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R. W. PRICE

3,296,490

CONDUCTIVE COVERING FOR SHOES

Filed Oct. 11, 1963

2 Sheets-Sheet 1

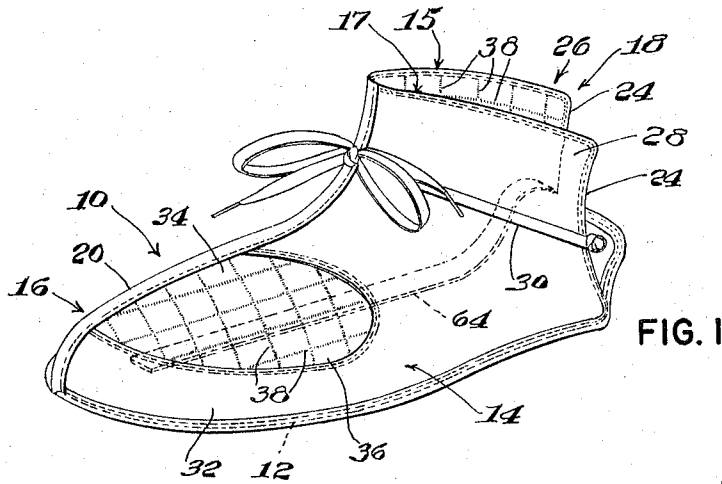


FIG. 1

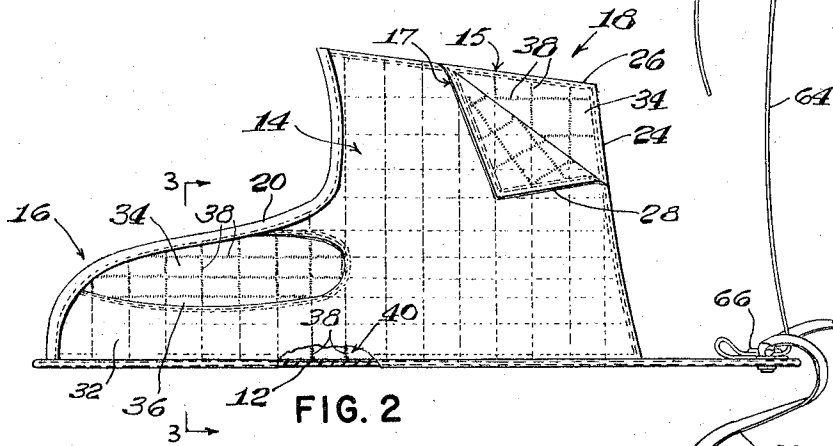


FIG. 2

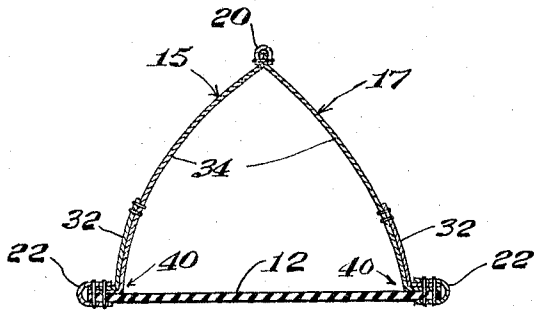


FIG. 3

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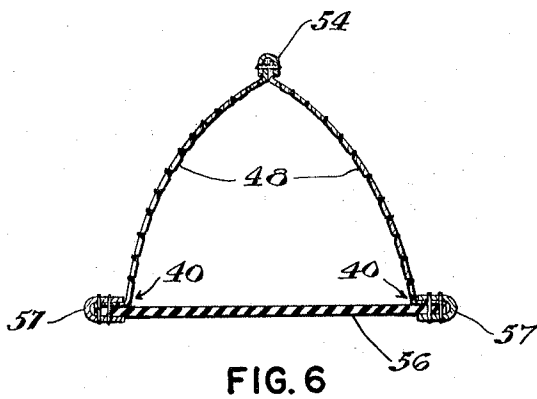
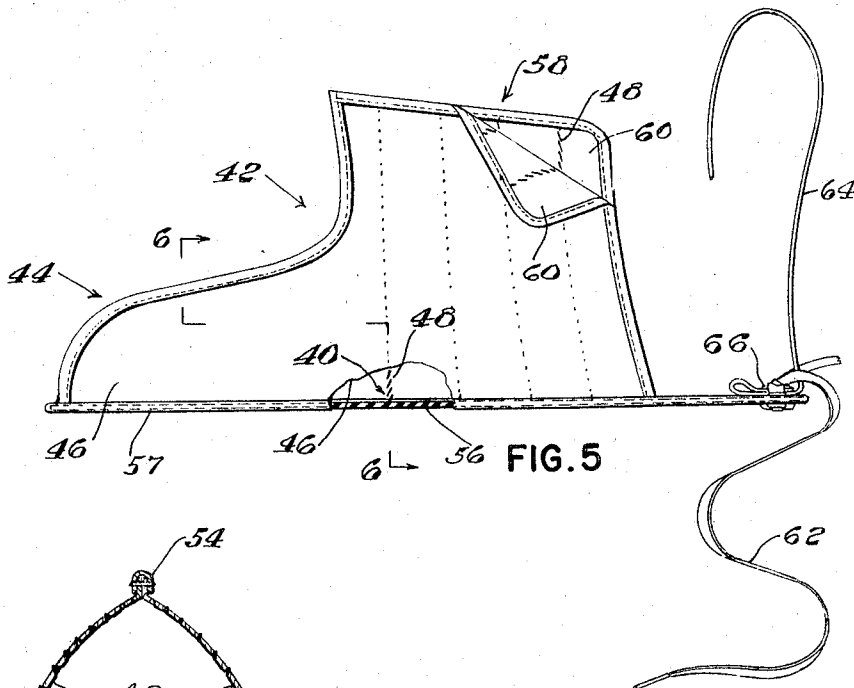
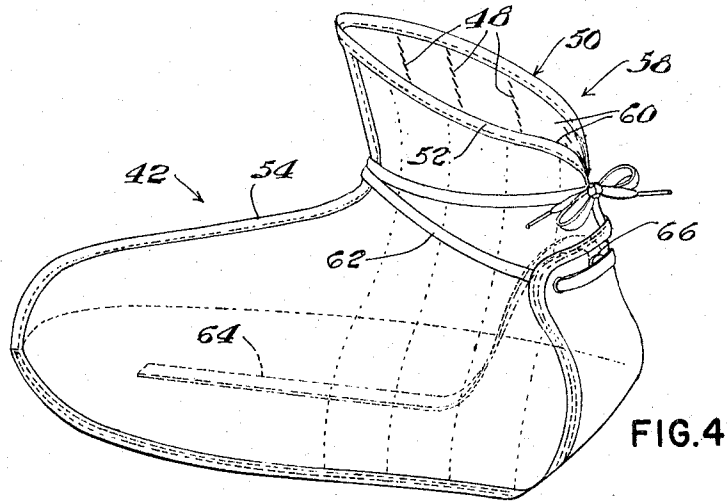
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CONDUCTIVE COVERING FOR SHOES

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CONDUCTIVE COVERING FOR SHOES

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2 Claims. (Cl. 317-2)

This invention relates to a conductive covering for shoes. The invention has for one object to provide a novel and improved conductive foot covering adapted to be worn over the shoe as a protective sanitary covering therefor and which is capable of establishing a grounded connection between the body of the wearer and a grounded floor surface to the end that risk of explosion as a result of static charges from the wearer may be reduced to a minimum.

Another object of the invention is to provide a novel and improved conductive foot covering of the character specified constructed in a manner such as to accommodate shoes of a wide variety of sizes.

A further object of the invention is to provide a novel and improved foot covering embodying a conductive cloth having conductive threads woven or sewed into the cloth to form a conductive path from the wearer to the grounded floor.

With these general objects in view and such others as may hereinafter appear, the invention consists in the conductive foot covering hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a perspective view of a conductive foot covering embodying the present invention;

FIG. 2 is a side elevation partly in cross section of the foot covering;

FIG. 3 is a cross sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is a perspective view of a modified form of conductive foot covering embodying the present invention;

FIG. 5 is a side elevation of the same shown partly in cross section; and

FIG. 6 is a cross sectional view taken on the line 6—6 of FIG. 5.

In general the present invention contemplates a novel and improved conductive foot covering designed to be worn over the shoe for aseptic purposes whereby to prevent soiling of the shoes worn by surgeons or nurses in the operating room and possible cross infection therefrom. The present foot covering provides a safe conductive path for discharging electrostatic charges from the body to a conductive grounded floor with no danger of a spark, and is used with particular advantage by hospital personnel in operating rooms during a surgical operation where there is a constant danger of explosion or fire from inflammable liquids or anesthetic gases.

In the illustrated embodiment of the invention the present conductive foot covering takes the general form of a boot embodying conductive materials arranged to make contact with the body of the wearer and to form an electrically conductive path through the foot covering to the floor whereby electrostatic charges may be dissipated in a safe and efficient manner.

In accordance with one feature of the present invention the foot covering is constructed in a novel manner such as to accommodate shoes of various sizes. Such structure is of particular advantage in manufacturing the covering since only one size need be stocked resulting in economy of production. It is also of advantage to the consumer in that only one size need be purchased for all users. In practice one size is manufactured to accommodate all normal sizes in men's footwear, and another size to accommodate all normal sizes in women's footwear.

In accordance with another feature of the present invention the present conductive foot covering embodies uppers of a flexible fabric, such as a textile material, having conductive threads woven or sewed into the fabric to form a conductive path from the foot to a conductive sole in contact with the floor.

Referring now to the drawings, 10 represents a conductive foot covering comprising in general a conductive sole portion 12 of flexible conductive rubber, and a conductive upper portion indicated generally at 14 having a toe portion 16 and an ankle portion indicated generally at 18. The upper 14 may be made in two sections 15, 17, as illustrated in FIG. 2, the forward portions comprising the toe portion and the front of the ankle portion being brought together face to face and covered by piping 20 and stitched together as shown. The lower edges of the upper sections 15, 17 may then be placed face to face against the upper surfaces of the outer marginal edges of the sole portion 12 and likewise stitched together with the piping 22. As thus assembled, the rear edges 24 of the ankle portion terminate short of the rear of the sole portion 12 leaving the back of the ankle portion open and providing spaced wings or flaps 26, 28 adapted to be overlapped and wrapped about the ankle of the user.

As shown in FIG. 2, the sole portion 12 is extended a substantial distance beyond the termination of the ankle or wing portions 26, 28 and is provided at the end of its extended portion with a tie string 30 extending from and through openings in each rear corner of the extended sole portion. Since the present structure of foot covering does not provide a clearly defined heel portion it will be understood that the term "sole portion," as used herein, is intended to include an area where the heel of the shoe will rest and that the elongated sole portion is extended a substantial distance beyond such heel area. It will also be understood that the term "ankle portion" is intended to include portions of the foot or leg immediately above the ankle.

From the description thus far it will be seen that in the operation of applying the present foot covering to the shoe and to the foot, the toe of the shoe is placed in the toe portion 16 of the upper with the sole and heel of the shoe resting on the sole portion 12. In practice the toe portion 16 is made of a size such as to accommodate the largest shoe toe of the range of sizes to be fitted. The wings 26, 28 of the ankle portion may then be overlapped and wrapped about the ankle and the leg in direct and contour fitting contact with the skin of the wearer whereupon the extended portion of the flexible conductive sole 12 is folded upwardly against the back of the heel of the shoe and against the folded wing portions. The tie strings are then tied together, as shown, to hold the upper portion of the conductive material in firm contact with the skin of the wearer. It will be understood that the socks or stockings may be pulled down a sufficient distance to permit engagement of the conductive material with the bare skin of the wearer.

In the embodiment of the invention illustrated in FIGS. 1 and 2 the conductive upper portion 14 comprises a composite material including an outer sheet 32 of a thin plastic stain-resistant material and an inner sheet of conductive cloth 34 which are sewed together along their marginal edges. The outer sheet 32 serves as a protective or reinforcing sheet and may be provided with open portions indicated at 36 revealing the conductive cloth 34. The conductive cloth 34, as shown, is provided with a pattern of intersecting horizontal and vertical spaced parallel lines 38, each of said lines representing groups of conductive threads woven into the cloth during the manufacture thereof. Thus, the conductive threads 38 in engagement with the bare skin of the wearer form a conductive path to the marginal edges of the conductive sole

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to which the conductive cloth is sewn, as indicated at 40, and then to the grounded floor of the operating room.

With the present construction of conductive foot covering it will be seen that different lengths or sizes of shoes may be easily and conveniently accommodated by folding the extended sole portion upwardly at the back of the heel of the shoe at whatever point such heel terminates on the sole, and then tying the extended portion about the angle portion in form fitting relation to hold the conductive cloth in firm engagement with the wearer's skin. Thus, in practice the position of the upper edge of the upwardly folded extended sole portion will extend to a relatively low point when applied to a large size shoe, and will extend to a relatively higher point when applied to a smaller size shoe. In each case, however, the position of the tie strings will be such as to retain the foot covering in contact with the shoe and the foot for the purpose defined.

Referring now to FIGS. 4, 5 and 6, in a modified form of conductive foot covering, as indicated at 42, the structure of the foot covering may be substantially the same as that shown in FIGS. 1 to 3 except that the upper portion 44 comprises a non-conductive canvas or like material 46 having reinforced conductive threads 48 sewn or stitched in spaced vertical lines throughout the ankle portion of the material as shown. The modified foot covering may likewise have an upper portion 44 made in two half sections 50, 52 in the general shape of a boot and which are sewn together along their forward edge by piping 54, and the lower edges are sewn to the marginal edges of a conductive sheet rubber sole portion 56 by piping 57. The rear edges of the ankle portion 58 of the upper terminate short of the extended portion of the sole 56 leaving the back of the ankle portion open and providing wings or flaps 60 which may be wrapped in overlapping relation about the ankle and leg of the wearer. As shown in FIG. 4, the string 62 may extend through openings in the corners of the extended portion and may be looped around the front of the ankle and brought back and tied behind the ankle portion to assure firm engagement of the conductive threads 48 with the bare skin of the user. It will be apparent that in use the conductive threads in contact with the bare skin of the wearer form a conductive path to the conductive rubber sole portion 56 to which they are stitched, the conductive path continuing through the sole to the conductive floor.

In practice the conductive thread comprises a low tensile strength viscose rayon yarn treated with vinyl carbon black solution. Such conductive threads are not subject to bleaching or bleeding off so that when worn against the skin or clothing it will not soil the same. Also in practice such yarns treated with carbon black to render them conductive are capable of withstanding laundering without losing their conductive characteristics. Thus, the present conductive foot coverings are capable of being laundered and reused without losing their conductivity.

While such conductive yarns have sufficient tensile strength to be handled in a loom or weaving machine to produce the conductive cloth 34 used in the production of the conductive foot covering shown in FIG. 1, it is preferred to combine the conductive threads 48 with threads of a higher tensile strength to produce a reinforced conductive yarn capable of being handled in a sewing machine to produce the conductive foot covering shown in FIG. 4.

While both embodiments of the invention embodying conductive threads, as shown in FIGS. 1 and 4, are capable of forming a complete conductive path from the bare skin to the conductive sole, each of the present conductive

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foot coverings are further adapted to embody a conductive rubber strip 64 which may be detachably secured to the extended end of the sole portion in electrical contact therewith and which may be extended into the shoe and under the stocking to provide a second electrically conductive path from the wearer's foot through the moisture in the stocking and into the strip 64 connected to the conductive sole. Such strip is preferably detachably connected to the sole portion by a snap fastener, as indicated at 66, and as illustrated and described in my prior United States Patent No. 2,745,041, issued May 8, 1956. The use of such strip, however, provides further assurance of a safe electrically conductive path from the body to the floor and is of particular advantage in a conductive covering for women's shoes where it may not be convenient to remove or roll down the full length nylon stockings usually worn in order to contact the skin of the wearer.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A conductive foot covering for shoes comprising an elongated electrically conductive flexible sole portion, an upper comprising a woven textile fabric embodying an electrically conductive material in the form of conductive yarn threads woven therein, said threads providing a conductive path from the bare skin of the wearer to the conductive sole portion, said conductive yarn threads being woven into the fabric in a pattern of intersecting horizontal and vertical spaced parallel lines, said foot covering including a toe portion and an ankle portion open at the back, said ankle portion providing opposed wings adapted to be wrapped in overlapping relation against the bare skin above the shoe of the wearer, said upper stitched in electrically conductive engagement with the marginal edges of the sole portion at the toe portion and along the sides thereof, said sole portion extending rearwardly a substantial distance beyond the upper providing a foldable portion adapted to be bent up at the heel of the shoe and against said overlapped portions to accommodate shoes of different sizes, and tie means secured to the rearwardly extended end of said sole portion for securing the ankle portion of the upper in firm electrical engagement with the bare skin of the wearer whereby to provide a conductive path from the foot through the upper and the sole to a grounded conductive floor.

2. A conductive foot covering as defined in claim 1 which further includes a flat electrically conductive strip detachably connected to the rearwardly extended end of said sole portion and adapted to be extended into the shoe and under the foot to provide a second electrically conductive path from the foot through the strip and the conductive sole to an electrically conductive grounded floor.

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