United States Patent

[11] **3,564,335**

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[54] **ELECTRICALLY CONDUCTIVE SHOE COVER**
11 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **317/2;** 12/1, 36/7.1
[51] **Int. Cl.** **H05f 3/00**
[50] **Field of Search** 317/2.2; 36/7.1, 7.2, 7.3; 12/142, 1

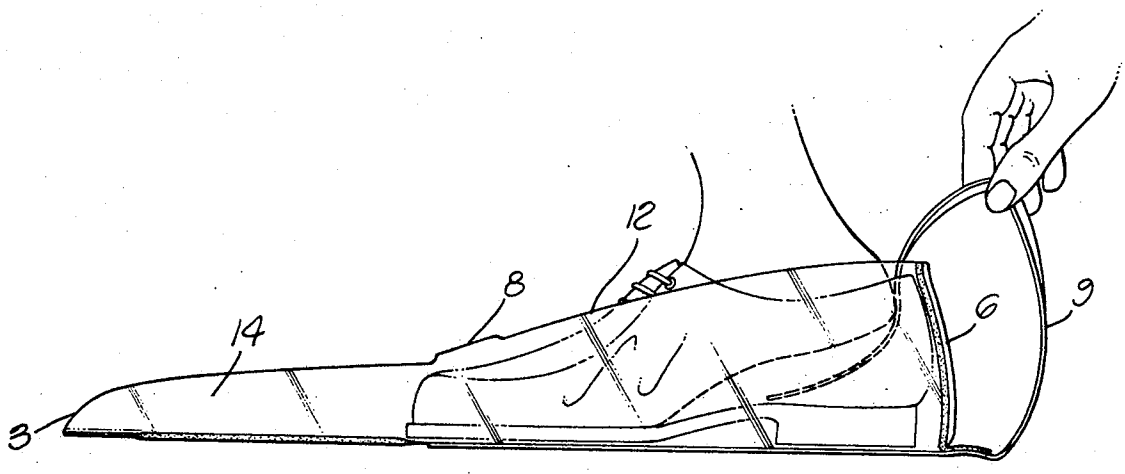
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ABSTRACT: A plastic overshoe adapted to be worn by physicians and nurses during surgery to electrically ground their bodies to a floor on which they stand, so static electricity cannot build up and cause a spark near explosive gases sometimes used in surgery. The overshoe fits various shoe sizes and has two superimposed plastic panels joined along their rear and bottom edges with a connecting web across midportions of their top edges holding the panels together. An electrically conductive plastic strip is sealed along a bottom edge of one panel, which strip has an extending portion for tucking into the wearer's shoe or stocking to make electrical contact with his body. A series of these overshoes connected end to end are made by die-cutting and heat-sealing portions of layflat tubular plastic material.



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SHEET 1 OF 2

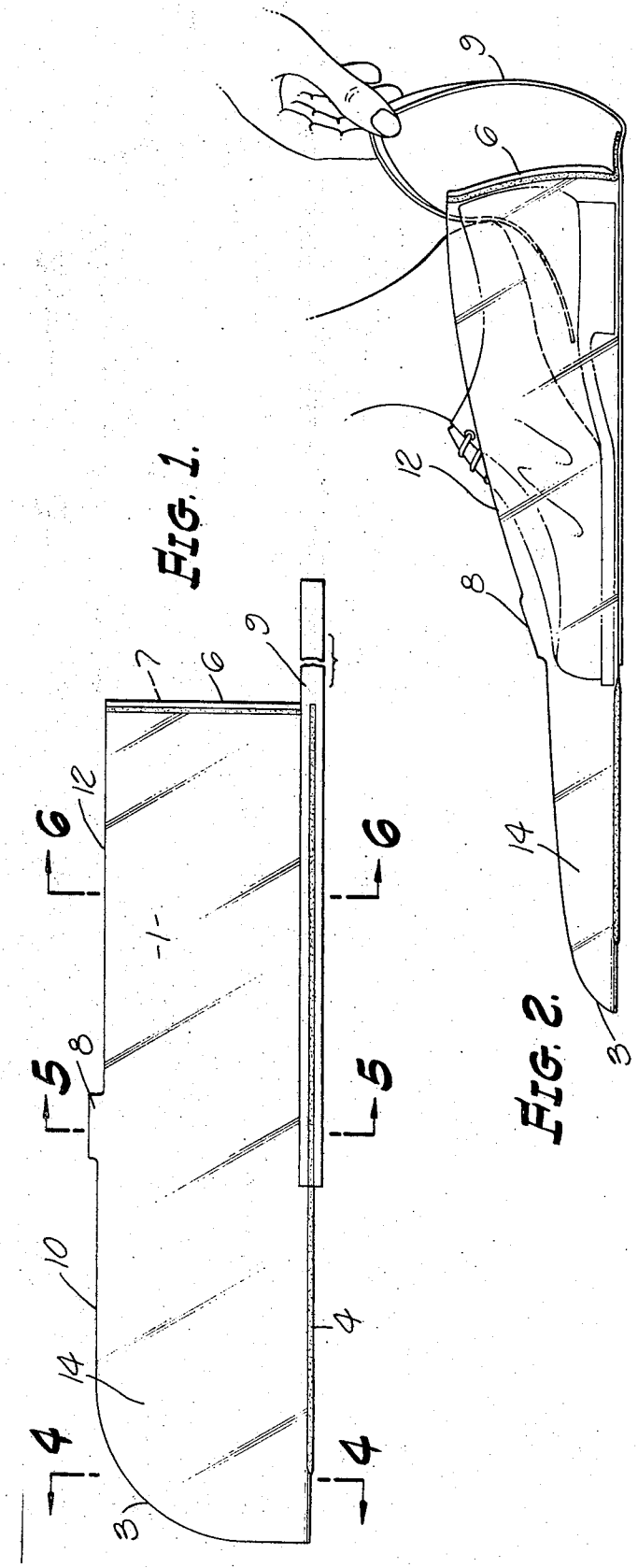


FIG. 1.

FIG. 2.

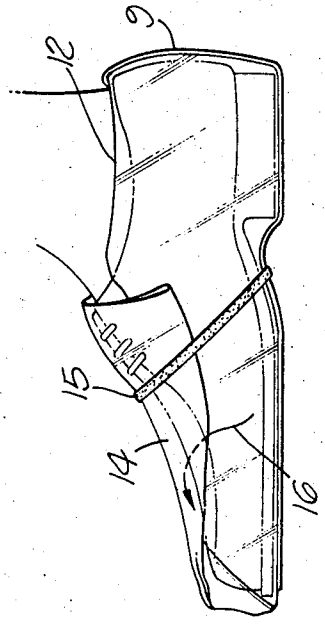


FIG. 3.

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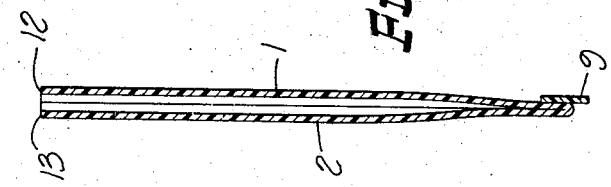


FIG. 6.

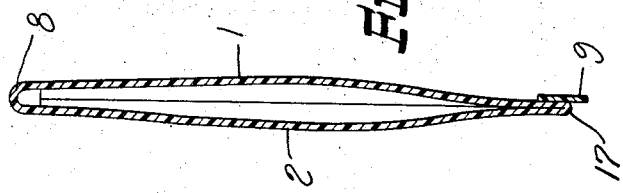


FIG. 5.

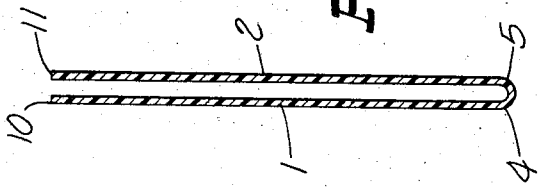


FIG. 4.

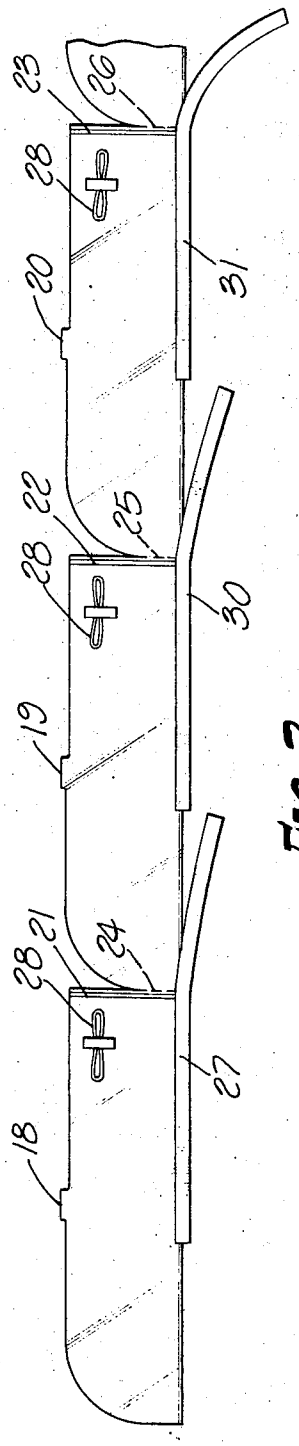


FIG. 7.

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ELECTRICALLY CONDUCTIVE SHOE COVER

BACKGROUND OF THE INVENTION

This invention relates to an electrically conductive overshoe such as those commonly worn by nurses and physicians during surgery. These overshoes keep bacterial and other types of contamination that might be on the wearer's shoes encased in the overshoe so it does not contaminate the patient. The conductive feature of the overshoe grounds the body of the physician or nurse so static electricity generated by clothing rubbing together and by other means does not cause a spark. A spark in a surgery room is particularly dangerous because of explosive gases and oxygen which are sometimes used during surgery.

In the past there have been conductive overshoes that kept contamination of the wearer's shoes confined within the overshoes and also provided an electrical grounding system for the wearer's body. These prior overshoes were formed of two paper panels each in the shape of a side silhouette of a large shoe. The two paper panels were sewed together along their back, sole, toe and instep edges. Their top edges were left unjoined so the physician or nurse could insert his foot between the two panels. An electrically conductive strip of material was sewed along a bottom edge of the overshoe and an elongated portion of the strip which extended behind the overshoe could be tucked into the wearer's sock or shoe to make electrical contact with his body. Thus, the wearer's body was grounded to the hospital floor when he was standing on the conductive strip sewed to the bottom edge of the overshoe.

These previous conductive overshoes, however, had several disadvantages. First, the overshoes were made of paper and were not waterproof. When they became wet either by the wearer stepping in liquid on the floor or from liquid spilling from the operating table, the overshoes could easily tear because the wet strength of the paper was low. Another disadvantage of these prior overshoes was the expensive and tedious sewing process needed to join the two panels together. Since the overshoes were discarded after a single use to minimize operating room contamination, it was important to keep the manufacturing cost as low as possible. If plastic panels could be used instead of paper, the panels could be very economically joined by heat sealing the edges together and this would eliminate the laborious sewing step.

Plastic panels were not suitable for use in the prior overshoe construction described above. This was because the plastic panels were not as porous as paper and the wearer's foot would become hot when perspiration could not evaporate. In order to make plastic panels feasible in a conductive overshoe, I have invented an entirely new overshoe construction.

SUMMARY OF THE INVENTION

The overshoe of this invention encases the wearer's shoe and is waterproof, keeping the shoe protected from liquid on the floor and from liquid spilled from the operating table. Also, there is no need to sew panels together in the present invention. Instead, my overshoe is made by die cutting segments from tubular plastic film, heat sealing portions of the tubular film together, and heat sealing a plastic conductive strip to a sole of the overshoe. The overshoe which is made from a roll of tubular film material is connected end to end with a series of other overshoes. Each overshoe is separated from an adjacent overshoe by a transverse perforated tear line so the overshoes can be dispensed from the roll as needed in much the same way as toilet tissue.

It will be easier to understand my invention with reference to the attached drawings, in which:

FIG. 1 is a side elevational view of the overshoe;

FIG. 2 is a side elevational view of the overshoe showing the wearer donning the overshoe;

FIG. 3 is a side elevational view showing the overshoe after it has been donned by the wearer;

FIG. 4 is a sectional view taken along line 4–4 of FIG. 1;

FIG. 5 is a sectional view taken along line 5–5 of FIG. 1;

FIG. 6 is a sectional view taken along line 6–6 of FIG. 1; and

FIG. 7 is a side elevational view of a series of overshoes connected end to end.

Referring to the drawings, the overshoe is comprised of a pair of superimposed flat thermoplastic panels 1 and 2, each of which has a general rectangular shape except for a convexly rounded corner 3 as shown in the upper left of FIG. 1. These two panels are permanently joined together along their bottom edges 4 and 5 and their rear edges 6 and 7. Midportions of the panels' upper edges are permanently connected by a web 8, and this web fits across a wearer's instep to hold the panels in position around the wearer's foot.

One of the panels has an electrically conductive strip 9 of a thermoplastic, such as polyethylene having 50,000 to 200,000 ohm/linear foot resistance sealed to this panel along a bottom edge thereof. This conductive strip extends outwardly beyond rear edges of the panels and can be tucked into the shoe of the wearer. The conductive strip can go either between the foot and stocking or between the stocking and shoe, the latter of which is generally used by nurses who wear long stockings. In either case, electrical contact is established with the wearer's body because foot perspiration will carry electricity through the stocking to the conductive strip. As shown in FIG. 3, this conductive strip connects the wearer's body to the floor on which he stands so static electricity can be dissipated to the electrically grounded floor.

The overshoe comprised of the two panels 1 and 2, web 8 and conductive strip 9 is adapted to fit various shoe sizes and is put on the wearer's shoe in the following manner. First, the two panels are separated along their top edges 12 and 13 between the web and rear edges of the panels so the panels can form a pocket for the shoe. After inserting the shoe in this pocket, the wearer pulls the overshoe forward so the heel of his shoe is next to rear edges 6 and 7 of the panels. Now he puts the extending end of the conductive strip inside either his shoe or stocking. After this is done, he pulls apart the top edges 10 and 11 of the panels and folds a forward portion 14 of the overshoe back over the shoe. Finally, he puts a rubber band 15 around the instep of his shoe to hold the overshoe in this position, as shown in FIG. 3. Now, the wearer's body is electrically grounded to the floor on which he stands.

As shown in FIG. 3, the waterproof thermoplastic material of the overshoe underneath the shoe sole protects it from water on the floor. Also, the forward portion 14 which is folded back over the shoe protects the shoe from liquid that might be spilled from the operating table. The folded-back forward portion 14 overlaps other portions of the panels so that any liquid dropping on the overshoe from above will not enter the shoe. Even though the overshoe encases the shoe and protects it from liquid, it does provide for ventilation to the wearer's shoe and foot. As shown in FIG. 3, air can enter at 16 between the folded-back forward portion 14 and other portions of the panels and flow along a tortuous path to the shoe and foot.

The structure of the overshoe described above allows for a very simple and inexpensive manufacturing process. The overshoe is made from a roll of antistatic layflat tubular thermoplastic material such as polyethylene. The walls of the tubular material are flattened, thus forming two superimposed walls or panels which are connected by a top fold (web 8) and a bottom fold 17, as shown in FIG. 5. Thus, the panels begin as homogeneous portions of a one-piece thermoplastic tube. To make a series of overshoes from a length of tubular material, intermittent portions from the top fold are cut away, leaving intermittent connecting webs 18, 19 and 20. In between these webs transverse heat seals 21, 22 and 23 are made which join together rear edges of a particular overshoe. Immediately rearward of this heat seal is formed a series of transverse perforations 24, 25 and 26 to form a line of severance between adjacent overshoes. Finally, conductive strips such as 27, 30 and 31 are heat sealed along a bottom edge of one panel of each overshoe.

The series of overshoes in end-to-end relationship connected by transverse perforations is best shown in FIG. 7. These overshoes can be rolled on a mandrel and shipped to a hospital. When nurses and physicians prepare for surgery they simply pull an overshoe off the roll and tear it along the perforations in much the same way as toilet tissue. If desired, a rubber band **28** may be temporarily taped to each shoe or there may be a box of rubber bands located next to the roll of overshoes.

The overshoes described above are an improvement over previous sewed paper overshoes because the present overshoes are waterproof while providing ventilation, can be manufactured by simple die cutting and heat sealing process, and can be dispensed from a roll. Although the overshoes are preferably made of a thermoplastic material, the construction including the web permanently connecting the panels and the end-to-end perforation connection of several overshoes, would provide advantages to overshoes made of other materials.

I have used specific examples to explain my invention. However, it is understood that persons skilled in the art can make certain modifications to this embodiment without departing from the spirit and scope of the invention.

I claim:

1. An electrically conductive overshoe adapted to fit various shoe sizes, said overshoe comprising: a thermoplastic tube defining a pair of superimposed integral panels each having top, bottom, front, and rear edges, the top and bottom edges of the panels being integrally secured together in a longitudinal direction of the tube; said panels having portions adjacent their top edges cut away to define a connecting web between the two panels and to form separable top edges of the panels forwardly and rearwardly of the web; the panels being permanently secured together at their rear edges; and an electrically conductive strip secured along the bottom edge of the overshoe and extending outwardly beyond the overshoe's rear edge.

2. An electrically conductive overshoe as set forth in claim **1** wherein the panels are of an antistatic thermoplastic.

3. An electrically conductive overshoe as set forth in claim **2** wherein the antistatic thermoplastic panels are polyethylene.

4. An electrically conductive overshoe as set forth in claim **1** wherein rear edges of the panels are heat sealed together.

5. An electrically conductive overshoe as set forth in claim **1** wherein the panels are a homogeneous one-piece thermoplastic film material which is folded to form the panels' bottom edges.

6. An electrically conductive overshoe as set forth in claim **1** wherein the electrically conductive strip is of polyethylene and has a resistivity of between 50,000 and 200,000 ohms/linear foot.

7. An electrically conductive overshoe as set forth in claim **1** wherein the overshoe panels have their front edges connected to rear edges of a similar overshoe's panels, whereby a series of overshoes can be connected end to end prior to use, said connected front and rear panel edges having lines of severance between them.

8. An electrically conductive overshoe as set forth in claim **7** wherein the lines of severance include a series of perforations.

9. A method of making conductive overshoes from a roll of tubular thermoplastic material which has two superimposed panels joined by longitudinal top and bottom folds, said method including the steps of: intermittently severing the material along the top fold leaving longitudinally spaced connecting webs across the top fold connecting the two panels; sealing the panels together between the webs in a direction transverse to the top and bottom folds; forming a line of severance adjacent each transverse seal so individual shoes can be separated from the roll; and sealing an electrically conductive thermoplastic strip to at least one of the panels adjacent the bottom fold.

10. A method of making conductive overshoes as set forth in claim **9** wherein the method also includes the step of forming a series of transverse perforations at each line of severance in an area near where the panels are transversely sealed together so that the overshoes can be torn from the roll of tubular thermoplastic material as needed.

11. An electrically conductive overshoe adapted to fit various shoe sizes, said overshoe comprising: a thermoplastic tube defining a pair of superimposed integral panels each having top, bottom, front, and rear edges, the top and bottom edges of the panels being integrally secured together in a longitudinal direction of the tube; said panels having portions adjacent the top edges cut away to define a connecting web between the two panels and to form separable top edges of the panels forwardly and rearwardly of the web; said rear edges of the panels being permanently secured together, whereby a wearer's foot and shoe can be inserted into a pocket formed by the two panels between the web and rear edges, and whereby at least portions of the panels between the web and front edges can be pulled apart and folded back over the shoe, which overshoe is adapted to be held in such position by a rubber band around the wearer's instep; and an electrically conductive thermoplastic strip sealed along a bottom edge of at least one panel, said conductive strip extending outwardly beyond the rear edge of the panel for conducting electricity from a body of the wearer to a floor on which he stands.