United States Patent [19]

Kanor

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[54] DISPOSABLE SHOE COVERING

[75] Inventor: **Steven Kanor,** White Plains, N.Y.

[73] Assignee: **Lorton Laboratories, Ltd.,** New York, N.Y.

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[52] **U.S. Cl.** .....**317/2 B,** 36/7.3, 36/72 C

[51] **Int. Cl.**.....**H05f 3/00,** A43b 1/10

[58] **Field of Search** .....317/2 B; 36/72 C, 36/7.3

[56] **References Cited**

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3,634,954	1/1972	Larsen et al.	36/7.3
3,694,939	10/1972	Chen	36/7.3

Primary Examiner—L. T. Hix

Attorney—Donald R. Bentz

[57] **ABSTRACT**

A disposable protective shoe covering for entirely enclosing the shoe of a wearer is provided wherein a single flat sheet of flexible heat shrinkable material is centerfolded to form a pair of complementary halves having a straight bottom edge adjacent the centerfold and a top edge, defined by the adjacent edges of the sheet halves opposite the fold, which is opened to provide access into the shoe covering. The side edges of the sheet halves, between the top and bottom edges, respectively define the front and back edges of the shoe covering and are heat sealed together (i) at the back edge along an inclined line extending outwardly and rearwardly with respect to the bottom edge, (ii) at the front edge along a first inclined line extending upwardly and rearwardly with respect to the bottom edge and along a second inclined line, defining the instep of the shoe covering, extending from the first line upwardly and rearwardly to the top edge at a greater inclination than the first line, and (iii) adjacent the bottom edge, at the front and rear portions thereof, along lines extending upwardly and outwardly from the bottom edge to their points of interconnection with the first line and the back edge respectively.

8 Claims, 8 Drawing Figures

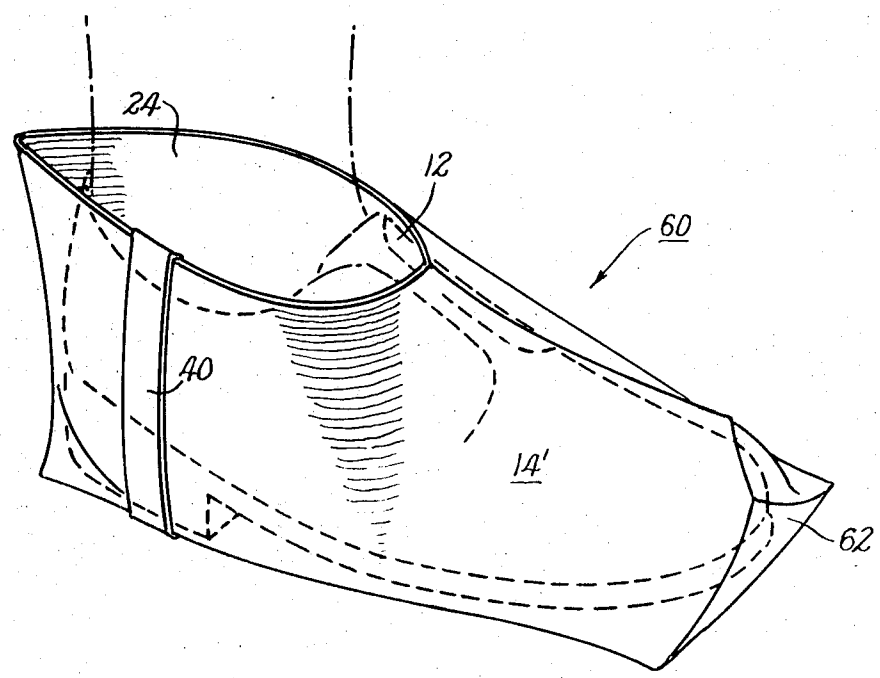


Fig 1

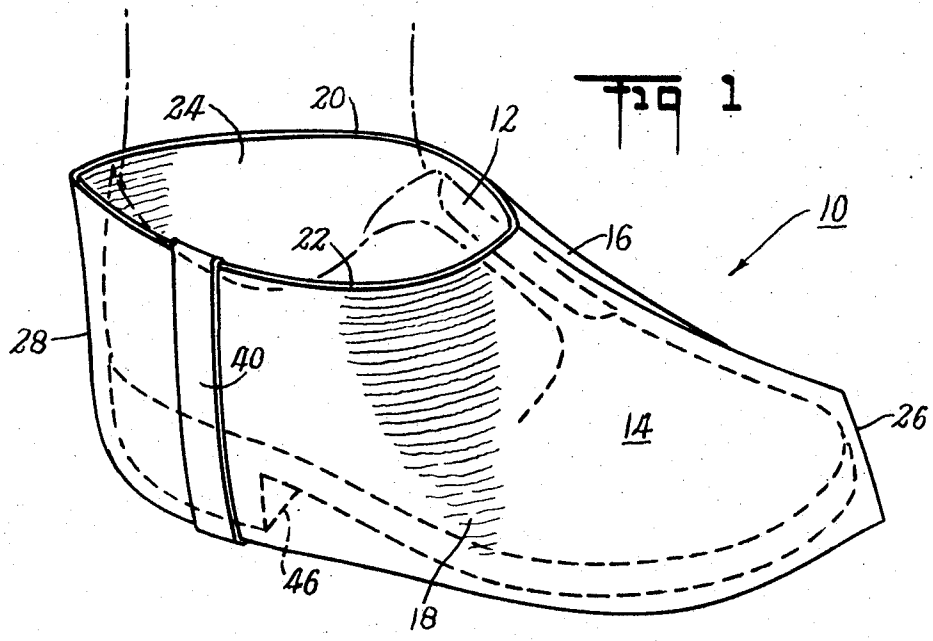


Fig 2

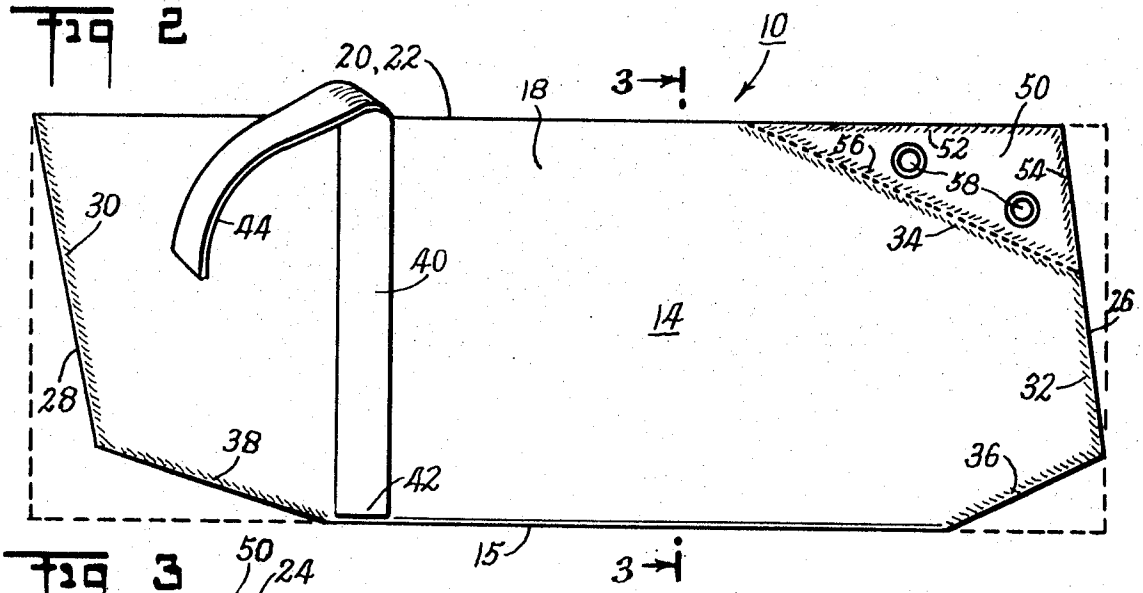


Fig 3

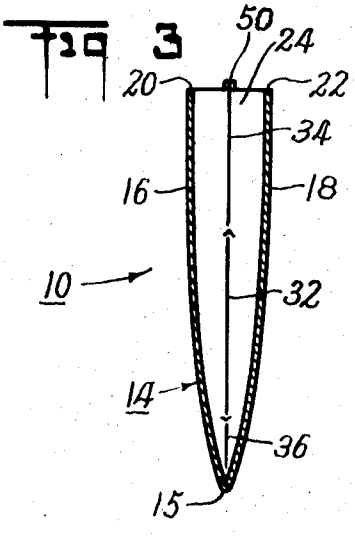


Fig 4

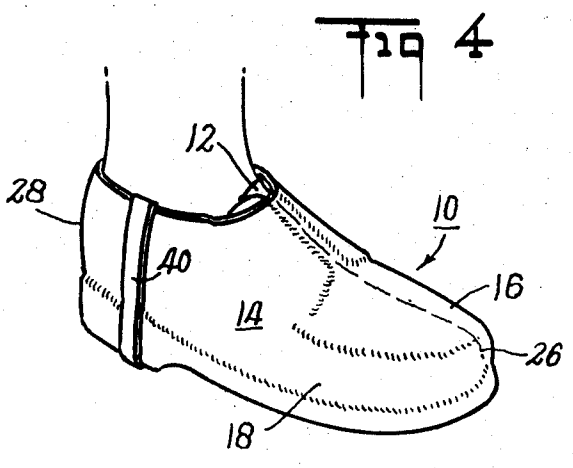


Fig 5

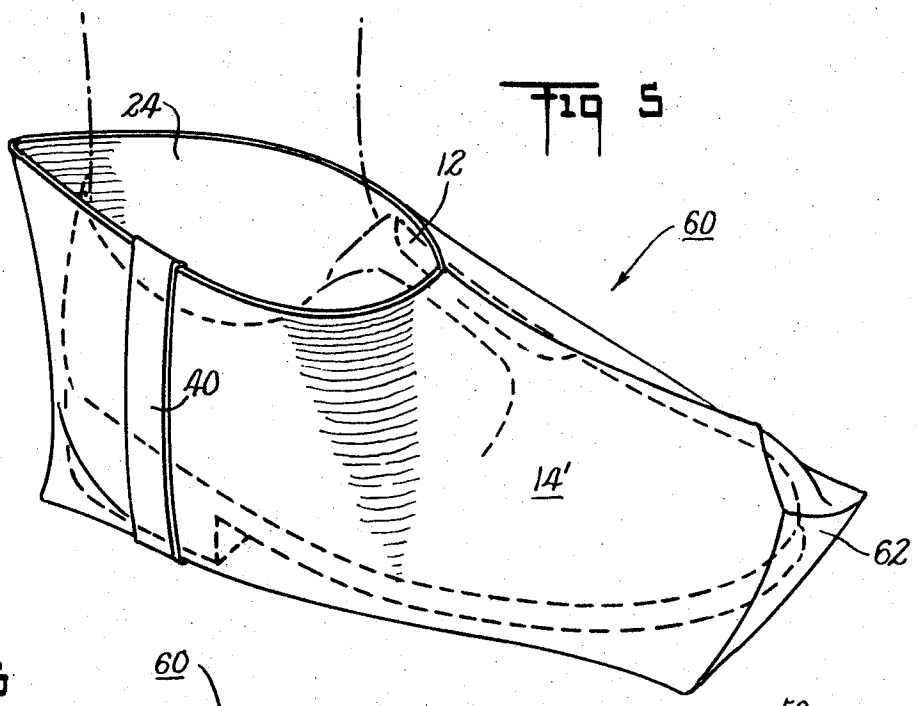


Fig 6

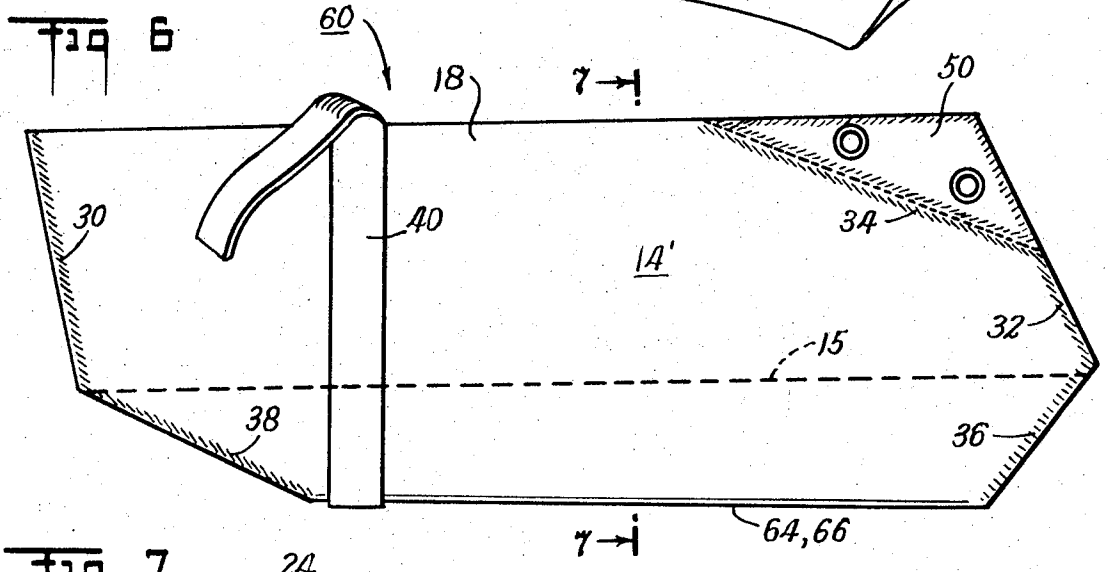


Fig 7

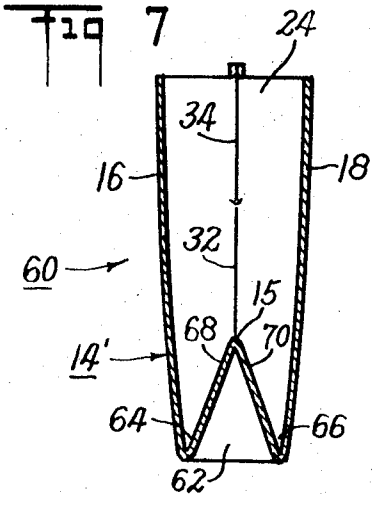
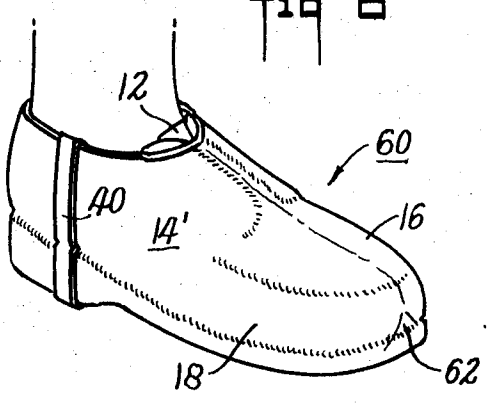


Fig 8



DISPOSABLE SHOE COVERING

The present invention relates generally to protective shoe coverings and more particularly to a disposable protective shoe covering formed of heat shrinkable material.

Disposable overshoes have been proposed in the past for use in various facilities in which sterile conditions must be maintained, e.g. for covering the shoes of physicians or personnel working in operating or clean room facilities. Such shoes are often utilized in hospital rooms where it is necessary to prevent contamination of the atmosphere and floor from bacteria carried on street shoes, thereby to avoid infection of the patient. Further, it is frequently necessary to maintain extremely clean conditions in industrial and commercial installations during production. This is particularly necessary in the aerospace and electronics industry, where delicate electronic components must often be protected from chemical and physical contaminants, minute particles of dirt, fine metal particles, etc.

The sanitary overshoes which have previously been proposed for use in these areas have been generally formed from a variety of material, including paper, natural synthetic fibers, and plastic films. These overshoes have also been formed in a variety of manners, as by gluing, sewing, or heat sealing the various parts to form completed shoe coverings. These coverings are generally provided with elastic tops, tie strings, snap fasteners, and the like to secure them to the shoe and to facilitate later removal thereof.

While these prior art boots have been helpful in maintaining sanitary conditions in hospital operating rooms and other clean rooms, they have numerous disadvantages. For example, they are generally cumbersome in appearance and are difficult to apply and remove. Moreover, the prior art boots are relatively expensive to produce and do not offer complete sanitary protection for hospital use. In particular, they are not fully sealed to the shoe, but rather are generally loose fitting with numerous folds and openings through which bacteria and contaminants may escape to the atmosphere or floor of the operating room. Due to their expense, many of these boots must be reuse, thereby requiring time consuming and costly sterilization procedures, which, it is noted, are not generally fully satisfactory. Finally, due to their cumbersome size and baglike character, the prior art boots are not only uncomfortable and untidy, but are also difficult to walk in. Thus, for example, such boots may hinder the mobility of the physician in the operating room.

Also, there is a need for a cheap, disposable, protective foot covering to protect shoes in unexpected inclement weather. Such coverings could conveniently be dispensed from coin operated machines in public places, such as airports, railroad stations, and the like.

One previously proposed shoe covering and shoe covering method has avoided the above problems. That shoe covering and method is described and claimed in U. S. Pat. application Ser. No. 84,328, filed Oct. 27, 1970, and now Pat. No. 3,694,939, commonly assigned herewith, wherein a method and apparatus are disclosed for applying a heat shrinkable wrapper to a shoe on the foot of a wearer. The apparatus is adapted to supply heat shrinkable wrappers, each having a shoe-shaped configuration and an access opening for a shoe, to stations where the heat shrinking process is performed. After insertion of the foot into the wrapper, a supply of heat, such as a current of warm air, is directed over the wrapper to shrink the material on the shoe so that the wrapper conforms to the shoe and fully encloses the same. This wrapper and method have been found to be extremely satisfactory in use, and the present invention relates to an improvement in the configuration and formation of the heat shrinkable shoe wrapper itself.

In particular, the present invention describes a shoe wrapper or covering being formed of a single ply of heat shrinkable material which is heat sealed in a novel and predetermined configuration to conform to the general outline of a shoe. The single sheet of heat shrinkable material is folded to form a pair of complementary halves with a straight bottom edge adjacent the centerfold. The bottom edge, in one presently preferred embodiment, forms the bottom of the shoe covering and the top edge of the shoe covering is defined by the adjacent edges of the sheet halves opposite the fold. The side edges of the sheet halves, between the top and bottom edges, provide the front and back edges of the shoe covering. These edges are heat sealed along a plurality of inclined lines in order to conform the shoe covering to the general configuration of shoes, and to provide a minimum amount of material which must be shrunk during the heat shrinking process. To this end, the sheet halves are heat sealed together, at the back edge, along an inclined line extending outwardly and rearwardly with respect to the bottom edge. This inclined heat seal serves as a guide to the heel of the shoe in order to position the shoe forwardly in the shoe covering so that the toe of the shoe is inserted within the toe portion of the shoe covering. The latter is formed partially at the front edge by a first inclined line at an intermediate portion of the front edge, which extends upwardly and rearwardly with respect to the bottom edge, and a second inclined line, which defines the instep of the shoe covering, extending from the first line upwardly and rearwardly to the top edge at a greater inclination than the first line. The sheet halves are also heat sealed together adjacent the bottom edge at the front and rear portions thereof along lines extending upwardly and outwardly from the bottom edge to points of intersection with the first line and back edge respectively. The heat seal at the front portion of the bottom edge cooperates with the first line on the front edge of the shoe covering to form the complete toe portion of the shoe covering which receives and conforms to the toe portion of a shoe on the foot of a wearer. By this arrangement, a minimum amount of material is provided at the toe and heel of the shoe covering so that the covering conforms closely to the shoe after completion of the heat sealing process.

In the boots described in the above mentioned copending patent application, because of the configuration of the boot, excess material is located at the heel and toe of the shoe covering which may not be always fully shrunk during the heat sealing process, thereby sometimes providing a slightly loose fit for the shrunk boot. This situation is obviated by the configuration of the boot provided by the present invention.

Accordingly, it is an object of the present invention to provide protective shoe coverings, particularly for use in clean rooms and operating rooms, which are adapted to closely conform to shoes on the foot of a wearer and which are disposable after a single use.

Yet another object of the present invention is to provide a relatively simple and inexpensive shoe covering or sanitary shoe wrapper.

Yet another object of the invention is to provide a shoe covering for either the right or the left shoe of the wearer with a single undifferentiated wrapping.

The above, and other objects, features and advantages of this invention will be apparent in the following detailed description of illustrative embodiments of the invention which are to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a disposable protective shoe covering formed in accordance with one embodiment of the present invention;

FIG. 2 is a detailed side elevational view of the embodiment of shoe covering illustrated in FIG. 1;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 2;

FIG. 4 is a perspective view similar to FIG. 1 illustrating the configuration of the shoe wrapper after the completion of the heat shrinking process;

FIG. 5 is a perspective view similar to FIG. 1 of a disposable protective shoe covering constructed in accordance with another embodiment of the invention;

FIG. 6 is a side elevational view of the shoe wrapper illustrated in FIG. 5;

FIG. 7 is a sectional view taken on line 7—7 of FIG. 6; and

FIG. 8 is a perspective view similar to FIG. 4 showing the configuration of the shoe wrapper of FIG. 5 after the completion of the heat shrinking process.

Referring to the drawing in detail, FIG. 1 shows a disposable protective shoe covering **10,** embodying one presently preferred embodiment of the invention, placed about the shoe **12** on the foot of a wearer prior to completion of the heat shrinking operation. Covering **10** is formed of a single sheet of material **14,** e.g. a film of plastic such as polyethylene, or a vinyl copolymer, which is adapted to be heat shrunk at relatively low temperatures. The wrapper is center folded, that is, folded along its centerline **15** (FIG. **2**), so as to form two complementary halves **16, 18,** on either side of fold line **15.** The portions of the sheet material adjacent line **15** form the bottom of the completed shoe wrapper and the top edges **20** and **22** of halves **16, 18,** form an access opening **24** therebetween which permits insertion of the shoe **12** into the interior of the wrapper.

The front and rear edges **26** and **28** of halves **16, 18** respectively, are heat sealed together in order to form the completed wrapper. Rear edges **28** are sealed along an inclined line **30** which extends rearwardly and upwardly with respect to fold **15.** Front edge **26** is sealed along a pair of angularly related lines, including a first line **32,** which extends upwardly and rearwardly with respect to base **16,** about an intermediate portion of the front edge, and along a second line **34,** which extends upwardly and rearwardly at a greater angle than the line **32.** The base portions of halves **16, 18,** adjacent fold **15,** are heat sealed along front and rear sections thereof at the lines **36, 38** in order to contour the shoe covering so that it closely conforms to the general shape of a shoe.

Heat seal lines **32** and **36** define the toe portion of the shoe covering which receives the toe of shoe **12** when the latter is inserted in cover **10.** By sealing the wrapper along these lines, any excess material at the toe is avoided and after the heat shrinking process, the toe portion closely conforms to the toe of the shoe. Heat sealed lines **30** and **38** provide the heel portion of the shoe wrapper and, because of the inclined configuration thereof, serve to position and locate the heel of shoe **12** forwardly with respect to the wrapper, thereby positioning the toe of the shoe into the toe portion defined by lines **28** and **32.** This arrangement assures a tight fit of the wrapper on the shoe and provides a more conforming configuration for the wrapper.

After the heat shrinking operation, as performed, by example, by the device described in the above-mentioned U.S. Patent application, the disclosure of which is incorporated herein by reference, wrapper **10** conforms to shoe **12** on the foot of a wearer, as seen in FIG. **4,** to provide a pleasant appearing, comfortable and compact shoe covering which is sealed tightly to the shoe to prevent escape of bacteria and other contaminants from the shoe to the ambient atmosphere, to a hospital operating room, or to a clean room environment in which the wearer is working.

Wrapper or covering **10** may be provided with a strip **40,** of conductive material, such as a polyethylene fiber impregnated with carbon black or metallic particles, which is heat sealed to the wrapper adjacent fold **15,** at the end **42** thereof, and is looped about the exterior of the wrapper with second end **44** positioned within access opening **24.** After application of the shoe covering **10,** end **44** of strip **40** is inserted in shoe **12** or the stocking to touch the ankle of the wearer and provides a ground connection between the body and the floor in order to safely discharge static electricity therebetween. Alternatively, it is contemplated that shoe covering **10** itself may be completely formed of a conductive plastic material, in lieu of the use of strip **40.**

If a material which shrinks anisotropically is employed as the heat shrinkable film in forming shoe covering **10,** the material is "aligned" in the longitudinal direction of the boot, so that the boot will shrink during the heat shrink operation more in the direction of the length of the foot than in the direction of its width. By this construction, the material is not tightened to a substantial extent adjacent the edge **46** of the heel of shoe **12** so as to fracture or tear the material during walking.

As illustrated in FIG. **2,** the sheet **14** used to form shoe covering **10** may be precut along lines **30, 32, 34, 36** and **38** prior to folding along line **15** so that all excess material is eliminated prior to the heat sealing process. Alternatively, it is contemplated that sheet **14** may also be formed as a generally rectangular member folded along line **15,** as illustrated in dotted lines in the drawing, with the excess portions exteriorly of the heat seal lines cut and removed during the heat sealing process, in a conventional sealing and cutting operation. This latter arrangement is more rapid and less expensive and thus is suitable for a mass production of the shoe coverings.

In either case, sheet **14** may be formed with an excess sheet portion **50** adjacent heat seal line **34.** This extension, as seen in FIG. **2,** is triangular and is defined by the extension of top edges **20** and **22** of the sheet halves and by the extension of heat seal line **26.** Halves **16, 18** of sheet **14** are heat sealed along the three lines **52, 54** and **56,** with a tear or perforated line being formed between the heat seal lines **56** and **34.** The extension can be provided with one or more holes **58** therein and is utilized to support and store the shoe covering prior to the heat shrinking process.

By this arrangement the shoe coverings **10** may be conveniently stored on a hook or the like inserted in holes **58** and located adjacent a heat shrinking console, such as that illustrated in my above-mentioned copending patent application. The person utilizing the shoe covering may then remove a shoe covering from its storage rack or hook by pulling the boot by its main body portion, causing sheet **14** to tear along the line between heat seal lines **34** and **56.** After insertion of the foot in the shoe covering, the foot is inserted in the heating console in order to heat shrink the plastic covering.

The shoes may be readily removed from the foot upon the completion of their use by simply grasping the shoe covering at the access opening **24** and tearing it from the shoe. The force required to break the heat seal and tear the plastic material is not excessive, however, these seals are formed of sufficient strength to absorb substantial abuse when in use.

Referring now to FIG. **5,** a slightly modified embodiment of the shoe covering **10,** illustrated in FIG. **1,** is disclosed. In this embodiment a shoe covering **60** is formed with a gusset **62** along its bottom edge so that a pair of pleats **64, 66** are formed along the length thereof. The shoe covering is then heat sealed along the same lines as in the embodiment of FIGS. **1** and **2,** with the exception that the heat seals formed at lines **36** and **38** do not seal the halves **16** and **18** of the shoe covering directly together. At these lines the halves **16** and **18** are respectively heat sealed to the adjacent inner portions **68, 70** of their associated pleats **64, 66** respectively, in order to close all openings to the interior of the shoe covering, with the exception, of course, of the upper access opening **20.** By this arrangement, when shoe **12** is inserted in the shoe covering, the base thereof flattens out upon the expansion of the gusset **62,** as is illustrated in FIG. **5.** In this manner the flattened bottom surface of the shoe covering conforms more closely to the configuration of shoe **12** so that a still better and tighter completed shoe covering is formed after the heat shrinking process, as is illustrated in FIG. **8.** This shoe covering may be formed as described above with respect to the shoe covering of FIG. **2,** i.e. with the sheet **14'** forming the shoe covering being either precut with lines corresponding to the heat seal lines, or it may be formed as a generally rectangular folded sheet and cut during the heat sealing process along the heat seal lines. In addition, the shoe covering may be provided in either case with extension **50** as described above in order to facilitate handling and storing of the wrapper adjacent a heat shrinking console.

It is thus seen that a simple, convenient and sanitary shoe covering is provided which is readily placed on the foot of a wearer and which is neat and clean in appearance and comfortable in use. Further, the overshoes of the present invention are both for right and left feet, so that a single overshoe will fit either foot and thus substantially reduce the cost of manufacturing. Moreover, the overshoes are relatively inexpensive, thus disposable, and they are rapidly and conveniently applied to the shoes of the wearer by relatively simple heat shrinking processes.

Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of this invention.

What is claimed is:

1. A disposable protective shoe covering for enclosing the shoe of a wearer comprising a single flat sheet of flexible heat shrinkable material centerfolded to form a pair of complementary halves and having a straight bottom edge, adjacent the centerfold, and a top edge, defined by the adjacent edges of the sheet halves opposite said fold, with the side edges of said sheet halves, between said top and bottom edges, respectively defining the front and back edges of said shoe covering, said sheet halves being heat sealed together (i) at said back edge along an inclined line extending outwardly and rearwardly with respect to said bottom edge (ii) at said front edge along a first inclined line, in intermediate portion of the front edge, extending upwardly and rearwardly with respect to said bottom edge and along a second inclined line, defining the instep of the shoe covering, extending from said first line upwardly and rearwardly to said top edge at a greater inclination than said first line and (iii) adjacent said bottom edge, at the front and rear portions thereof, along lines extending upwardly and outwardly from said bottom edge to their points of intersection with said first line and said back edge respectively, said heat seal at the front portion of said bottom edge cooperating with said first line to form a contoured toe portion in the shoe covering which receives and conforms to the toe of a shoe on the foot of a wearer.

2. The disposable protective shoe covering as defined in claim **1** wherein said adjacent edges of the sheet halves defining the top edge of the shoe covering provide an access opening in the top of the covering for insertion of the shoe on a wearer.

3. The disposable protective shoe covering as defined in claim **2** including an electrically conductive strip of material secured at one end adjacent said bottom edge, with the other end of said strip being adapted to be positioned through said access opening in contact with the skin of the wearer for conducting static electricity from the wearer's body to the floor.

4. The disposable protective shoe covering as defined in claim **2** wherein said material is aligned to shrink to a substantially greater extent in length than in width.

5. The protective shoe covering as defined in claim **1** wherein the adjacent edges of said sheet halves at the top edge of said shoe covering form a generally triangularly shaped extension on the side of said second line opposite the shoe covering, said second line being located along one side of said extension, a tear line being formed in said sheet halves between said extension and said second line, and said extension being heat sealed along its three sides and having at least one aperture therein to facilitate storage and support of the shoe coverings on a hook prior to use.

6. The shoe covering as defined in claim **2** wherein said bottom edge is gusseted and the heat seals at the front and rear portions of said bottom edge are formed as pairs of heat seals, between the respective halves of said shoe covering and the adjacent gusseted portion thereof.

7. The disposable shoe covering as defined in claim **6** including an electrically conductive strip of material secured at one end adjacent said bottom edge, with the other end of said strip being adapted to be positioned through said access opening in contact with the skin of

the wearer for conducting static electricity from the wearer's body to the floor.

8. The disposable shoe covering as defined in claim 6 wherein the adjacent edges of said sheet halves at the top edge of said shoe covering form a generally triangularly shaped extension on the side of said second line opposite the shoe covering, said second line being located along one side of said extension, a tear line being formed in said sheet halves between said extension and said second line, and said extension being heat sealed along its three sides and having at least one aperture thereon to facilitate storage and support of the shoe coverings on a hook prior to use.

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