April 3, 1951 E. E. SUGARMAN ET AL 2,547,419

METHOD OF OBTAINING FOOT IMPRESSIONS

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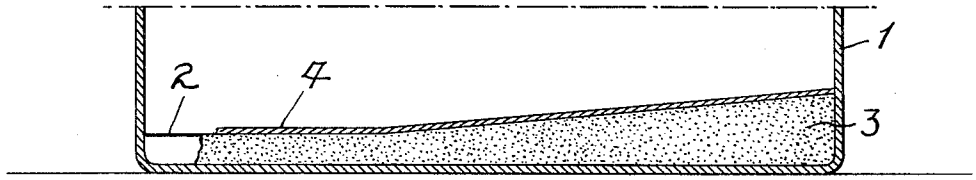

Fig. 1.

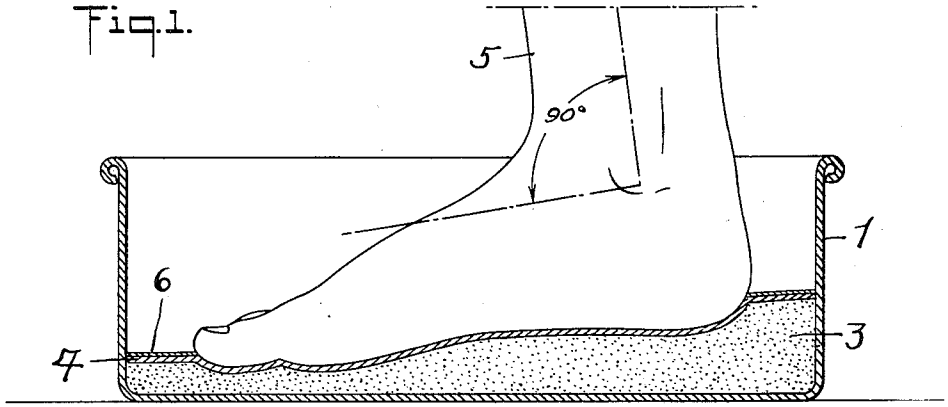

Fig. 2.

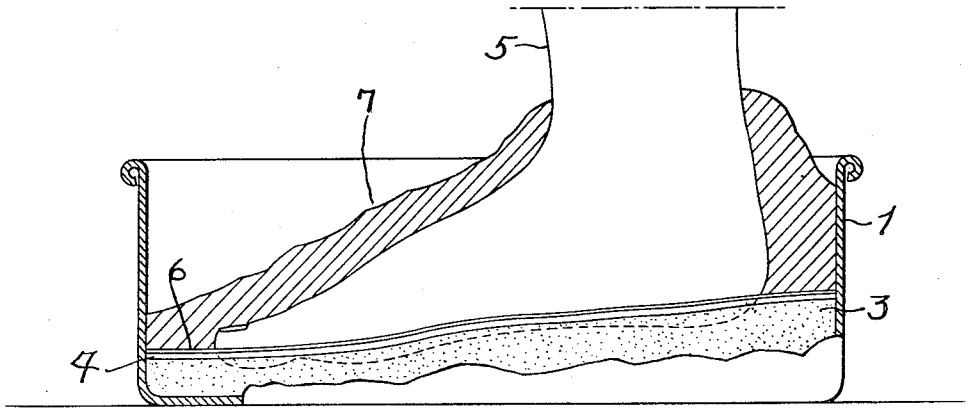

Fig. 3.

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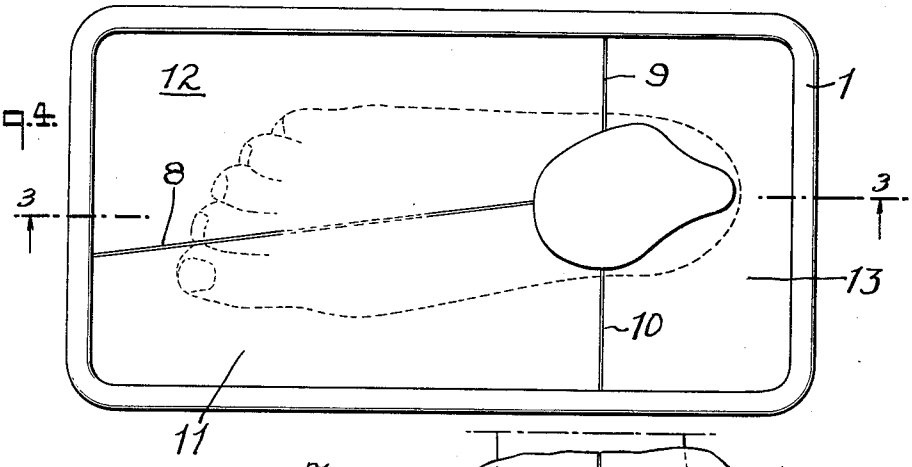
Fig. 4.



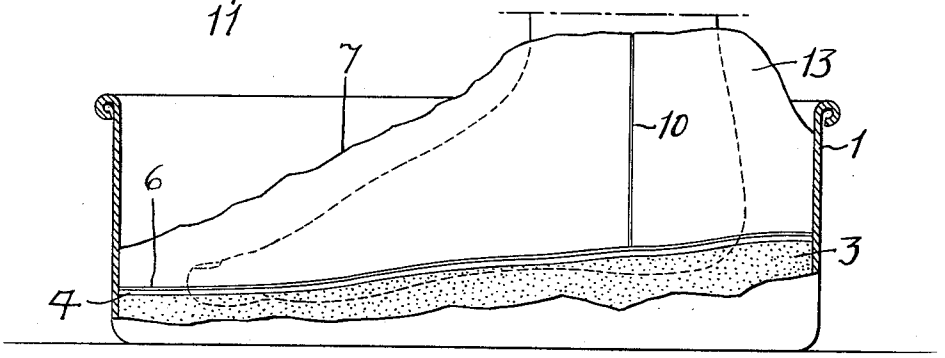


Fig. 5.

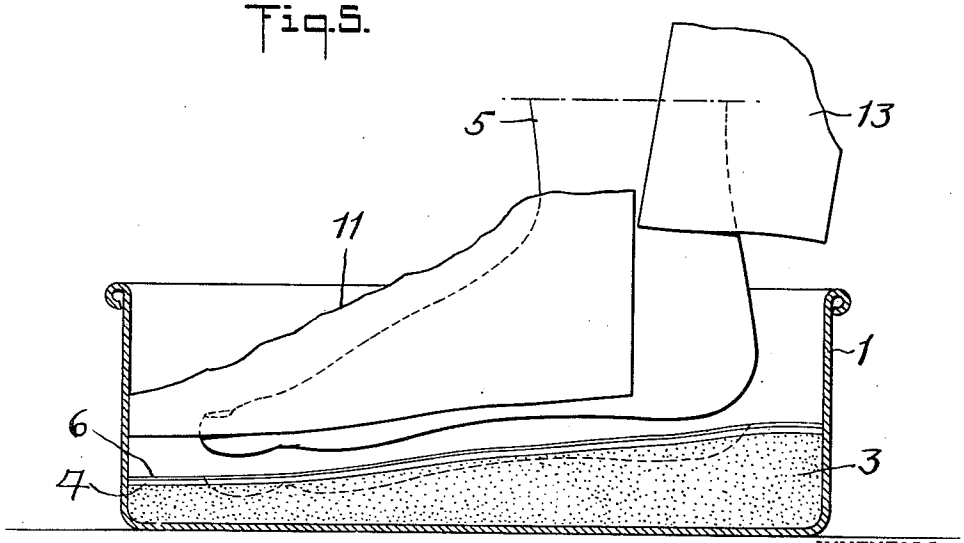


Fig. 6.

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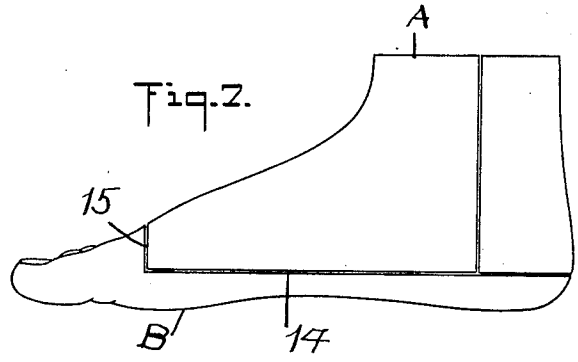

Fig. 7.

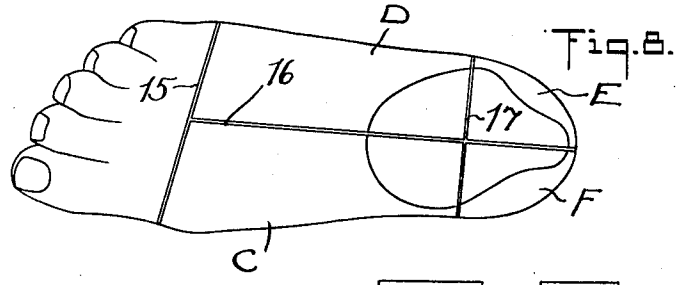

Fig. 8.

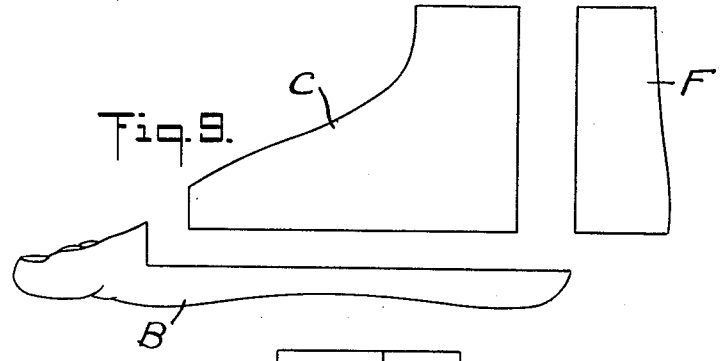

Fig. 9.

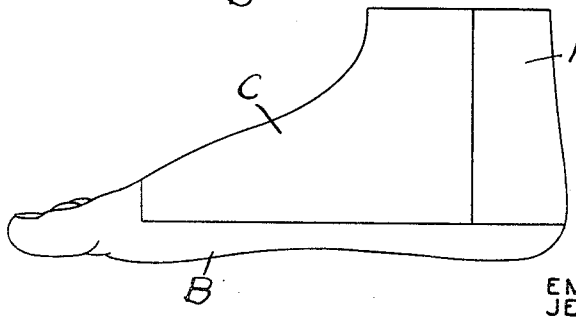

Fig. 10.

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METHOD OF OBTAINING FOOT IMPRESSIONS

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Application April 19, 1948, Serial No. 21,768

7 Claims. (Cl. 18—55.01)

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The invention relates to a method of obtaining foot impressions for use in making form fitting shoes to aid in the correction and/or the prevention of malformations of the feet.

In the making of shoes to aid in the correction or prevention of malformations of the feet it is necessary to first make an impression of the foot to obtain a duplication of the contours thereof while the foot is positioned with the bones thereof adjusted as nearly as their structure permits to a normal correct relation and in a position the bones would normally occupy before any deformation or exaggeration of existing deformity thereof has occurred due to body weight supported by the foot.

In previous methods which have been employed, for obtaining such foot impressions, it has been the practice to apply a sufficient pressure to the underpart of the foot, while the foot is placed upon an arbitrary support, so that the bones of the foot will be altered to a more correct or natural position and then to apply a plastic material adapted to set in a hard mass over the upper part of the foot and so that said material will conform to the contour of said upper portion. After this has been done the pressure is removed from the sole of the foot and said sole is pressed into a viscous material which is adapted to set while the hardened plastic mass of material still remains on the upper side of the foot.

It is the main object of the present invention to improve on such previous methods of obtaining foot impressions by providing a method by which an accurate duplication of the contours of the feet in molded form may be obtained without applying any pressure to the sole of the foot and which molded impressions may be used in producing shoes or supports which will be efficient aids to the corrections for the feet which are desired to be effected.

A further object is to provide a method of taking foot impressions which will produce an accurate duplication of the contours of the foot and which will give the foot more of an elongation factor than heretofore provided in previous methods and so that the resultant shoe made from said impressions will be more comfortable to the wearer in the toe area thereof.

A further object is to provide a method of obtaining foot impressions which may be performed easily, with a minimum of time, and with a minimum of equipment.

Further objects of the invention will appear from the detailed description thereof hereinafter

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set forth in connection with the accompanying drawings in which—

Figure 1 is a sectional view of a container or pan used in practicing the method of the invention and showing the same with the bottom thereof covered with sand or other suitable granular material and with the upper surface of such granular material extending in a predetermined inclined line from one end of the pan to the other, and also showing a layer of a thin plaster wash on the upper surface of the granular material;

Figure 2 is a view similar to Figure 1, but showing a foot placed in position in the pan and with the sole of the foot resting on the layer of plaster and also showing a thin layer of a separating plaster material applied over the granular material and plaster around the outer edges of the foot;

Figure 3 is a sectional view of the pan or container with the foot positioned therein and showing a further step in the method of the invention and wherein the exposed upper surface of the foot has been covered with a coating of plaster of Paris;

Figure 4 is a plan view of the pan or container with the foot positioned therein at the stage of the method indicated in Figure 3 but showing cuts made in upper plaster material to weaken the same;

Figure 5 is a sectional elevational view of the container or pan with the foot positioned therein at the stage of the method indicated in Figure 4;

Figure 6 is a sectional view of the container and showing the step in the method wherein the foot has been raised from the container and the upper segments of the plaster coating being removed from the foot to be used in forming a negative mold;

Figure 7 shows a positive mold made from the negative mold and indicating cuts which are made in the positive mold as contemplated by the method of the invention;

Figure 8 is a plan view of the positive mold showing the cuts made therein;

Figure 9 is a view of the cut portions of the positive mold separated from each other; and

Figure 10 is a side elevation of the positive mold in its completed assembled form, and with the cut portions shown in Figure 9 reunited with each other.

In practicing the method of the invention a rectangular shaped container or pan, made of metal or wood, and such as is indicated at 1 in Figure 1,

is employed. The pan is marked on the interior side walls thereof with a gauge line indicated at 2. This gauge line is positioned approximately one-half inch from the bottom of the pan at one end thereof and extends along the side walls toward the other end of the pan at this same height for three inches and then upwardly at an angle until it reaches a point of approximately one and a half inches from the bottom of the pan at the opposite end thereof. The pan is filled with sand or other suitable material, indicated at 3, until its upper surface coincides with said gauge line and so that said surface will be inclined as shown in Figure 1. This arrangement of the sand or other suitable material in the pan provides a heel height for the foot when it is placed in position on the granular material of approximately one inch and the foot will be inclined toward such heel height from the heads of the metatarsal bones.

When a foot impression is to be made, the surface of the granular material is covered with a thin wash 4, of a plastic material such as plaster of Paris, and the foot is then placed gently upon said plastic wash in such manner that the leg 5 will extend at a 90° angle to a horizontal plane. It is intended that the person whose foot is placed in the pan shall sit in a normal and natural position on a chair or other support and with the foot resting upon the plaster wash 4 without any pressure being put thereon. The foot is kept in this position without motion until the plastic wash has set.

When the plaster of Paris wash 4 has set, and while the foot is positioned thereon a thin coating of a separating material such as liquid sodium silicate 6 is applied over the plaster and all around the outer edge of the foot and also over the exposed dorsal portion of the foot.

The next step of the method consists of pouring a quantity of plaster of Paris 7 mixed with water and so that it possesses a thick consistency over the dorsal surface of the foot and so as to enclose the entire foot in this plaster mass to a point just above the ankle joint.

Before the mold formed by this upper plaster of Paris hardens, it is weakened by knife cuts 8, 9 and 10 shown in Figure 4. The knife cuts 9 and 10 are made through the plaster at that portion of the ankle anterior to the widest portion of the ankle joint left and right of the malleoli line. The knife cut 8 is made down the dorsum of the foot from the ankle joint to a point between the first and second toe. In this manner the plaster coating 7 is adapted to be divided into three sections, namely 11, 12 and 13.

When the upper plaster coating 7 has completely set and hardened, the foot is lifted from its position in the plantar section of the plaster wash as shown in Figure 2, and the upper plaster segments 11, 12 and 13 are separated from each other at the sites of the knife cuts 8, 9 and 10 with the use of a suitable instrument and removed from the foot as indicated in Figure 6, and the foot is then entirely removed from the pan.

The three sections or segments 11, 12 and 13 are then placed together again and with respect to the impression made of the bottom portion of the foot in the plaster wash 4, to form a negative mold of said foot. Said mold is then soaked in a solution of sodium silicate and then when the air bubbles have ceased seeping out of the hardened plaster, a very aqueous mixture of plaster of Paris is slowly poured and vibrated into the negative mold and until it reaches the top of said mold.

When this plaster has hardened in the negative mold the outer segments of the negative mold are broken up and removed, and a positive mold, shown in Figures 7 and 8, is the result. This positive mold provides substantially the form which is used in making a shoe which is adapted to fit the particular foot from which the impressions were made and thereby provide maximum aid in the correction of any malformations existing in said foot.

Before the positive mold is completed in its final form, however, it is reduced in size in the following manner. A cut 14 is made in the mold approximately one-half inch from the plantar surface of the foot at the heel and extending forwardly to a point at the metatarso-phalangeal joint, first and fifth. A second cut 15 is made from the dorsal surface connecting these two joints, thus producing the sections A and B (see Figure 7). The section A is then lifted off of the segment B, and a third cut is then made through the segment A down its mid line separating the same into two sections C and D, and a fourth cut 17 which separates section A into the two sections E and F. There will be then provided five cut sections—B, C, D, E and F of the positive mold.

These sections are then placed together again as shown in Figure 10 and caused to be united with each other by a plastic composition to form the completed mold, said mold having a reduced size caused by the elimination of the width of the cutting blade used in making the above mentioned cuts.

The shoe is then adapted to be constructed over this molded form and when completed the mold is broken out of the shoe by a chisel or other suitable instrument.

A foot impression taken by the method above described provides a duplication of the contours of the foot which is of sufficient accuracy so that a shoe can be made which will be comfortable to the wearer thereof and efficient in aiding the foot to be restored to its normal condition.

What is claimed is:

1. The method of obtaining an exact mold of the foot in a normal condition which comprises placing the foot in a normal partial weight bearing position on an inclined surface composed of a granular shifting compressible material simulating a natural surface and which has a thin covering of a material adapted to set and to form a molded impression of the plantar section of the foot, applying a material adapted to set and to conform to the contours of the upper portion of the foot while it is thus positioned on said support, then removing the foot from the support and breaking away the material applied to the upper portion of the foot in predetermined sections, then repositioning said broken away sections with respect to the molded impression made of the bottom of the foot on said granular shifting compressible material to form a hollow mold, then making a positive molded reproduction of the foot by pouring a material adapted to set in said negative mold.

2. The method of obtaining an exact mold of the foot in a normal condition which comprises placing the foot in a normal partial weight bearing position on an inclined surface composed of a granular shifting, compressible material simulating a natural surface and which is covered with a thin layer of material adapted to set and to form a molded impression of

the plantar section of the foot and with the heel portion of the foot elevated at a predetermined height above the metatarso-phalangeal joints, coating the upper surface of the foot with a separating material and then applying over the upper surface of the foot a material adapted to set and to conform to the contours of said upper portion, then lifting the foot from said support and removing the material from the upper surface of the foot in predetermined sections, then repositioning said sections with respect to the molded impression made of the bottom of the foot to form a hollow negative mold, then coating the interior surface of said mold with a separating material and filling the mold with a material adapted to set in a hard mass to form a positive molded reproduction of the foot, then breaking away the negative mold from the positive molded reproduction of the foot.

3. The method of obtaining foot impressions which comprises positioning a foot, without pressure, on an inclined support composed of a granular shifting compressible material covered with a thin layer of material adapted to set and to produce a molded impression of the bottom portion of the foot, allowing said material to set while the foot is positioned thereon, applying to the upper surface of the foot, and up to a point just above the ankle portion thereof, a covering of a material adapted to set while conforming to the contour of said upper surface of the foot, then lifting the foot from said support and from the molded impression made of the bottom of the same after the upper covering material has set, removing said upper covering material from the foot in predetermined shaped sections and repositioning the sections with respect to the molded impression made of the bottom portion of the foot to form a hollow mold, then filling said mold with material adapted to set into a hard mass and to form a positive molded reproduction of the foot, then removing the outer mold from said positive mold.

4. The method of obtaining foot impressions which comprises positioning a foot without pressure on an inclined support composed of a granular shifting compressible material covered with a thin layer of a material adapted to set and to produce a molded impression of the bottom portion of the foot, allowing said material to set, applying a coating of a separating material around the outer edges of the foot as it rests on said support and in said thin layer of setting material and also over the upper surface of the foot, applying to the upper surface of the foot and up to the height of the ankle portion thereof, a thick covering of a material adapted to set, lifting the foot from said support and the molded impression made of the bottom portion of the foot and after the upper covering of material has set, removing said upper covering of material from the foot in predetermined shaped sections and repositioning said sections with respect to the molded impression made of the bottom portion of the foot to form the same into a hollow mold, treating the interior surface of said mold with a coating of a separating material, then filling said mold with a material adapted to set in a hard mass and to form a positive molded reproduction of the foot, then removing the outer molded form from said positive mold.

5. The method of obtaining foot impressions which comprises positioning a foot on an inclined support composed of a granular shifting compressible material covered with a thin layer of material adapted to set and to produce a molded impression of the bottom portion of the foot, said granular material being inclined at an angle so that the heel of the foot will be positioned a predetermined height above the metatarso-phalangeal joints of said foot, applying a material, adapted to set, over the upper surface of the foot up to the ankle portion thereof, and after said material has set, lifting the foot from said support and said molded impression made of the bottom of the foot, and removing said upper covering of material therefrom in predetermined shaped sections, repositioning said sections with respect to the molded impression made of the bottom of the foot to form a hollow mold, then filling said hollow mold with a material adapted to set in a hard mass and to form a positive molded reproduction of the foot, then separating the outer mold from said positive molded reproduction.

6. The method of obtaining an exact mold of the foot while the foot is in a normal, partial weight bearing position in relation to a natural surface which comprises positioning a foot without pressure upon an inclined support composed of a granular material covered with a thin layer of a material adapted to set and to form a molded impression of the plantar section of the foot and with the leg projecting at a ninety degree angle from a horizontal plane causing said layer of material to set, applying to the dorsal portion of the foot a material adapted to set in a hard mass while conforming to the contour of said dorsal portion, allowing said dorsal covering material to partially set and then cutting through the same along predetermined lines to weaken the structure thereof, removing the foot from said support and the molded impression made of the plantar section thereof after the dorsal covering has set, and removing said covering from the foot in the shaped sections formed by said cuts, repositioning the shaped sections with respect to the molded impression made of the plantar section of the foot and forming said sections and the molded plantar impression into a hollow mold, filling said mold with a material adapted to set into a hardened mass and to form a positive molded reproduction of the foot, then breaking away the outer mold from said positive molded reproduction of the foot.

7. The method of obtaining foot impressions which comprises positioning the foot without pressure upon a support inclined upwardly from the metatarso-phalangeal joints of the foot and so that the heel is positioned at a predetermined height from said metatarso-phalangeal joints, said support consisting of a granular shifting compressible material and being covered with a thin layer of a material adapted to set and to form a molded impression of the plantar portion of the foot, causing said covering material on said support to set while the foot is positioned therein, applying a thin layer of a separating material over the upper surface of the foot and around the sides thereof adjacent the molded impression made of the plantar portion, applying a material over the upper surface of the foot and up to the ankle portion thereof and which is adapted to set while conforming to the contour of the upper portion of the foot, and after said last mentioned material has partially set, making cuts therein to divide the same into predetermined weakened sections, lifting the foot from said support and from the molded impression made of the plantar portion thereof, removing said upper covering of material from the foot in sections defined by said

cuts and then repositioning said sections with respect to said plantar impression to form a hollow negative mold, then coating the interior of the hollow negative mold with a separating material and filling the mold with a material adapted to set into a hard mass and to form a positive molded reproduction of the foot, then breaking away the negative mold from the positive mold, then cutting the positive mold into a plurality of sections along cutting lines of a predetermined width and then rejoining said cut sections into a molded reproduction of the foot.

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