

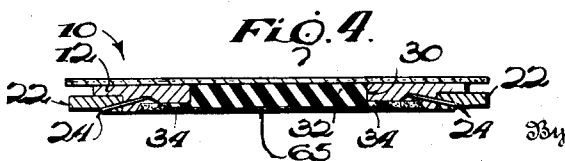
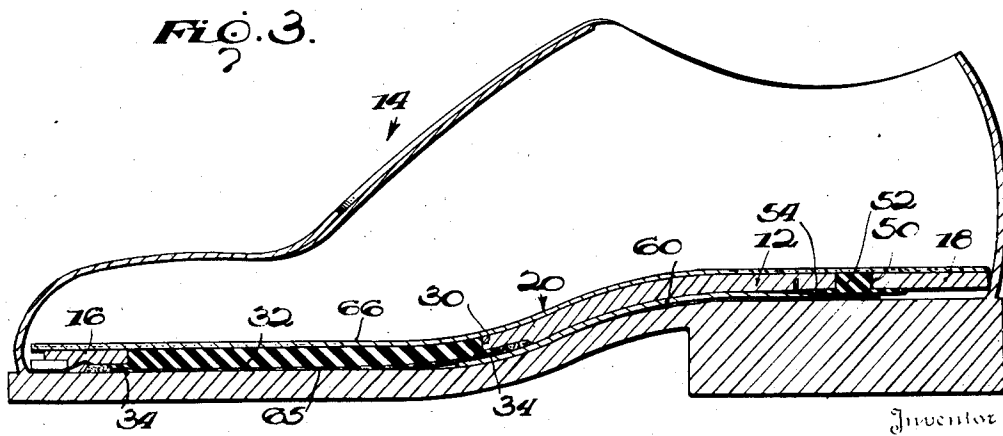
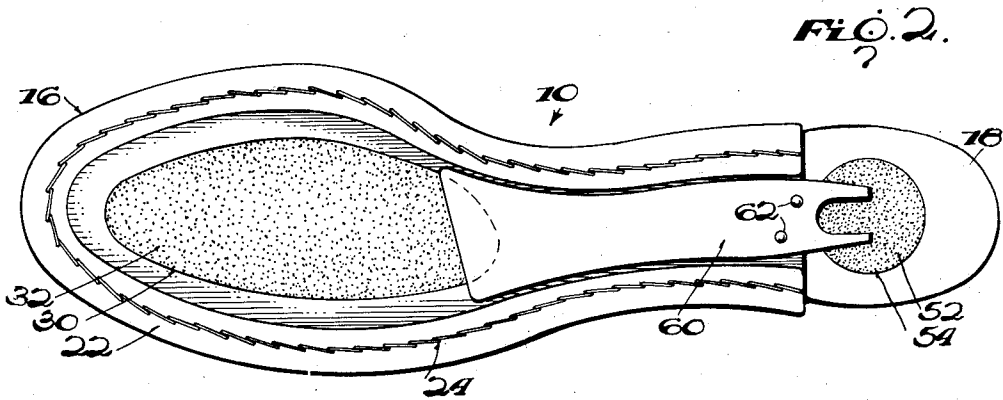
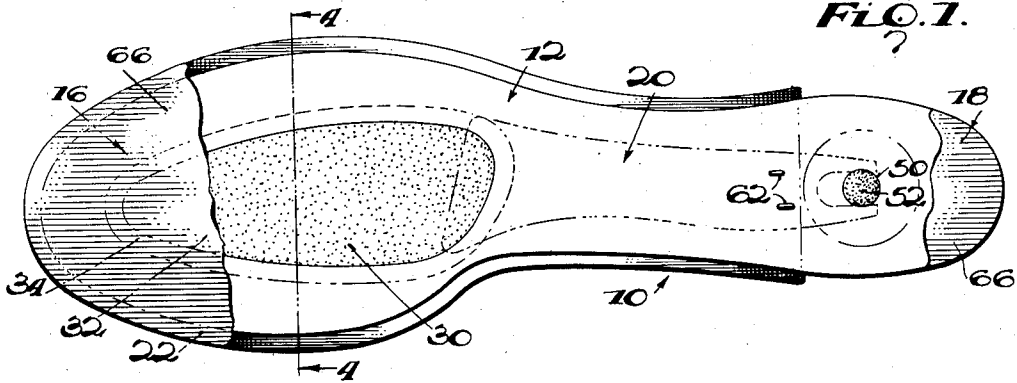
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CONDUCTIVE FOOTWEAR

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CONDUCTIVE FOOTWEAR

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The present invention relates to conductive footwear and more particularly to an insole designed for use in connection with conductive shoes and other articles of footwear wherein the outer sole, or at least an effective portion thereof, is of a conductive nature.

Footwear of the character set forth above and which is of a conducting nature is so designed that static electrical charges are not readily gathered by the human body. Furthermore, such electrical charges, if gathered, are practically instantaneously discharged through the shoe or other article of footwear directly to the supporting surface which constitutes an electrical ground or discharge body for the condenser action of the human body. Thus this type of footwear is found useful by surgeons, nurses and other attendants in operating rooms where the fumes of ether or other combustible vapors or gases are apt to be present.

Footwear of this character is also useful in certain industrial trades such as in powder plants and other places where explosives are manufactured as well as in gunnery turrets or powder magazines on board warships and in other places where extreme caution is required to prevent accumulation and accidental discharge of static electrical charges from the human body or from the clothing worn thereby.

The improved insole comprising the present invention is possessed of conducting features as will be set forth in detail hereinafter and is adapted to establish electrical communication or create a conducting electrical path between the foot of the user and the conducting outsole of the particular shoe or other article in which the insole is installed, regardless of whether this latter outsole is of a conducting nature throughout, or whether it is only partially so as in the case where metal or other conducting inserts are provided through the outsole. In either case, the improved insole may, with or without modification, be designed to establish the proper electrical communication between the foot of the user and the outsole and to otherwise serve the purposes for which it is intended.

Heretofore, various types and forms of conductive footwear have been devised for establishing an electrical path between the foot of the user and the ground. Earlier attempts to render footwear conductive have dealt with the provision of metallic plugs that extend through the sole of the shoe for making simultaneous contact with the body and the supporting surface. More recent attempts have resulted in various

methods for rendering leather and even rubber sole-forming materials conductive to provide a leakage path between the foot of the user and the supporting surface. In either case, in order to establish proper electrical connection between the foot of the user and the outsole, direct contact between the foot and outsole has been resorted to.

In the case where metal inserts are employed, the discomfort afforded by a direct skin-to-metal contact is too well known to require elaboration. Furthermore, the omission of an insole for the purpose of securing such direct electrical contact between the foot of the user and the outsole has resulted in the dispensing with the various functions of an insole and principal among which are the protection offered to the foot and to the shoe against perspiration, the comfort of the user, the reinforcing and stiffening action of the insole, the appearance of the shoe as marketed, etc.

Accordingly, the principal object of the present invention is to provide an insole for conductive shoes and other similar articles of footwear which will offer to the user of the shoe all the advantages of the ordinary insole while at the same time insuring proper electrical connection (i. e., an electrical leakage path) between the foot and the conductive outer sole of the shoe regardless of the specific nature of the latter.

Another object of the invention is to provide such an insole in which the major portion of the foot engaging surface area thereof is of a non-conducting nature thus imparting a maximum degree of comfort to the user.

A still further object of the invention is to provide an insole having associated therewith a stiffening member of metal which, during use of the shoe, constitutes a portion of the leakage path by means of which static charges of electricity originating in the human body are conducted to a source of ground potential.

Yet another object of the invention is to provide an insole possessing conductive features and which resembles the ordinary insole and is not unduly thick thus rendering it useable in the ordinary manner of insoles and without making it necessary to enlarge the size of the shoe with which it is associated.

A further object of the invention is to provide a multiple piece insole possessing conductive features.

The provision of a multiple piece insole possessing conductive features and which is of compact unitary construction; one which is rugged

and durable; one which presents to the foot of the user no obstructions or projections which would tend to render the shoe or other article in which it is installed uncomfortable; one which can be manufactured economically; and one which is well adapted to perform the services required of it, are further desirable features that have been borne in mind in the production and development of the present invention.

Other objects and advantages of the invention, not at this time enumerated, will become apparent as the nature of the invention is better understood.

In the accompanying single sheet of drawings forming a part of this application:

Figure 1 is a top plan view of a conductive insole manufactured in accordance with the principles of the present invention.

Figure 2 is a bottom plan view thereof.

Figure 3 is a sectional view taken longitudinally through the insole of Figures 1 and 2 and showing the same operatively associated with a shoe having a conductive outsole, and

Figure 4 is a sectional view taken substantially along the line 4—4 of Figure 1.

In all of the above described views, like characters of reference are employed to designate like parts throughout.

Referring now to the drawing in detail, the conducting insole is designated generally at 10 and includes an insole proper in the form of a strip 12 of leather or other suitable non-conducting material having a peripheral contour conforming to the shape of the shoe 14 or other article of footwear in which the insole is installed. The strip 12 includes a ball portion 16 and a rear heel portion 18 connected together by an arch portion 20.

Extending around the sides of the arch portion 20 and around the sides of the ball portion 16 and overlapping the edges thereof is a welt 22. This welt 22 is secured to the underneath side of the strip 12 by means of stitching 24 although it is obvious that other securing means may be employed if desired. The rear ends of the welt 22 terminate in the region of the insole proper which is adjacent the juncture between the connecting arch and heel portions 18 and 20.

A comparatively extensive opening or cut-away portion 30 is formed in the ball portion 16 of the insole proper in the medial region thereof and this opening 30 is generally of rounded triangular configuration. The opening 30 is closed by means of a conductive insert 32 (see also Figure 4) which terminates substantially flush with the upper surface of the insole proper. The insert 32 is of somewhat greater thickness than the thickness of the insole proper and is formed with a marginal flange 34 which underlies the edges of the opening 30 and which extends laterally beyond those edges to the inner edge of the welt 22.

The insert 32 may be formed of any suitable conducting material such as leather or other composition which has been treated chemically to render the same conducting. However, it is preferred that the material of the insert 32 be formed of conductive rubber on account of the softness and elasticity of the latter and on account of the waterproofing and other physical properties which render it suitable for use in connection with articles of footwear. Irrespective, however, of the specific material of which the insert 32 may be formed, the essential features of the invention are at all times preserved.

The heel portion of the insole proper is like-

wise formed with an opening 50 centrally thereof and this latter opening may be of circular contour. A conductive insert 52 is disposed in the opening 50 and terminates flush with the upper surface of the insole. The insert 52 is slightly thicker than the insole and a peripheral flange 54 underlies the edges of the opening 50. The material of the insert 52 is preferably the same as the material of the insert 32 and both inserts may be received in their respective openings by a forced fit or by cementing or the like.

An arched stiffening piece 60 which is preferably formed of metal is secured to the insole proper on the underneath side thereof and underlies and contacts a portion of the underneath surface of the insert 52. The specific securing means employed for this purpose may be in the form of rivets 62 or the like which are preferably situated adjacent the opening 50. The stiffening piece 60 extends forwardly along and is free of the arch portion of the insole proper and overlaps the rear portion of the insert 32 and contacts the latter thus establishing a direct conductive path of low resistance between the inserts 32 and 52.

When the insole is installed or incorporated in a shoe or other article of footwear as shown in Figure 3, a layer of a conductive filler material 65 is applied to and substantially covers the underneath side of the ball portion of the assembled multiple-piece insole 10. This filler material is in intimate contact with the underneath side of the ball portion 16 of the insole proper and of the conductive insert 32. The welt 22 which, in effect forms a raised marginal ridge extending around the forward and side edges of the insole proper serves to confine the conductive filler material to an effective area of the insole.

Substantially the entire upper surface of the strip 12 as well as the upper surfaces of the inserts 32 and 52 may have secured thereto by a suitable adhesive, a sock lining 66 which is formed of a conductive material such as conductive rubber, or leather which has been treated to render the same conductive. The sock lining 66 being in intimate contact with both inserts 32 and 52 serves to establish a permanent high resistance conductive path between the two inserts.

Inasmuch as the sole of the shoe with which the conductive insole is incorporated is of a conductive nature, an electrical connection between the insert 52 and the sole is effected by direct contact between these parts as well as by the direct contact of the insert with the stiffening member 60 which bears against the sole proper of the shoe. Electrical communication between the insert 32 and the sole of the outer shoe is obtained by conduction of electrical charges through the conductive filler material 65.

It will be seen from the above description that in actual use of the present insole, electrostatic charges gathered in the human body will be conducted safely to the ground either through the opening 30 adjacent the ball of the foot or the opening 50 adjacent the heel of the foot by means of the inserts 32 and 52 which are exposed to the foot through these openings, and which make electrical contact with the conductive sole of the outer shoe with which the insole is incorporated. The term "relatively soft" as used herein is applicable to conductive rubber and leather or other similar material which has been rendered conductive by a suitable processing operation. Such a term is designed to distinguish the conductive material used in both the inner and outer soles from harder and more rigid

materials such as metal which are perfect conductors and, unlike these softer materials, do not afford a slow leakage path for static electrical charges to the ground.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawing or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit of the invention. Only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

What is claimed is:

1. A conductive shoe comprising a conductive outsole designed for direct contact with the ground, said outsole being formed of relatively soft flexible material which presents a relatively high resistance to static electrical charges, an insole substantially coextensive with the inner face of said outsole, said insole comprising a strip of relatively soft material including a ball portion, a heel portion and a connecting arch portion, there being openings extending completely through the ball and heel portions of said strip respectively, and an insert of relatively soft flexible conductive material disposed in each of said openings, said inserts also presenting a relatively high resistance to static electrical charges and conductively connected to said outsole whereby such charges are slowly and without an attendant spark conducted from the foot through the insole and outsole to the ground.

2. A conductive shoe for personal wear com-

prising a conductive outsole designed for direct contact with the ground, said outsole being formed of relatively soft flexible material which presents a relatively high resistance to static electrical charges, an insole substantially coextensive with the inner face of said outsole, said insole comprising a strip of relatively soft material including a ball portion, a heel portion and a connecting arch portion, there being openings extending completely through the ball and heel portions of said strip respectively, an insert of relatively soft flexible conductive material disposed in each of said openings, said inserts also presenting a relatively high resistance to static electrical charges and being conductively connected to said outsole, and a member formed of conductive material electrically connecting said inserts.

3. A conductive shoe for personal wear, comprising a conductive outsole designed for direct contact with the ground, said outsole being formed of relatively soft flexible material which presents a relatively high resistance to static electrical charges, an inner sole substantially coextensive with the inner face of said outsole, comprising a strip of relatively soft material having an opening therein, an insert of relatively soft flexible conductive material disposed in said opening, said insert also presenting a relatively high resistance to static electrical charges and being conductively connected to said outsole.

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