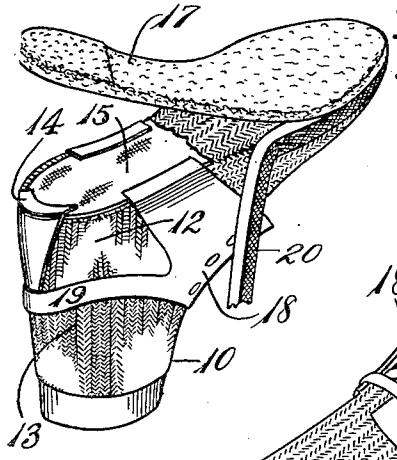
Feb. 14, 1939. A. A. GLIDDEN 2,147,197

ARTICLE OF FOOTWEAR

Filed Nov. 25, 1936 2 Sheets-Sheet 1

Fig-3



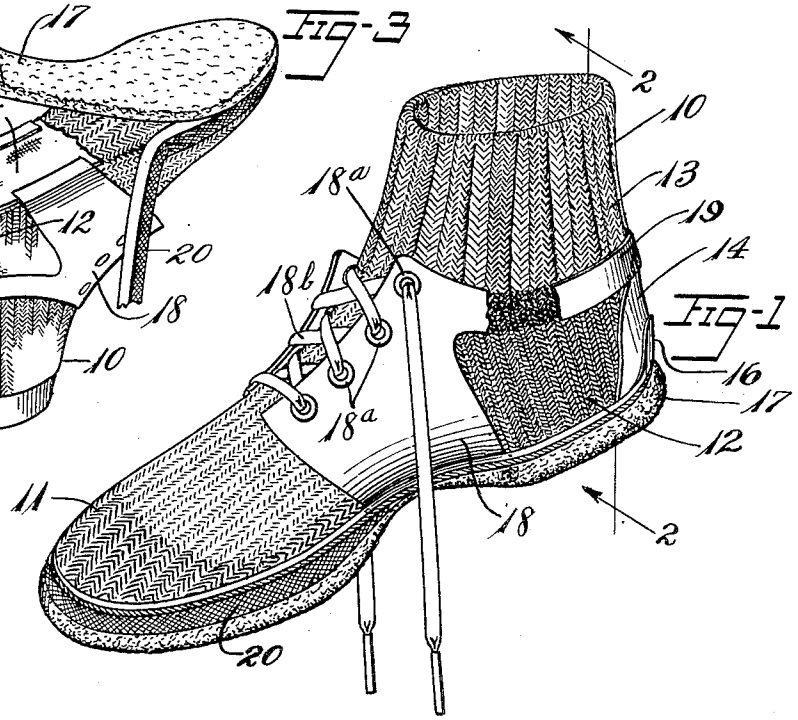
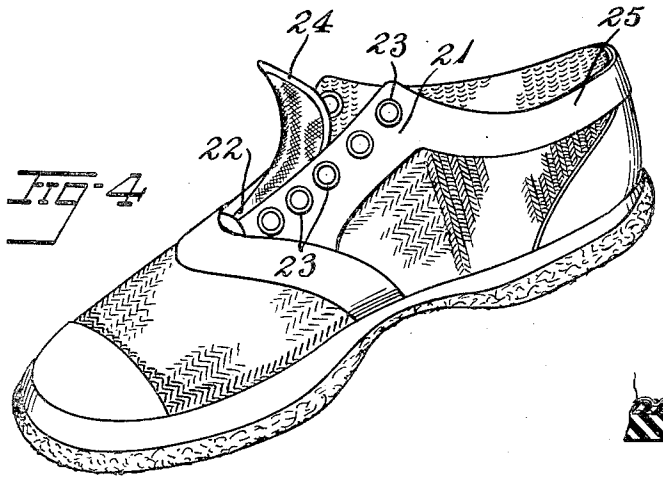


Fig-1

Fig-4



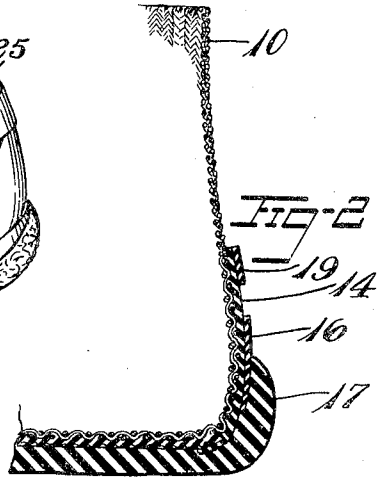
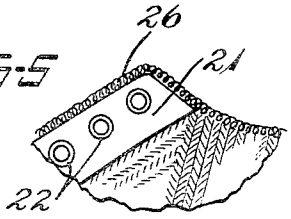


Fig-2

Fig-5



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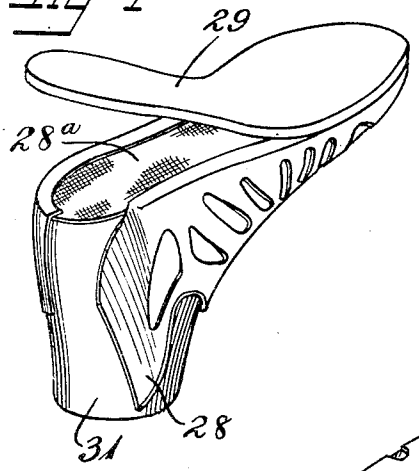
ARTICLE OF FOOTWEAR

Filed Nov. 25, 1936 2 Sheets-Sheet 2

Fig-7



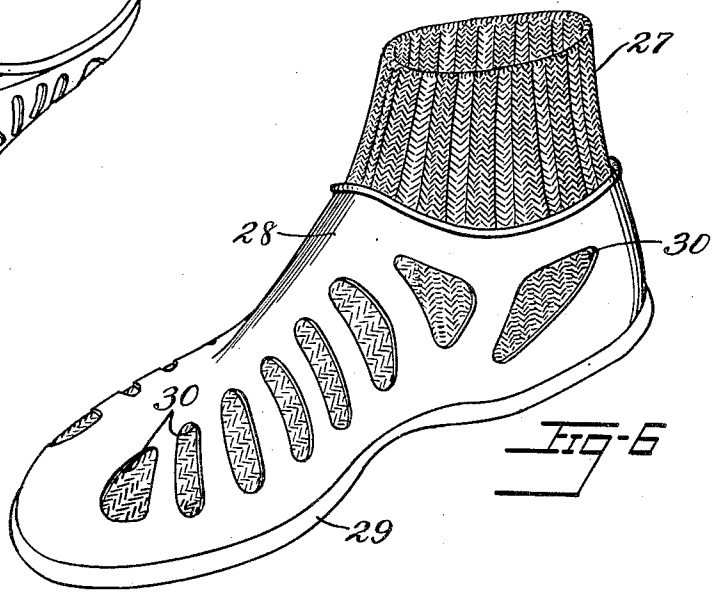
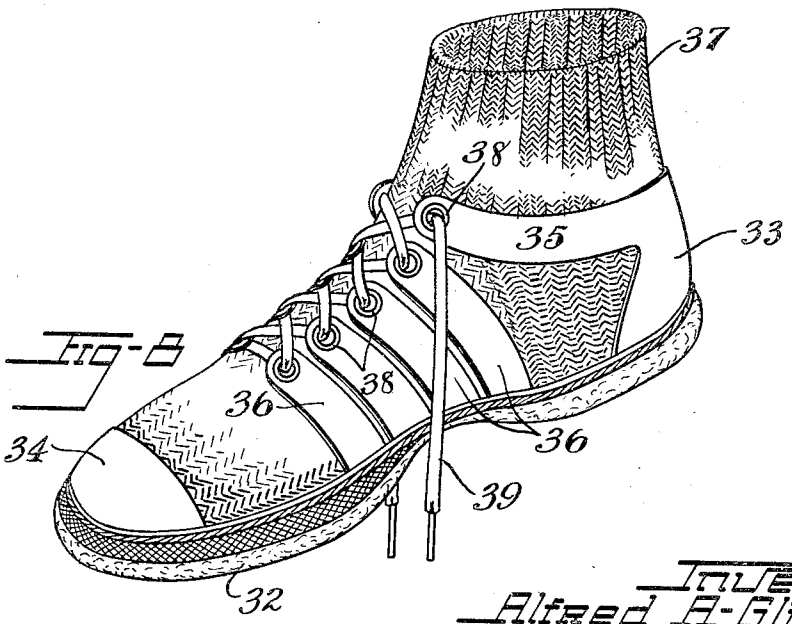


Fig-6

Fig-8



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2,147,197

UNITED STATES PATENT OFFICE

2,147,197

ARTICLE OF FOOTWEAR

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Application November 25, 1936, Serial No. 112,735

5 Claims. (Cl. 36—9)

This invention relates to articles of footwear and to methods of making the same, and is especially useful in the manufacture of shoes having textile uppers. Heretofore shoes for use in playing athletic games and for similar purposes, sometimes called sneakers or tennis shoes, have been manufactured from substantially nonstretchable canvas or similar woven material. It has been the practice to construct the uppers with a fabric lining attached to the upper by an intervening layer of rubber. In the manufacture of such shoes a great amount of waste has been involved in the cutting of the fabric parts, and due to the substantially nonstretchable nature of the textile material comprising the upper difficulty has been experienced in providing the proper shape to such shoes. The resulting shoes are of such a nonabsorbent nature and so impervious to moisture that discomfort has been caused to the wearer by perspiration. The woven materials which have been used in the uppers of such shoes are subject to objectionable shrinkage from repeated wetting and drying, adding further discomfort to the wearer.

The principal objects of the present invention are to provide comfort, stretchability, light weight, breathability and absorption properties in an article of footwear and to provide for economy of materials and convenience of procedure in the manufacture of the same. Other objects will appear from the following description and the accompanying drawings.

Of the drawings:

Fig. 1 is a perspective view of a shoe embodying and made in accordance with the invention, part of the rubber being broken away.

Fig. 2 is a detailed cross sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a perspective view of the shoe of Fig. 1 during a stage of its manufacture, the parts of the shoe being partially assembled upon a last.

Fig. 4 is a perspective view of another embodiment of the invention in its completed form.

Fig. 5 is a fragmentary view of a portion of the upper margin of a shoe illustrating a further embodiment in which an overcast stitching is applied to the margin.

Fig. 6 is a perspective view of a further embodiment of the invention in which the elastic textile upper is removable from the remainder of the shoe.

Fig. 7 is a perspective view illustrating the building of the rubber portions of the shoe of Fig. 6 upon a last, the rubber portion of the shoe being shown as partially completed.

Fig. 8 is a perspective view of a further embodiment of the invention in its completed form.

Referring to the drawings, the invention contemplates the construction of an article of footwear in which an upper of extensible and elastic textile material, such, for example, as knited material, and of such extent as to form the complete upper including the insole, is fabricated without substantial waste to the desired shape to accommodate the foot without uncomfortable wringles. A reinforcing structure, preferably of rubber is provided on the outer face of the upper in form-fitting contact therewith without wrinkling or buckling of either of the parts, while preferably leaving extensive portions of the textile upper exposed to provide breathability and facility of flexing.

Referring to the drawings:

In proceeding according to the method of this invention a complete and integral, extensible and elastic, unlined shoe upper 10 is formed, preferably by knitting, to final form and without waste, of yarn which may be of any suitable material, such for example, as cotton, wool, combinations of cotton and wool, animal fibers such as mohair, alpaca, cellulose filaments such as rayon, cellulose acetate or the like, vegetable fibers such as jute, sisal, hemp or especially prepared fibers such as combinations of rayon, shredded leather held together by resinous bodies, natural or artificial dispersions of rubber or other agglutinous material.

In fabricating the unitary upper, as by knitting, areas thereof which are normally subjected to greater wear and in which a lower degree of elasticity is desired, such as the toe 11 and the heel portion 12, may be more densely fabricated to provide therein heavier weight and less extensibility than in the other parts of the upper, as by changing the type of stitch or amount or thickness of the yarn in the knitting. Other areas, such as the ankle portion 13, are preferably made so as to provide softness and elasticity, as by making them of ribbed construction, as shown.

In the embodiment of Fig. 1 the entire upper, preferably including the insole, is fabricated as an integral, shaped, sock-like article although in some cases the insole portion may be omitted, if that is desired. In any event the complete article preferably is formed as nearly to the shape of the last on which the shoe is to be built as possible. The fabricated upper is slipped over the building last and the remaining parts of the shoe are assembled thereon and attached in form-fitting relation either by adhesion or by sewing

operations. The upper may be wetted either before or after being applied to the last and then dried on the last in order to more closely conform it to the shape of the last.

In order to provide good ventilation and comfort it is desirable to leave as much of the elastic upper exposed as possible and all of the trimming pieces are reduced to a minimum. In the embodiment of Fig. 1, after the upper has been applied to the last, the parts, preferably of rubber including a counter **14**, heel reinforcement **16**, outsole **17** and a blucher saddle **18** having an integral heel strap **19**, which encircles the rear of the shoe, are mounted in place upon the upper as illustrated in Fig. 3, and may be cemented thereto in the places where it is desired to attach the parts to the upper, and a foxing **20** is preferably applied around the lower portion of the shoe where it joins the outer sole. A filler or reinforcing layer **15**, preferably of thin, rubberized fabric, may be provided to facilitate assembly and to provide a stronger union of the outsole to the textile upper and to provide greater smoothness of the inner sole bottom. The article is then vulcanized preferably while on the last and then removed therefrom. The eyelets **18***a* for receiving the shoe lace **18***b* may be applied to the margins of the blucher saddle **18** after vulcanization. The blucher saddle is permanently attached to the upper only at or near the sole leaving the eyeleted portion free. While rubber is the preferred material, some or all the parts applied to the upper in this and the other embodiments may in some cases be of any other suitable material, such as fabric, or natural or artificial leather. Where rubber is used, it may be unreinforced, or it may be reinforced, as by fabric, if desired.

In the embodiment of Fig. 4 the front of the upper has reinforcing stays **21** secured thereto, as by cementing or stitching, over the instep and extending to the top of the shoe, and the upper may be slit as at **22**, preferably after vulcanization, to provide a vent extending from the top of the shoe to the instep in a forward direction, the stays being provided with eyelets **23** for lacing. A tongue **24** also may be provided. In some cases the tongue **24** and the slit **22** may be omitted, the stays being retained, however, to permit lacing, and for bracing. A strap **25** may be provided, extending around the back of the foot and secured at its ends to the stays. As shown, the shoe may be of the low type with the strap **25** extending along the top margin of the upper.

Where the cutting of the textile upper, to provide the slit **22**, or for any other purpose, leaves a raw textile edge which might ravel or fray, the edges may be protected, as by an overcast stitch **26**, as illustrated in Fig. 5, where the stitch is shown as extending not only along the margins of the slit, but also along the top margin of the upper at the leg opening.

Other modifications of the invention, in which the rubber portion of the shoe may be detachable from the textile upper to facilitate washing the upper, are illustrated in Figs. 6, 7 and 8.

In the embodiment of Figs. 6 and 7, the lower portion of the textile upper **27** is embraced by an integral rubber covering **28** having no lacings or other fastening means, but provided with a sole **29** and formed with ventilating and expansion-facilitating openings **30** which expose the textile upper.

Whether or not the rubber portion **28** is to be attached to the upper it is preferably built upon the textile upper while the latter is upon a last, as in the building of the embodiments shown in Figs. 1 and 4, or a last which corresponds in dimension and shape with the outside of the lasted textile upper **27** may be constructed, and the rubber portion may be assembled thereabout and vulcanized thereon, as illustrated in Fig. 7, in which a perforated sheet of material **28** is shown as being laid about the last **31**, and the sole **29** is laid thereon in adhesive engagement with the sheet **28**. A filler or reinforcing layer **28***a*, like **15** of Fig. 3, may be provided if desired, to facilitate uniting the sole **29** to the part **28** and to provide a smooth inner bottom. The vulcanized article will have the same inside dimensions and shape as the textile upper **27** and the two may be assembled without wrinkling of the upper or objectionable localized stretching of either of the parts. If desired, the rubber part **28** may then be cemented to the textile upper over all or a part of their contacting surfaces.

The embodiment of Fig. 8 may be constructed in similar manner. Here a sole **32** is provided with a counter **33**, toe cap **34**, heel straps **35**, and sole straps **36**, united to each other. This rubber structure may be assembled either upon a last having the textile upper **37** thereon, or upon a last formed to the same outside dimensions and shape as the outside of the lasted upper **37**, and vulcanized thereon. If the rubber portion has been formed without the use of the textile upper, the upper is then placed therein. Eyelets **38** and a lacing **39** are provided for securing the shoe on the foot. In this embodiment, also, the upper may be either removable or cemented or otherwise attached in place over at least a portion of the area of contact with the rubber parts.

An article of footwear constructed according to the invention has decided advantages over articles of footwear heretofore produced. Because of the unlined, absorbent nature of the upper perspiration is readily absorbed and evaporated from the foot. The high porosity of the upper provides good ventilation, and the flexibility of the upper and its inherent elasticity provide a degree of comfort comparable to wearing well fitted socks without shoes, while the outsole, which may be of any desired type and may be of crepe soling or may be molded to provide any desired anti-skid surface, provides adequate traction and protects the feet in walking. Where the foxing **20** is extended for a substantial distance above the sole the shoe may be used upon wet floors without wetting the feet. Comfort to the wearer is contributed to in a large measure by the fact that the outer parts of the shoe, whether attached to the upper or not, are built to fit each other so that the shoe will fit the wearer without wrinkles or other undesirable non-foot-conforming malformations.

Since the entire upper of the shoe, including the insole, preferably is formed of continuous elastic textile material, such shoes may be worn directly over the feet without the use of stockings or socks. The stretchability of the upper, especially when an upwardly-extending, flexible rubber sole and foxing are provided, permits the elimination of half sizes and makes it easier to provide a good fit.

I claim:

1. A shoe having an upper of porous elastic material providing an elastic top portion, a less flexible midportion and substantially less flexible

portions at the lower margin of its sides and at its toe and heel, a sole on said upper and a bracing structure secured to the sole and extending over the instep portion of the upper to restrain the upper from being excessively stretched, the bracing structure covering only a portion of the upper thereby leaving extensive ventilating area of the latter exposed.

2. A shoe having an upper of knitted material providing elasticity and ventilating porosity by virtue of the knitted construction, a sole on the upper, and a bracing structure secured to the sole and extending over the instep portion of the upper to restrain the upper from being excessively stretched, the bracing structure covering only a portion of the upper thereby leaving extensive ventilating area of the latter exposed and said upper having in the foot portion below the ankle a plurality of zones of knitted material of different degrees of stiffness merged integrally by knitted union with one another to provide localized reinforcement of the knitted material acting in cooperation with said bracing structure to resist excessive localized stretching while providing elasticity and ventilation of the upper.

3. A shoe having an upper of knitted material providing elasticity and ventilating porosity by virtue of the knitted construction, a sole adhered to the upper, and a bracing structure secured to the sole and adhered at least in part directly to said upper and extending over the instep portion of the upper to restrain the upper from being excessively stretched, the bracing structure covering only a portion of the upper thereby leaving extensive ventilating area of the latter exposed and said upper having at the margin of an adhered portion of said bracing structure a zone of increased density of knitting merging with a zone of the knitted material of less dense knitting spaced from the bracing structure to provide local reinforcement of the knitted material at the margin of the bracing structure against excessive localized stretching.

4. A shoe having an upper of such knitted construction as to provide an elastic top portion, a less flexible midportion and a substantially less flexible lower portion, the upper being porous for ventilation by virtue of the knitted construction, a sole on the upper, and a bracing structure secured to the sole and extending over the instep portion of the upper to restrain the knitted upper from being excessively stretched, the bracing structure covering only a portion of the upper thereby leaving extensive ventilating area of the latter exposed.

5. A shoe having a sock-like upper of such knitted construction as to provide an elastic top portion, a less flexible midportion, and substantially less flexible portions at the lower margin of its sides and at its toe and heel, a sole essentially of rubber adhered to the upper and a bracing structure essentially of rubber for restraining the upper from being excessively stretched, said structure comprising a portion adhered to the sole and extending over the instep of the upper and a portion adhered to the sole at the heel and extending forwardly around the upper, the bracing structure covering only a portion of the upper thereby leaving extensive ventilating area of the latter exposed.

ALFRED A. GLIDDEN.