May 22, 1956 H. S. HEILBRONNER 2,746,054

GARMENT CONSTRUCTION

Filed June 5, 1952 2 Sheets-Sheet 1

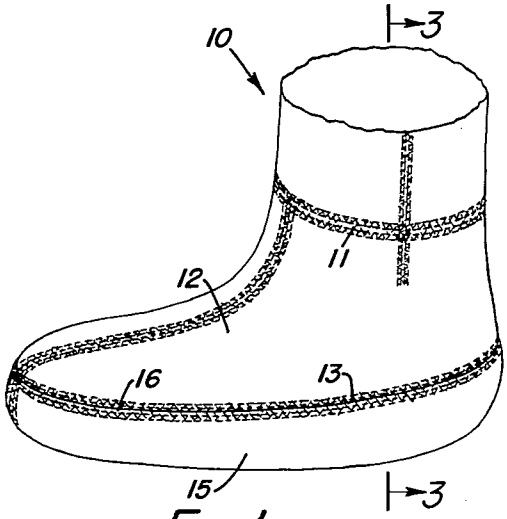


FIG. 1.

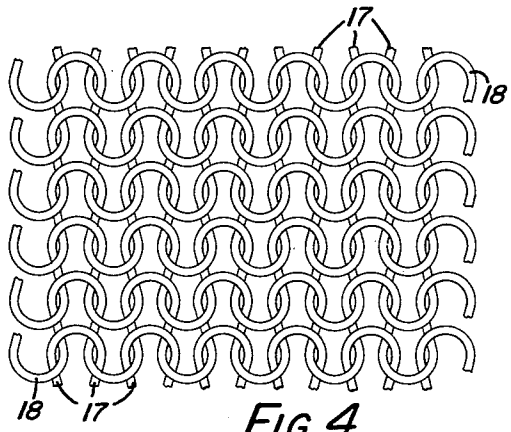


FIG. 4.

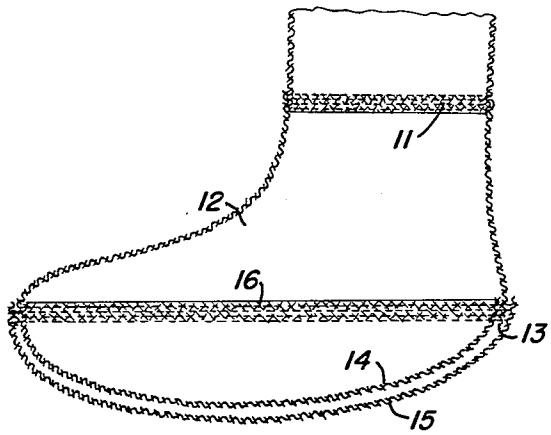


FIG. 2.

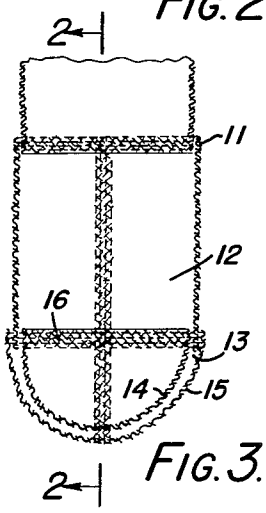


FIG. 3.

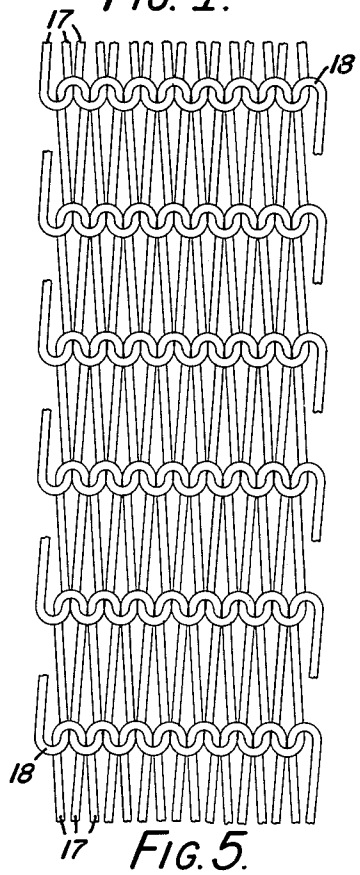


FIG. 5.

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May 22, 1956 H. S. HEILBRONNER 2,746,054

GARMENT CONSTRUCTION

Filed June 5, 1952 2 Sheets-Sheet 2

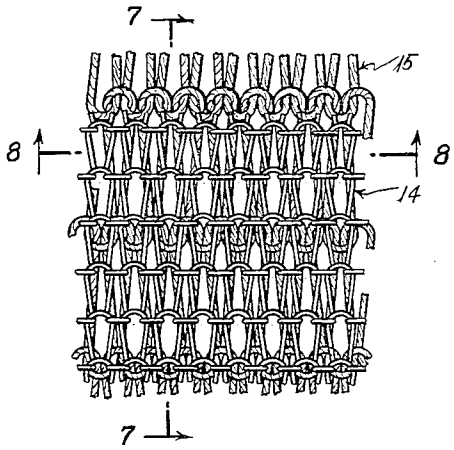


Fig. 6.

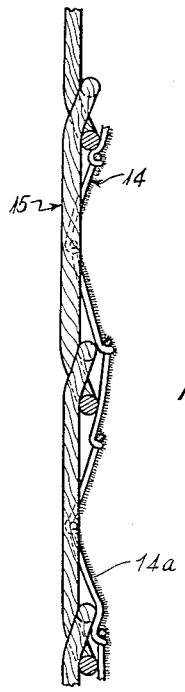


Fig. 7.

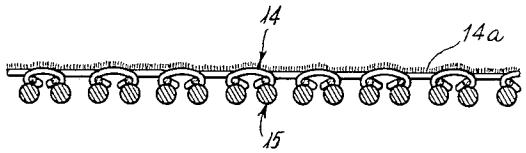


Fig. 8.

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GARMENT CONSTRUCTION

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Application June 5, 1952, Serial No. 291,897

1 Claim. (Cl. 2—83)

This invention relates to garments and, more particularly, to the variety known as children's sleeping garments in which a body portion has a foot portion attached thereto and including a sole portion made of fabric for continuously enclosing the foot. Textile garments with attached foot enclosures have been heretofore subject to a number of objectionable features. For obvious reasons the sole of the foot of such a garment receives more severe wear and usage than any other portion of the garment and tends to rapidly wear out, while for equally obvious reasons the use of leather and flexible plastic sheets for such sole portions is not satisfactory because of the limited washability and pliability of such materials at near boiling temperatures. Another defect of the prior constructions has been excessive frictional resistance between the sole portion and a floor with the result of crowding the toes into the toe portion so as to produce uncomfortable pressure and discomfort in walking. Another defect has been the tendency of prior art sole materials to pick up and retain dirt which tends to increase such friction, as well as requiring frequent washing.

One object of the invention, therefore, is to provide such a garment with an improved foot portion having a more durable and practical sole construction.

Another object is the provision of such a construction producing reduced frictional resistance in contact with the floor while walking, but with sufficient frictional resistance in contact with the foot while standing, so as to provide greater comfort for the foot in both stance and gait.

A further object is to supply a garment foot sole of the above character having a reduced tendency to pick up and retain dirt and capable, therefore, of remaining relatively clean for a longer period.

Still a further object is to produce a garment foot construction having the above advantages and capable of being readily and economically manufactured and sold.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claim at the end of the specification.

In the drawings:

Fig. 1 is a perspective fragmentary view of part of a garment having a foot portion embodying the present invention;

Fig. 2 is a sectional elevation on the line 2—2 in Fig. 3;

Fig. 3 is a sectional elevation on the line 3—3 in Fig. 1;

Fig. 4 is an enlarged fragmentary schematic view of a portion of the outsole in normal or unstressed condition;

Fig. 5 is a view similar to Fig. 4, but showing the fabric as frictionally stressed during walking;

Fig. 6 is an enlarged fragmentary schematic plan view showing the relation of the loops of the outsole and insole fabrics under the pressure of the foot;

Fig. 7 is an enlarged sectional view taken on the line 7—7 in Fig. 6, and

Fig. 8 is an enlarged sectional view taken on the line 8—8 in Fig. 6.

The friction produced in the wearing of a foot covering may be of two kinds or a combination of both. A child, while standing, applies a substantially vertical and stationary force on the foot sole which develops sufficient friction by any slight movement so that the child can stand still without having its feet slide inadvertently out of place and in this may be referred to as static friction, to distinguish it from the somewhat different type encountered in walking. When the child starts to walk, and most children walk with a shuffling style of gait, the more active motions of the feet generate what may be termed kinetic friction between the foot and sole and between the sole and the floor. With the conventional type of foot enclosure, the foot itself moves toward the toe part of the covering, leaving an empty space in its heel part. This produces excessive pressure against the toes of the foot which, if not relieved, builds up blood pressure and discomfort and may cause a distaste for walking. Efforts have heretofore been made to develop a smooth-surfaced sole portion made from woven or knitted material capable of being readily washed, but the use of such products has been characterized by rather rapid disintegration of the material into a frazzled condition.

I have found that such defects can be overcome by adopting for the walking surface, or outsole, a comparatively coarse knitted fabric made from synthetic polymerized plastic filament or spun fiber which by reason of its method of production as an extruded filament has a nearly perfect fibrous smoothness. This characteristic eliminates to a large extent the resistance of the filaments to sliding contact with each other and reshaping of the loops in the knitted construction, as more fully explained hereafter. I prefer to line this outsole portion with an insole for engagement with the foot made from a piece of ordinary knitted fabric with a napped-up surface, if so desired, for contact with the foot. This insures sufficient frictional resistance between the foot and the sole portions, while the loops of the knitted insole material, under the pressure of the foot, tend to dig into the loops of the coarse knitted plastic fabric of the outsole and thus limit sliding relocation between the insole and outsole.

When the child starts to walk, the lifting of the foot relieves the pressure from the insole and tends to separate and loosen the grip between the insole and outsole. The foot tends to slip ahead in its enclosure which yields more readily to such motion and reduces pressure on the toes of the foot, while the contact between the outsole and the floor produces lessened frictional resistance because of the extremely smooth surface of the plastic fibers of the outsole, and their tendency to assume a generally parallel relation longitudinally of the foot, as hereinafter explained.

Referring more particularly to the drawings, there is shown at 10, Fig. 1, a lower fragment of the leg of a knitted sleeping garment of the character described, having secured to its lower end, as by flat stitching 11, a knitted foot portion 12. The latter terminates in a line 13 extending around the perimeter of the foot and to its edge are secured an insole 14 and an outsole 15. Preferably the upturned edges of the insole and outsole overlap the lower edges of the foot portion 12 on opposite sides thereof and are secured thereto by flat stitching 16, of known and suitable construction.

The insole 14 is preferably made of ordinary knitted fabric with the loops thereof extending longitudinally of the foot portion and with a napped upper or foot contacting surface 14*a*, as well understood in the art, to afford soft comfortable contact with the foot with some stabilizing frictional resistance to the movement of the foot over the insole.

The outsole 15 is a coarse knitted fabric made with a synthetic polymerized plastic filament or spun fiber, made

from Vinyon N (vinyl resin), nylon, Dynel (copolymer of acrylonitrile and vinyl chloride), Orlon (acrylic filament), Dacron (polyester fiber), or the like. These smooth filaments or fibers 17, Fig. 4, are knitted in any known and suitable manner, as represented diagrammatically in Fig. 4, where they are shown in the normal unstressed condition. The knitted fabric is preferably arranged over the knitted insole with the loops, as 18, extending longitudinally of the foot portion. When this material is stressed by frictional contact with the floor, the loops tend to assume the stretched relation shown in Fig. 5 in which the arc portions of the loops are reduced in diameter while the sides of each loop are increased in length and lined up in near parallelism with each other, so as to generally resemble a lattice structure, as shown in Fig. 5. Such arrangement of the loops with the filaments or fibers extending in a predominantly longitudinal direction, combined with their smooth hard surfaces, substantially reduces the friction or contact with the floor and the derangement and pressure of the covering on the foot.

Such constant alteration of the shape of the loops has the further advantage of reducing the tendency to pick up and retain dirt particles because the changing shape of the loops tends to simultaneously loosen and shake out the particles, thereby maintaining the bottom surface of the outsole in a cleaner condition and with lowered frictional resistance for a longer period of time.

As stated earlier, when subjected to foot pressure as in walking, the loops of the knitted insole material tend to dig into the comparatively coarse loops of the outsole material to restrain relative sliding movement of the insole over the outsole. Fig. 6 shows the relative positioning of the loops of the two fabrics under this condition. Thus when the smaller insole loops sink into the larger outsole loops, the loop ends of many of the insole loops will necessarily bear against raised portions of the outsole loops so as to produce the restraining action described. This is clearly shown in Figs. 7 and 8.

While I have shown a garment foot portion as stitched to a garment leg, my invention is obviously capable of use with a foot portion detachably associated with the garment leg, and with garments of either the known one-piece or two-piece construction. The term "yarn" is employed in a broad sense in the appended claims as inclusive of both filaments and spun fibers.

My invention thus provides a garment foot portion with a fabric outsole of highly durable quality and of such a character as to lessen the frictional resistance in contact with the floor in walking, while maintaining sufficient frictional contact between the foot and the sole portion for stability of position in stance. The changing loop shape of the knitted fabric tends to loosen and shake out dirt particles and thus maintain the fabric in a cleaner condition for a longer period of time. At the same time, the fabric combines good washability with abrasion resistance and the construction is one which is capable of being readily and economically manufactured and sold.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of a preferred embodiment, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claim.

I claim:

A garment comprising a body portion and a foot portion of fabric attached thereto and having an insole portion of ordinary knitted fabric with the loops extending longitudinally of said foot portion and with a napped upper surface for contact with the foot, and an outsole of coarse knitted fabric made with synthetic plastic yarn and arranged with the loops of knitting extending longitudinally of said foot portion so as to be alternately elongated by frictional contacts between the foot and floor and released between said contacts for return to normal shape, to intermittently vary the shape of said loops, and so that the loops of the knitted insole fabric coordinate under pressure with the loops of the outsole fabric to restrain slipping between said insole and outsole, said outsole having its edges extended substantially around the perimeter of the foot portion and turned upwardly in overlapping relation therewith, and a line of stitching connecting the upturned edges of said outsole to the perimeter of said foot portion.

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