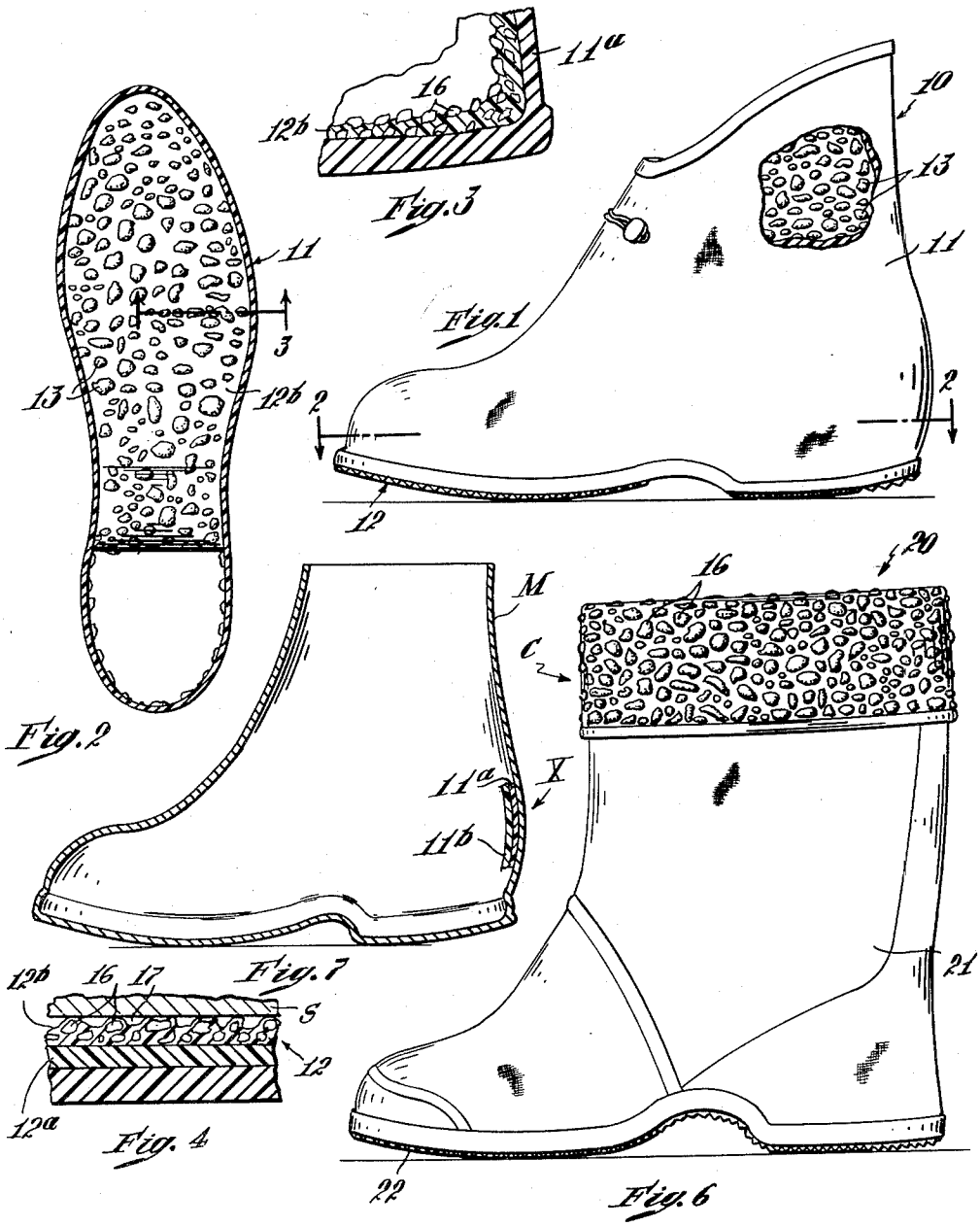
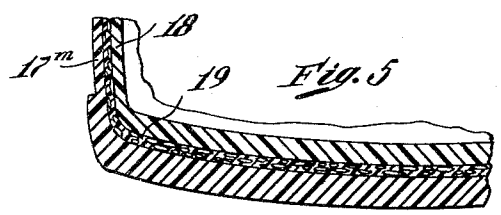
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INSULATING AND VENTILATING FOOTWEAR

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INSULATING AND VENTILATING FOOTWEAR

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This invention pertains to footwear, more especially to waterproof footwear, for example, but without limitation, to footwear, such as shoes, bootees, overshoes, all of which are included (except as otherwise designated) in the following description under the general term "shoe," made in part, at least, from a synthetic plastic resinous material, for example, and for instance, by a slush-molding or equivalent procedure.

An object of the present invention is to provide a novel boot or shoe of the above type which, without recourse to the provision of an independent lining of textile or similar insulating material, has good insulating properties, although made at a cost which does not greatly exceed that involved in the manufacture of uninsulated footwear of this kind.

Another object is to provide a novel overshoe or bootee whose inner surface is of a character such as to make possible the circulation of air between the wearer's shoe and the material of the boot, thereby additionally providing for ventilation and minimizing discomfort from overheat which is a common fault of impervious waterproof boots and shoes.

A further object is to provide a novel boot or shoe whose exterior surface may be of a texture and appearance such as customarily results from the manufacture of a boot by the use of a hollow mold, but whose inner surface has projecting therefrom, in irregular distribution, a multitude of hollow hillocks or blisters of various size and shape, said hillocks collectively, by contact with the wearer's shoe (or foot, if the shoe of the present invention be worn on the unshod foot), spacing the intervening surface from the shoe or foot and thus providing for air circulation.

A further object is to provide a waterproof boot having an outer layer of synthetic plastic which is of substantially uniform texture and appearance, and an inner layer integrally bonded to the outer layer and which consists of a synthetic plastic which, when cured, is harder than that which forms the outer layer and from whose inner surface project a multitude of irregularly distributed hillocks whose summits provide spaced points of contact with a shoe with which the boot is worn.

Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings, wherein:

FIG. 1 is a diagrammatic side elevation of an overshoe made in accordance with the present invention;

FIG. 2 is a horizontal section to smaller scale than FIG. 1, substantially on the line **2**—**2** of FIG. 1, showing the appearance of the upper surface of the sole of the shoe;

FIG. 3 is a fragmentary section, to larger scale, substantially on the line **3**—**3** of FIG. 2, illustrative of the structure of the sole and side wall of the boot;

FIG. 4 is a fragmentary section in the same plane as that of FIG. 3, but to larger scale, and showing a portion of the sole of a shoe over which the overshoe is worn;

FIG. 5 is a section similar to FIG. 3, but illustrating a slight modification;

FIG. 6 is a diagrammatic side elevation of a bootee made in accordance with the present invention and having its upper turned down to form a cuff which exhibits the appearance of the inner surface of the upper; and

FIG. 7 is a diagrammatic vertical, front-to-rear section through a conventional boot mold, illustrative of certain steps of the process of the present invention.

Referring to the drawings, the numeral **10** (FIG. 1) designates an overshoe which, in general, may be of conventional appearance and which includes the upper **11** and the sole **12**. If this shoe is to be made of plastic by the slush-molding method, a hollow mold M (FIG. 7) may be employed, and the first step in the process of preparing the overshoe would be to fill the mold with a fluid plastic so chosen, from those available on the market, that, when cured, it becomes tough but flexible. The mold is so treated as, for example, by heating it, as to cause a layer **11***a* (FIG. 7) of this plastic to gel in contact with the interior surface of the mold, and when a suitable thickness of this material has thus gelled, the remaining fluid will be removed from the mold cavity. This first layer **11***a* may, if desired, be cured, although it is preferable, in accordance with the present invention, merely to permit this layer to dry, but so that it remains tacky. The mold is then filled with a fluid plastic containing a blowing agent of any customary type, for example, one having the general characteristics of those employed in the manufacture of sponge rubber or the like and capable of producing bubbles of the desired size. After a suitable thickness of this plastic has gelled to form the layer **11***b* (FIG. 7), the remaining fluid is withdrawn from the mold and the mold is then subjected to sufficient heat, completely to cure both layers **11***a* and **11***b* and, at the same time, activate the blowing agent so that the inner layer **11***b* develops a multitude of gas filled bubbles **13** of various sizes and shapes. Those bubbles which lie near the exposed surface of the layer **11***b* will project outwardly from said surface, forming hollow hillocks **16** (FIG. 3) which are readily perceptible, visually, as illustrated in FIGS. 1 and 2 and whose crests are spaced from each other so that the exposed inside surface of the upper is irregular with valleys intervening between the crests of the hillocks.

If the shoe be made by the slush-molding method as above suggested, the sole **12** will be of the same general construction as the upper, comprising outer and inner layers **12***a* and **12***b* (FIG. 4), the inner layer being characterized by the inclusion of a large number of gas filled cavities, or bubbles, with those bubbles which are near the upper surface of the sole expanding outwardly to form hollow hillocks such as above described.

As may be noted from inspection of the drawings, for example FIGS. 1 and 2, a large percentage of the blisters or hillocks are of a maximum dimension substantially exceeding the thickness of the outer wall **11***a* and of such height, as illustrated, for example, in FIG. 4, that when subjected to pressure against the shoe of the wearer, spaces or valleys are provided between them of effective depth for the circulation of air.

While a synthetic plastic may be used for making the overshoe in the manner above described, it is contemplated that other resinous materials may be employed for the purpose, providing such resinous materials, when cured or set, have the desired characteristics to form the wall of the shoe.

A shoe thus constructed has pronounced insulating characteristics by reason of the multitude of gas filled cavities or bubbles within its inner layer. However, by following the procedure above described, the outer surface of the shoe will have the contour and texture resultant from the use of the hollow mold, such contour and texture being conventional, if desired, so that the shoe does differ in appearance from shoes made by customary procedures. It may further be understood that while the slush-molding method provides a simple and inexpensive procedure for the manufacture of a waterproof shoe or

overshoe, the invention contemplates the manufacture of the shoe by other procedures, providing, however, that the shoe comprises a layer of waterproof material which is characterized by the presence of a large number of gas filled cavities.

Not only does the boot or shoe, made in accordance with the above-described procedure, have insulating characteristics by reason of the inclusion of a multitude of gas filled cavities, but it has additional insulating value because of the fact that when this overshoe is worn over an ordinary shoe, the projecting hollow hillocks at the inner surface of the overshoe act to space the inner surface proper of the overshoe from the surface of the shoe with which it is worn. Thus, as illustrated, for example in FIG. 4, which is a diagrammatic enlarged vertical section through the bottom of the overshoe, the sole S of a leather shoe is shown as resting upon the upper surface of the sole **12** of the overshoe, and it will be noted that the valleys **17**, between the hillocks **16**, permit the circulation of air between the overshoe and the shoe, thus helping to prevent uncomfortable heating of the boot.

In other words, the area of contact between the shoe and overshoe is reduced to the sum of the areas of the summits of the blisters or hillocks of greatest height, thus leaving room for air to move between the surface of the shoe and the inner surface of the overshoe.

While the above description has been directed more particularly to an overshoe to be worn over another shoe, it is contemplated that some of the advantages of the invention will be attained when the method described is employed in the manufacture of a waterproof shoe which is to be worn directly over the foot and, in such case, the presence of the ventilating spaces **17** is of a special importance.

In FIG. 6 a bootee **20** is illustrated having the upper **21** and the sole **22**, it being understood that the interior layer of this bootee is like the layer **11***b* above described, in that it contains a multitude of gas filled bubbles, those which are close to the inner surface protruding to form hollow spaced hillocks **16**. The bootee, as shown in FIG. 6, has its upper turned down to form the cuff C, and because of the distinctive character imparted by the projecting hillocks **16**, the bootee is thus given an ornamental effect.

When the effect produced by the projection of the blisters or bubbles is not of particular importance, insulation may be obtained, together with a smooth interior surface, as illustrated in FIG. 5, wherein the outer layer **17***m* and the inner layer **18** may be of conventional material devoid of included cavities, but with an interposed layer **19** between them which is filled with minute gas filled cavities. This interior layer provides insulation, but with this arrangement the appearance of the shoe or overshoe is conventional both externally and internally but the advantage of air circulation between the overshoe and foot is thereby sacrificed.

While certain desirable embodiments of the invention and certain desirable procedures in the manufacture of the improved shoe have herein been described by way of example, it is to be understood that the invention is broadly inclusive of any and all modifications, both of materials and procedures, which fall within the scope of the appended claim.

I claim:

An overshoe comprising a seamless, impervious outer wall of cured plastic which is flexible, tough and homogeneous and whose outer surface accurately reproduces the contours of the mold in which the plastic was molded, said overshoe also comprising an integral, seamless inner wall intimately conforming to the inner surface configuration of said outer wall in which said inner wall was molded, and wherein, to provide for the movement of air between the inner surface of the inner wall and the outer surface of the shoe with which the overshoe is worn, the inner wall has projecting from its inner surface a multitude of isolated blisters or hollow hillocks, the effect of which is that the area of contact between the overshoe and the shoe is reduced substantially to the sum of the areas of the summits of said blisters or hillocks, said blisters or hillocks being of irregular shape and constituting the outwardly projecting parts of bubbles such as result from the curing of a plastic containing a blowing agent, a large percentage of said blisters or hillocks being of a maximum dimension substantially exceeding the thickness of said outer wall and of a height such as to provide spaces or valleys between them of effective depth for the circulation of air, the material of said inner wall being harder than that of the outer wall and effective to prevent crushing of said blisters or hillocks in response to the pressure of the shoe thereagainst.

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