Sept. 15, 1936. H. L. WHITMAN 2,054,151

UNIFIED SOLE ARCH SUPPORT

Filed April 29, 1936 2 Sheets-Sheet 1

Fig. 1.

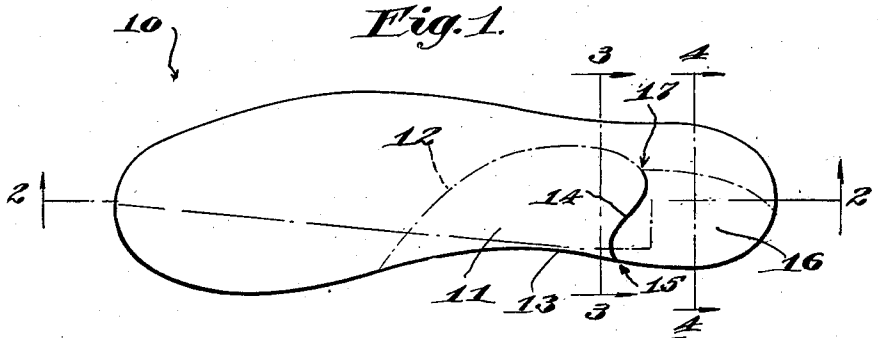


Fig. 2.

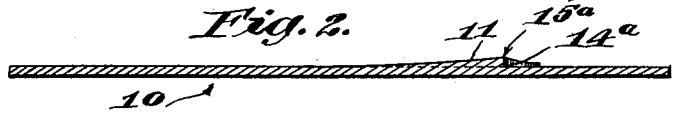


Fig. 9.

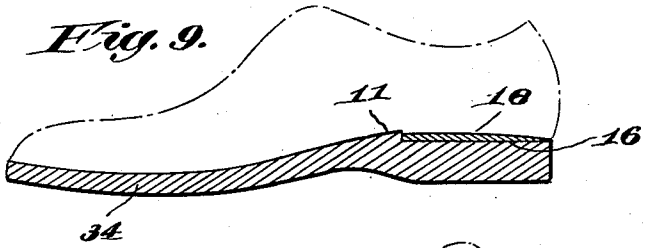


Fig. 6.

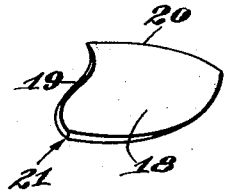


Fig. 5.

Fig. 4.

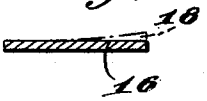


Fig. 3.

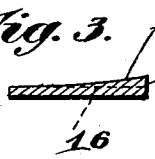


Fig. 6.

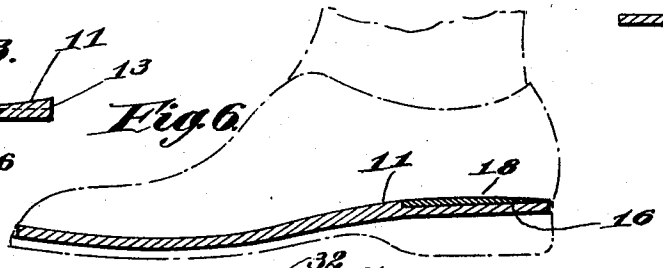
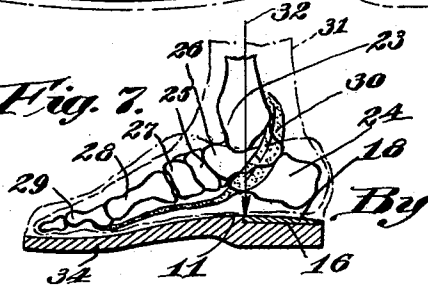


Fig. 7.



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Sept. 15, 1936. H. L. WHITMAN 2,054,151

UNIFIED SOLE ARCH SUPPORT

Filed April 29, 1936 2 Sheets-Sheet 2

Fig. 10.

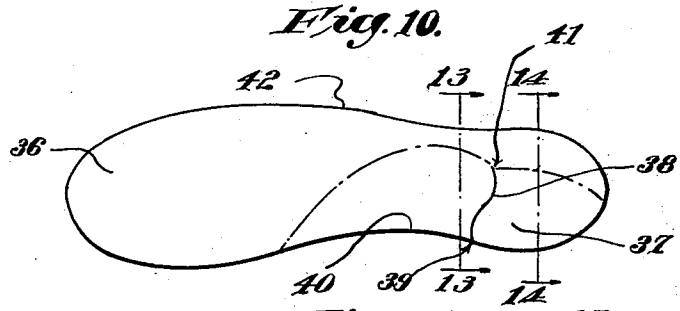


Fig. 11.

Fig. 12.

Fig. 17

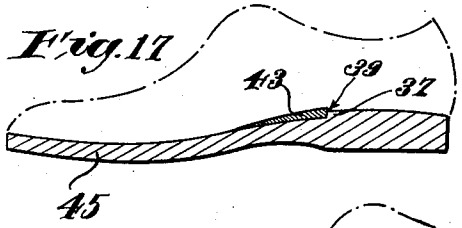


Fig. 15.

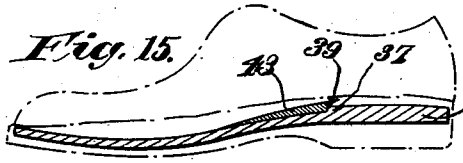
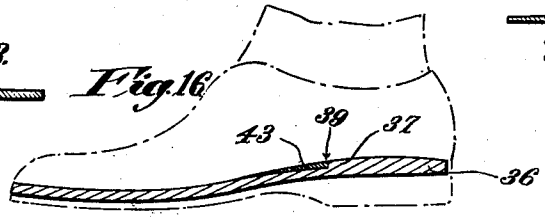


Fig. 14.

Fig. 13.

Fig. 16.



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2,054,151

UNITED STATES PATENT OFFICE

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UNIFIED SOLE ARCH SUPPORT

Hyman L. Whitman, Bridgewater, Mass., assignor to Hood Rubber Company, Inc., Watertown, Mass., a corporation of Delaware

Application April 29, 1936, Serial No. 76,989

8 Claims. (Cl. 36—71)

This invention relates to a unified sole arch support particularly adapted to use in tennis shoes and the like although its application may be carried over into all types of footwear.

The present application is a continuation in part of my now pending application Ser. No. 710,863 filed February 12, 1934 and is an improvement on U. S. Patent No. 1,938,127 granted to me December 5, 1933 for Arch supporter.

In my earlier patent, referred to above, considerable discussion was directed to correction of arch pronation in a foot by the application of my improved arch supporting principle.

Briefly the description of this arch principle relates to correctly supporting the tripod construction of a foot, consisting of the os calcis, the scaphoid, and the astragulus. Such a corrective effect is attained by associating in a particular manner, a substantially non-resilient element directly under the os calcis and abutting thereagainst a resilient member along a reversely curved line indicative of the area of sensitivity of the plantafascia tendon. The resilient element is adapted to act as a partial supporter and exerciser for the plantafascia tendon and the metatarsus. Similar principles of arch supporting are to be understood as being made use of in my present device in which somewhat different structure is provided.

One of the developments of this type of arch is the application of its principle to sole construction for rubber sole footwear and in particular tennis shoes. In this connection it has been found that improvements may be made with respect to the construction and operation of the composite arch structure by reducing the number of separate elements present.

There is some objection to disposing two separate elements on a tennis shoe sole due to difficulty encountered in maintaining a solid durable construction and in correctly applying the critical boundary of the non-resilient arch portion. This has been overcome as indicated above.

The principal object of my invention is therefore an improved arch support for shoes and the like.

Another object is a combination sole and arch supporter structure.

Another object is a unified sole arch support comprising a moulded sole and a separate substantially non-resilient element adapted to be associated therewith.

Another object is a unified sole arch support comprising a moulded sole with an arch portion and a separate resilient element adapted to be associated therewith.

Another object is a substantially non-resilient inner sole having an arch supporter portion moulded therein.

Another object is a resilient inner sole member having an arch supporter portion moulded therein.

Other objects and novel features comprising the construction and operation of my invention will appear as the description of the same progresses.

In the drawings illustrating the preferred embodiment of my invention,

Fig. 1 is a diagrammatic plan view of my improved sole arch support as viewed from the upper side.

Fig. 2 is a longitudinal cross section taken on the line 2—2 of Fig. 1.

Fig. 3 is a transverse cross section taken on the line 3—3 of Fig. 1.

Fig. 4 is a transverse cross section taken on the line 4—4 of Fig. 1.

Fig. 5 is a central longitudinal cross section of a completed shoe partly broken away and showing the sole arch construction associated therewith, the hard element being inserted against the resilient moulded portion and occurring somewhat therebelow when the weight of a foot is not disposed thereon.

Fig. 6 is a view similar to Fig. 5 with the difference that a foot has been diagrammatically shown disposed thereon with a consequent flattening of the raised resilient portion.

Fig. 7 is a central longitudinal cross section of a sole having the arch construction integrally associated therewith, and disposed thereon in side elevation is a foot skeleton with the plantafascia tendon indicated therein and the flesh outline and shoe outline appearing in broken lines.

Fig. 8 is a perspective showing of a substantially nonresilient element to be associated with the member shown in Fig. 1.

Fig. 9 is a modification of Fig. 1 showing the sole arch construction as an integral portion of a unified sole arch.

Fig. 10 is a view similar to Fig. 1 indicating a sole member formed from a substantially nonresilient material and having a heel arch portion integrally formed therein.

Fig. 11 is a view similar to Fig. 2 and further illustrates the heel arch portion integrally formed therein.

Fig. 12 is a view in perspective showing a separate resilient arch portion adapted to be located

ahead of the integral heel portion illustrated in Figs. 10 and 11.

Fig. 13 is a cross section taken on the line 13—13 of Fig. 10.

Fig. 14 is a cross section taken on the line 14—14 of Fig. 10.

Fig. 15 is a view similar to Fig. 5 with reference to the heel arch portion.

Fig. 16 is a view similar to Fig. 6 likewise illustrating the integral heel construction and

Fig. 17 is a view similar to Fig. 9 also referring to the integral heel arch construction.

Referring more in detail to the drawings, Fig. 1 indicates in plan view a moulded sole, or a sole having an arch portion forming an integral part thereof, generally indicated by the numeral 10. This figure is to be understood as being particularly illustrative of the modification shown in Figures 2, 3, 4, 5, and 6 and generally so of the modification shown in Figures 7 and 9.

In Figure 1 there has been diagrammatically indicated a raised formation 11 which is skived outwardly to converge with the thickness of the sole 10 at a locus 12 generally indicated as a curved broken line but which is to be understood as appearing only for purposes of a diagrammatic showing and description as no real line of demarcation is present. The higher part of this formation 11 occurs at the inner border 13 and reaches its greatest thickness at the point of intersection, indicated by the arrow 15, of the reversely curved line portion 14 with the inner border 13.

16 indicates a heel area which has the same thickness as the sole normally and is recessed away from the formation 11 to form the reversely curved edge 14*a* as shown in Fig. 2. This edge diminishes in height from the point of intersection 15 to merge with the thickness of the sole normally at the point denoted by the arrow 17 shown in Fig. 1. It is apparent that the same receding effect takes place in the non-resilient element from the point 21 towards the rear of the heel.

It is pointed out that all of the material comprising the sole 10 may be moulded as one piece and may comprise a resilient spongy rubber so that the formation 11 may be of a soft yielding nature. This formation 11 is adapted to contact the sensitive plantafascia area of a foot along the reversely curved line 14 as illustrated in Fig. 7. This relation is maintained whether a separate sole unit is employed, as shown in Figures 2, 3, 4, 5, and 6 or a solid construction such as is shown in Figures 7 and 9 indicating a solid sole 34.

In Fig. 8 there has been shown a perspective view of a hard element 18 formed of one or more pieces of a substantially non-resilient material such as leather or hard rubber. The element 18 has provided a reversely curved edge 19 shaped coincidently with respect to the edge 14*a*, and further is formed with an inner raised portion tapering outwardly to a feather edge 20. This element 18 is adapted to be located upon the area 16 and fastened by some adhesive means to the sole 10 with the edge 19 abutting the edge 14*a* in a compact manner as shown in Figs. 5, 6, and 7 and 9, and the feather edge 20 merging with the normal thickness of the sole 10.

It is to be noted with respect to this abutting of the hard element that the high point 21 of the hard element is normally the point 15 of the raised resilient portion when abutment has been effected as shown in Figs. 5 and 8, and this effect has been purposely designed to provide for re-adjustment when body weight has been disposed upon the arch whereby the point 15 is depressed to that level of the point 21 under actual wearing conditions as shown in Fig. 6. It is apparent that this effect is present all the way along the edge 14*a*.

As previously cited one of the advantages from the present type of construction is increased stability and accuracy in the application of the point 15 and the related reverse curve 19 to the arch of a foot disposed in such a shoe. In an effort to further clarify the effect obtained, Fig. 7 has been added which indicates a foot skeleton in association with the sole arch support. The skeleton includes the ankle bone 23, the tripod construction comprising the os calcis 24, the astragulus 26 and the scaphoid 25, together with the cunieform 27, the metatarsus 28 and phalanges 29. Associated with the skeleton has been shown the plantafascia tendon 30 surrounding the skeleton; the flesh outline appears as the broken line 31.

The center of weight distribution has been found to be at a point indicated by the plummet line 32 and this point determines the exact location of the point 15. It should be noted in this respect that the plantafascia tendon makes a very definite upward swing just before it crosses the plummet line which results in the disappearance of sensitivity at precisely this point so that the need for maintaining an accurate application of the reverse curve 14 may be better appreciated. Bordering upon the area of sensitivity as determined by the position of the plantafascia tendon, the non-resilient element provides a supporting effect along the reversely curved line 14. The result of such a supporting action tends to correctly align the tripod construction, previously referred to, by maintaining the os calcis in its proper position.

Figures 10–17 inclusive illustrate a modification which is practically the equivalent of that modification shown in Figs. 1–9 inclusive. The structure of these latter figures performs substantially the same function and provides the same combination sole and arch supporting effect. These figures show the heel portion of the arch construction moulded therein, or otherwise formed as an integral part of the sole, the arch portion and sole being constructed from a material somewhat less resilient than that used for similar parts in the modification of Figures 1–9 inc. In this case that portion of the arch structure which must have a certain amount of resiliency is provided as a separate element.

Fig. 10 indicates a sole 36, similar to that sole illustrated in Fig. 1, composed of a material which may be of a substantially non-resilient character. The sole 36 may be constructed with a raised moulded heel portion as 37 which is, as in the modification shown in Fig. 1, similarly recessed along a reversely curved edge 38. The highest point as 39 occurs at the inner border 40 and the raised formation tapers downwardly to the normal thickness of the sole as at point 41 and in the direction of the outer border 42.

In Fig. 12 there has been shown a separate arch element 43 which is made of some resilient material such as sponge rubber and which is constructed with a reversely curved edge 44 coincident in formation with the edge 38. This element 43 is adapted to be abutted against edge 38 on sole 36 and is similarly skived or otherwise thinned down to a feather edge with the highest point oc-

curring at the inner border 40 and receding towards the outer border 42. The height of this element at the point 39 will exceed the height of the portion 37 at this point as was the case before.

Figures 15, 16, and 17 further illustrate the application of this modification of the combination sole and arch support to an inner sole and a complete sole 45 as described with the first modification. In either case the element 43 will be separately secured to the combination member by some desirable means as by utilizing an adhesive.

There are several advantages from using these alternative combination structures. In one case the resiliency of rubber is made use of and in the other the greater desirability of some less resilient material such as leather for contact with the foot may be realized. With both modifications a cheaper and more durable construction is possible the application of which may range over any type of footwear.

Having thus described my invention, what I claim is:

1. A combination sole and arch support member comprising a sole having a moulded raised portion located on its upper side and forming a part of said arch support structure, said raised portion recessed from the inner border towards the outer border of said sole to form a reversely curved edge thinned to converge with the normal thickness of the said sole, a separate arch element located on said sole and coincidently abutting said reversely curved edge, and said mounted arch portion and said separate arch portion being of unequal heights and resiliencies with the greatest point of difference occurring at the inner border of said sole and tapering downwardly towards the said outer border.

2. A combination sole and arch support member comprising an inner sole having a moulded raised portion located on its upper side, said raised portion recessed at its rear from the inner border towards the outer border to form a reversely curved edge skived to converge with the normal thickness of the said inner sole, a non-resilient heel element located on said inner sole and coincidently abutting said reversely curved edge, said raised portion being substantially higher than the heel element with the greatest point of difference occurring at the inner border of said inner sole and tapering downwardly towards said outer border, said inner sole being adapted to present a resilient surface to the exact sensitivity area of the plantafascia tendon of a foot located thereon.

3. A combination sole and arch support construction for tennis shoes comprising a tennis shoe sole provided with a raised portion on its upper side, said raised portion having a high point adjacent the inner border of said sole and skived outwardly therefrom to merge with the normal thickness of said sole, and a hard element located on said sole, said raised portion recessed at its rear to form a reversely curved edge skived from the inner border outwards, and said hard element coincidently skived and abutted against said reversely curved edge.

4. In a resilient inner sole member recessed at its rear to form a reversely curved edge skived from the inner border outwards, a heel element, being formed from a material substantially less resilient than that comprising said inner sole, and coincidently skived and abutted against said reversely curved edge, said heel element having a vertical dimension less than that of the reversely curved edge portion of the inner sole member.

5. A resilient inner sole member recessed at its rear to form a reversely curved edge skived from the inner border outwards, said reversely curved edge adapted to border upon the plantafascia sensitivity area of a foot located upon said sole, the heel portion of said sole having a thickness less than the thickness of the reversely curved edge portion of the inner sole.

6. A combination sole and arch support construction for shoes and the like comprising a resilient sole raised at its rear to form a reversely curved edge skived from the inner border outwards, a heel element being formed from a material substantially less resilient than that comprising said inner sole, and coincidently skived and abutted against said reversely curved edge, said heel element having a thickness less than that of the reversely curved edge portion of the said inner sole.

7. A combination sole and arch support construction for shoes and the like comprising a relatively non-resilient sole raised at its rear to form a reversely curved edge skived from the inner border outwards, a resilient arch element, being formed from a material substantially more resilient than that comprising said inner sole and coincidently skived and abutted against said reversely curved edge, said arch element having a thickness greater than that of the reversely curved edge portion of the said sole at its highest point.

8. An improved sole arch support for shoes comprising a relatively non-resilient base formed with a rear raised portion skived outwardly towards the outer border, the front of said raised portion recessed to provide a reversely curved edge diminishing towards the outer border, and a resilient element coincidentally abutted against said reversely curved edge and similarly skived outwardly, the said resilient element having a vertical thickness greater than that of the said raised portion.

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