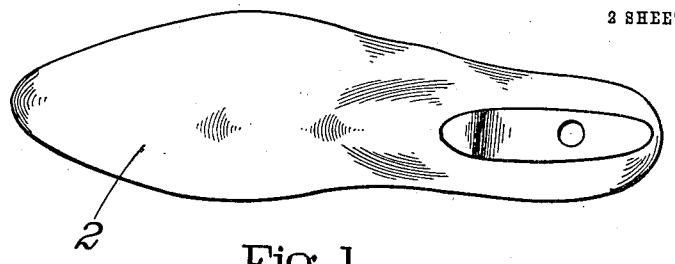


Fig. 1.

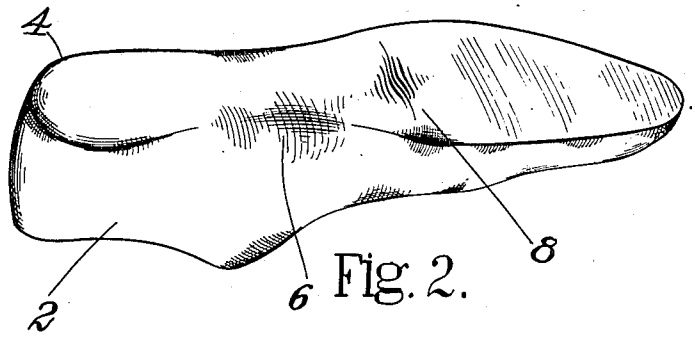


Fig. 2.

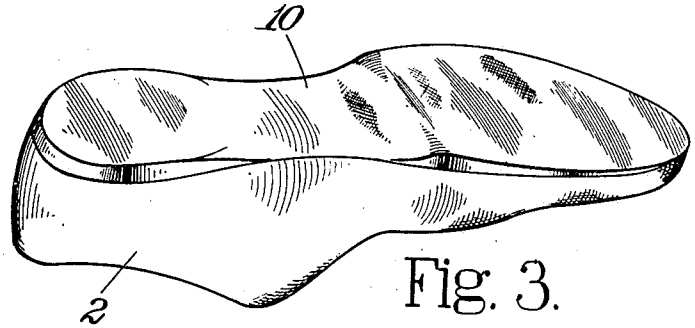


Fig. 3.

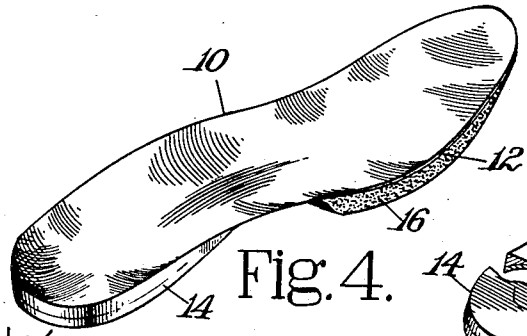


Fig. 4.

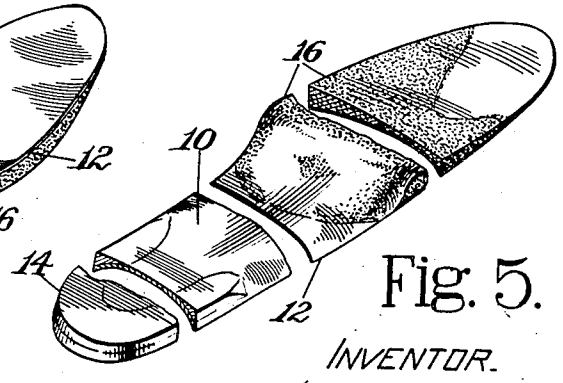


Fig. 5.

WITNESSES.

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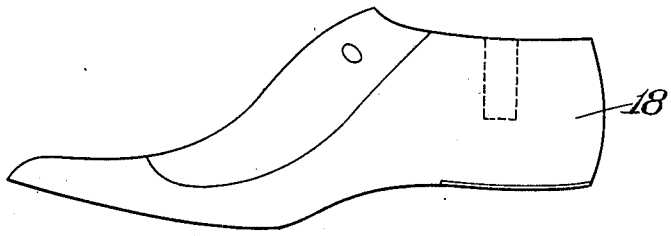


Fig. 6.

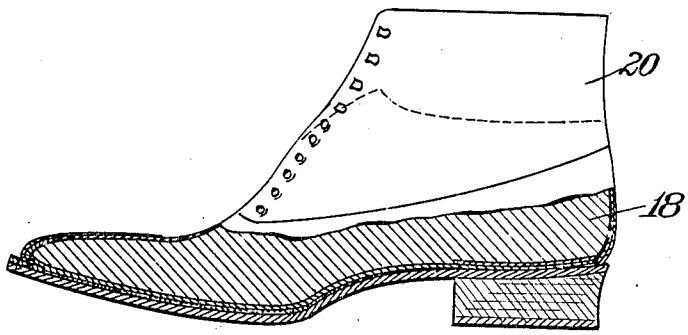


Fig. 7.

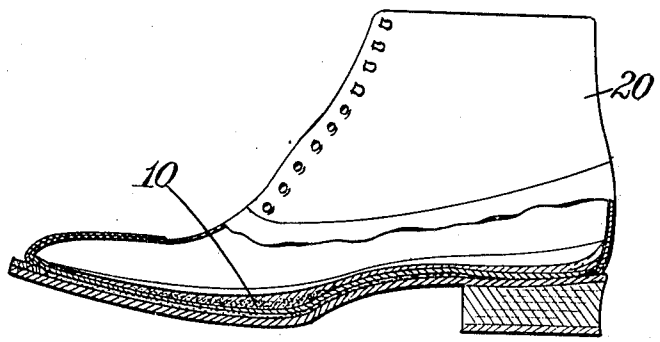


Fig. 8.

WITNESSES.

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PROCESS OF MANUFACTURING SHOES.

1,120,489. Specification of Letters Patent. Patented Dec. 8, 1914.

Application filed June 8, 1914. Serial No. 843,727.

To all whom it may concern:

Be it known that I, MATHEW HILGERT, a citizen of the United States, and resident of the borough of Manhattan, city, county, and State of New York, have invented certain Improvements in Processes of Manufacturing Shoes, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to boots and shoes and more particularly to an improved process of manufacturing boots and shoes.

The purchaser of a pair of standard or ready-made shoes usually finds, when he first puts the shoes on, that they cause him more or less discomfort and that it is necessary to wear them for a time, sometimes for the greater part of their life, before they really become comfortable. This difficulty undoubtedly is often due, in some degree, to the failure of the shoe salesman to make the proper selection of style and size of shoe suited to the requirements of the purchaser's foot; but it is also due in a large measure to the fact that ready-made shoes conform only approximately to the anatomical structure of the foot and, consequently, must be reshaped by the foot in order to produce that conformity essential to comfort. Until this reshaping process has been completed the pressure which should be distributed over a large part of the foot is concentrated on relatively small portions of the foot and this unnatural distribution of pressure is responsible for many of the more common foot ills, such as corns, calli and enlarged joints. It also produces an unbalanced muscular condition of the foot and a disturbance of the circulation of the blood through the foot which, in turn, cause additional foot maladies.

While it is possible to manufacture shoes which are not open to the objections just described, such shoes are, so far as I am aware, made entirely by methods that are suited only to hand or custom work where attention can be given to the peculiarities of each individual foot. Consequently, such shoes are made only on a very small scale, usually by orthopedic specialists, and the expense of manufacture of such shoes places them beyond the reach of the great majority of people. It has never been considered practicable, so far as I am advised, to adapt these methods to the requirements of modern shoe factory practice in which shoes must be manufactured in large quantities by machinery.

The present invention has for its chief object to devise a process by which shoes, which will fit the feet more accurately and be more comfortable than the ready-made shoes heretofore produced, can be manufactured at a moderate cost; and to devise a process of this character which can be practised on a large scale and with the use of modern shoe making machinery.

A convenient way of carrying out my improved process will now be described, reference being made to the accompanying drawings, in which—

Figure 1 is a plan view of a form which preferably is used in practising this process; Fig. 2 is an angular view showing the bottom of the form illustrated in Fig. 1; Fig. 3 is an angular view similar to Fig. 2 but showing a filler secured on the bottom of the form; Fig. 4 is an angular view of the filler illustrated in Fig. 3, but showing the filler in an incomplete state; Fig. 5 is an angular view of the bottom of the filler shown in Fig. 4; Fig. 6 is a view in side elevation of the last on which the shoe is made; Fig. 7 is a longitudinal sectional view of a shoe made on the last shown in Fig. 6; and Fig. 8 is a longitudinal sectional view of a complete shoe with the filler positioned therein.

In practising this process I prefer first to make a foot-shaped form or last similar to an ordinary last but having its bottom face shaped to conform to the more prominent projections and depressions of the foot. Such a form is shown at 2 in Figs. 1 and 2 of the drawings, from which it will be seen that the form has substantially the lateral, instep and upper surfaces of a last made for a substantially normal foot, but the bottom face includes a well rounded heel 4, an arch surface 6 deeper than that usual in the ordinary last but substantially like that of a normal foot, and a forepart surface

nearly flat but with a slightly rounded portion or protuberance at 8 corresponding to the joint of the great toe. The extent to which the detailed duplication of the features of the bottom of the foot are carried out can be varied as circumstances require; but ordinarily, in making a form of a given size, only the more prominent features of the foot, which will not vary to any great degree in the majority of feet of the same size, will be reproduced in the form. This form, therefore, is made of the dimensions and shape required to construct a shoe for a substantially normal foot of a given size, but differs from the usual last of the same size and style in its bottom contour.

A filler is next made to fit the bottom of the form 2. This filler is indicated at 10 in the drawings and is shown in Figs. 4 and 5 in an incomplete state for the purpose of illustrating more clearly its construction. A number of methods of making this filler will suggest themselves to those skilled in this art, but one very satisfactory method consists in dieing out a piece of leather 12 of the shape required to fit the bottom of the form 2, tempering it and then securing it to the form with tacks until it has dried to the shape of the form. A rand 14 is then glued around the heel part of the leather piece 12 and a piece 16 of felt or similar material is glued to the forepart, this felt being first given the desired shape, as for instance by running it through a splitting machine equipped with a suitably shaped die roll or by using a suitable templet in connection with the splitting machine, as will be readily understood by those familiar with such machines. According to this method, the filler is made on the bottom of the form and the parts 14 and 16 are shaped to give to the upper surface of the filler a contour conforming to that of the bottom of the form. Since this contour is a duplication of the more important features of the bottom of the foot, the upper surface of the filler will fit the foot. The lower surface of the filler, however, may be given any desired shape, but preferably is shaped like the bottom of an ordinary last. If the lower surface of the filler is rough or uneven it may be scoured to level it up. Inasmuch as most feet have a slight "outside roll" or a tendency to bear too heavily on the outer edge of the foot, I prefer to make the outer edge of the filler 10 of greater average thickness than the inner edge. This result is accomplished in the filler shown by shaping the felt member 16, as shown in Fig. 5, so that it is somewhat thicker on the outside portion where the joint of the little toe will bear on it than on the inside under the great toe joint. This filler or a duplicate of it will be used in the shoe and, accordingly, the top and bottom surfaces of the filler are next preferably covered with cloth although for the upper surface a covering of leather, such as glazed kid, sometimes is preferred since this surface comes next to the foot.

The next step consists in making a last on which to manufacture the shoe. This result I prefer to accomplish by securing the finished filler 10 in its normal or operative position on the bottom of the form 2 and then using this form with the filler secured thereto as a model from which to turn the required last in the usual manner. Inasmuch as the filler, while having a substantially permanent shape, is made of material that might yield sufficiently under the pressure of the model wheel of the last turning lathe to prevent the lathe from making an exact reproduction of the model, I prefer to reinforce the filler. This may conveniently be done by soaking the filler in some hot liquid composition that becomes firm and solid when cooled to ordinary temperatures. I find that a very satisfactory composition for this purpose can be obtained by mixing 81¼ per cent. of Malayan gum with 12½ per cent. of ozocerite and 6¼ per cent. of Montan wax. This composition may be easily melted and the filler, when soaked in it and allowed to cool, will be found to be practically as firm as a piece of wood. This method of reinforcing the filler has the further advantage that it does not change the dimensions of the filler and, consequently, does not modify the form or dimensions of the model. The filler made for the purpose of making the model from which to turn the last may, if desired, be made of leather, fiber, or some material that is sufficiently firm and unyielding to require no reinforcement, but still can be given the required shape. The last produced in the manner just described is indicated at 18, Fig. 6.

A shoe 20 next is made on the last 18 in exactly the same manner that a shoe is made on any last. After the shoe has been completed and the last 18 has been withdrawn, a duplicate of the filler 10 is inserted in the shoe, as indicated in Fig. 8. It will now be evident that, since the last 18 on which this shoe was made, was itself made from the form 2 with the filler 10 secured thereto, the inside tread of the shoe will fit accurately the bottom face of the filler 10. The upper surface of this filler, as previously stated, accurately fits the foot and, since the last 18 is equivalent in dimensions to the form 2 plus the filler 10, there will be ample room in the shoe, after the filler has been inserted therein, to receive the foot for which the form 2 was originally made. Accordingly, when a purchaser, having a substantially normal foot of the size for which the form 2 was made, puts on the finished shoe he will find that the surface of the filler will fit his foot much more accurately than does the

inside tread of an ordinary shoe. The heel will rest comfortably in the concave socket formed in the heel portion of the filler 10; the arch, having substantially a normal contour, will fit the arch of the foot; and the forepart will support comfortably the bottom of the forepart of the foot, particularly if this part of the filler is built up of felt or other yielding material, as above described. At the same time the filler will correct the slight outside roll that nearly all feet, even those considered normal, have. The pressure caused by the weight of the body thus will be distributed uniformly over those parts of the foot that are designed to sustain this pressure, the correct balance of the foot will be maintained, and the normal circulation of the blood will be restored.

This process requires no change in the usual factory methods of making shoes after the last 18 has been made. The fillers may be made in a separate factory and inserted in the shoes after they reach the packing room.

The shoe produced by this process affords unusual facility in fitting a foot accurately. The shoe salesman, before trying on the shoe, can remove the filler 10 from the shoe, try it on the foot of the prospective purchaser and judge with much greater accuracy than otherwise would be possible whether the particular style and size of shoe that he has selected will fit the purchaser's foot correctly. It also enables the salesman to modify the shoe in certain minor particulars that greatly contribute to the wearer's comfort. If, for instance, the salesman finds that a customer has a corn or tender spot on the bottom of his foot, he can remove the filler from the shoe, determine by applying it to the bottom of the purchaser's foot exactly what part should be modified, and then by ripping off the bottom covering he can scour or cut away a portion of the bottom of the filler sufficient to relieve the pressure on the corn or tender part. The covering can then be cemented back in place and the filler placed in its operative position in the shoe. Such corns or tender spots are particularly likely to be found under the joints of the little or great toes. The pressure of the upper on the toes or toe joints can olso be relieved by cutting away the filler under the tight portion. If, for any reason, as for instance where an unusual outside roll is encountered, treatment opposite to that just described is required, the salesman can cement on to the filler a piece of leather, felt or other material of the required dimensions to correct the difficulty.

It is obvious that, after the last 18 has once been obtained, it is then unnecessary to repeat the process above described in order to obtain other lasts, since the last 18 may itself be used as a model for turning other lasts of the same style, as will be readily understood by those skilled in this art. It is also unnecessary to make a complete form 2 for the purpose of making fillers by the method above described, but instead of this form, a form having merely the bottom contour and dimensions of the form 2 may be used but without the lateral and upper surfaces, and this form may be made of any convenient material. It is essential, however, that the bottom face of the filler shall fit the inside tread of the shoe, that its upper face shall fit the more prominent projections and depressions of the bottom of the foot, and that the last on which the shoe is made shall be equivalent in dimensions to a last made for said foot with its bottom face shaped to conform to the bottom of said foot plus said filler secured upon its bottom face. If desired, the part 12 of the filler 10 can be molded to the required shape and the filler made without using the form 2; or the filler can be molded from suitable material by a pair of molds, one having the contour and dimensions of the bottom of the form 2, and the other, the contour and dimensions of the bottom of the last 18.

The novel last described herein is not claimed in this application, being claimed in my application Ser. No. 843,726, filed June 8, 1914. The process of making the last is claimed in my application Ser. No. 856,423, filed Aug. 12, 1914, which is a division of application Ser. No. 843,726, and is not claimed herein.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. That improvement in the art of manufacturing shoes which consists in providing a filler having an upper face shaped to fit the more prominent projections and depressions of the bottom of a foot and an outer face like the bottom of an ordinary last, providing a last of the usual construction but equivalent in dimensions to a last made for said foot but having its bottom face shaped to conform to the bottom of said foot and having said filler secured upon its bottom face, said last having its bottom face sufficiently rigid to withstand the operations of a leveling machine, making a shoe in the usual manner on the first mentioned last, and then inserting in said shoe, after the last has been withdrawn, the filler above mentioned or a substantial duplicate thereof.

2. The method which consists in making a form shaped substantially like the human foot with its bottom face conforming substantially to the contour of the bottom of a substantially normal foot, making a filler having its upper surface shaped to

fit the bottom of said form and having its bottom face shaped substantially like the bottom of an ordinary last, securing said filler to said form, making a last in the usual manner by using as a model said form with said filler secured thereto, said last having its bottom face sufficiently rigid to withstand the operations of a leveling machine, and then making upon said last a shoe which, with a duplicate of said filler inserted, will fit said form.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MATHEW HILGERT.

Witnesses:
JOHN H. MCCREADY,
WILLIAM B. KING.