

April 25, 1944.

M. MARGOLIN

2,347,207

VENTILATED INSOLE

Filed Nov. 22, 1940

2 Sheets-Sheet 1

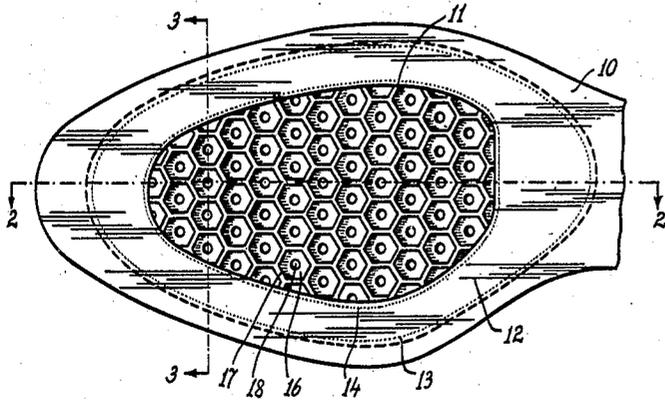


Fig. 1

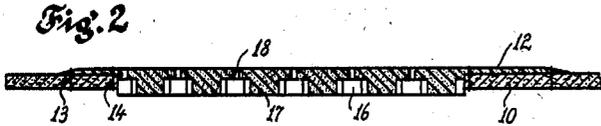


Fig. 2



Fig. 3

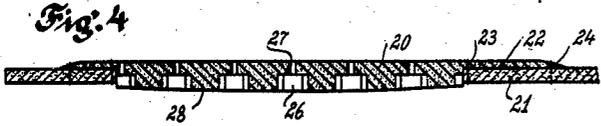


Fig. 4

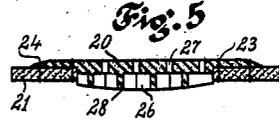


Fig. 5

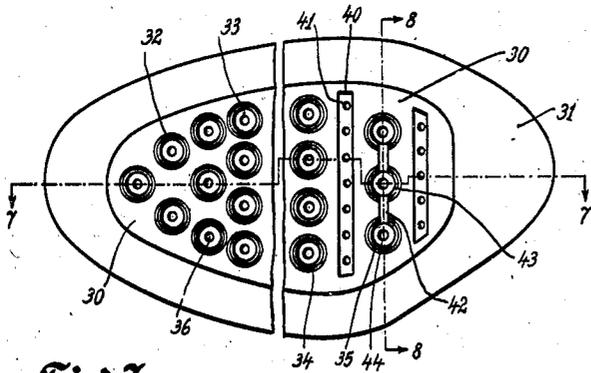


Fig. 6

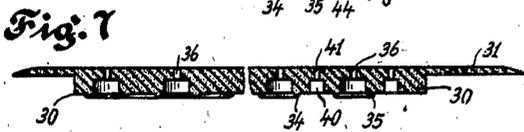


Fig. 7

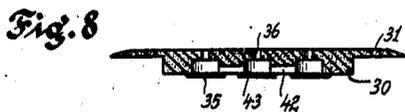


Fig. 8

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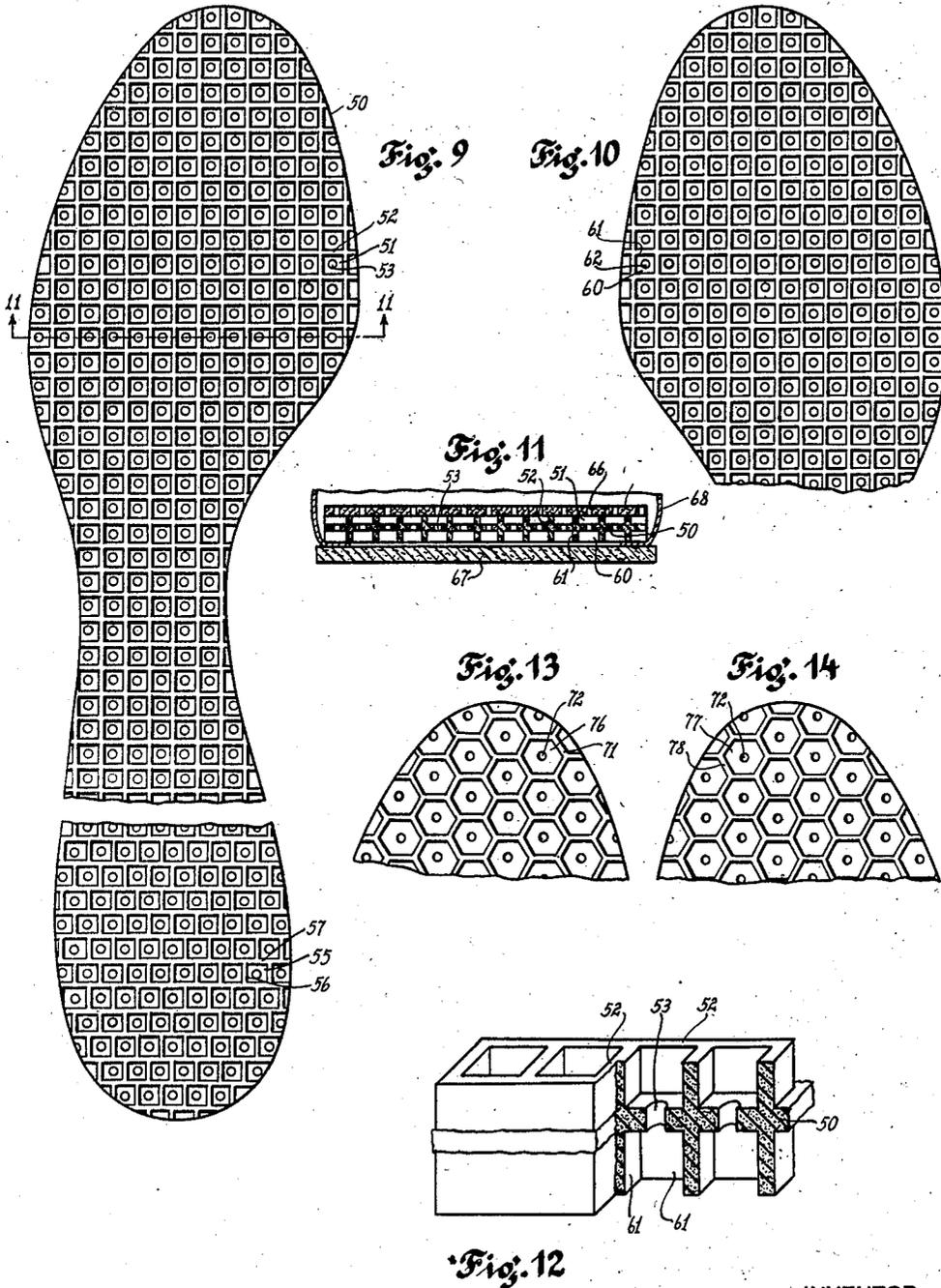
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2 Sheets-Sheet 2



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2,347,207

VENTILATED INSOLE

Meyer Margolin, Elgin, Ill.

Application November 22, 1940, Serial No. 366,574

2 Claims. (Cl. 36—3)

My invention relates to a novel insole construction and more particularly my invention relates to an insole with a resilient insert secured therein, the resilient insert being of such form as to provide increased resilience, forced breathing and at the same time being characterized by lightness of weight.

In my prior Patents Nos. 2,153,021, 2,207,632 and 2,307,416 and my applications Ser. No. 257,351 and Ser. No. 306,778, I have set forth certain constructions in which I secure a resilient insert to an insole having an opening, the insert carrying a lap which extends over and is secured to that portion of the insole which is adjacent the opening therein. As pointed out in the above applications and patents, it is the purpose of my construction to provide for forced breathing effects within the shoe, e. g. it is desired that an air pumping action be provided by the insert construction so that air is forced into the foot area of the shoe. It is further desirable that the insert be such as to provide increased resilience for the ball of the foot to provide for increased comfort.

I have found that weight is a factor of great importance in these constructions and according to the invention which I shall presently describe, I have succeeded in obtaining the desirable results of resilience, forced breathing effects and at the same time I have achieved a lightness of weight hitherto unobtainable in inserts having these characteristics.

According to the present invention I provide an insert formed of resilient material such as rubber, either in the form of expanded closed cell rubber or expanded open celled rubber or sponge rubber. I preferably mold this resilient insert in such form that it has a thin peripheral lap adapted to extend over and be secured to a portion of the insole adjacent the opening in which the insert is adapted to be fitted, and I so mold the thicker body portion of the insert that it is in the form of a series of hexagonal cavities generally resembling a honeycomb in such form that the main body of the insert is, in effect, a multiplicity of integrally formed cavities adapted to be compressed in the act of walking so that air is forced therefrom through a suitable opening which leads from such cavities into the foot area of the shoe which, of course, lies directly above the insole. This construction is distinguished by the fact that there is a minimum of solid material and a maximum of resilience and forced breathing structure in this particular insert formation. The characteristics and physical construction as well

as the operation and function of this novel insert construction will be more apparent from the specific description of my invention which is set forth hereinafter.

5 According to a modified form of my invention I may also provide an insert characterized by the same general lap construction and resilient material, but in the modified form of my invention the openings in the insert are substantially round and circular in shape and accordingly the insert is not as light as the construction above described. 10 However, I employ as many closely bordering circular openings as possible and although I do not achieve the extreme lightness of the honeycomb construction described above, nevertheless this insert is stronger because of the greater amount of rubber between the various cells therein, and where extreme lightness is not an absolute factor as in heavy sport shoes and men's shoes, this construction has certain advantages because of its inherently stronger nature.

The circular cavities result in forced breathing and increased resilience for the insert, thus carrying out the functions of my novel construction.

25 It is the object of my invention to provide a novel resilient insert for an insert-insole construction for increased foot comfort.

30 It is a further object of my invention to provide a novel insert for an insole, the insert being characterized by a cavity construction on the underside thereof which is adapted to provide increased resilience and maximum forced breathing effects with a minimum of weight.

35 It is a further object of my invention to provide a novel insert for an insole, the insert having a thin peripherally extending lap and a thicker central portion, the thicker central portion comprising a multiplicity of adjacent and bordering polygonal cavities adapted to be compressed in walking by the ball of the foot.

40 It is a further object of my invention to provide a novel resilient insert comprising a thin peripherally extending lap adapted to be secured to an insole and a thicker central portion, the thicker central portion comprising a multiplicity of adjacent polygonal cavities which are connected to the foot interior by perforations extending through the central portion of the insert.

45 It is a further object of my invention to provide a novel resilient insert, the thicker central portion of which is made up of a multiplicity of substantially circular cavities which lie adjacent one another.

50 It is a further object of my invention to provide a novel resilient insert, the thicker central

portion of which is made up of a multiplicity of substantially circular cavities which lie adjacent one another, the cavities lying on the bottom portion of the thicker central area and having openings leading to the top of the insert.

It is a further object of my invention to provide a resilient insert having a thick central portion formed as above described, the thick central portion extending beyond the insole.

It is a further object of my invention to provide a resilient insert having a thick central portion formed as above described, the thick central portion extending beyond the insole, and being thicker than the combined thickness of the insole and the thin extending lap portion of the insert.

It is a further object of my invention to provide a resilient insert having a thick central portion formed as above described, the thicker central portion being rounded and with the greatest thickness in the central portion thereof to provide a ball cushion support or rounded shoe bottom effect.

These and further objects of my present invention will become apparent from a consideration of the drawings taken in connection with the description which here follows.

Figure 1 is a bottom view of an insole and the resilient insert of my invention which is secured within an opening in the insole.

Figure 2 is a cross section taken along the line 2—2 of Figure 1.

Figure 3 is a cross section taken along the line 3—3 of Figure 1.

Figure 4 is a cross section of a modified form of my invention which is characterized by the same honeycomb construction as that shown in Figure 1, the distinction lying in the rounded general shape given to the thicker central portion of the insert.

Figure 5 is a cross section across the modified form of my invention shown in Figure 4.

Figure 6 is a bottom view of an insole carrying an insert which is a still further modified form of my invention.

Figure 7 is a cross section taken along the line 7—7 of Figure 6.

Figure 8 is a cross section taken along the line 8—8 of Figure 6.

Figure 9 is a top view of a middle sole of my invention, the middle sole being broken away to show two different structural designs.

Figure 10 is a bottom view of the middle sole of my invention.

Figure 11 is a cross section along the line 11—11 of Figure 9.

Figure 12 is a perspective of a small broken away section of the middle sole of my invention.

Figure 13 is a top view of a portion of a modified form of the middle sole of my invention.

Figure 14 is a bottom view of the middle sole shown in Figure 13.

Referring now more specifically to the drawings, in Figure 1 I show an insole 10 which has an opening in the central portion thereof in which opening is disposed a resilient insert generally characterized as 11, which has a thin peripheral lap portion shown in dotted line 12 which lap portion extends over the adjacent portion of the insole 10 and is secured thereto by the stitching 13 and 14 shown in dotted line. The thicker central portion of the insert is characterized by a multiplicity of polygonal cavities 16 which in the specific example here shown are hexagonal in shape having six-sided walls

17, each of the cavities bordering upon one another, the walls 17 forming in each case a wall for a multiplicity of cavities. The thin walls, of course, may be integrally formed with the entire insert by a molding operation and the walls are characterized by a resilience so that they may be compressed by the weight of the body transmitted through the foot in walking. An opening 18 leads from the cavity 16 through the middle portion of the insert so that air which is compressed within the cavity 16 during the act of walking may be forced up into the interior of the shoe to provide foot comfort.

It is believed that it will be apparent that by reason of the physical construction here shown that a maximum of resilience and a maximum of forced breathing effects may be obtained. In the act of walking and the consequent flexing of the resilient insert the multiplicity of thin rubber walls 17 which characterize the underside of the resilient insert are flexed and hence the respective cavities 16 are ultimately compressed and expanded causing a general flow of air up through the openings 18 which provide for communication between the cavities and the shoe interior. By reason of the fact that each of the walls of the cavities acts as a wall for a multiplicity of cavities and, in general, because there is a minimum of solid structure the insert is characterized by exceedingly light weight, particularly in view of the thickness and bulk thereof and the forced breathing effects obtained by the construction.

Although I have shown the cavity 16 as being formed with a hexagonal wall 17 it is to be understood that it is within the scope of my invention to employ cavities of other shapes, including polygonal walled cavities and it is of particular importance to note that the respective cavities 16 border directly upon one another, utilizing a single thin wall for the cavities so that an insert of decreased weight may be obtained.

In Figures 2 and 3 I show a resilient insert of my invention in which the thick central portion is slightly thicker than and extends slightly beyond the insole 10.

In this form of my invention it will also be noted that the thicker central portion is of greater thickness than the combined thickness of the lap 12 and the insole 10. By an examination of Figures 2 and 3 it will be noted that in this form of my invention the thick central portion of the insert, although extending beyond the insole 10 is substantially flat.

In Figures 4 and 5 I show a modified form of my invention in which a resilient insert 20 is secured within an opening in an insole 21 by means of a lap 22 which is secured to the insole 21 by lines of stitching 23 and 24. The cavities 26 which are polygonal in shape similar to those shown in Figure 1 communicate with the interior of the shoe by means of the openings such as 27. It will be noted that the lower curvature of the insert which I have indicated as 28 is generally domed, the central portion thereof being thicker than the peripheral portions. This is particularly apparent from a consideration of Figure 5. In this case also the thicker central portion of the insert is of greater thickness than the insole and in the particular example here shown, the central portion of the insert is of greater thickness than the combined thickness of the lap 22 and the insole 21. By means of this construction I obtain a rounded shoe bottom effect which is desirable in women's shoes and I also may ob-

tain by this domed construction a ball cushion support which is a value even in men's shoes.

Referring now to Figure 6 I show a modified form of my invention comprising a resilient insert 30 secured within an insole 31, the resilient insert here being characterized by a multiplicity of adjacent cavities 32 and 33 positioned on the underside of the insert and having bosses such as 34 and 35. Openings 36 are provided for the passage of air to the interior of the shoe from the cavities 32 and 33 which are adapted to be compressed by the weight of the foot thereon.

I may additionally provide in this insert grooves 40 having openings 41 which lead from these grooves to the upper portion of the insert and I may also provide grooves 42 which connect the cavities 43 and 44. By the combination of the grooves and cavities I decrease the weight of the insert and at the same time I obtain the forced breathing effects by the flexure of the grooves and cavities and the compression thereof during the act of walking.

From these constructions above specifically described it will be understood that I have provided an improved form of my invention in which I obtain all the desirable results of forced breathing effects and resilience while at the same time avoiding the increase of weight of the insole which, of course, adds to the weight of the shoe.

Although I have set forth a specific description of the particular construction which I employ, it will be understood that certain variations may be made therein coming within the spirit of my invention and I intend to include such variations as will be apparent to those skilled in the art.

It is a particular feature of my invention that I may employ an increased number of forced breathing cavities while at the same time I obtain increased resilience and decreased weight.

In other words the novel construction affords a combination of desirable properties hitherto unobtainable in this art. The polygonal construction shown in Figure 1 is of particular importance because of the fact that the polygonal walls there shown are constantly flexed during the walking and hence the polygonal cavities are constantly compressed and decompressed to obtain the desired forced breathing effects.

The flexure in one area is generally communicated to other areas causing a general flexing of the cavities and hence forced breathing throughout the insert.

A particular feature of my invention as presently set forth is that I employ a resilient insert which is substantially entirely made up of cavities which account for the resilience and forced breathing effects I desire. The cavities are preferably adjacent and bordering on one another so as to employ common walls for the cavities as is shown in Figure 1, and in that modified form of my invention as shown in Figure 6, the cavities which are round are preferably positioned so close to one another that they are also substantially common walls. Although, as pointed out, if lightness is not the feature particularly desired, the cavities may be slightly spaced from one another in this construction of Figure 6.

The formations shown particularly in Figures 2, 3, 4 and 5 represent another feature of my invention in that the resilient insert is of greater thickness than the insole and has a thickness that extends beyond the width of the insole on each side. Thus, in use, when the foot compresses

the resilient insert any possible discomfort at that line where the insert meets the insole is eliminated. It is to be understood that the insole 10 and 21 respectively as shown in Figures 2 and 4, is generally formed of a relatively non-resilient material, and if the resilient insert 17 did not extend beyond the thickness of the insole, the foot would feel the joint between the insole and the insert.

Further, I have found in inserts of this type that by extending the thickness of the thick central portion of the insert beyond the surrounding insole on each side thereof that the stitching which in Figure 2 is denoted as 13 and 14 is subjected to less stress and strain and hence has a longer life. This is because the flexure between the insert and insole is diminished, the resilient insert absorbing a greater portion of the load imparted by the foot bearing thereon. If the resilient insert 17 did not extend below the plane of the insole on the lower side thereof, the compression of the resilient insert 17 by the foot would exert a strong pull on the line of stitching 13 or 14, particularly stitching 14, with the likelihood that this line of stitching would be the weakest point in this structure.

Although I have set forth my invention in connection with the use of the structure shown as a resilient insert for the forepart of the insole, it is to be understood that it is within the scope of my invention to extend this resilient insert substantially the length of the insole, the insole being cut out for such modification both in the forepart, heel and middle portion. Thus I can employ an insert extending substantially from toe to heel, an opening extending substantially throughout the length of said insole.

It is also within the purview of my invention to employ as a modified form, the resilient insert generally denoted as 11 in Figure 1, such insert being substantially of the length and size of the ordinary insole, the desired edge stiffness or edge strength in such modified form being imparted thereto by means of an edge binding such as is set forth in my application Serial No. 344,414 which has matured into Pat. No. 2,319,818.

In Figure 9 I show a middle sole generally denoted as 50 which comprises a multiplicity of cavities 51 which have the walls 52 and perforations 53. The walls 52 of the respective cavities act as walls for adjacent cavities as will be noted from an examination of this drawing. By means of this construction a middle sole of extreme lightness is obtained which is characterized by increased resilience and increased forced breathing effects. This is because the flexing and compression of the walls 52 is communicated to two cavities and at the same time communicated to adjacent walls causing flexing and compression of such walls and adjacent cavities.

In the lower part of the drawing which is broken away I show a modified structural design in which the cavities 55 are staggered with respect to one another, the walls 56 and 57, however, still taking the form of common walls for adjacent cavities.

In Figure 10 I show the reverse side of the middle sole shown in Figure 9. The structure will be more clearly apparent from a consideration of Figure 11 in which I show the middle sole 50, positioned between an insole 65 and the outsole 67, having perforations 66 to permit the flow of air from the cavities 51 and 60. The middle sole 50 is positioned between the inner sole 65 and the outsole 67. The relative position of the

upper 68 in the shoe construction is illustrated. From Figure 11 it will be apparent that upon the flexing of the middle sole during the act of walking, the respective cavities 51 and 60 will be alternately compressed and decompressed causing the flow of air therefrom and the tension and stresses on the respective walls 52 and 61 of the cavities will be transmitted to adjacent walls and adjacent cavities.

In Figure 12 I show a section of the middle sole to more clearly illustrate the structure thereof, and like numbers here correspond to like numbers in Figures 9, 10 and 11.

In Figures 13 and 14 I show cavities 70 made up of hexagonal walls 71 and having perforations 72 located in such cavities to provide the communication of air from the cavities to the shoe interior. In the reverse side of the middle sole shown in Figure 14 I show cavities 77 having walls 78 and perforations or openings 72 extending therethrough.

According to the constructions here shown, therefore, I have set forth certain middle sole and insole constructions characterized by extreme lightness in weight and possessed of increased resilience and forced breathing effect for foot comfort. A minimum of solid material is used with a maximum of resilience and breathing spaces, and means are provided for causing trans-

mission of the stresses in the respective cavity walls throughout the shoe insole and middle sole.

I claim:

- 5 1. In combination an insole and a resilient insert, said insert comprising a thick central portion and a peripheral lap extending over said insole, and means for securing said lap to said insole, said insert having cavities on its under-
- 10 side, adjacent cavities having relatively thin common walls, said cavities being polygonal in shape, said walls comprising resilient material, and openings leading from said cavities to the upper side of said insert, said thick central portion extending beyond the plane of said insole.
- 15 2. In combination an insole and a resilient insert, said insert comprising a thick central portion and a peripheral lap extending over said insole, and means for securing said lap to said in-
- 20 sole, said insert having cavities on its underside, adjacent cavities having common walls, said cavities being polygonal in shape, said walls comprising resilient rubber like material, and openings leading from said cavities to the upper side
- 25 of said insert, said thick central portion extending beyond the plane of said insole, said central portion having its greatest thickness at substantially its center.

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