Dec. 26, 1967 R. W. PRICE 3,359,658

CONDUCTIVE COVERING FOR SHOES

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Fig. 1

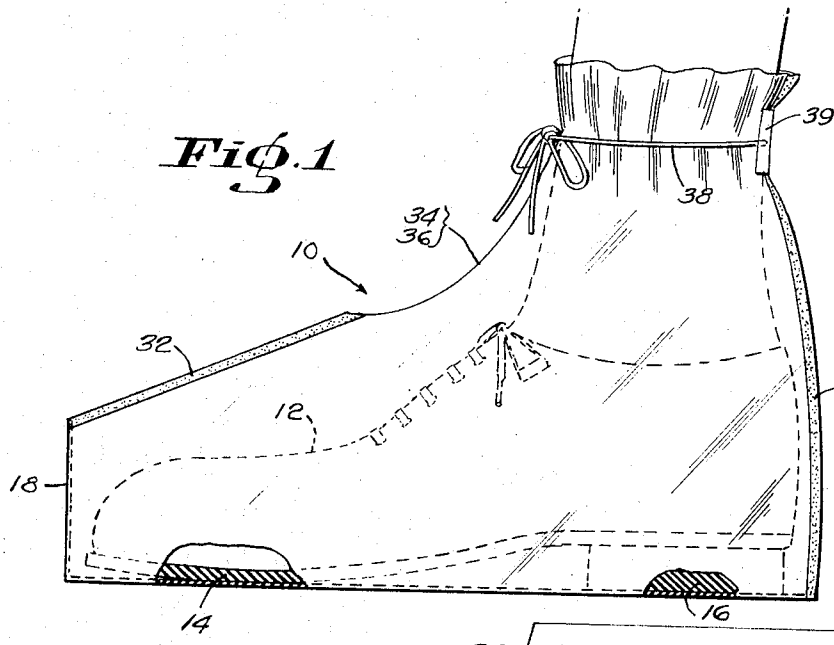

Fig. 2

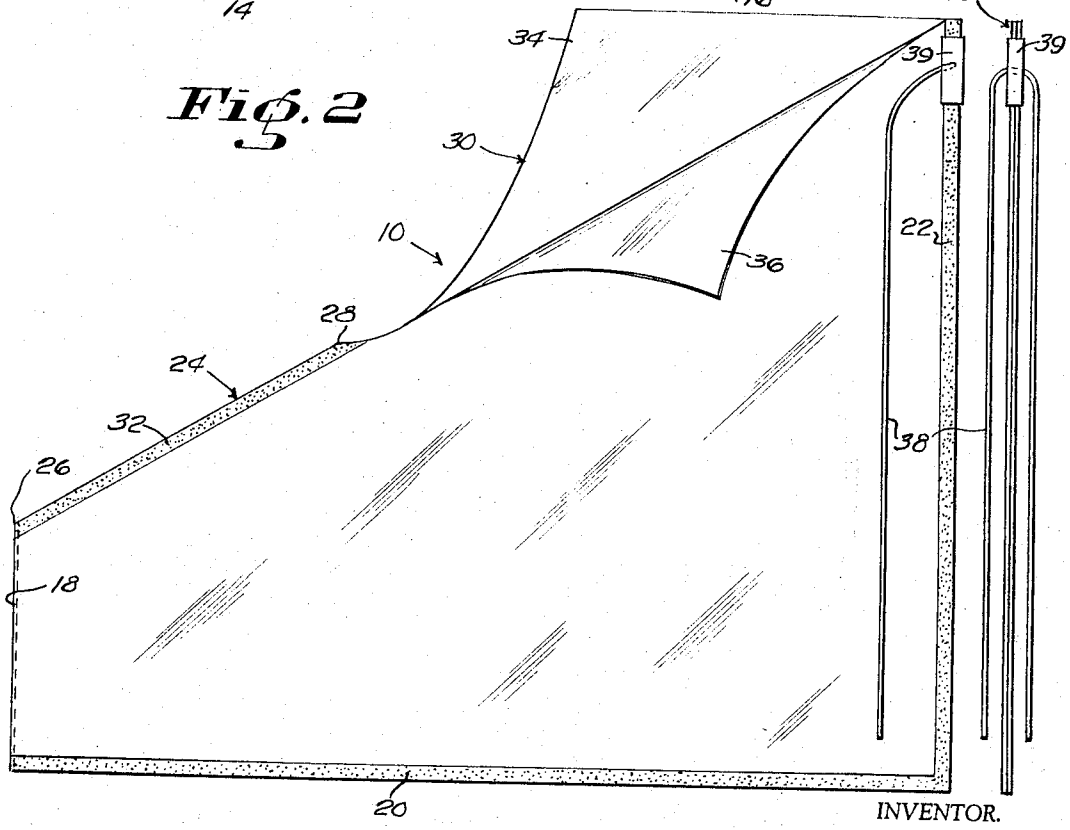

Fig. 3

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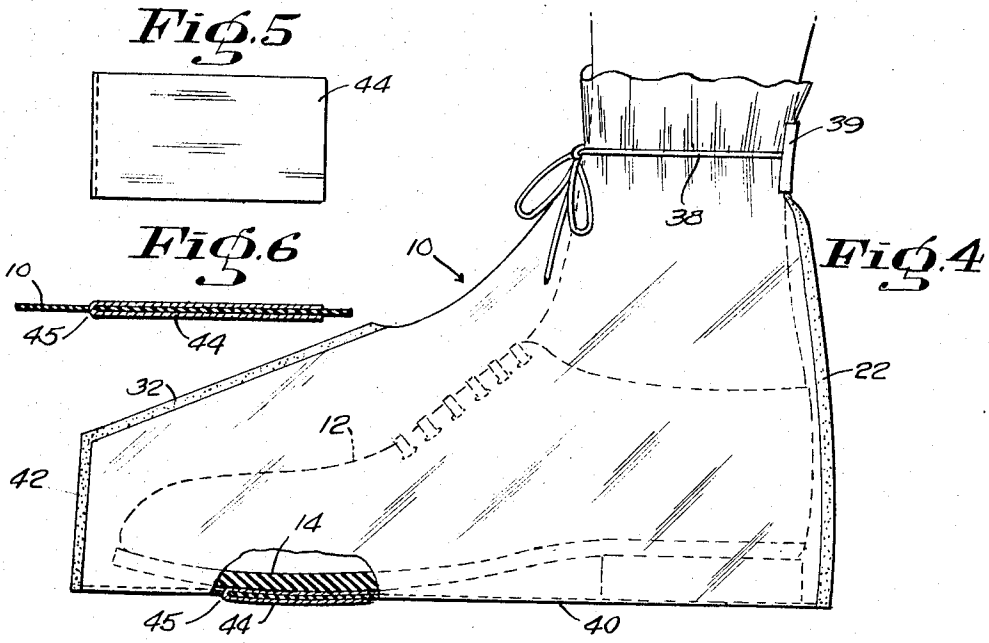
Fig. 5

Fig. 6

Fig. 4



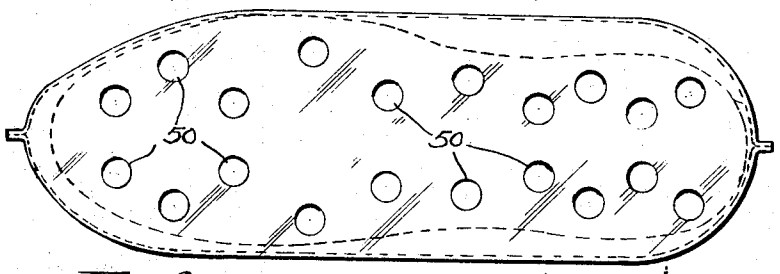


Fig. 7

Fig. 8

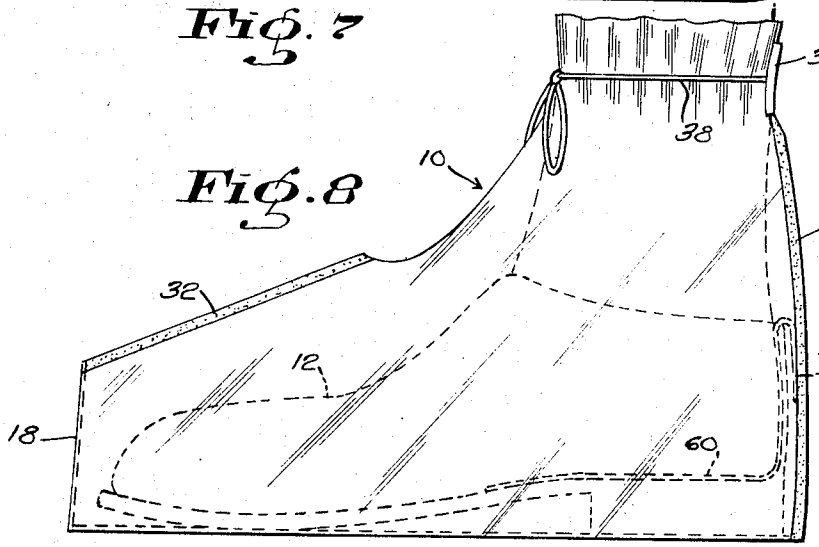


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Fig. 9

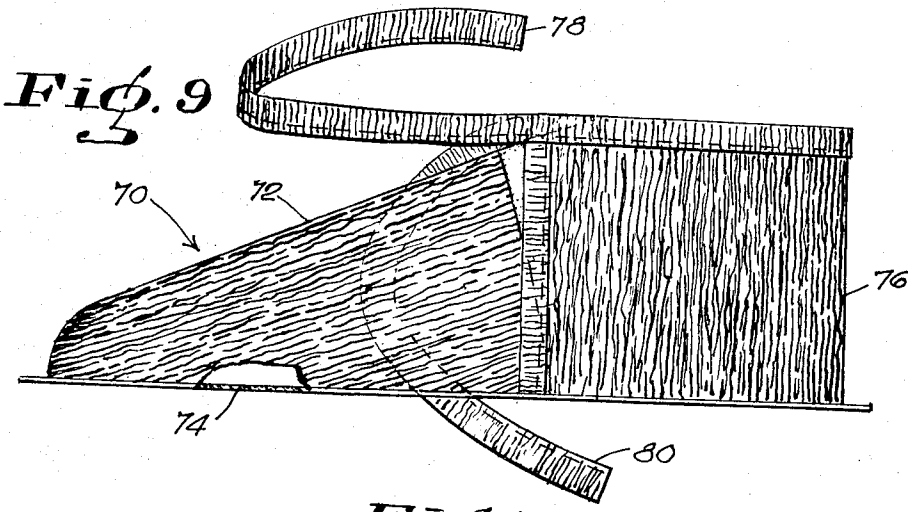


Fig. 10

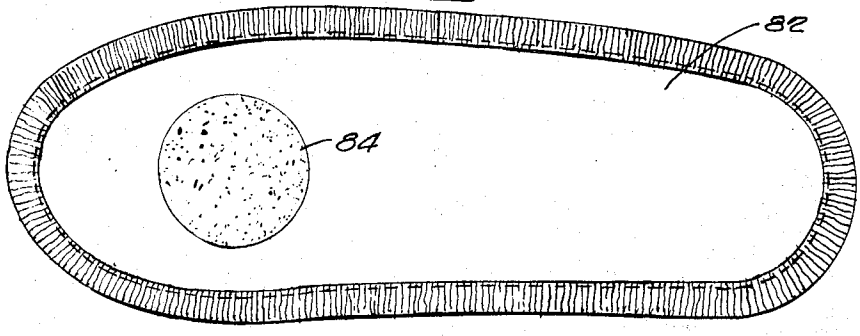
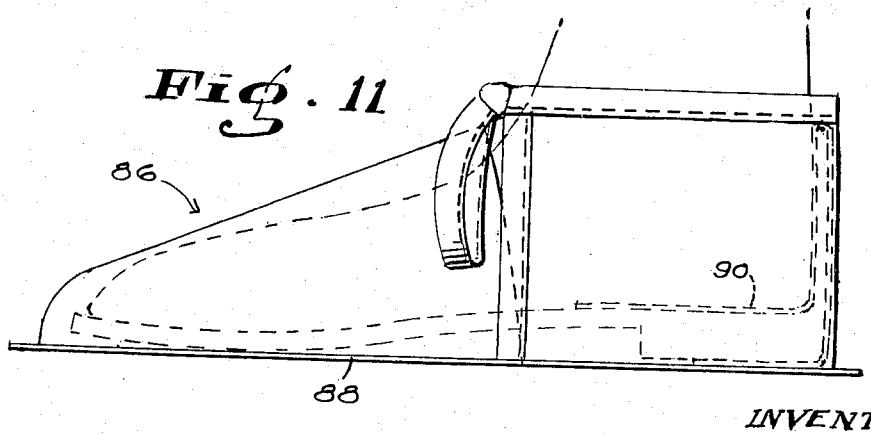


Fig. 11



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3,359,658

CONDUCTIVE COVERING FOR SHOES

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Continuation of application Ser. No. 761,555, Sept. 17, 1958. This application May 23, 1966, Ser. No. 584,027
5 Claims. (Cl. 36—7.1)

ABSTRACT OF THE DISCLOSURE

A disposable electrically conductive shoe cover for surgical and similar uses is formed of two halves of thin material which in flattened condition prior to use are each shaped in the outline of a shoe as viewed in side elevation, open at the top for insertion of the shoe of the wearer and joined at least at the toe and sole. Ties are provided to secure the cover in place and means is also provided for grounding the leg of the wearer to the floor. An alternate form is of slipper shape.

This application is a continuation of co-pending application S.N. 761,555, filed Sept. 17, 1958, for Conductive Covering for Shoes, now abandoned.

This invention relates to a conductive foot covering and more particularly to a disposable conductive foot covering designed to be worn over a shoe.

The invention has for an object to provide a novel disposable 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 or surface to the end that the risk of explosion as a result of static charges from the wearer may be reduced to a minimum.

A further object of the invention is to provide a novel conductive foot covering of the character specified particularly adapted for use by hospital personnel to provide an inexpensive disposable sanitary protective foot covering having conductive properties and which may be discarded after use. To this end the shoes are prevented from becoming soiled, and the foot covering provides an aseptic precaution to prevent possible cross infection from soiled or bacteria-carrying shoes.

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 side elevation of the present disposable conductive foot covering as worn with a conductive shoe;

FIGS. 2 and 3 are detail views in side and end elevations respectively of the present conductive foot covering;

FIG. 4 is a side elevation similar to FIG. 1 illustrating a modified form of conductive foot covering for use with a conductive shoe;

FIGS. 5 and 6 are detail views in plan and horizontal cross section respectively of a portion of the foot covering shown in FIG. 4;

FIG. 7 is a bottom plan view of another modified form of conductive foot covering to be described;

FIG. 8 is a side elevation of a conductive foot covering designed to be used with non-conductive shoes;

FIG. 9 is a side elevation of another modified form of foot covering designed to be used with conductive shoes;

FIG. 10 is a bottom plan view of a modification of the foot covering shown in FIG. 9; and

FIG. 11 is a view similar to FIG. 9 showing a foot covering designed to be worn with a non-conductive shoe.

In general the present invention contemplates a novel

and improved disposable conductive foot covering designed to be worn over the shoe for aseptic purposes whereby to prevent soiling of the shoes and possible cross infection therefrom. The present foot covering provides a safe conductive path for discharging electrostatic charges from the body to a conductive floor with no danger of a spark for use 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. The present foot covering also affords a protective disposable covering for the shoes to prevent blood stains or accumulation of dirt or foreign matter on the shoe, thus eliminating a source of bacterial growth which might cause cross infection when the shoes are worn outside the operating room, or where the same shoes are worn for several operations without being cleaned between operations.

In a preferred embodiment of the invention the present foot covering is designed to be worn over a conductive shoe of the type which provides an electrically conductive path from the body of the wearer to a conductive floor for the purpose of dissipating electrostatic charges generated by the wearer through the conductive floor. The present conductive foot covering when worn over a conductive shoe provides a protective covering having conductive properties for completing the conductive path from the conductive shoe to the floor.

In another embodiment of the invention a conductive foot covering designed to be used with non-conductive shoes is provided with means forming an electrically conductive path between the foot of the wearer and the conductive foot covering whereby electrostatic charges may be dissipated through the foot covering directly to the conductive floor.

Referring now to the drawings, **10** represents the present disposable conductive foot covering, shown in FIG. 1 as worn over a conductive shoe **12** having a conductive rubber sole **14** and heel **16**, such conductive shoe being of the type which provides an electrically conductive path from the foot of the wearer through the conductive sole or heel, the present conductive foot covering **10** completing the electrically conductive path to a conductive floor. In practice one form of the present conductive foot covering may comprise a relatively thin conductive material, such as a polyethylene sheet material having carbon black embodied therein and, as illustrated in detail in FIGS. 2 and 3, the conductive foot covering may be inexpensively produced in a flat bag or envelope form by folding a rectangular sheet of the material upon itself providing a folded closure along the front edge **18** and heat sealing the material along the bottom edge **20** and rear edge **22**. The folded material may be cut in the general shape of a boot by cutting along an upwardly inclined line **24** from a point **26** of the folded edge **18** to a point **28**, and may then be cut upwardly along a curved or concave line **30** terminating at the open upper edge of the folded material. The edges of the material between the points **26**, **28** may be heat sealed to provide a closure seam **32**. The edge along the curved line **30** is left open defining with the open upper end a pair of flaps **34**, **36**. A fastening element, such as a tie string **38**, may be secured to the rear edge **22** of the bag in any usual or preferred manner, herein shown as by an adhesive or heat sealed tab **39**. The tie string may comprise a fabric cord of the type used as shoe lacings or may comprise a paper covered wire providing a more secure tie.

In use the flaps **34**, **36** of the conductive foot covering may be opened and the foot inserted, the foot covering being pulled over the shoe after which the open end may be wrapped about the ankle and secured thereto by the tie string **38** as shown in FIG. 1. It will be understood that in practice the sides of the flat bag will spread apart

and conform generally to the shape of the shoe so as to have a flat bottom and rounded sides, and the open edges defined by the curved line 30 may be arranged in overlapping relation so as to completely cover the shoe to prevent soiling or contamination thereof during use.

In a modified form of the invention, as shown in FIG. 4, and which is also designed for use with a conductive shoe, the bottom edge 40 of the conductive foot covering therein shown may comprise the folded edge, and the front edge may be closed by a heat sealed seam 42, the remainder of the foot covering being substantially the same as shown in FIG. 1. The modified form of conductive foot covering shown in FIG. 4 is further provided with a bendable conductive metal strip 44 which may be extended through a slit opening 45 in the bottom of the bag and folded into U-shape to embrace the inner and outer surfaces of the conductive bag material as shown in detail in FIGS. 5 and 6. Thus, in practice a conductive path is provided from the conductive rubber sole of the shoe through the conductive metal strip 44 to the conductive floor. The conductive foot covering shown in FIG. 4 is likewise provided with a tie string 38 for securing the bag to the ankle.

In a further embodiment of the foot covering, as shown in FIG. 7, which is also designed for use with a conductive shoe, a bag may take the general form shown in FIG. 4 wherein the bottom edge comprises the folded edge. In this embodiment of the invention, the side walls of the flat bag, which forms the bottom of the foot covering when in use, may be provided with a plurality of openings 50 adjacent the lower or folded edge. Thus, in use the conductive rubber sole of the conductive shoe may directly engage the conductive floor through the openings 50. It will be apparent that in the modification illustrated in FIG. 7, wherein the conductive shoe makes direct contact with the conductive floor, that the foot covering will preferably but not necessarily comprise a conductive material.

The embodiment of the invention shown in FIG. 8 is particularly designed to be worn over a non-conductive shoe. In this embodiment of the invention the conductive bag or foot covering may take the general form shown in FIG. 1, and in addition thereto the modified form shown in FIG. 8 is provided with a conductive strip 60 which may be secured at one end to a wall of the bag in any usual or preferred manner, such as by heat sealing or by a conductive cement as indicated at 62. The free end of the strip 60 may be placed within the shoe, as shown, thus providing a conductive path from the foot of the wearer through the conductive strip and the conductive material of the bag to the conductive floor. The strip 60 may comprise a conductive rubber strip or a relatively thin, flexible and bendable conductive metal strip which may be laminated with a plastic or other reinforcing strip.

In the description thus far, the embodiments of the invention illustrated in FIGS. 1 to 8 have been described as comprising a foot covering formed of a polyethylene sheet material which during its formation has been rendered electrically conductive by the addition of carbon black. Referring now to FIG. 9, the present disposable foot covering, indicated generally at 70, designed for use with conductive shoes, may also be produced entirely from paper, wherein the upper portion 72 of the foot covering may comprise a non-conductive paper, such as a relatively strong, inexpensive kraft paper, and wherein the bottom or sole portion 74 may comprise a paper impregnated with carbon black or a similar substance which is capable of carrying an electrical current. The upper 72 may take the general form of a boot and may be secured to the sole portion 74 in any suitable manner, such as by stitching. The upper may include a separate heel portion 76 also stitched to the conductive sole 74 and may be provided with extended binding portions 78, 80 to provide tie strings for securing the boot to the foot.

In use the foot covering shown in FIG. 9 is employed for covering a conductive shoe in a manner similar to that shown in FIG. 1, and wherein the conductive sole 74 of the foot covering completes the electrical conductive path from the foot through the sole 14 of the shoe to the grounded floor.

In the embodiment shown in FIG. 9, the entire sole portion 74 may comprise a conductive paper of the character described. In the modified embodiment shown in FIG. 10, the sole portion 82 may comprise a non-conductive and preferably an absorbent paper material wherein a portion of the sole indicated at 84 may be provided with a liquid conductive vinyl compound which may be produced by adding a carbon black filler to the vinyl. This may conveniently be accomplished by daubing the conductive material onto the absorbent sole with a paint brush, the material penetrating through the absorbent sole, which when dried provides the conductive spot 84. This embodiment is also designed for use with a conductive shoe to complete the conductive path from the shoe through the conductive spot 84 and into the conductive floor.

In practice it will be understood that the amount of carbon black filler provided in any of the above described embodiments may be varied in accordance with the resistance requirements for a particular use up to a maximum providing a resistance of approximately 250,000 ohms.

Referring now to FIG. 11, the foot covering 86 therein shown may comprise a structure similar to that illustrated in FIG. 9 except that it is designed for use with a non-conductive shoe. As shown in FIG. 11, in order to provide a conductive path from the wearer's foot through the conductive paper sole 88 to the grounded floor, a conductive rubber or thin conductive metal strip 90 is provided, the free end of which may be extended into the shoe in a position to contact the heel of the wearer. The strip 90 is then extended over the rear wall of the shoe and down under the heel into contact with the conductive sole 88. The strip 90 may be secured to the sole 88 in any usual manner, such as by a cement which has been rendered conductive by the addition of carbon black or other suitable material.

From the above description it will be seen that the present foot covering made from an inexpensive conductive sheet material is capable of forming a conductive path from the wearer to a conductive floor, and in addition affords a readily disposable waterproof protective foot covering designed to be used once and then discarded, thus solving the problem of eliminating the possibility of cross infection from the shoes.

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.

What is claimed is:

1. A disposable shoe cover shaped and constructed to fit over and entirely enclose the shoe of the wearer formed of thin, flexible material to conform to the shape of said shoe and of the lower leg of the wearer, said cover in flattened condition prior to installation over said shoe comprising two substantially flat, parallel, congruent halves, each said half generally shaped in the outline of a shoe as viewed in side elevation and having a straight elongated bottom edge, an upstanding back edge at the rear of said bottom edge, a short upstanding toe at the front of said bottom edge, a backward-upward slanting instep edge and a top edge, said cover being open at said top edges to provide an ankle opening for insertion of said shoe, said halves joined along said bottom and toe edges, and means attached to said cover for securing said cover in place over said shoe and a portion of the lower leg of said wearer, at least a portion of said cover having an external, electrically conductive area positioned to ground to the floor when in position over the shoe of the wearer and

means for electrically connecting said area to the leg of said wearer.

2. A cover according to claim 1, in which said bottom edges of said halves are substantially straight and extend substantially the entire length of said cover.

3. A dispostable shoe cover comprising a disposable boot of relatively thin, light-weight flexible material, shaped and consrtucted to be worn over a shoe to provide a protective covering entirely enclosing said shoe, said disposable boot having means including a conductive sole portion providing a conductive path from the sole of the foot to a conductive floor, said boot being formed in flattened condition prior to insertion on a shoe of two substantially flat, parallel, congruent halves, each said half shaped in the outline of a shoe as viewed in side elevation, and formed with bottom, back, toe, instep and top edges, said cover open at said top edges for insertion of said shoe and said halves joined along said bottom and toe edges, and means attached to said cover for securing said cover in place over the shoe and a portion of the lower leg of the wearer.

4. A disposable conductive foot covering of the character described, comprising a flat bag composed entirely of thin conductive material open at one end and forming a disposable boot adapted to be worn over a shoe to provide a protective covering entirely enclosing the shoe, means for detachably securing the boot to the foot of the wearer, and means providing a conductive path from the foot through the conductive boot to a conductive floor, said boot being formed in flattened condition prior to insertion on a shoe of two substantially flat, parallel, congruent halves, each said half shaped in the outline of a

shoe as viewed in side elevation, and formed with bottom, back, toe, instep and top edges, said cover open at said top edges for insertion of said shoe and said halves joined along said bottom and toe edges, and means attached to said cover for securing said cover in place over the shoe and a portion of the lower leg of the wearer.

5. A disposable foot covering comprising a boot of relatively thin, light-weight flexible material, having a sole portion having at least a portion of its external surface conductive, a separate, substantially semi-conical upper portion generally in the form of the toe and instep of a boot secured along its bottom edges to the margin of the front of said sole portion and extending from the toe to a position forward of the heel, and a separate, substantially arcuate heel portion connected at its bottom edges to the margin of the back of said sole portion, said heel portion shaped to extend around the back of the heel of the wearer, means connected to said heel portion for securing said boot to the foot, and electrical conductive means for electrically connecting said external conductive portion of said sole with the body of the wearer.

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