United States Patent

Ericson

[15] **3,684,922**

[45] **Aug. 15, 1972**

[54] **ANTI-STATIC PLASTIC SHOE COVER AND METHOD OF MAKING SAME**

[72] Inventor: **Richard E. Ericson,** Keene, N.H.

[73] Assignee: **Elliot Laboratories, Inc.,** Fitzwilliam, N.H.

[22] Filed: **Aug. 2, 1971**

[21] Appl. No.: **168,256**

[52] **U.S. Cl.** .....**317/2 B,** 36/7.1

[51] **Int. Cl.** **A61n 1/14**

[58] **Field of Search** .....317/2 B; 36/7.1, 7.4, 10

[56] **References Cited**

UNITED STATES PATENTS

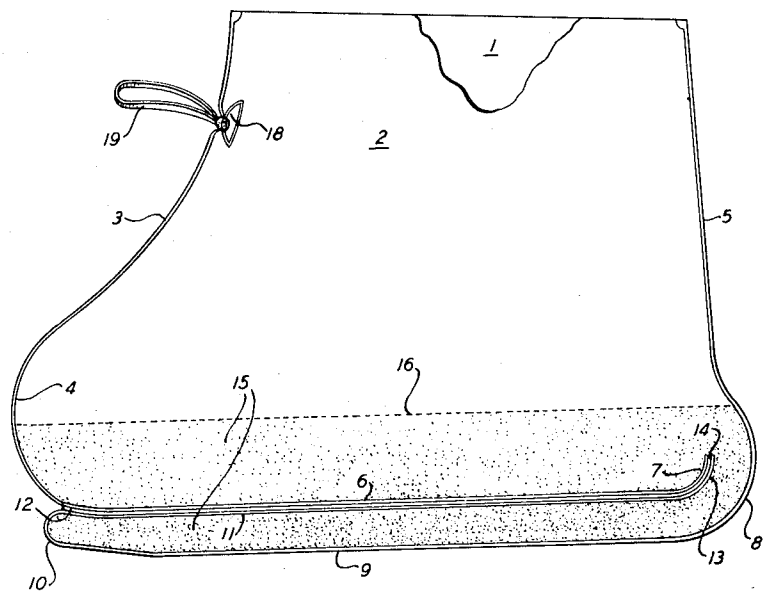
3,564,335	2/1971	Siegel	317/2 B
3,426,454	2/1969	Mitchell et al	36/10
2,958,964	11/1960	Abel	36/10

Primary Examiner—J. D. Miller
Assistant Examiner—Harry E. Moose, Jr.
Attorney—W. Saxton Seward

[57] **ABSTRACT**

A shoe cover adapted to be worn over other footwear by operating room personnel, including physicians and nurses, the cover having electrically conductive surface portions disposed to ground the bodies of wearers to the floor and thus prevent the build-up of static-electric charges which might cause a spark near explosive gases, the cover being formed from flat sheets of plastic material sealed together and cut along lines defining the front and rear edges of the cover and a bottom line defining one edge of an integral connecting strip, and being also sealed and scored (weakened) along a line parallel to said bottom line which defines the lower edge of the shoe cover and the upper edge of the connecting strip, said strip and an adjacent portion of the cover being rendered conductive by the application thereto of a conductive surface coating. The double sealed and scored line stops short of the rear edge and the cover is prepared for use by tearing strip along the scored line to the end thereof, whereby the strip is available to be tucked into the heel of the wearer's shoe to provide a continuous conductive path from the foot, along the surface of the strip to the adjacent conductive surface area of the cover and thence to the floor.

7 Claims, 5 Drawing Figures



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SHEET 1 OF 3

FIG. 1

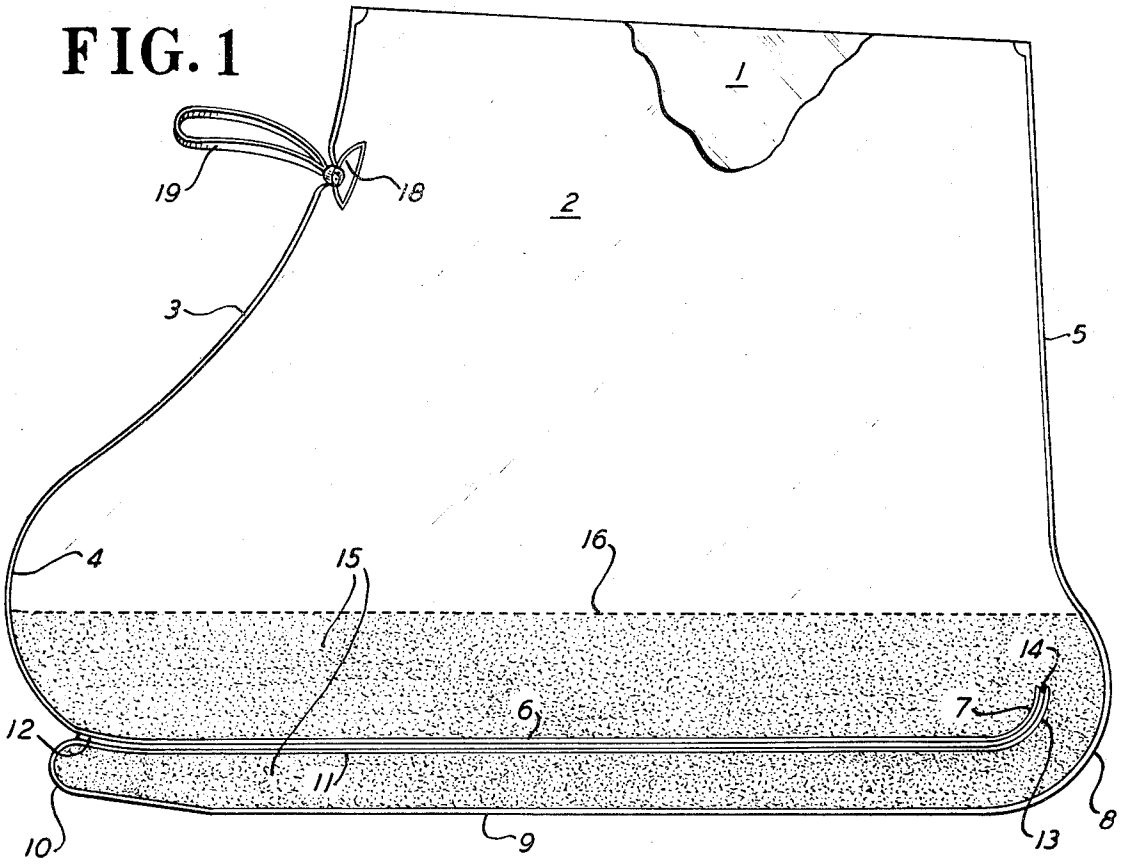
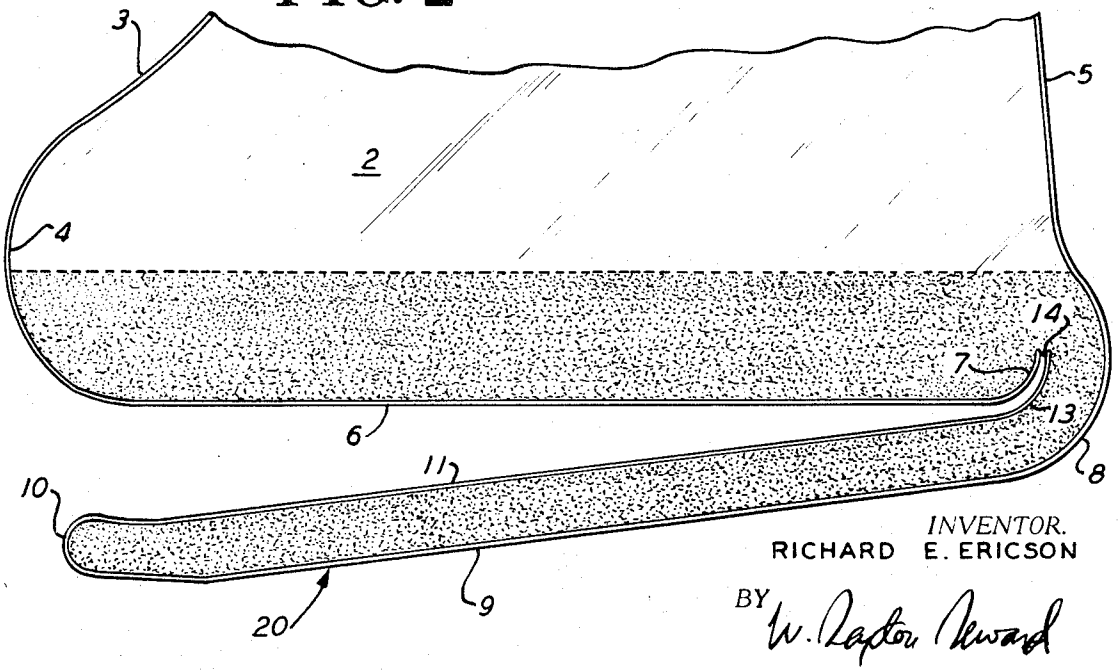


FIG. 2



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FIG. 3

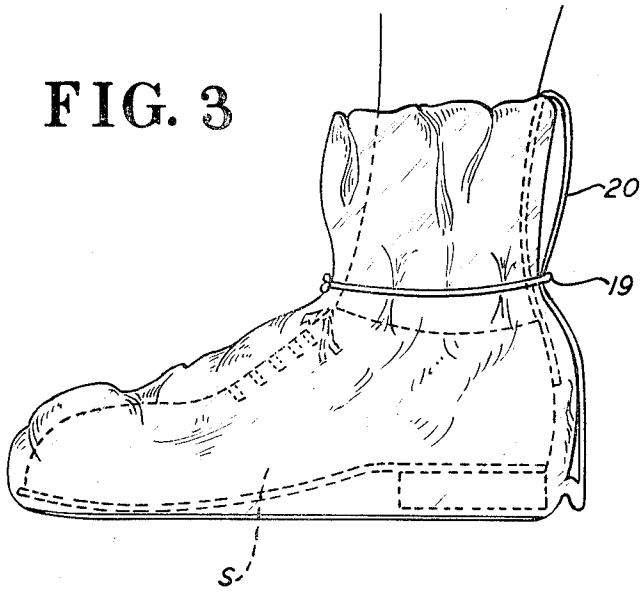
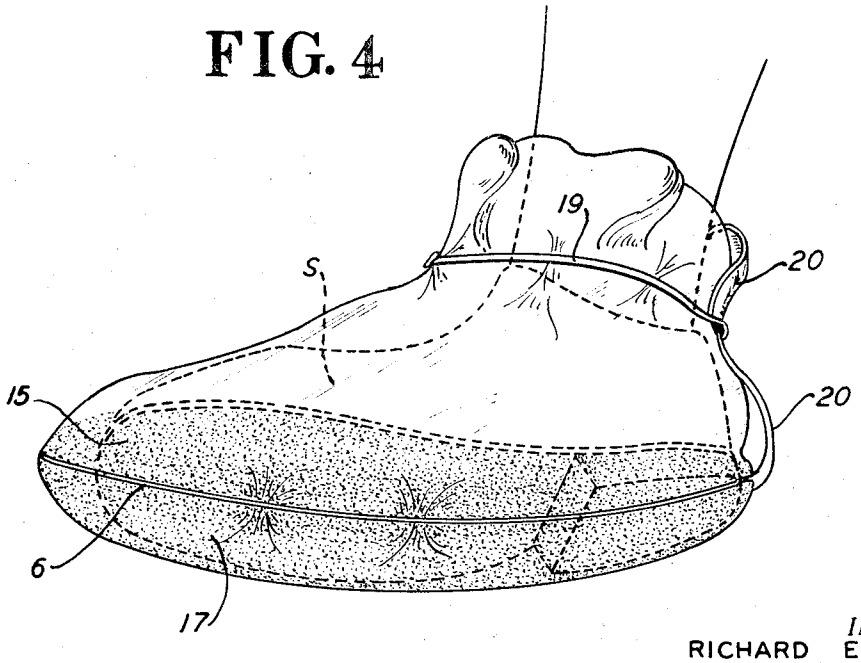


FIG. 4

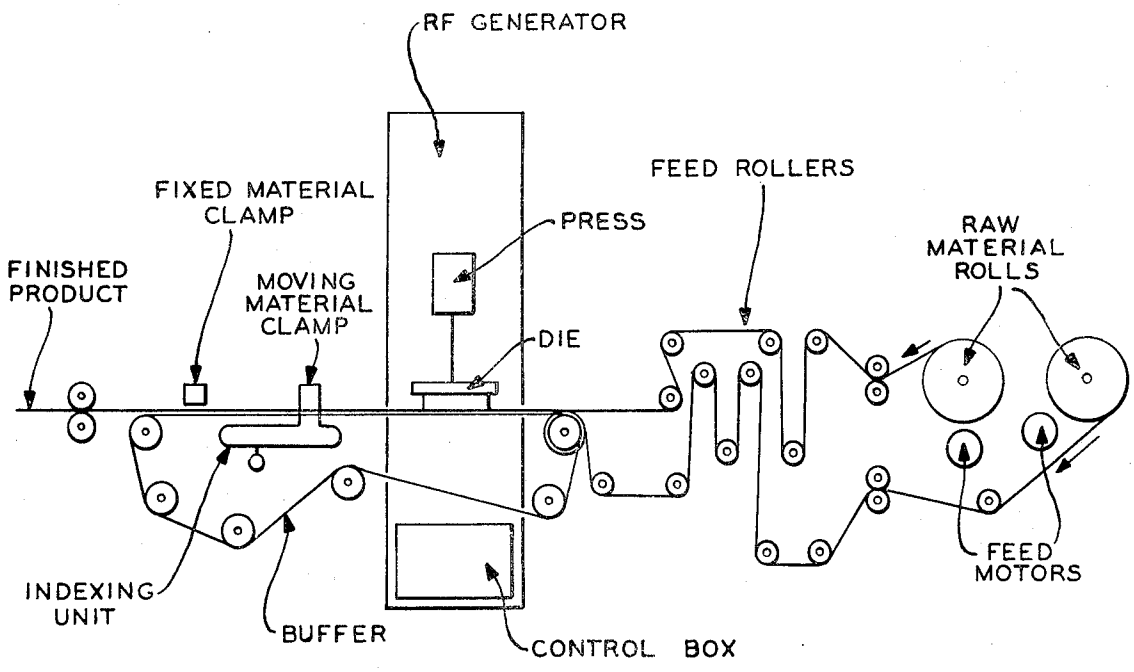


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FIG. 5



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ANTI-STATIC PLASTIC SHOE COVER AND METHOD OF MAKING SAME

BACKGROUND OF THE INVENTION

The need for a simple and reliable shoe cover to ground the bodies of operating room personnel to the floor has long been recognized and many attempts to meet this need have been made, as represented by patents to Price, U.S. Pat. No. 3,359,658, to Siegel, U.S. Pat. No. 3,564,335, and to others cited as references, particularly to the Siegel patent which sets forth quite clearly the background of this art.

As indicated in the abstract, the shoe cover of this invention is made by bringing together flatwise two sheets of heat-sealable plastic material and subjecting the superposed sheets to a single sealing, cutting and scoring operation, followed or preceded by the application of a conductive material across a zone which includes an area destined to become a "sole portion" of the shoe cover and a continguous area designed to form a conductive path between the sole portion and the wearer's foot.

A practical embodiment of the invention is shown in the accompanying drawings wherein:

FIG. 1 represents a side elevation of the completed shoe cover, a part being broken away;

FIG. 2 represents a detail side elevation of the lower part of the shoe cover with the connecting strip separated from the sole portion along the line of scoring;

FIG. 3 represents a side elevation of the shoe cover in use on the foot of a wearer;

FIG. 4 represents a bottom perspective view of a modified form of shoe cover in use on the foot of a wearer, and

FIG. 5 is a flow diagram showing the steps of the manufacturing procedure.

Referring to the drawings, the shoe cover is constituted by right and left flat plastic sheets, **1** and **2**, cut to a generally "boot" shape and heat sealed together marginally along lines which are sloping at **3**, representing the instep section, rounded at **4**, representing the toe, and substantially vertical at **5**, representing a back seam. The toe seal line **4** is continued horizontally at **6** to close the sole portion of the cover, and this sole seal line terminates at the heel in a short upwardly curved portion **7**. The back seam **5** is continued downwardly in a smooth curve **8** of about 90°, around the heel, then horizontally at **9** to a point beneath the toe where the seal line runs upwardly and turns 180° to parallel, at **11**, the horizontal sole seal line **6**, from which it is spaced by a weakened score line **12**. The line **11** terminates at the heel in a short upwardly curved portion **13**, concentric with the portion **7**, and the score line **12** also terminates at the same point, indicated at **14**.

Conductivity is provided by applying, in any suitable manner, a surface coating **15** of conductive material such as a carbon black composition in a vehicle compatible with the plastic sheets **1** and **2**, the coating covering a zone which includes the entire surface of the strip between seal lines **8 – 9** and **11–14** as well as a surface of the sheet **2** between the seal line **6–7** and a line **16** parallel to and spaced an inch or two from said line **6–7**. While it may be adequate to apply conductive material only to the surface of sheet **2**, it is preferable to treat correspondingly a lower surface zone of sheet **1** as shown at **17** in FIG. **4**.

A "button-hole" **18** may desirably be formed through the sheets **1** and **2** near the top of the instep seal line **3** to receive a rubber band **19** for use in securement of the cover to the wearer's foot, as described below.

When the shoe cover shown in FIG. **1** and made as just described is to be used, the connecting strip **20** (FIG. **2**) is pulled away from the sole portion of the cover by rupturing the score line **12** to, but not beyond, the ends of the curved seal lines **7** and **13** (point **14**). The wearer's foot (including shoe S) is placed within the cover, the strip **20** is passed up around the rear of the cover and its end tucked securely into the shoe and/or sock (FIG. **3**), and the rubber band **19** is stretched around the covered foot to assume a position around the ankle where it holds the strip **20** in place and gathers the upper portion of the cover loosely but securely against the shoe and the wearer's ankle. Since the conductive material **15** and **17** coats a substantial portion of the sole of the shoe cover and is continuous with the material on the surface of strip **20**, the wearer is most effectively grounded electrically to the floor.

Suitable materials for the sheets **1** and **2** include vinyls with anti-static agents incorporated, to pass N.F.P.A. 56—A Code, less than 5 × 10″ ohms resistance. Ethylene vinyl acetate brass-ruled polyethylene are also suitable. The conductive coating is, dielectric example, a quick-drying solvent active ink impregnated with carbon black, most conveniently applied to both sides of the shoe cover after the sealing, in a continuous web-feeding process. The materials used for the sheets **1** and **2** are preferably characterized by very low tack, so that embossing or other surface treatment is not necessary to prevent sticking of facing surfaces.

With particular reference to FIG. **5**, the continuous manufacturing is as follows: Two rolls of vinyl sheeting are introduced through feed rollers and brought together and dielectrically sealed into a shoe cover configuration. The die is brass-ruled and hydraulically pressed into the film making a dielectric seal from the RF generator. The outside of the shoe cover die is beveled to permit removal of the sealed shoe cover before the printing of the conductive ink. After sealing of the shoe cover, the moving clamp advances the vinyl material while the fixed clamp stabilizes the material during and after the actual sealing operation.

The shoe covers are hand removed from the sealed vinyl web, inspected, and placed on an in-feed conveyor to be printed. The conductive coating is applied to both sides of the shoe cover in an automatic printing process, the printer being conventional and hence not illustrated.

It will be understood that various changes may be made in the form, construction and arrangement of the several parts and in the steps of the method without departing from the spirit and scope of the invention and hence I do not intend to be limited to the details shown or described herein except as the same are included in the claims or may be required by disclosures of the prior art.

What I claim is:

1. An anti-static plastic shoe cover comprising two flat sheets of thermoplastic material heat-sealed together along lines defining the front and rear edges of the cover and along a bottom line, being also sealed

together along a line slightly spaced from said bottom line and being effectively weakened throughout the space between said bottom line and said spaced line, the bottom line being a continuation rearward of the front edge line, and terminating at a distance from the rear edge line, the spaced line and the weakened area also terminating adjacent the point of termination of the bottom line, and the sheets being cut along a line extending from the bottom of the rear edge line forward substantially parallel to said spaced line throughout the length of the spaced line, at least one of said sheets having applied to its surface in the region of said bottom line, spaced line and parallel line, a conductive coating.

2. A shoe cover according to claim 1 wherein said sheets are sealed together along said parallel line, which line is a continuation of the rear edge line and is connected at its forward end to said spaced line.

3. A shoe cover according to claim 1 wherein the conductive coating is applied to the outer surface of both sheets throughout a zone extending from the front edge to the rear edge and from the parallel line to a boundary line above the bottom line and spaced therefrom.

4. A shoe cover according to claim 1 which includes retention means attached at a point adjacent the front seal line and adapted to be passed around the rear edge of the cover.

5. The method of making plastic shoe covers which includes, providing webs of heat-sealable plastic sheeting, bringing together said webs in face-to-face relation, providing a die having at least one die face rolled in the desired shoe cover configuration with the bottom edge rule line extending from the front edge to a point spaced from the rear edge and with an additional rule line extending from the rear edge to a point spaced from the front edge and connected to the bottom edge rule line near its front end, sealing said webs along said rule lines, weakening said sealed webs along all peripheral rule lines for easy separation of the shoe covers from adjacent web areas, weakening to a lesser degree the bottom edge rule line, and applying to at least one web surface a conductive coating in an area lying on both sides of the bottom rule line.

6. The method according to claim 5 wherein the conductive coating is applied to both web surfaces.

7. The method according to claim 5 which includes separating the shoe covers from adjacent web areas and thereafter applying said conductive coating.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,684,922 Dated August 15, 1972

Inventor(s) Richard E. Ericson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading:

Line [73] should read:

--Assignee: C.R. Bard, Inc., Murray Hill, New Jersey --

In the specification:

Column 4, line 7 should read:

--tion, providing a die having at least one die face ruled--

Signed and sealed this 13th day of March 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334

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