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FOOTWEAR

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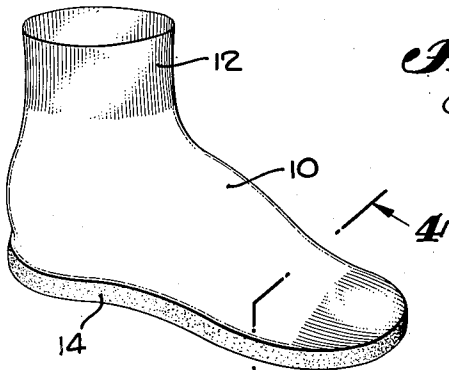


Fig. 1.

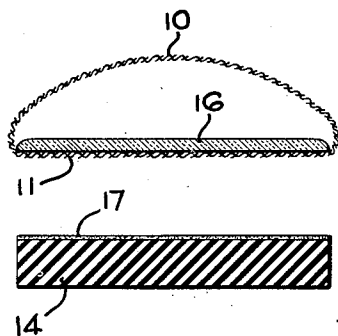


Fig. 2.

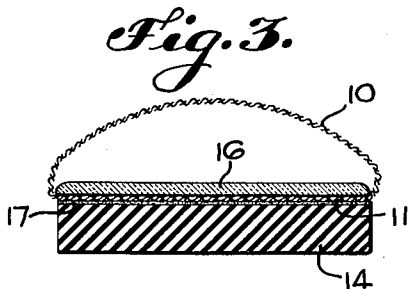


Fig. 3.

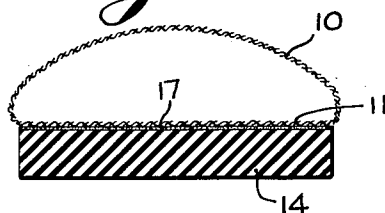


Fig. 4.

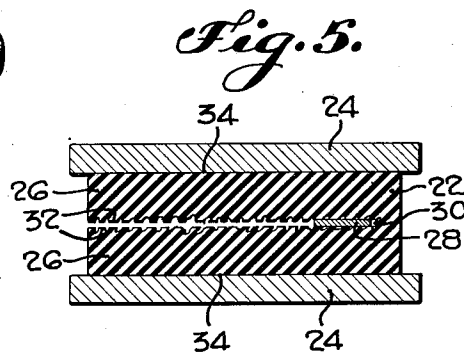


Fig. 5.

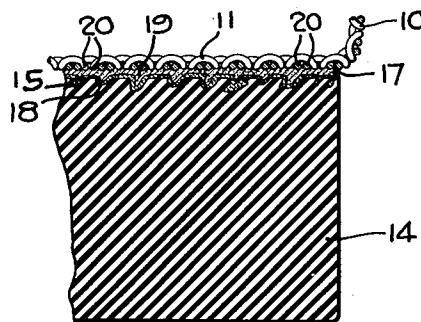


Fig. 6.

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FOOTWEAR

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4 Claims. (Cl. 36-9)

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This application is a continuation in part of my application Serial Number 37,772, filed July 9, 1948, now abandoned.

This invention relates to an improved article of footwear and to a method for producing same.

An object of this invention is to provide an article of footwear which includes only two members, a sole member and an upper member, cemented together.

Another object of this invention is to provide an article of footwear including a sole member and a fabric upper member combined so that the foot of the wearer contacts only the inside of the fabric upper member when the article of footwear is being worn.

Another object is to provide an article of footwear including a sole member and a fabric upper member combined in such a way that the said upper member, unaltered in any way, rises from said sole member so that the juncture of said upper member and said sole is substantially even all the way around the sole, lying substantially flush with the periphery of said sole.

Another object is to provide an article of footwear comprising an ordinary knitted sock which is cemented onto a washable sponge or foam rubber sole, whereby said footwear can be easily washed as often as desired, thus keeping the footwear clean.

Another object is to provide a handsome, economical article of footwear which is suitable for use as a home slipper, beach slipper, sports slipper, or for any other indoor or outdoor wear.

Another object of this invention is to provide a method for cementing together the sock and the sole member of an article of footwear of the character described without the necessity of providing an insole or of altering the construction of the sock in any way and in which the cement permeates the bottom of the sock slightly, but not sufficiently to go all the way through, thereby avoiding discomfort to the wearer.

A further object of this invention is to provide a method for joining together the sock and the sole member of an article of footwear of the character described which features the application of cement to the sole member only, and not to the sock, which makes the process a very simple and inexpensive one.

Other objects and advantages of this invention will be apparent from the following description and appended claims.

In the accompanying drawings, forming a part of the present specification,

Figure 1 is a perspective view of my footwear.

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Figure 2 is a transverse sectional view showing the sock and an enclosed pattern in position for application of the sock to the sole.

Figure 3 is a view similar to Figure 2 showing the sock and an enclosed pattern in position against the sole for the application of pressure to seal the sock and sole together.

Figure 4 is a transverse sectional view taken in the direction of the arrows along the line 4-4 of Figure 1.

Figure 5 is an enlarged sectional view showing one step in my preferred method of producing a sole member having a porous upper surface.

Figure 6 is an enlarged section showing the relationship between the loops of the fabric of the sole portion of the upper member, the porous surface of the sole member, and the cement which binds the two together.

Referring to the drawings, my article of footwear comprises an upper member 10 having a fabric sole portion 11, and a sole member 14, which two members are attached by means of cement 17. In the preferred embodiment of my invention, cement 17 comprises a layer of solvent type cement 18 and a layer of latex type cement 19. The upper member is an ordinary knitted sock, unaltered in any way, and may be made of cotton, wool, nylon, or any other suitable material. Although the sock preferably includes an elastic top section 12 or a turned down cuff to firmly secure the footwear to the foot by binding about the ankle, the said elastic top section or turned down cuff is not necessary for proper functioning of the footwear.

The sole member 14 is cut to substantially conform to the bottom of the foot of the wearer, and is composed of a cushiony, washable material such as natural or synthetic sponge rubber or foam rubber.

Some of the advantages of using natural or synthetic sponge rubber over using foam rubber, or any other type of material which might be suitable for use in the sole member 14 are that the sponge rubber has good wearing qualities throughout, and it is very flexible and elastic.

The comparable flexibility and stretchability of the sole portion 11 of the upper member 10 and the sole member 14, when such sole member is made of natural or synthetic sponge rubber, is an important factor in effecting the comfort and durability of my article of footwear. This flexibility and stretchability provides comfort to the wearer by enabling the bottom of the upper member 10 and the sole member 14 to both substantially conform to the contour of the bottom of

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the foot of the wearer at all times, regardless of the nature of the activity of the wearer, whether it be mere walking, twisting and turning, or some strenuous athletic activity.

The effect of this flexibility and stretchability on the durability of my product can be seen by comparing it with a shoe made by combining a rigid sole member and a knitted upper member, wherein any undue or continued stress on the upper member of the footwear without a flexing or stretching of the sole portion might tear the upper member.

Further advantages of the use of sponge rubber in the sole member 14 are that it is readily washable, and that it supplies a certain amount of support to the arch.

My preferred method of combining an ordinary knitted sock and a sole member generally conforming to the bottom of the foot of the wearer to produce my article of footwear, is to first completely cover the upper surface of the sole member with a solvent type of cement 18. The upper surface of sole member 14, when the latter is made of sponge rubber, is of a rough and porous texture. The solvent type of cement is brushed or sprayed onto the upper surface of the sole member so that the surface pores 15 are filled with the solvent type of cement 18 as best shown in Figure 6. This solvent type of cement contains rubber, either natural or synthetic rubber being satisfactory when the sole member 14 is made of either natural or synthetic sponge or foam rubber, but natural rubber being preferable in the cement when the sole member is made of natural sponge or foam rubber.

While the solvent type of rubber cement 18 is still wet, a coating of latex type of rubber cement 19 is applied on top of the solvent type of rubber cement 18, as illustrated in Figure 6, so as to form the complete covering of cement 17. Then the sole portion of the upper member is applied to the top of the second coating of cement while the latter is still wet. It is very important to note here that no cement is applied to the upper member itself before it is applied to the top of the second coating of cement on the sole and that the upper member is clean and dry when applied. An advantage of applying the cements 18 and 19 to the sole member only and not to the sole portion of the upper member is that the manufacturing process is made much simpler. It is much easier to achieve a neat, even juncture between the edge of the sole member and the sole portion of the upper member without any cement being spread onto the upper portion of the sock, if it is not necessary to directly apply any cement to the bottom of the sock during the manufacturing process.

Another reason why my method is simpler is that it is very difficult, if not impossible, to spread a layer of wet cement evenly on the bottom of a sock without penetrating beyond the lower loops of the knitted fabric of the bottom of the upper member.

Still another reason that my method is simpler is that it is easier to spread two layers of cement, one solvent, the other latex, on the sole member than it would be to spread the two layers of cement on the sock or to spread one layer on the sole member and the other on the sock member and then make the two opposed wet cement surfaces match properly and dry in the correct relative relation to each other.

Before the sock is applied to the cement on the upper surface of the sole, a pattern, 16 is

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inserted in the sock and applied to the inside of the sole portion of the sock. The pattern 16 can be made of plastic, wood, or any other suitable material, and conforms to the sole member 14, with the possible exception of the instep, whereby the operator can make the sock fit evenly against the sole when applying the sock to the sole, thus providing a clean, even outside junction between the sock and the sole in the finished product.

At the time that the sock, with the pattern 16 inside, is applied to the sole, which has the two coatings of different kinds of cement on it, the operator manually exerts sufficient pressure (preferably fifty pounds or over, which may be measured by having the sole rest on a suitable scale when the pressure is applied) for a short period of time (preferably from 30 to 60 seconds) to cause the pores 15 in the rough upper surface of the sole member 14 to contract somewhat whereby some of the cement contained in these pores is squeezed out and rendered available to increase the amount of cement which engages the bottom of the sock 10.

This initial pressure is also sufficient to cause the cement to permeate only the fibers of the outwardly extending loops of the fabric of the sock 10, as best seen in Figure 6. This leaves the inwardly extending loops completely free of any cement, and renders the article of footwear more comfortable for the wearer. The amount of cement and initial pressure used is governed by the absorbency and thickness of the material in the sock and varies according to the quality and character of the material. For example, it takes less cement for a thin sock than it does for a heavy wool sock. In any event, no more cement or pressure is used than is necessary to cause the cement to permeate the fibers of the outwardly extending loops of the material of which the sock 10 is composed.

After the sock has been applied to the sole with this slight pressure, preferably using a wooden or lightweight metal pressing block (not shown) preferably with a sponge or soft bottom to assure uniformity of pressure, with the block resting on the sock, the cement may be allowed to partially set. The length of time it is preferred to let the cement so set depends on the humidity and temperature, but it is preferably less than two hours. It is allowed to dry until the cement has become somewhat coagulated but it is still wet and soft enough to be pressable.

Then the sock and its attached sole are subjected to great pressure, with or without the pattern in the sock, preferably from three to four hundred pounds per square inch. This pressure may be applied by running the sock and attached sole, with or without the pattern 16, through an apparatus similar to an ordinary clothes wringer. The preliminary slight pressure causes the cement to permeate vertically the desired distance into the fibers of the outwardly extending loops of the sock material, and the much greater pressure which is later applied makes the cement spread substantially laterally through the fibers of the outwardly extending loops of the fabric so that the cement firmly grips and holds the fibers of the outwardly extending loops. The pattern 16, is then removed, if it has not been previously removed, and the cement is permitted to dry without any pressure, the preferred drying time being about twenty-four hours, resulting in the finished article of footwear.

Looking at Figure 6, we see that this process for manufacturing my article of footwear provides an exceptionally strong and practical bond between the sole member 14 and the upper member 10. The rough, porous surface of the sole member 14 not only gives the cement a much greater gripping surface area than there would be on a smooth surface, but it also allows the cement to get behind the irregularities of the porous surface, and to thus form a lock to further increase the strength of the cement bond. The bottom of the sock is firmly gripped by the cement which has permeated the outwardly extending loops of the fabric, and yet no signs of cement appear on the inwardly extending loops of the fabric, so that the fullest comfort of the soft, sock material is retained.

An alternative manufacturing process can be used for certain types of sole materials which includes the use of the steps outlined in the preferred process with the exception that either a solvent type of cement 18 or a latex type of cement 19 is used alone without the use of the other type of cement.

The preferred method for producing the sole member 14 when the latter is made from natural or synthetic sponge rubber is illustrated in Figure 5. This process enables the rapid, efficient production of a sole member which is of the proper rough, porous texture on one side, but which is nevertheless smooth and attractive on the side which is exposed on the finished article. Sponge rubber stock has a "skin" on all outer surfaces caused by the molding process in its manufacture. Cement will not adhere satisfactorily to this skin, and therefore the skin must be removed and the surface made suitably rough in some way before the cement is applied. My preferred method for accomplishing this is to commence with a flat sheet of sponge rubber stock 22 which is substantially twice the thickness of a finished sole member 14, and to clamp or manually hold this stock between flat plates 24 composed of wood, metal, or other suitable material. The stock 22 is then split into two flat pieces 26 of equal thickness by a bandsaw 28, which preferably has rather coarse teeth 30 so that the cut surface 32 of each of the sheets 26 will be of sufficiently rough texture. A number of sole members 14 are cut out of each of the sheets 26, and each of these sole members 14 is secured to the bottom of a sock 10 by the process heretofore described, so that the surface 32 of the sponge rubber sheet contacts the sock, and the neat, smooth "skin" of the sponge rubber remains exposed so that it will contact the ground when the footwear is worn.

A most distinctive novelty of my process resides in the fact that the cement is applied to the sole member only, so that the cement permeates only the outwardly extending loops 20 of the fabric of the upper member 10, but does not go all the way through the material. In this way the inner surface of the sock retains its soft texture. Hence, the footwear does not need or use an insole such as is found in prior art devices. The saleability of this product depends to a great extent on this feature, as an insole is quite undesirable in most uses for which this footwear is designed. For example, in use as a home slipper, the soft, cushiony effect of having only a sock between the sponge rubber sole portion and the foot is certainly more desirable than having the usual hard, and often insecure insole between the sock and the foot. As a fur-

ther example, in sports or beach use, my footwear can be kept clean by washing as frequently as desired, whereas it is very difficult to keep any kind of footwear possessing an insole properly cleaned under such use.

This method of joining together the sock and the sole produces a bond between the two which is generally stronger than the sock material. There is no alteration of the construction of the sock, which is left clean and devoid of any cement stains inside and around the edge on the outside where the sole is applied. Also, the sock and sole have a very smooth, even line of joining all the way around the periphery of the sole, making it a uniform and attractive product.

The handsomeness and utility of my product, combined with the low cost made possible by the relatively simple process used in its production, make my article of footwear highly saleable.

It is to be understood that the form of my invention herein shown and described is my preferred embodiment and that various changes in the shape, size, arrangement of parts and method of manufacture may be resorted to without departing from the spirit of my invention, or the scope of the appended claims.

In the following claims the term "cellular rubber" is intended to include both sponge rubber and foam rubber, whether natural or synthetic and the term "rubber" includes both natural and synthetic rubber.

I claim:

1. An article of footwear comprising a stretchable cellular rubber sole member and a knitted sock having a knitted sole portion with inwardly and outwardly extending loops, one surface of said stretchable sole member being uniformly joined to the substantially similarly stretchable knitted sole portion of said sock by a cement bond which grips only said outwardly extending loops, the inwardly extending loops of the knitted sole portion of said sock being substantially free from cement and being exposed for direct contact with the foot of the wearer, whereby said sole member and said sole portion of said sock will stretch together substantially the same amount when the wearer walks in said shoe.

2. An article of footwear comprising a cellular rubber sole member having a porous upper surface, a knitted sock having a knitted sole portion with inwardly and outwardly extending loops and a rubber cement bond which grips only said outwardly extending loops and which also penetrates into and fills the holes in said porous surface, the inwardly extending loops of the knitted sole portion of said sock being substantially free from cement and being exposed for direct contact with the foot of the wearer.

3. The method of manufacturing an article of footwear which includes the steps of covering the porous upper surface of a cellular rubber sole member with a solvent type cement which includes rubber among its ingredients, applying a coating of latex type cement which includes rubber among its ingredients on top of the solvent type rubber cement while the latter is still wet and then applying the clean, dry, knitted sole portion of a knitted sock to the top of the coating of latex type rubber cement while the latter is still wet.

4. The method of manufacturing an article of footwear which includes the steps of covering the porous upper surface of a cellular rubber sole member with a cement which includes rubber among its ingredients, inserting a pattern into

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a knitted sock having a knitted sole portion which includes outwardly and inwardly extending loops, applying only said outwardly extending loops of said knitted sole portion to the top of said cement while the latter is still wet, applying sufficient pressure to said rubber sole member and said knitted sole portion through said pattern to cause said cement to penetrate into only said outwardly extending loops of said knitted sole portion, permitting said cement to partially dry, until the cement has become somewhat coagulated but the cement is still wet and soft enough to be pressable, thereafter applying sufficiently greater pressure to said rubber sole member and said knitted sole portion to cause said cement to spread laterally through said

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outwardly extending loops of said knitted sole portion of said sock and then permitting the said cement to completely dry.

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