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3,359,456

STATIC ELECTRICITY DISCHARGE DEVICE FOR USE ON SHOES

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FIG. 1.

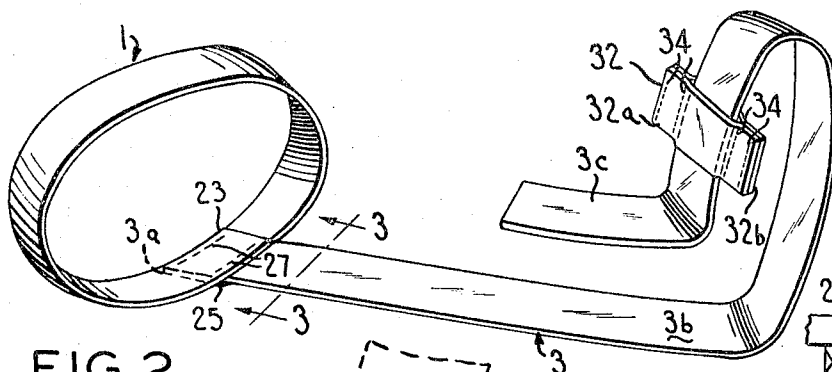


FIG. 2.

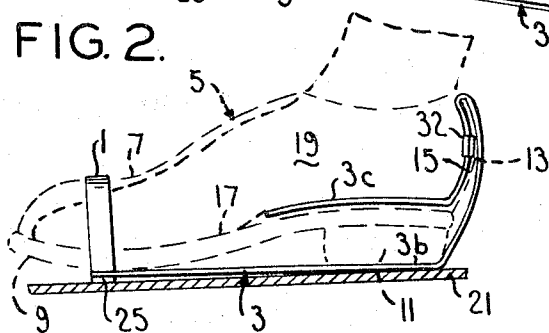


FIG. 4.

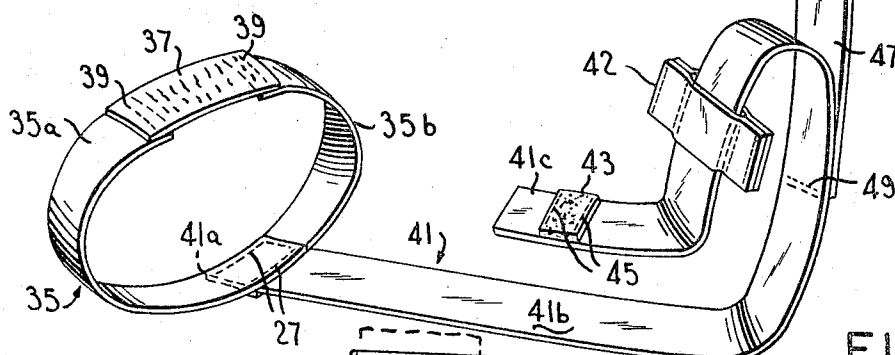


FIG. 5.

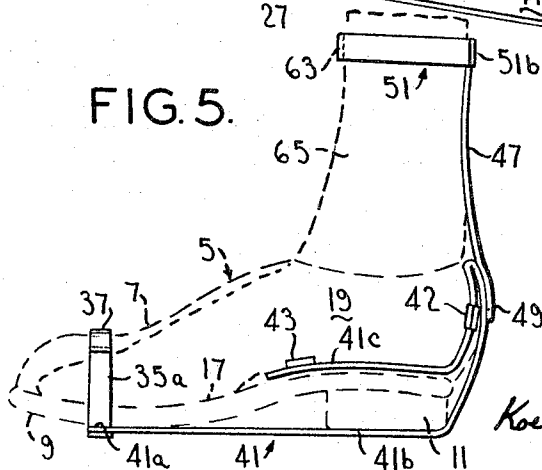


FIG. 3.

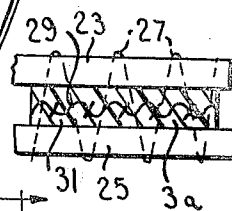
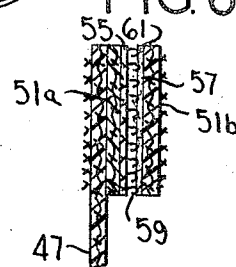


FIG. 6.



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STATIC ELECTRICITY DISCHARGE DEVICE FOR USE ON SHOES

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This invention relates to static electricity discharge devices for use on shoes of personnel in hospital operating rooms and other environments where static electricity needs to be conducted away from the body of an individual to the floor.

It will be understood that it is of utmost importance to eliminate static electricity in operating rooms to avoid fire hazard. Heretofore, it has been customary for personnel in the operating room to wear shoes with conductive inserts or special overshoes to conduct static electricity away from the body to the floor of the operating room (which is electrically conductive), but such shoes and overshoes are inconvenient to use and involve substantial cost.

Accordingly, among the several objects of this invention may be noted the provision of a static electric discharge device adapted to be worn on street shoes and which is so constructed as to be easy to put on over the street shoes and placed in contact with the body; the provision of a device such as described which may be used for conducting static electricity from the bodies of persons with skin of low electrical conductivity; the provision of a device such as described which fits over street shoes of various sizes; the provision of devices such as described which may be manufactured either from materials which are resistant to strain and which may be laundered and sterilized or from materials which are sufficiently inexpensive to permit economical disposal of the device after a single use; the provision of a device of the type described which remains in the desired position on a shoe even though the device is narrower than the shoe; and the provision of devices such as described which are constructed so that they are economical to manufacture. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated,

FIG. 1 is a perspective view of a static electricity discharge device of this invention showing the parts generally in the positions they assume when the device is worn on a street shoe;

FIG. 2 is a view on a smaller scale showing the FIG. 1 device on a street shoe illustrated in phantom;

FIG. 3 is an enlarged fragmentary section on line 3-3 of FIG. 1;

FIG. 4 is a perspective similar to FIG. 1 showing a modified form of the static electricity discharge device of this invention;

FIG. 5 is a view showing the FIG. 4 device on a street shoe and leg of a person illustrated in phantom; and

FIG. 6 is an enlarged fragmentary section on line 6-6 of FIG. 4.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, a static electricity discharge device of this invention is shown generally to comprise a loop 1 formed from a thin, narrow strip of flexible electrically conductive material attached to one end portion

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of a strap 3 of the same conductive material. The device is positionable over a street shoe indicated at 5 in FIG. 2 with loop 1 extending around the vamp portion 7 and beneath the outer sole 9 of the shoe for holding the device on the shoe. Strap 3 extends from loop 1 along the outer sole 9 and beneath the heel 11, then upwardly against the outer surface of the counter 13 of the shoe, and then into the shoe where it lies along the backstay 15 and extends forward on the insole 17 of the shoe. When the foot 19 of a person is positioned in the shoe 5, the foot engages the portion of strap 3 inside the shoe so that static electricity from the person is conducted from the foot through strap 1 and to the floor 21 on which the person is standing.

More specifically, the loop 1 of the static eliminating device shown in FIGS. 1-3 comprises a narrow, one-piece length of a suitable conductive tape of uniform width having end portions 23 and 25 overlapping each other. An end portion 3a of strap 3 (which may consist of a length of the same tape material) is sandwiched between loop end portions 23 and 25 as best illustrated in FIG. 3. The end portions of loop 1 and strap end portion 3a are sewn together by lines of stitching shown at 27. The length of strap 3 is generally perpendicular to a plane through loop 1.

Loop 1 and strap 3 are preferably made from an abrasion-resistant electrically conductive elastomeric sheet material comprising, for example, a core of nylon fabric 29 (FIG. 3) covered or impregnated with conductive neoprene material 31 containing carbon black. This material has a high stain resistance which makes it desirable for use in hospitals where the device is to be cleaned and sterilized after each use in the operating room. Strap 3 can also be made of a less expensive conductive material such as polyethylene containing carbon black to make it conductive. Since conductive polyethylene material is relatively inexpensive, a static discharge device made from this material may be economically disposed of after only a single use in an operating room. Because the end portion 25 of loop 1 is beneath strap 3, the loop 1 is preferably made of the same conductive material as strap 3. If a nonconductive material is desired for loop 1, then the connection of the strap and loop shown in FIG. 3 can be rearranged to place the strap end portion 3a beneath the end portions 23 and 25 of the loop.

A strip 32 is slidable along strap 3. This strip comprises two lengths of material 32a, 32b positioned on opposite sides of the strap and sewn together by lines of stitching 34. The material used for strip 32 may be the same as the material used for loop 1 and strap 3. The inner lines of stitching 34 are spaced from the side edges of strap 3 at the backstay 15 of the shoe so that the strip can be freely adjusted along the strap to accurately position the strip at the backstay.

The static discharge device of FIGS. 1-3 can be placed over the shoe 5 by slipping the loop 1 over the toe end of the shoe so that the top of the loop is generally at the vamp 7 of the shoe and the end portions 23 and 25 of the loop lie beneath the outsole 9. An intermediate portion 3b of strap 3 is then positioned beneath the outsole 9 and the heel 11 of the shoe. The end portion 3c of strap 3 is positioned along the insole 17 and the backstay 15 of shoe 5 where it can be contacted by the heel and sole of the foot 19 in the shoe. Strip 32 is moved along strap 3 to that it is between the heel of the foot and the backstay of the shoe. Strip 32 and the end portion 3c of the strap are, of course, positioned in the shoe prior to placing the foot 19 in the shoe. When the strap is very narrow it tends to slip off the counter 13 and the heel 11 of the shoe. Slipping of the strap is prevented by strip 32. Static electricity is conducted through the strap 3 to floor

21 which may be a conductive tile of the type commonly used in operating rooms of hospitals.

FIGS. 4-6 illustrate a modified form of a static-eliminating device of the invention. This device includes a loop generally designated 35 which comprises two portions 35a and 35b joined by an elastic band 37 secured by lines of stitching 39 to the end of the loop portions. The elastic 37 permits loop 35 to snugly fit over shoes of various sizes, thereby reducing the number of sizes that need to be stocked by a hospital. The ends of loop portion 35a and 35b opposite from elastic 37 are secured to each other and to an end portion 41a of a strap 41 in the same or similar manner to that illustrated in FIG. 3. Strap 41 has an intermediate portion 41b adapted to be positioned beneath the outer sole 9 and heel 11 of the shoe and an end portion 41c which is normally position inside the shoe along the insole and backstay of the shoe. A strip 42 is slideable along end portion 41c of the strap. Strip 42 is the same as strip 32 previously described.

A sponge 43 is sewn to the end 41c of strap 41 by lines of stitching 45. Sponge 43 is on the surface of strap end 41c which is contacted by the foot 19. Sponge 43 can be a cellulose sponge and it is adapted to receive and hold an electrically conductive solution such as water, electrolytic jellies or other solutions. The sponge and solution it holds insures good conduction of static electricity from the body to strap 41 thereby making the device particularly suitable for people who have dry skin which is generally nonconductive. Sponge 43 may also contain salt so that when moistened by perspiration or by applying water it increases the conductivity between the skin and the strap.

A connecting strap 47 is attached at its lower end to an intermediate portion of strap 41 by a line of stitching 49 and it is attached at its upper end to one end portion of a leg band 51 by lines of stitching 53. Lengths of cooperable fabric fastener material 55 and 57 are used to close the leg band or strap 51. The fastener material 55 is sewn to the outer surface of an end 51a of leg band 51 and the fastener material 57 is sewn to the inner surface of the other end 51b of the leg band. The fabric fastener 55 has a multiplicity of hook-like pile elements 59 (FIGS. 4 and 6) which project outwardly away from the leg strap. The other length of fastening material 57 has a loop pile surface 61 facing inwardly for interengagement with the hook-like pile elements 59. The lengths of fastener material 55, 57 are connected together by placing them in overlapping relation and pressing the pile surface 61 against the pile elements 59, and the lengths of material can be separated by pulling either of the lengths of material away from the other. The lengths 55 and 57 of fastener material are available commercially under the trademark Velcro and are similar to the materials shown in the De Mestral U.S. Patent 2,717,437 issued Sept. 13, 1955.

There is a sponge 63 secured to the inside surface of an intermediate portion of the leg band 51. Sponge 63 can hold electrolytic jellies, salt, etc. and performs the same function as the sponge 43 previously described. Sponge 63 is positioned so that it engages the front of the leg when the band 51 is fastened around the leg.

Loop 35 and straps 41, 47 and 51 can be made from the conductive materials previously described. In both embodiments of the invention the loops and strap can be entirely fabricated from narrow conductive tape stock of a single, uniform width, thereby making the devices very economical to manufacture.

The static-eliminating device of FIGS. 4-6 is positioned on the shoe and around the leg of the body by first stretching the elastic 37 and pulling loop 35 over the toe of the shoe until the loop surrounds the vamp portion 7 and the outer sole 9 of the shoe. Then strap 41 is placed along the bottom of the outer sole 9 and heel 11 of the shoe, around the counter and backstay of the shoe, and end 41c

is positioned along the inner sole 17 with sponge 43 facing upwardly as shown in FIGS. 4 and 5 so that it can be contacted by the foot 19 when placed in the shoe. Strip 42 is moved along the strap so that it is positioned along the backstay of the shoe. With the foot in the shoe, the free end 51b of the leg band or strap 51 is wrapped around the leg 65 to place sponge 63 in engagement with the front of the leg. Then the pile surfaces 59, 61 are engaged to hold the leg strap around the leg. Sponges 43 and 63 can hold water or various types of conductive substances of the type set forth to facilitate conduction of static electricity from the foot and leg of the body through the conductive leg band 51 and straps 41 and 47 to carry the static electricity from the body to the floor. In some instances sponges 43, 63 are not needed and one or both of them may then be eliminated.

In both embodiments of the invention there are three plies or thicknesses of conductive material between the sole 9 and floor 21 at the point where the loops and straps are sewn together. This provides a high pressure contact between the static-eliminating devices and the floor to insure good conductivity of electricity to the floor. The width of the straps and loops is substantially less than the width of the shoe sole which also provides a high pressure contact between the devices and the floor. The strips 32, 42 prevent the narrow straps from sliding sideways off the counter and heel of the shoe.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A static electricity discharge device for use in operating rooms over street shoes, the device comprising a narrow flexible loop of substantially uniform width adapted to fit around the vamp and outsole of a street shoe, and a long, narrow electrically conductive strap of substantially uniform width throughout its length, the strap being secured to the loop and adapted to extend from the loop along the shoe outsole, heel, counter and insole whereby static electricity can be conducted through the strap from a foot in the shoe to a floor beneath the shoe.

2. A device as set forth in claim 1 wherein the loop is electrically conductive, the loop has end portions positioned on opposite sides of an end portion of the strap, and the loop end portions are sewn to the strap end portion by a line of stitching.

3. A device as set forth in claim 1 wherein a portion of the loop is elastic whereby the loop can snugly fit around the vamp and outer sole of shoes of various sizes.

4. A device as set forth in claim 1 further comprising a sponge secured to the end portion of the strap opposite from the loop, the sponge being positionable inside the shoe for contact with a foot therein.

5. A device as set forth in claim 1 further comprising a band of conductive material for positioning around a leg above the shoe, and conductive means connecting the leg band to the strap.

6. A device as set forth in claim 5 further comprising a sponge attached to the inside of the leg band.

7. A device as set forth in claim 5 wherein the loop, strap, leg band and the means connecting the leg band to the strap are all of uniform width.

8. A device for use in operating rooms over street shoes, the device comprising a narrow flexible loop formed by overlapping end portions of a strip of electrically conductive material, the loop having a substantially uniform width and being adapted to fit around the vamp and outsole of a street shoe, and a long, narrow electrically conductive strap, the strap having a substantially uniform

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width throughout its length and being narrower than the width of the sole of a street shoe, the strap having an end portion sandwiched between the end portions of the strip forming the loop and being secured to the loop by a line of stitching, the strap being adapted to extend from the loop along the shoe outsole, heel, counter and insole whereby static electricity can be conducted through the strap from a foot in the shoe to a floor beneath the shoe.

9. A static-eliminating device as set forth in claim 8 further comprising a sponge in electrically conductive relation with the strap, the sponge being adapted to hold an electrolytic solution for increasing conductivity between the skin of a person and the strap.

10. A static-eliminating device as set forth in claim 8 wherein at least a portion of the loop is elastic whereby the device may be worn over shoes of various sizes.

11. A device as set forth in claim 1 further comprising a strip of material projecting laterally from the strap and positioned on the strap to engage the backstay of the shoe.

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12. A device as set forth in claim 8 further comprising a strip of conductive material projecting laterally from the strap and positioned on the strap to engage the backstay of the shoe, the strip comprising two lengths of conductive material positioned on opposite sides of the strap and sewn together along lines of stitching at the ends of the strip, the lines of stitching being spaced from the sides of the strap so that the strip is freely adjustable along the strap.

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