March 2, 1954

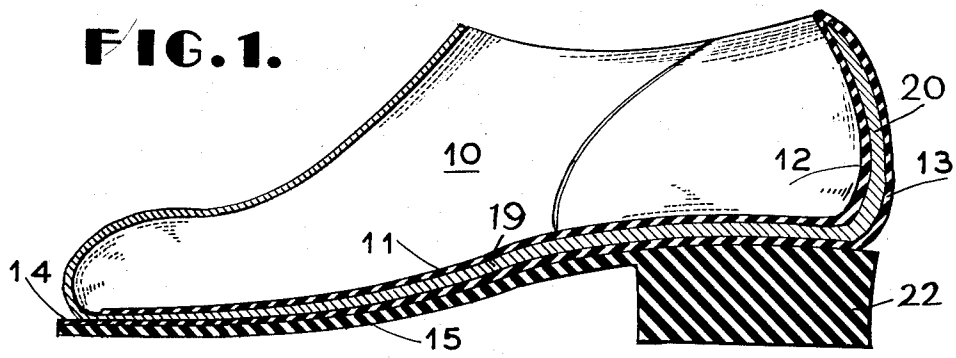
O. I. BLOOM

2,671,185

CONDUCTIVE SHOE DEVICE

Filed March 15, 1952

FIG. 1.



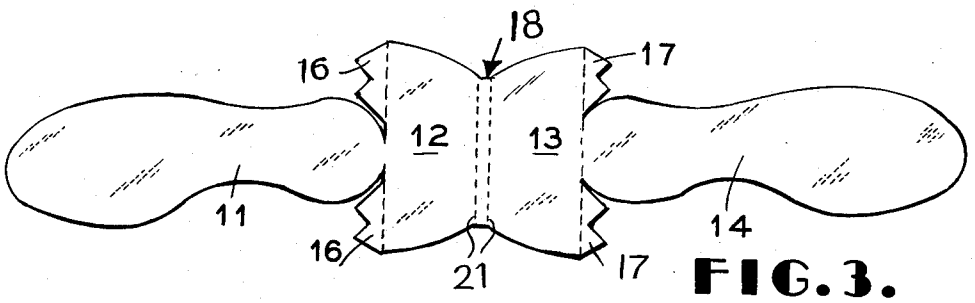


FIG. 3.

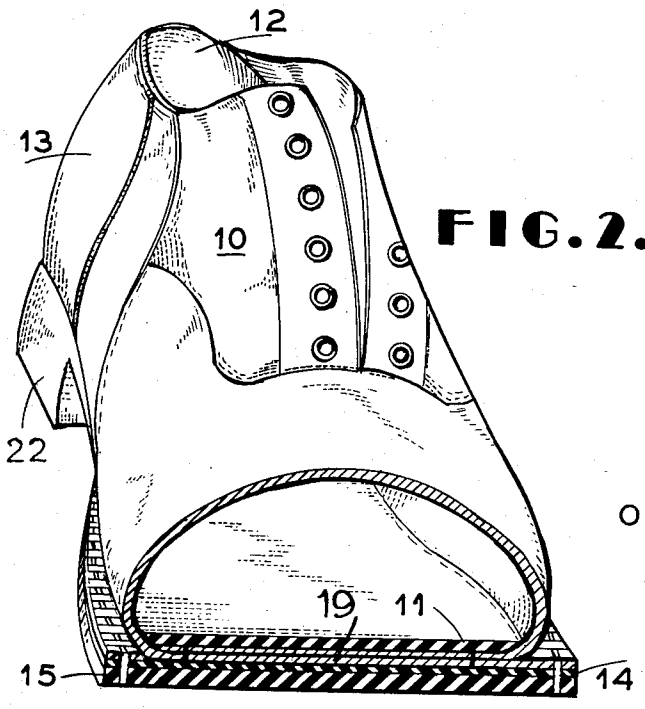


FIG. 2.

OTTO I. BLOOM

INVENTOR.

Otto I. Bloom M.D.

Patented Mar. 2, 1954

2,671,185

UNITED STATES PATENT OFFICE

2,671,185

CONDUCTIVE SHOE DEVICE

Otto I. Bloom, New York, N. Y.

Application March 15, 1952, Serial No. 276,863

3 Claims. (Cl. 317—2)

1

This invention relates to means for converting shoes which are not ordinarily electrically conductive into electrically conductive shoes and particularly to the conversion of such shoes by the application of a reduplicated wrapper or envelope of conductive material to surround the shoe-counter and rest in intimate contact with the inner and outer sole areas of the shoe.

The wearing of conductive shoes is important when working in areas where explosive dust, fumes or gases are used or stored or may develop. Such areas exist in plants where explosives or chemicals are manufactured or the operating rooms of hospitals where such gases are used for anaesthesia. In such areas the development of static electricity is a hazard because the sudden dissipation of such an electric charge may result in an explosion with serious consequences to life and property. The wearing of conductive shoes is one means of preventing such sudden discharges.

Static electricity develops when dissimilar materials are pressed or rubbed together. In this action free electrons may leave one material and attach themselves to the surface of another. In such instances the object which has lost electrons is said to be positively charged and the object which has gained electrons, negatively charged. Friction or rubbing is conducive to the transfer of electrons. If the materials are separated and if one or both are non-conductors, this unequal distribution of electrons will persist. Positive and negative charges of electricity which are kept apart by non-conductors have no pathway of flow and are said to be at rest or "static." Static electricity on an insulated body, such as a surgeon wearing non-conductive shoes, can suddenly discharge through the air if an object of different potential is brought near. The result may be a spark which although too small to be seen or felt, may nevertheless develop enough heat to ignite an explosive mixture of anaesthetic and oxygen.

In no area of comparable size are the hazards of gas explosions so great as in an operating room or delivery room. The presence of many materials at different potentials such as rubber pads on operating tables, sheets, rubber gloves and non-conductive shoes contribute to this hazard. Maintenance of high humidity in the area, the use of conductive flooring, sheeting and rubber, and the proper grounding of all equipment are some measures of a preventive nature. For the grounding of personnel (surgeons, nurses and others working in the area) the wearing of omni-

2

effective conductive shoes is an accepted and approved practice.

New conductive shoes are presently available commercially. However such shoes have a disadvantage from the standpoint of shape, size, fit and comfort as related to the feet of the wearer. An individual purchasing an ordinary non-conductive pair of shoes has a choice of several thousands of shapes (lasts) because the market for ordinary shoes serving the general population is great enough to warrant the production of so great a number of shapes. Consequently, the individual has a high chance of obtaining a comfortable fit. On the other hand, because of the limited market, the individual purchasing a pair of conductive shoes may not always be able to obtain the comfortable fit which a wide variety of lasts affords. Surgeons, nurses, students and others working in the operating area are constantly under tension, do a great deal of walking, and hence shoe-comfort is a compelling necessity. As a matter of fact, surgeons and nurses frequently keep their oldest and most comfortable shoes in the operating suite lockers and change into these from dress shoes because of the comfort they derive from working in these older, well worn and therefore better fitting shoes.

Since it is economical to convert a worn pair of shoes into a conductive state rather than to build a new one, and since such old shoes are immediately comfortable and properly shaped to the wearer's foot without having to be "broken in," it is clear that this invention is novel, practical and useful. Such conversion does not materially modify the structure or shape of the shoe and it carries over into the converted shoe all the advantages of foot comfort inherent in a pair of shoes that have already molded themselves to the contour of the wearer's foot.

It is therefore an object of this invention to provide a simple, efficient and economical means for the conversion of shoes from an electrically non-conductive state to an electrically conductive condition.

An additional object of this invention is to provide for the conversion of any type, shape or size shoe from a non-conductive to a conductive state without materially altering the fit, shape, last or basic contours of the shoe. The existing features of comfort and fit of the shoes are retained while effecting such conversion.

A further object of this invention is to effect the aforementioned conversion in such manner as to provide an extensive area of contact between

the foot of the wearer and an electrically conductive inner sole co-extensive therewith and a similar contact area for the outer sole of the shoe electrically continuous with said inner sole, thereby assuring the existence of a continuous electrically conductive path from the body of the wearer to a supporting surface. The conductive path so provided is present at all times and in all positions assumed by the foot of the wearer.

Another object of this invention is to provide a unitary blank of conductive material which is adapted to be doubled over upon itself, or reduplicated, to thereby provide a jacket, wrapper or envelope for the inner and outer surface areas of the counter and sole portions of a shoe; thereby providing a continuous and uninterrupted physical electrically conductive path from the interior of said shoe to exterior or surface contacting portions thereof.

It is also an object of this invention to provide a device of the character indicated wherein an extensive portion of the surface including the lower, posterior and lateral aspects of the heel makes electrical contact with a layer of conductive material in addition to the extensive contact area provided for the sole of the wearer.

This invention also has as one of its principal objects the provision of a blank of the character and for the purposes indicated which is capable of being readily and effectively shaped to conform to the contours of the parts of an existing shoe.

For the attainment of these and such other objects as may hereinafter appear or be pointed out, I have illustrated an embodiment of my invention in the drawings wherein:

Figure 1 is a cross-section of a shoe which has been converted in accordance with the present invention,

Figure 2 is a perspective view showing a cross-section of the toe portion of the shoe, and

Figure 3 is a plan view of a conductive blank in accordance with my invention shown on a reduced scale.

In its general aspect the invention contemplates the use of an elongated blank of a comparatively thin flexible sheet of conductive material the extremities of which conform to the outline of the inner and outer soles of the shoe; said extremities being connected with a central portion which is adapted to be conformed to the inner and outer surfaces of the counter portion of the shoe. The blank is adapted to be folded or reduplicated upon itself along its central line and thus provide a continuous electrical path from the interior to the exterior portions of said shoe.

As may be more particularly seen from Figure 3 the blank comprises an elongated strip designated generally by the numeral 18. Said blank is formed of a comparatively thin flexible sheet of electrically conductive material such as conductive rubber or leather. It will be understood however that similar materials suitable for providing a safe discharge path for static electricity may be utilized for this purpose. The material of which blank 18 is formed may, if desired, be laminated with fabrics. One extremity of the blank 18 is cut to the contour of the insole or sock lining of a shoe to form a liner therefor, while the other extremity 14 is similarly cut to conform generally to the outline of the outer sole of a shoe to form an outsole cover or what will be referred to herein as a nether sole. Extremities 11 and 14 are connected by means of an intermediate section comprised of the counter lining and counter covering portions 12 and 13 respectively. The transversely extending edges of said counter lining and covering portions are provided with projecting tabs 16 and 17 respectively, the purpose of which will more clearly appear hereafter. The blank may be advantageously formed by die cutting or may be formed by other suitable methods.

Blank 18 is adapted to be folded over upon itself or reduplicated as indicated by the broken lines 21. In so folding the blank a body is formed which may be characterized as a conductive envelope, jacket or wrapper adapted to be integrated in a shoe structure in a manner which may be more clearly seen from Figures 1 and 2 which illustrate a shoe which has been converted to electrical conductivity in accordance with the present invention. In the illustrated application of the invention, the normal inner sole or sock lining of the shoe to be converted has been removed as well as the outer sole and heel thus leaving the shoe upper connected to the midsole 19. It should be noted that the removal of these parts in no way affects the build, or shape thereof, and thus leaves the fit and foot comfort of the converted shoe unimpaired. In fact, the removal of these parts is normally effected in the repair and resoling of shoes. The wrapper or jacket comprised of blank 18 is then positioned over the shoe counter 20 so that one extremity 11 thereof assumes the place and function of the normal insole or sock lining. The interior surface of the shoe counter 20 is covered by portion 12 which thus forms a liner therefor. In this connection, it should be noted that tabs 16 are adapted to be folded inwardly and inserted under the heel portion of the insole liner portion 11 thereby erecting counter liner 12 and permitting said counter liner to be brought snugly against the interior surface of said counter. This permits the blank to rest in intimate surface contact with the interior sole surface of the shoe and the counter surface.

Counter cover portion 13 of the blank is bent over to surround the exterior surface of shoe counter 20 without in any manner disturbing its construction, and may be advantageously secured in position by cementing or other suitable means. As heretofore stated, counter cover portion 13 of the blank is formed with tabs 17 extending from its transverse edges. These tabs are adapted to be folded and inserted under the heel section of nether sole 14 thereby causing said counter cover 13 to be erected and to be conformed to the convex surface contour of the exterior of the shoe counter. The counter cover portion of the blank is thus securely anchored to the shoe structure and imparts a finished appearance thereto.

In the embodiment of the invention herein illustrated, the normal outer sole and heel of the shoe has been removed thereby exposing midsole 19. The nether sole portion 14 of blank 18 is then secured to the exposed under surface of said mid-sole in a suitable manner as by cementing. A conductive outer sole 15 is then applied to the undersurface of nether sole 14 and the two meeting surfaces are secured with an electrically conductive cement. An electrically conductive heel piece or heel support 22 is similarly secured in position thus establishing electrical continuity with blank 18. The entire assembly is then advantageously additionally secured to the shoe as by sewing around the edges or by other suitable means. The conductivity of a shoe so converted is effective in all positions

of the foot as the shoe makes contact with the floor.

Although in the illustrated embodiment of the invention, the normal outer sole has been removed and an independent conductive outer sole is secured to the nether sole portion 14 of the blank, it will be understood that such additional conductive outer sole may be dispensed with and the nether sole may be applied and secured to the undersurface of the existing outer sole without the removal of said outer sole from the shoe. This arrangement is particularly desirable in converting thin soled shoes such as those worn by women. Under such conditions it is merely necessary to secure a conductive heel piece or heel support such as shown at 22 in electrical contact with the heel portion of nether sole 14 as by cementing with an electrically conductive cement. In this form of the invention, the remainder of the nether sole portion 14 of the blank 18 functions as an outer sole and thus completes the electrically continuous path from the interior of the shoe. It will also be understood that many of the advantages of the present invention may be realized by the incorporation thereof into new shoe structures.

I have here shown and described a preferred embodiment of my invention. It will be apparent, however, that this invention is not limited to this embodiment and that many changes, additions and modifications can be made in connection therewith without departing from the spirit and scope of the invention as herein disclosed and hereinafter claimed.

I claim:

1. A conductive shoe comprising an outer sole of ground-engaging electrically conductive material and a mid-sole with a shoe upper and counter secured thereto, a first sheet of electrically conductive material having a toe and heel portion overlying the mid-sole, and a counter portion extending therefrom, a second sheet of electrically conductive material having a toe and heel portion and a second counter portion extending therefrom and underlying the mid-sole, the two counter portions being conductively secured to one another along a portion of their meeting ends to form a continuous electrical path therebetween, said second sheet overlying said outer sole, whereby the said sheets together with their counter portions and the outer sole

constitute an electrical grounding path for the wearer.

2. A conductive shoe comprising an outer layer of ground-engaging electrically conductive material and a mid-sole with a shoe upper and counter secured thereto, a first sheet of electrically conductive material having a toe and heel portion overlying the mid-sole, and a counter portion extending therefrom, a second sheet of electrically conductive material having a toe and heel portion and a second counter portion extending therefrom and underlying the mid-sole, the two counter portions being conductively secured to one another along a portion of their meeting ends to form a continuous electrical path therebetween, said second sheet overlying said outer layer, whereby the said sheets together with their counter portions and the outer layer constitute an electrical grounding path for the wearer.

3. In an electrically conductive shoe including an outer sole of electrically conductive material, a mid-sole, a shoe counter and upper extending therefrom, a conductive envelope for said shoe comprising a first sheet of electrically conductive material having a toe and heel portion overlying said mid-sole with a counter portion extending from said heel portion overlying the interior surface of said shoe counter, a second sheet of electrically conductive material having a toe and heel portion overlying the under-surface of said mid-sole and in electrical contact with the upper surface of said outer sole, a counter portion extending from the heel portion of said second sheet overlying the exterior surface of said shoe counter, said counter portions being conductively secured to one another along a portion of their meeting ends to form a continuously electrically conductive path therebetween.

OTTO I. BLOOM.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
497,822	Royer	May 23, 1893
2,261,072	Monahan	Oct. 28, 1941
2,279,094	Siers	Apr. 7, 1942
2,287,744	Monahan	June 23, 1942
2,407,189	Taber	Sept. 3, 1946