

Nov. 21, 1950

F. SHERWIN ET AL
SHOE MOLDED TO SHAPE OF FOOT

2,530,737

Filed Oct. 16, 1945

2 Sheets-Sheet 1

Fig. 1.

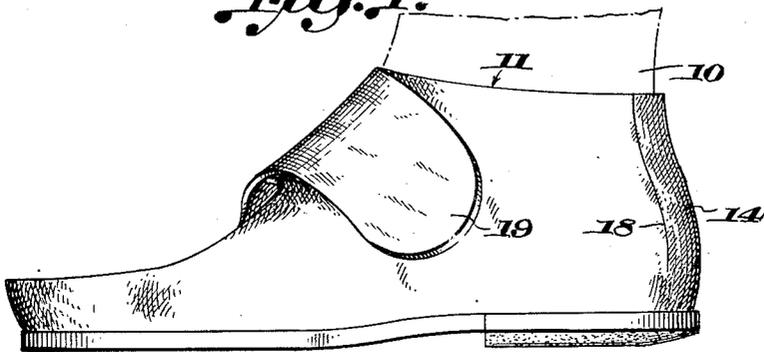


Fig. 2.

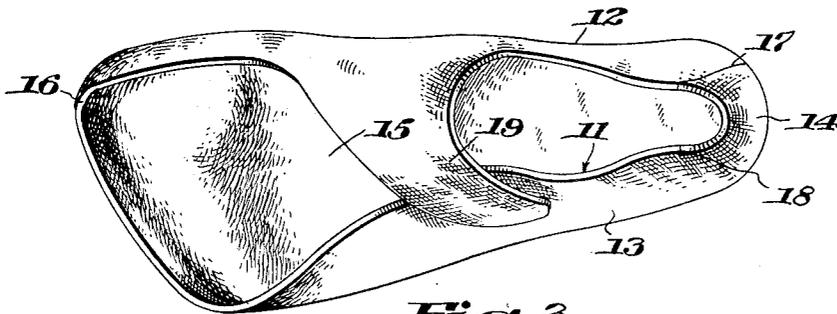
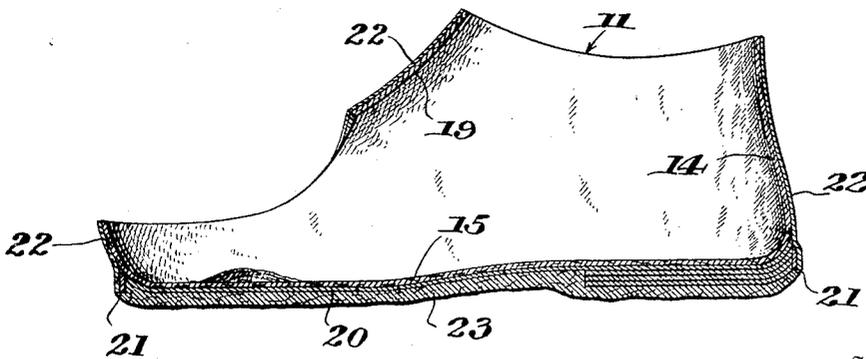


Fig. 3.



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Fig. 4.

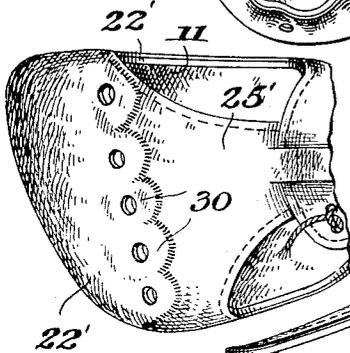
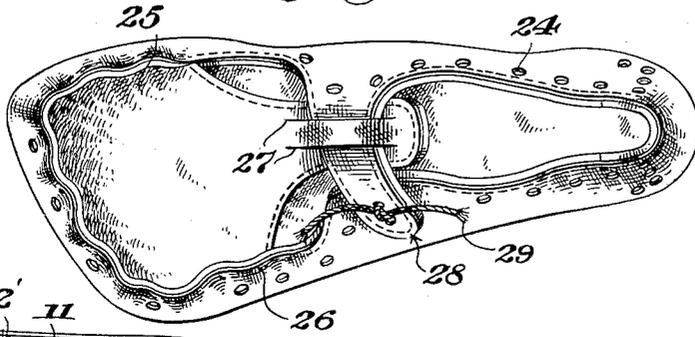


Fig. 5.

Fig. 6.

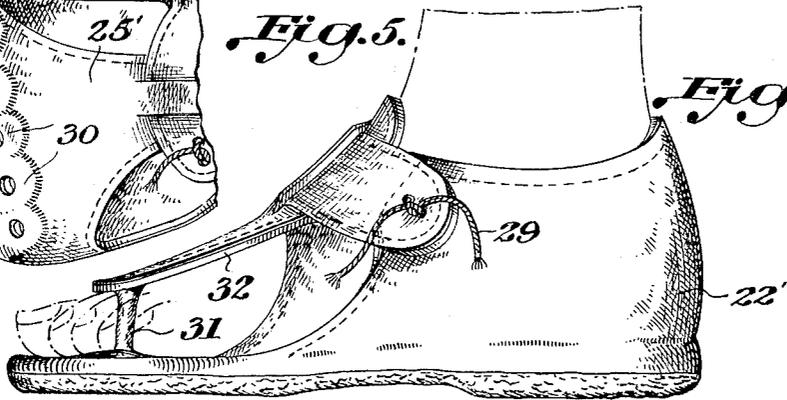
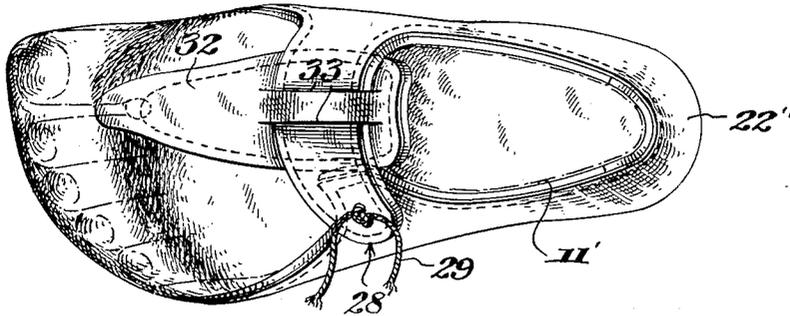


Fig. 7.



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UNITED STATES PATENT OFFICE

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SHOE MOLDED TO SHAPE OF FOOT

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Application October 16, 1945, Serial No. 622,574

1 Claim. (Cl. 36—8.5)

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This invention relates to shoe molded to shape of foot, and especially to the production of a shoe, individually tailored or constructed for the particular human foot on which it is intended to be worn.

The objects of the invention include the production of a shoe which will allow freedom of movement of the various parts of the foot, including the joints, which will provide maximum support, will be attractive in appearance, have maximum durability, and therefore of greatest practicability and comfort.

It is also an object of the invention to provide a shoe of the above characteristics with a lining, for both the sole and side walls of the shoe, of one piece or substantially one piece construction, as well as a shoe capable of being produced in a minimum of time with the least effort, simplest mechanism and materials, and at a reasonable cost.

Briefly stated, the invention includes the production of a mold of the foot by first applying a plastic composition to the exterior of the foot while the person or individual is seated so that the foot will be in its natural or relaxed position, not excessively spread, and then casting a last in the negative mold thus obtained. Upon this last the shoe is built.

The several steps of constructing the orthopedic shoe contemplated in the present invention comprise covering sole and sides of the last with softened leather cut to form an inner lining; forming or molding a resilient shock absorbing cushion or pad for the sole of the foot; securing said pad to the under side of the sole portion of the lining; securing a sole defining annulus around the edge of the cushioning pad; surrounding the inner lining and the periphery of the annulus with an outer layer or casing of softened leather; and affixing a sole to the under side of the resilient pad. It has been found that wool fibers with adhesive and a synthetic rubbery liquid having high heat and wear resistance makes a highly satisfactory sole, although leather, composition, or other material may be employed.

When the shoe is set the last is removed and the leather edges may be cut to improve the design, and sewn by hand or machine.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings, wherein:

Fig. 1 is a side elevation of an inner lining and its supporting sole portion, in accordance with the present invention;

Fig. 2, a top plan view of the structure of Fig. 1;

Fig. 3, a longitudinal section of the structure of the preceding figures, with the addition thereto of a surface layer, sole, and an annular retaining strip for the sole;

Fig. 4, a top plan view of the completed moccasin-type sole;

Fig. 5, a top plan view of the toe portion of a slightly modified type of shoe, in which the toes

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are likewise enclosed, but with greater exposure of the side portions of the foot;

Fig. 6, a side elevation of a shoe of a slightly modified construction in which the toes are exposed; and

Fig. 7, a top plan view of the shoe of Fig. 6.

Referring to the drawings, a last 10 of plaster of Paris or other quick-setting plastic material is cast within a negative mold formed about the foot for which the shoe is being made. This last will have a surface contour and configuration identical with the surface of the foot. If desired, portions of the last may be removed or supplemented in accordance with requirements.

Upon the last 10 is applied a lining 11, which may be of a single piece of material, of leather or the like, having a smooth surface which will be toward the surface of the foot and therefore comfortable to the wearer. As illustrated, this lining may conform to any desired pattern; however, as shown, it consists of side portions 12 and 13, a counter portion 14, and a sole portion 15. The side portions are abuttingly united at a joint 16 at the toe of the shoe, and the sides and counter portion are united at joints 17 and 18. The side portion 12 of the lining is provided with a strap 19, which extends over the instep into overlapping relation with the side 13.

The leather blank which forms the lining may be cut to other desired patterns, and is softened by manipulation, kneading or the like, under the proper conditions of temperature and humidity, an atmosphere of internal body temperature of about 98.6° F. being found satisfactory. On the smooth side of the lining a coating of adhesive is applied and the lining is placed, pressed, and worked into intimate engagement with the desired area of the last, with the smooth adhesively coated face against the last, and is permitted to set and adhere to the last. Thereafter, any surplus material producing bulging is cut away until a smooth surface is obtained. In this manner a lining is provided which will intimately conform to the configuration of and be comfortable to the foot.

While the lining is still cemented to the last, a pad or sole cushion 20 is added. This pad or cushion is formed of a porous sheet of woven fabric, or the like, treated or impregnated with hot semi-liquid plastic of a resilient nature when set, such as, for example, a rubber product, to afford desired cushioning of the foot. The layer 20 is applied to the lining beneath the bottom thereof to cover the sole portion thereof, and to intimately conform to the sole portion of the lining. The resilient layer or pad 20 has been found very desirable for maximum comfort. If greater resiliency is desired additional layers may be employed to obtain the desired thickness and degree of resiliency, without materially impairing the flexibility of the shoe.

If a plurality of layers 20 are employed, they may be held together by sewing and by adhesives. The resilient pad thus provided is of great

importance, because not only does it act as a cushion and resist prolonged flexing, but it spaces the foot above the surface on which the person walks. In addition, it resists sunlight, does not swell or disintegrate in the presence of oils and solvents, resists water, corrosion or oxidation, nor does it shrink, expand, or distort with use. After the resilient pad or cushion is satisfactorily set, its edge is trimmed and ground until the desired smoothness is obtained.

Thereafter an outsole retaining strip 21 of leather is applied and forms an annulus around the edge of the sole cushion 20. Next, the outer or surface leather layer 22 of the shoe is cut and softened similarly to that of the inner lining and adhesive is applied to its unfinished side so that the smooth, finished side will be the outer surface of the shoe. The surface layer 22 is then pressed into intimate contact with the exterior of the lining and the strip 21 so that it overlaps the underside of the sole cushion 20 and covers the sides 12, 13, 14 and strap 19 of the inner lining. Also, if desired, in addition to the use of adhesive, hand-sewing may be employed to additionally fasten the surface layer to the lining. That portion of the layer which underlaps the sole cushion is trimmed to remove surplus material extending below the annulus 21.

The sole 23 may be of any desired character although it has been found desirable to employ a sole of a flexible, durable, nature. Such a sole may be obtained from wool fiber treated or impregnated and mixed with adhesive and a synthetic rubbery liquid such as, for example, a rubber product which hardens substantially when allowed to set. Application of the mixture which constitutes this sole is preferably in plastic, flowable state, the mixture is substantially liquid or semi-liquid, and is added to the bottom of the shoe in an amount to obtain the desired thickness. This covers the pad 20 and the edge of the leather annulus positioned around the edge of said pad.

When the footwear is completed and set the strap 19 is separated from the last, the last is removed, and the leather edges are trimmed and sewn.

It will be readily understood that a shoe in accordance with the above will combine maximum comfort and durability, and the weight of the same can be readily controlled.

In Fig. 4, the shoe of Figs. 1, 2, and 3, is provided with openings 24, and with the front, top, portion of the shoe provided with a permanently attached or removable section 25 joined at its margin to the upper of the shoe, thus providing a moccasin-type shoe. The openings 24 serve both for decoration and ventilation. The upper of the shoe is formed by the inner and outer layers 11 and 22. The front top section or tongue 25 is secured in place by a lacing or stitching 26, and such top piece is removable if desired, or is permanently attached. The tongue of the top section 25 is provided with slits 27 for reception of the strap 28, the bottom layer of which is formed by the strap 19. The material of the tongue between the slits is pulled up and the strap inserted through the slits as disclosed. The tongue of the shoe in all embodiments may be connected by any desired fastening means, as for example, a tie 29 attached to the upper of the shoe and having its ends extending through the strap so that it may be tied to secure the tongue in position.

Fig. 5 illustrates the front portion of a slightly

modified form of shoe with a top piece 25' slightly narrower near the strap, providing additional freedom for the sides of the foot. Embossed apertured portions 30 overlying the toes are also provided, otherwise the inner and outer layers 11' and 22' correspond to the inner and outer layers 11 and 22 previously described.

In Figs. 6 and 7 is disclosed a shoe similar to that previously described, except for the covering for the toes and front portion of the foot. In the shoe of Figs. 6 and 7 the toes are exposed and a tether or restraining connection 31 joins the sole of the shoe, with the lower tapered extremity of a top member or tongue 32 provided with slits 33 for receiving the strap 28. The tether or restraining connection is adapted to be connected between the great toe and the adjacent toe of the foot and leave the toes exposed but retains the foot in proper position within the shoe.

Except for the modifications described above, the inner and outer layers 11' and 22' correspond to the inner and outer layers 11 and 22 previously described.

While we have described the production of a cushioning pad fabricated on the exterior of the lining beneath the sole thereof, this cushioning pad may be formed directly on the cast prior to the application of the lining to the cast, and such molded pad can thereafter be removed and subsequently be cemented to the underside of the lining beneath the sole thereof after the lining is applied to the cast.

Also, instead of an outsole defining strip or annulus of leather positioned around the edge of the cushioning pad, an annulus of like construction may be employed which serves merely to give a smooth finish to the cushioning pad before the outer layer of leather is applied.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claim.

What is claimed is:

An orthopedic shoe comprising an integral one-piece leather lining molded to the shape of a human foot, a resilient pad formed of porous woven fabric impregnated with a resilient plastic positioned beneath said lining and secured thereto, a sole defining annulus formed from a relatively narrow strip of sheet material of uniform cross-section surrounding said pad and depending therebeneath, an outer leather casing for said lining surrounding the periphery of said annulus, and a sole member of wool fibers treated with synthetic rubbery liquid having high heat and wear resistance, the component parts being adhesively united.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,344,930	Wolf	June 29, 1920
1,640,362	Mahler	Aug. 30, 1927
2,138,974	MacDonald	Dec. 6, 1938
2,177,304	Murray	Oct. 24, 1939
2,332,000	Murray	Oct. 19, 1943