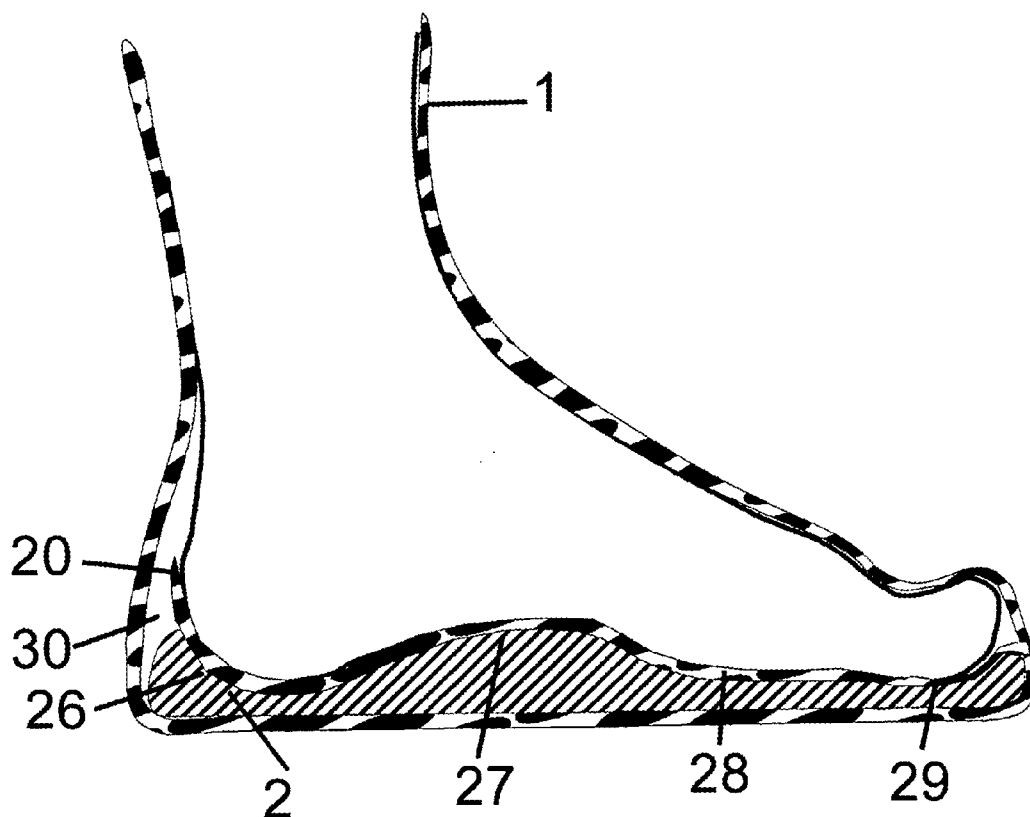




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**Coleman**(10) **Pub. No.: US 2016/0366974 A1**(43) **Pub. Date: Dec. 22, 2016**(54) **SHIELDING DEVICE FOR FOOT PAIN AND DISCOMFORT**(71) Applicant: **Gerald Edwin Coleman**, Greer, SC  
(US)(72) Inventor: **Gerald Edwin Coleman**, Greer, SC  
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(2013.01); *A43B 3/122* (2013.01); *A43B*  
*13/141* (2013.01)(57) **ABSTRACT**

The present invention relates to a shielding device for foot pain and discomfort generally associated with diabetics suffering from the effects of peripheral neuropathy. More specifically, the discomfort experienced when the users foot comes in contact with surrounding objects such as floors and bedding. This invention is comprised of six elements, but is not limited to using all six of them simultaneously. This device has an applied stationary or removable stiff and very smooth surface making contact with the foot, or an applied removable stiff appliance contained within a sleeve adjacent to the foot. Additionally the device has a protective perimeter boundary between the foot and the surrounding environment, with a secure means to wear the device. The invention is effectively a device with a perimeter and a securing fit held fast to the feet. The use of this invention will sanction the feet to a nearly neutral environment, allowing the user to have less pain and discomfort associated with neuropathy or diabetes.



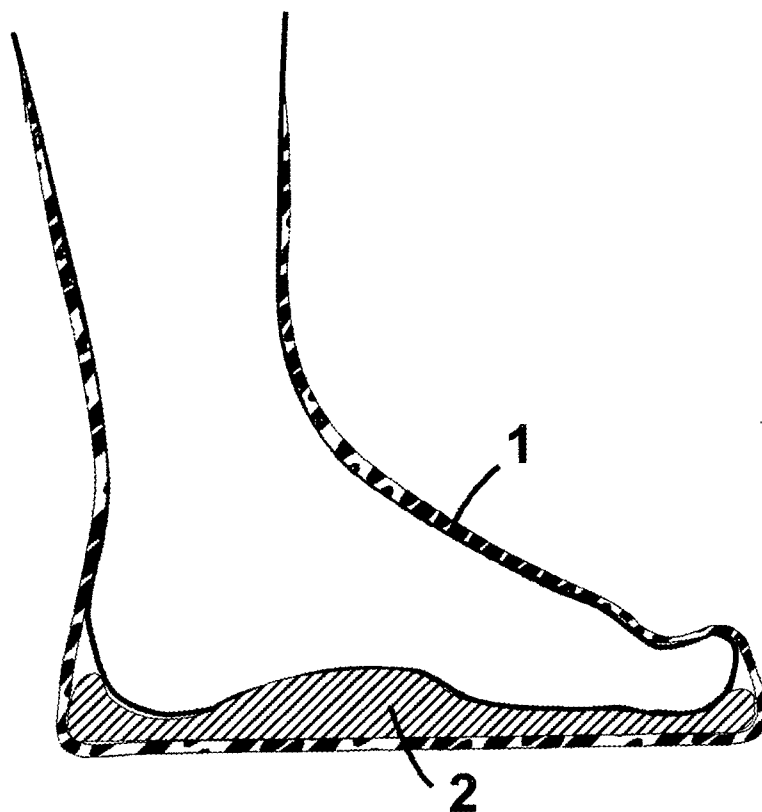


Fig. 1

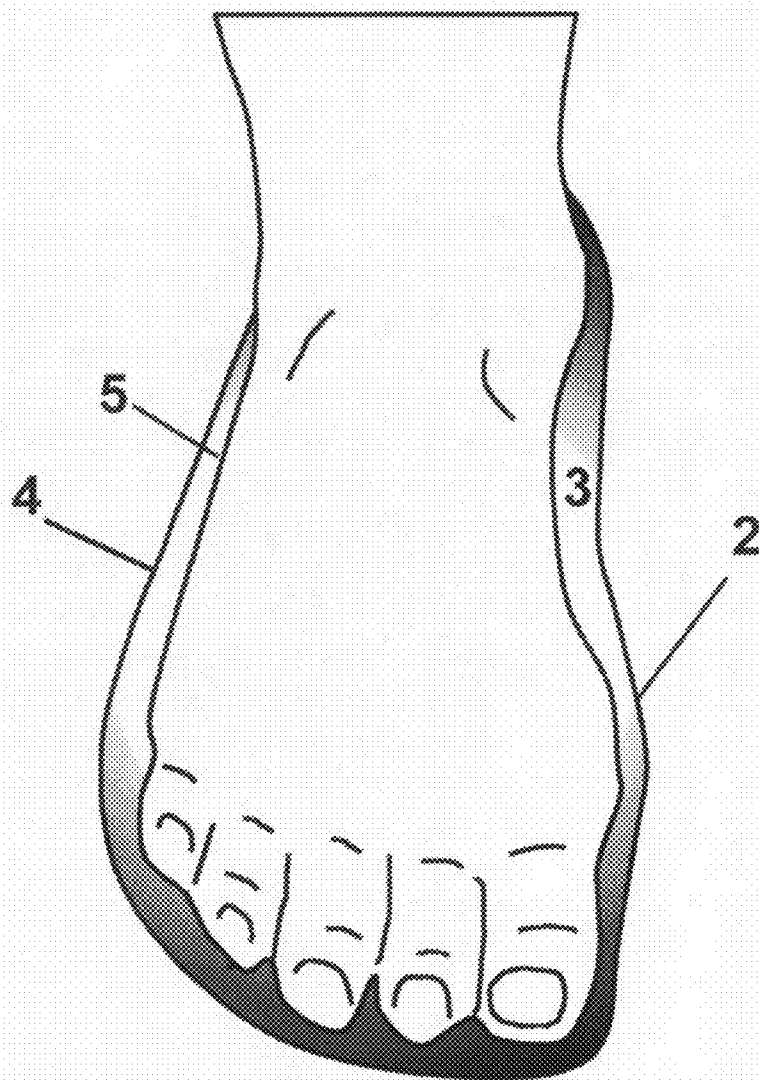
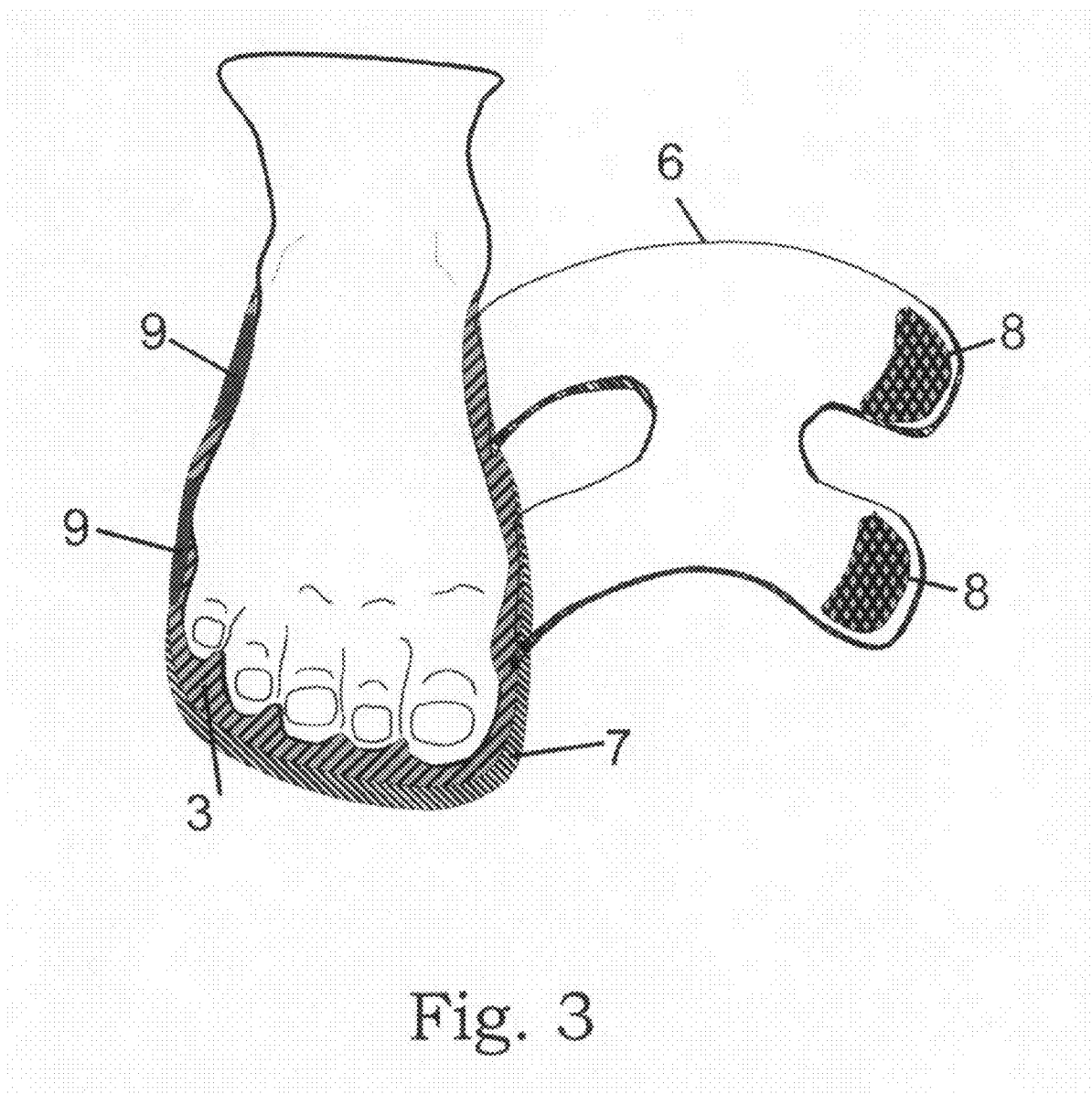
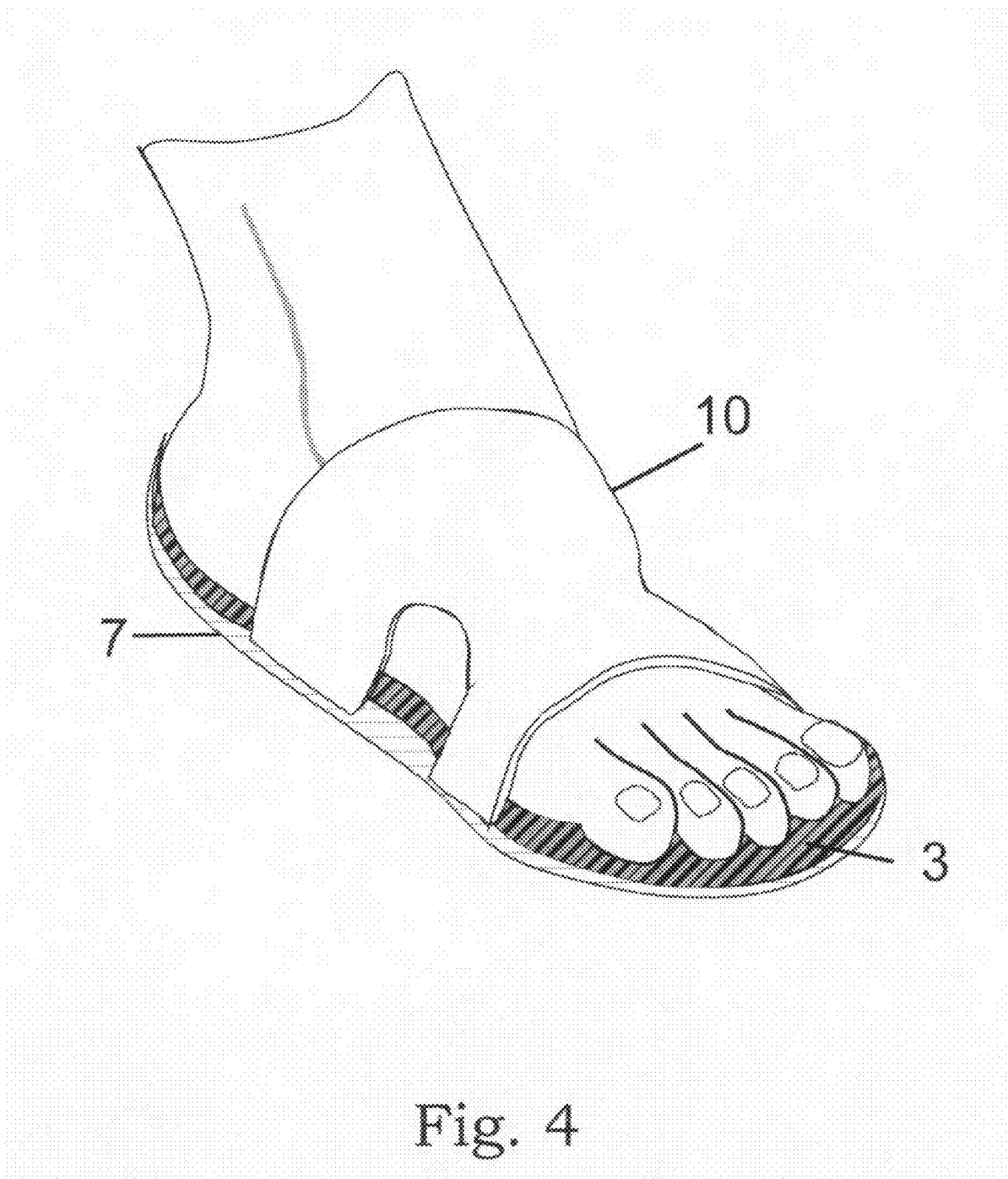


Fig. 2





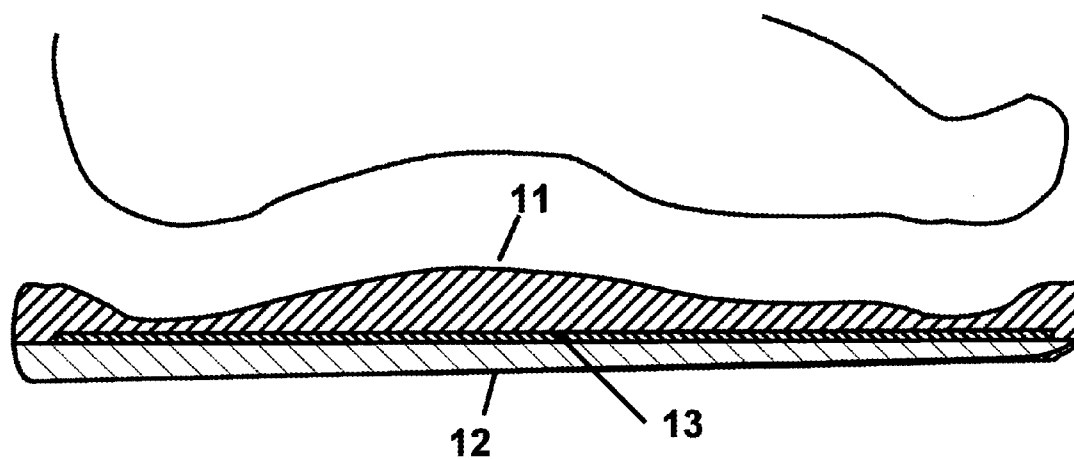


Fig. 5

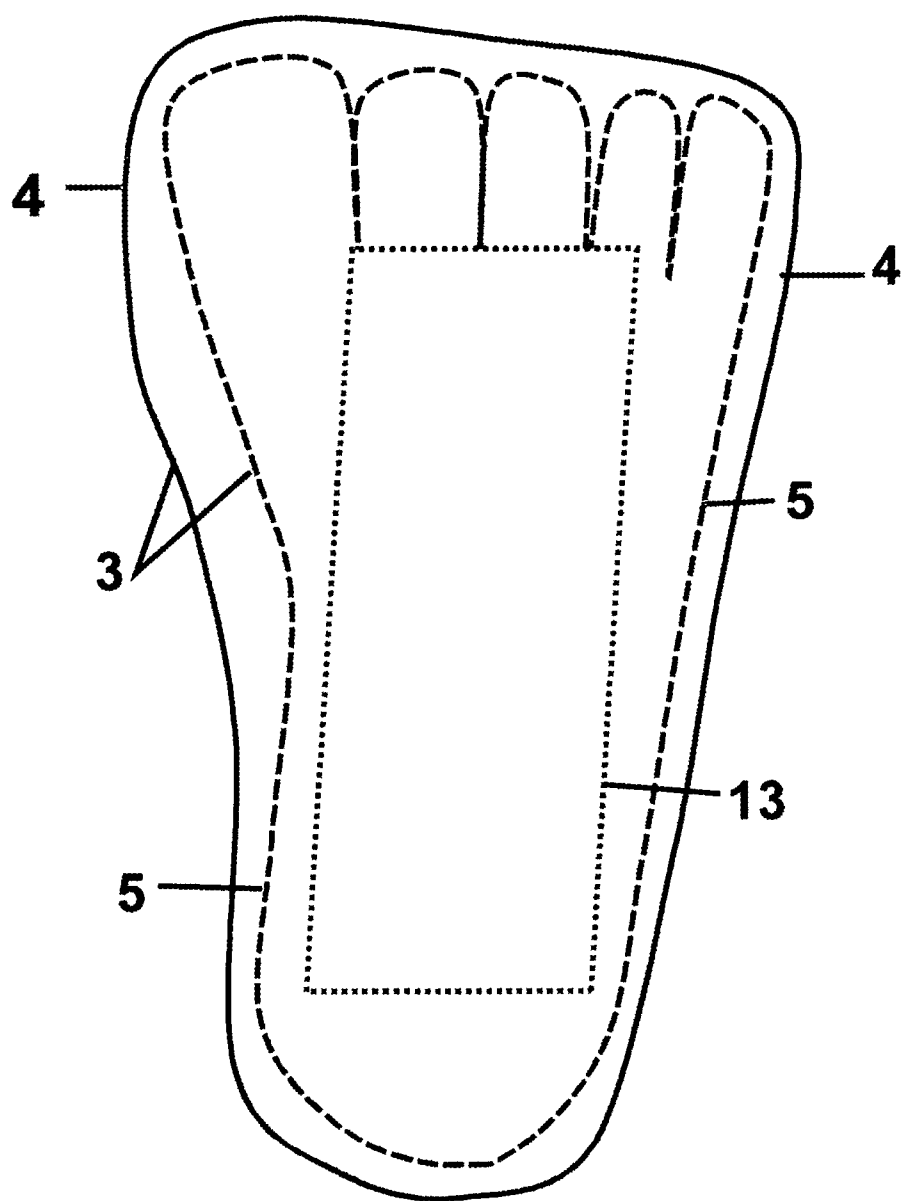


Fig. 6

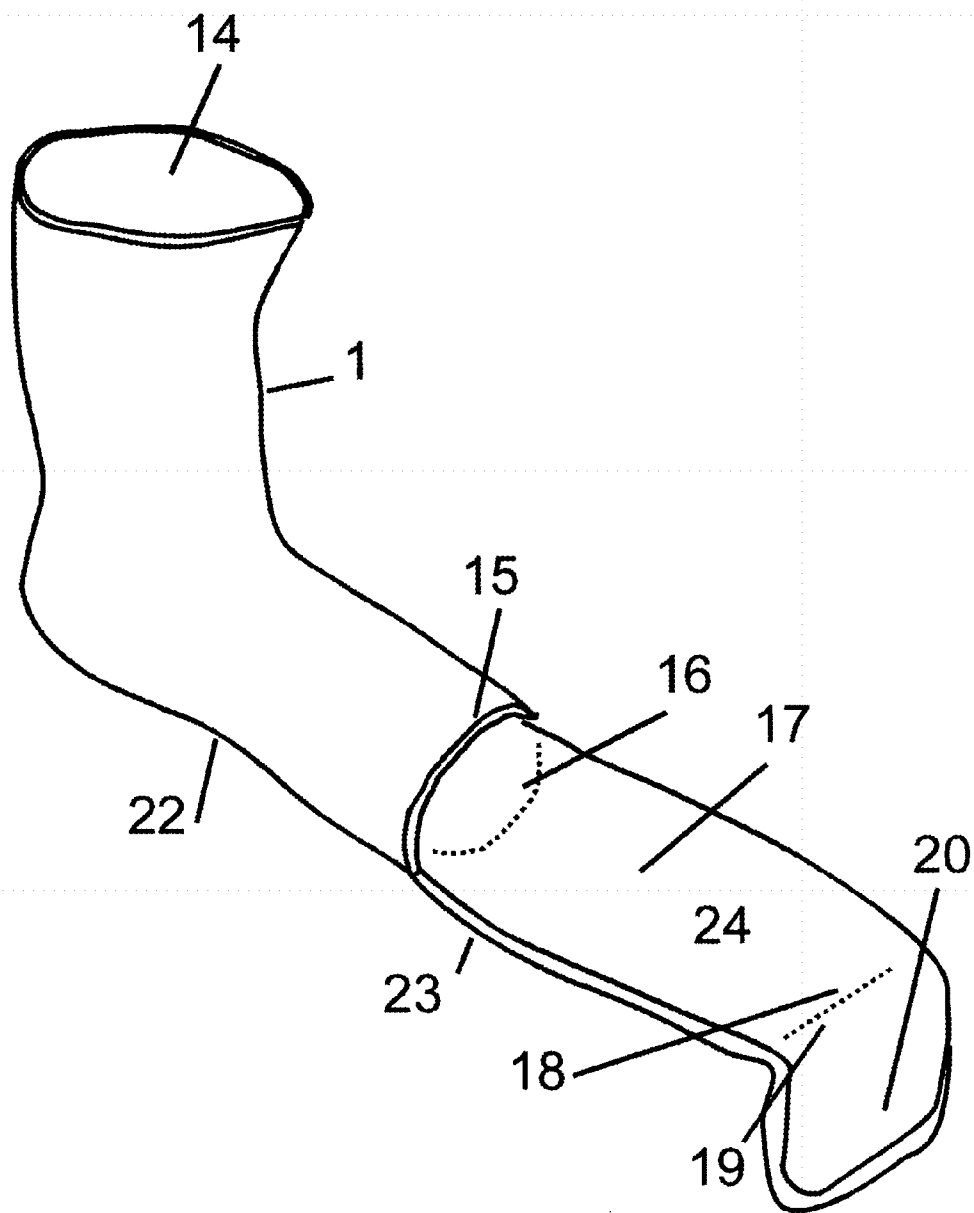


Fig. 7



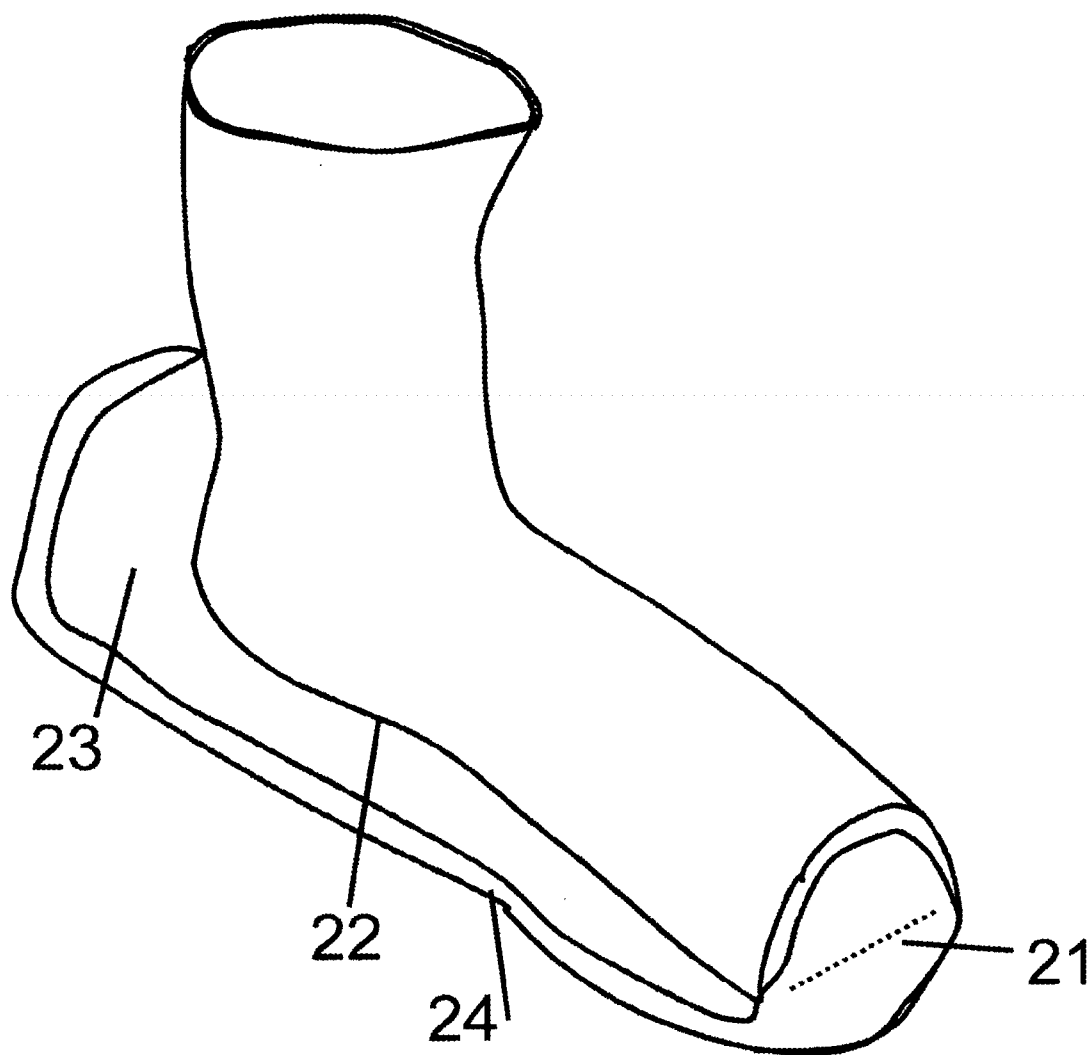


Fig. 8

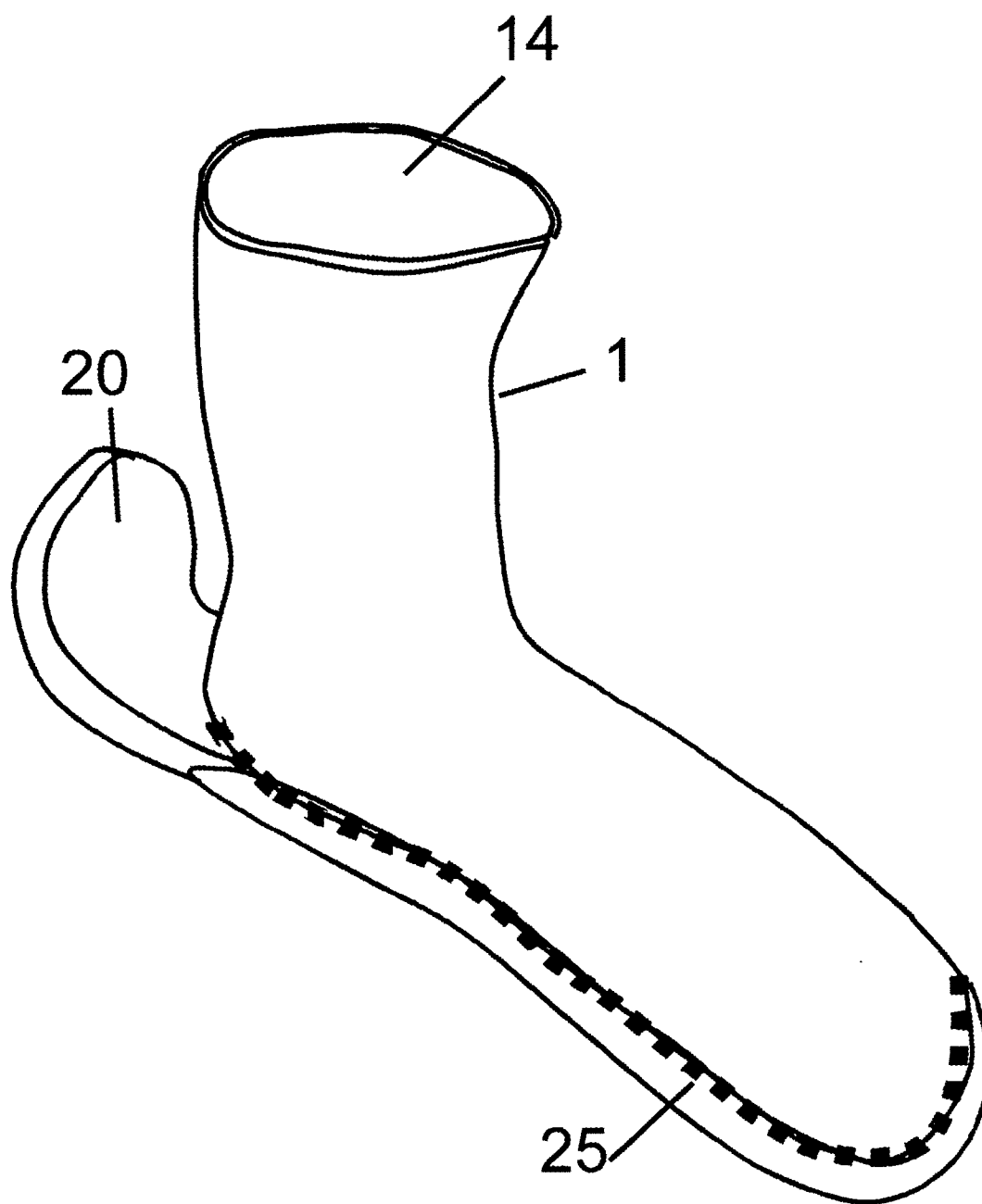


Fig. 9

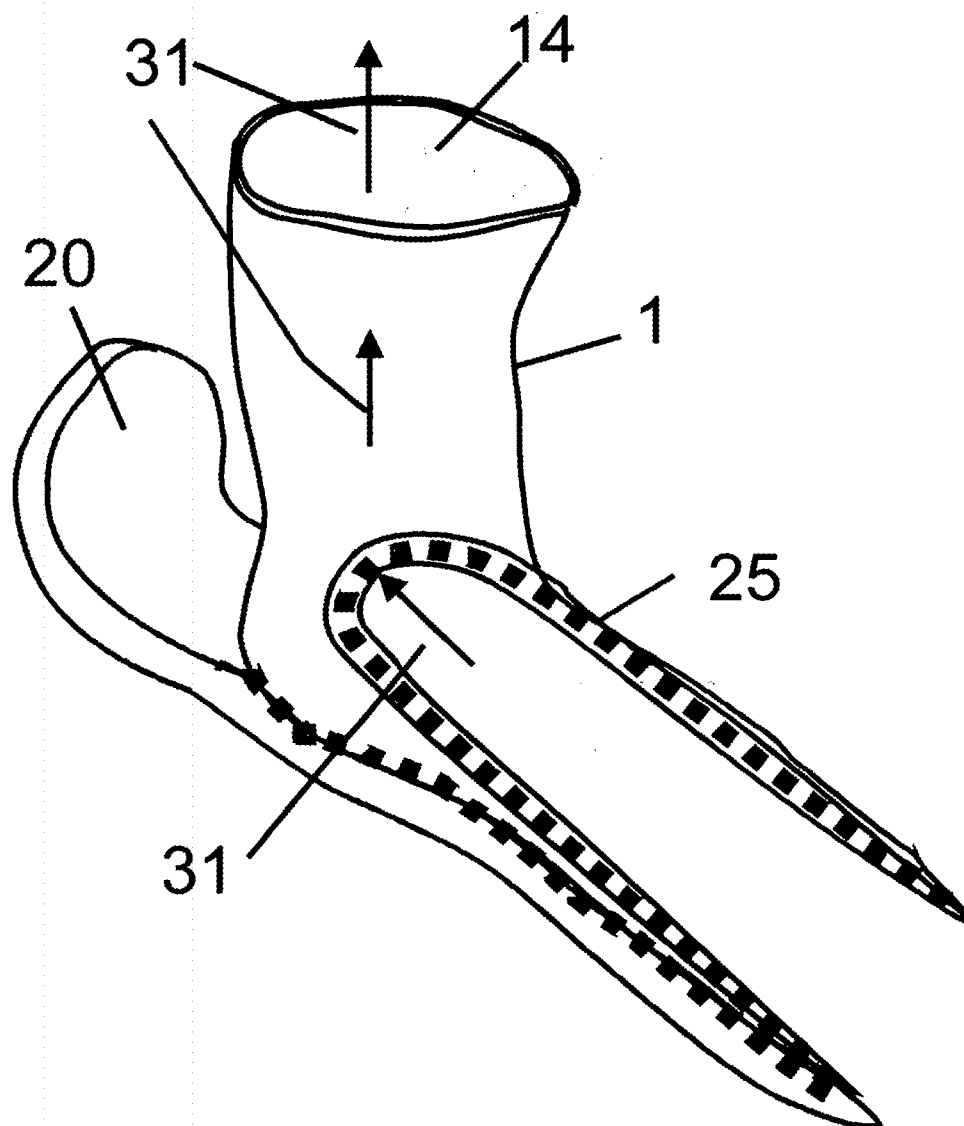


Fig. 10

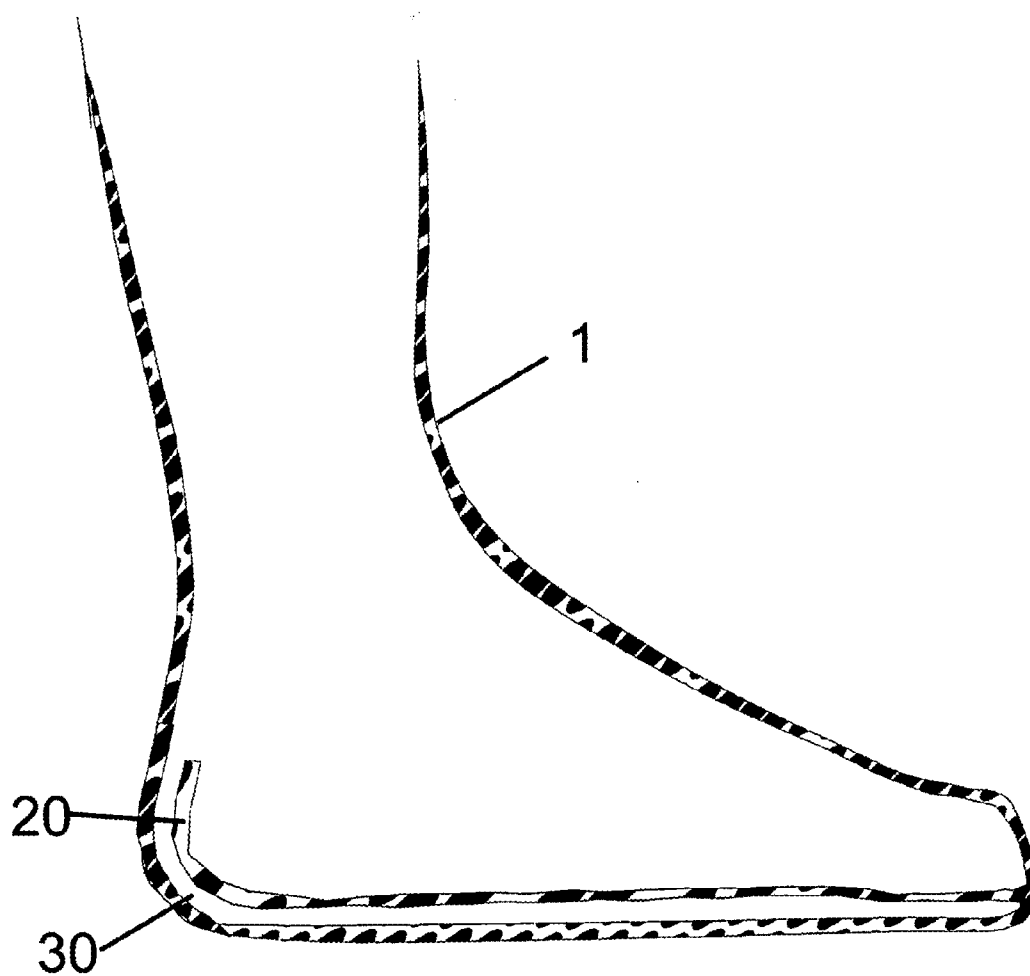


Fig. 11

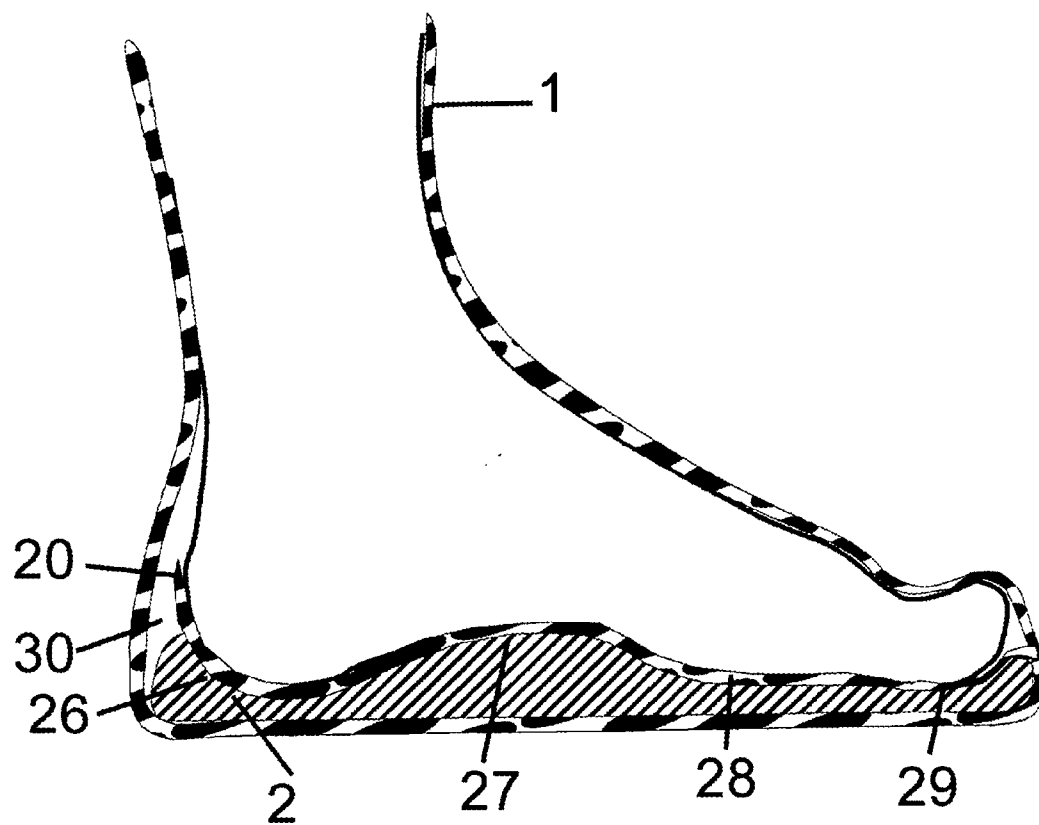


Fig. 12

## SHIELDING DEVICE FOR FOOT PAIN AND DISCOMFORT

### [0001] CROSS-REFERENCE TO RELATED APPLICATIONS

[0002] The present application claims the benefit two provisional applications: Application 61/998,068 file date 2014-6-18 applicant Gerald Edwin Coleman Application 62/178,492 file date 2015-4-13 applicant Gerald Edwin Coleman

### STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0003] Not applicable

### NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT

[0004] Not applicable

### REFERENCE TO A SEQUENCE LISTING

[0005] Not applicable

### BACKGROUND of the INVENTION

[0006] Pain and discomfort associated with peripheral neuropathy is certainly a condition that needs attention. Peripheral neuropathy can result from traumatic injuries, infections, metabolic problems, inherited causes and exposure to toxins. The most common cause is diabetes mellitus. Peripheral neuropathy, a result of damage to your peripheral nerves disturbs as many as twenty million people. Other users of the invention could be persons suffering from medical conditions such as restless leg syndrome, plantar fasciitis, Parkinson's disease, or pregnancy. Sufferers narrate that motion of the feet against the bed sheets causes friction on the bare feet to result in a horrific experience. Almost no touching, friction or movement is tolerable. Many diabetics sleep with their feet hanging off the side of the bed to avoid any contact. It is impractical and uncomfortable to sleep this way all of the time. When the device is worn, the feet will be isolated and will be experiencing a neutral, no friction, and no motion against the surfaces of the present environment. The device will shield and protect sensitive feet, allowing the user to sleep better and have protection while walking and awake at home. The invention has the benefit of a diabetic sock and shoe; it is different because it is intended for indoor use and worn while sleeping in bed. The invention provides the important feature of the soft smooth surfaces for soothing the foot and a stiff boundary between the foot and its surroundings. The invention is effectively calming the feet with smooth soft barrier surfaces, providing a protective perimeter and a securing fit held fast to the feet. The use of this invention will sanction the feet to a nearly neutral environment, allowing the user to have less pain and discomfort associated with neuropathy or diabetes. Therefore concluding it would be useful to have a device that would be worn as a sock or as a sandal/slipper that would provide comfort as well as protection for those suffering from the ill effects caused by peripheral neuropathy and/or other medical conditions.

### SUMMARY OF THE INVENTION

[0007] The present invention is directed to a footwear sole structure capable of relieving pain and discomfort of a user

with peripheral neuropathy. It has been discovered that a device comprised of a knit tubular sleeve, a stiff properly dimensioned appliance inserted into the sleeve will provide relief of pain and discomfort caused by peripheral neuropathy. The device could also be comprised of a lower sole with an upper component of straps or an upper component permanently fastened to the lower sole resembling a sandal or slipper respectfully. The sleeve or sandal/slipper has a smooth inner surface either applied to or implanted into the sleeve or sandal/slipper. The very smooth surface will make contact at the sole, sides, or upper portion of the foot. When the device is constructed as a sandal/slipper the lower soles will be a structure with stiffness. The contact surface to the foot will be form fitting from the heel as an indentation; to the bottom portion arch of the foot as an elevation; to the ball of the foot as an indentation continuing to indentions to fit the toes. When the device is constructed as a knit sleeve, an appliance is inserted into the sleeve. The surface of the appliance will be form fitting from the heel as an indentation; to the bottom portion arch of the foot as an elevation; to the ball of the foot as an indentation continuing to indentions to fit the toes. The lower sole or the inserted appliance of the device is comprised of rubber, or other composites. The lower sole or appliance is designed to be flexible enough for walking ability yet have enough stiffness to support the foot. Stiff support to the feet while sleeping is important because it holds the foot flat and straight preventing cupping and arching downward known as "planter". Planter is a major cause of the pain and discomfort. The outer perimeter of the lower/sole or appliance is made larger than the user foot profile. The dimensions outside the profile of the foot become a protective barrier to the foot, protecting the foot from lateral objects in the surrounding environment. The device perimeter will make contact with the objects isolating the foot from making contact to the surrounding environment.

### DESCRIPTION OF THE DRAWINGS

[0008] It is recommended by the applicant the use of FIG. 12 as the front page drawing

[0009] FIG. 1 is a side section view of users' foot inside of the tube 1 and appliance 2

[0010] FIG. 2 is a perspective top view of the users' foot as it is positioned on to the appliance 2 the appliance edge 4 the foot edge 5 and boundary 3

[0011] FIG. 3 is perspective top front views of the device as it could be used replacing the element of the tube 1, worn like a sandal/slipper; depicting strap 6 hooks 8 loops 9 lower sole 7 and boundary 3

[0012] FIG. 4 is a prospective left front view depicting use as a slipper using a lower sole 7 upper component 10 and boundary 3

[0013] FIG. 5 is a section view of the appliance upper half 11 appliance lower half 12 and insert stiffener 13

[0014] FIG. 6 is a bottom view showing the stiffener insert 13 appliance edge 4 foot edge 5 and boundary 3

[0015] FIG. 7 is a prospective left front view of the tube 1 tube opening 14 tubular knit termination 15 reciprocating knit beginning 16 single layer extension 17 reciprocating knit termination 18 cuff stitch beginning 19 retainer 20 tube sole 22 single layer extension top surface 24

[0016] FIG. 8 is a left front prospective view of a fold line 21 tube sole 22 Cuff fold 23 single layer extension top surface 24

[0017] FIG. 9 is a prospective view of stitching 25 tube 1 tube opening 14 and retainer 20

[0018] FIG. 10 is a left front prospective view showing motion 31 turning the tube 1 inside out through tube opening 14 retainer 20 and stitching 25

[0019] FIG. 11 is a section view of the device after the single layer extension 17 has been turned inside the tube 1 to form the appliance pocket 30 with the retainer 20 in final position

[0020] FIG. 12 is a section view showing the users' foot in the device with the tube 1 appliance 2 retainer 20 appliance pocket 30 the users' heel 26 instep 27 ball of foot 28 toes 29

#### DETAILED DESCRIPTION of the INVENTION

[0021] The invention will incorporate the use of as many as six elements to achieve the desired results. This invention can be used with all six elements or used with any combination of them individually. The first element is a knit tube 1 constructed of a yarn material with one open end 14 resembling a sock. The second element is an appliance pocket 30 formed within the tube 1 and positioned to receive the third element an appliance 2 with a significant function. The fourth element is a retainer 20 with the purpose of imprisoning the appliance 2. The fifth element is a lower sole 7 and the sixth element is an upper component 10.

[0022] As discussed above, the third element of the device is an appliance 2 with a significant function; the following two statements will make clarification.

[0023] 1. Stiff support to the feet while sleeping is important because it holds the foot flat and straight preventing cupping and arching downward known as a "Plantar". This is the condition that occurs as nerve damage progresses. There is a coefficient of flexibility in the appliance 2 achieving a median flexibility accommodating both aspects necessary. The first is stiffness adequate to keep the foot flat enough to prevent plantar. The second is adequate flexibility to allow walking. Plantar measurements are made in terms of N/kg (Newton's per kilogram) and kPa (Kilopascals). Foot pressure resistance required to overcome bending the plantar plane to cause pain begins at a coefficient greater than 1.0 N/kg and the required flexibility to allow walking is less than 3.0 N/kg. The appliance 2 is designed to have coefficient of flexibility greater than 1.0 N/kg and less than 3.0 N/kg.

[0024] 2. The outer perimeter of the appliance edge 4 is made larger than the profile of the users' foot edge 5. Achieving the proper distance of barrier 3 protection is a function to be determined in proportion to the size of users' foot. A very small amount of barrier 3 is all that is required. A range of distance from 5 to 15 millimeter's is sufficient. See FIG. 6.

[0025] 3. The first element is the tube 1 must be knit of a yarn and in a method assuring a softness desired to touch. The use of hybrid yarns such as hollow core synthetics, bamboo, and newer technology will aid to the desired moisture wicking and softness.

[0026] 4. The tube 1 will be knit starting at the open end 14 using a circular process normal to any sock. After the tube 1 has been constructed to the point of the tubular knit end 15 the reciprocating knit beginning 16 is started generating the single layer extension 17 and continuing to the point of the reciprocating termination

18 where the cuff stitch begins 19 forming the fourth element a retainer 20. See FIG. 7

[0027] 5. The single layer extension 17 is turned back and down toward the tube under side 22 at the fold 21 line. See FIG. 8

[0028] 6. Then the surface of the tube under side 22 and the surface of the single layer extension top surface 24 are matched and stitched 25 together. See FIG. 9

[0029] 7. Reaching down through the tube open end 14 to the retainer 20 and then with a pulling motion 31 See FIG. 10 the retainer 20 will come through the tube open end 14 making a sock with the second element an appliance pocket 30. See FIG. 11

[0030] 8. The fourth element the appliance 2 can be inserted through the tube open end 14 and placed into the appliance pocket 30 See FIG. 12.

What is claimed is:

1) Device to protect the wearers' foot isolating the foot from its surrounding environment comprising:

A material formed into a tube 1 having at least one open end 14, and an appliance 2.

2) The appliance 2 of claim 1 further claims the appliance 2 is inserted into said tube 1. without any method to retain the appliance 2. Shown FIG. 1

3) The appliance 2 of claim 1 further comprising of very soft smooth surface on the said appliance 2 adjacent to the wearers' feet.

4) The appliance 2 of claim 1 further comprising of dimensions cut to the appliance 2 larger than the profile of the wearers' foot to provide a protective boundary 3 whereas the dimensions are purposely designed to prevent the wearer' foot to become struck and impacted by means of feeling the surrounding environment. Shown FIG. 2

5) The tube 1 of claim 1 further comprising of a pocket 30 designed to contain the an appliance 2 whereas the said pocket 30 is inside the tube 1 positioned to receive an appliance 2. Shown FIG. 11

6) The tube 1 of claim 1 further comprising of a single layer extension 17 designed to be folded under the tube 1 and stitched 25 to the tube sole 22 and then turned inside out 31 whereas the tube forms the pocket 30. Shown FIG. 8 and FIG. 9

7) The tube 1 of claim 1 further comprising of a retainer 20 designed to imprison the appliance 2 whereas the said retainer 20 utilizes a sock cuff stitch at the end of the single layer extension 17. forming the said retainer 20. Shown FIG. 11

8) The appliance 2 of claim 1 further comprising of an insert stiffener 13 designed to be imbedded between the appliance upper half 11 and the appliance lower half 12 whereas the insert stiffener 13 designed to provide a coefficient of flexibility. Shown FIG. 5

9) The appliance 2 of claim 1 further comprising of appliances halves 11 and 12 appliance upper half 11 and an appliance lower half 12 whereas manufactured of material such as rubber, foam, fiber, and any combination of composites designed to provide a coefficient of flexibility. Shown FIG. 5

10) The appliances halves 11 and 12 of claim 1h designed to provide a coefficient of flexibility further claim the material used for each half are not necessarily similar materials and are not necessarily dissimilar materials.

11) The appliances **11** and **12** of claim **1h** designed to provide a coefficient of flexibility further claim the said two halves of the said appliances **11** and **12** can be manufactured as a single item.

12) The appliance of claim **1** further comprising of a form fit to the users' foot whereas the said appliance **2** is shaped with indentions **26**, **28**, and **29** additionally an elevation **27** to maintain a close fit to the foot particularly assisting to minimize any measurable plantar plane effect. Shown FIG. **12**

13) Device to protect the wearers' foot isolating the foot from its' surrounding environment comprising:

A structure with a lower sole **7** and an upper component **10**, and a boundary **3** Shown FIG. **4**

14) The device of claim **2** further comprised of a means to retain the said device to the wearer' foot whereas the use of a hook **8** and loop **9** fastening system attaches to the said retaining strap **6** and the said lower sole **7**, resembling a sandal. Shown FIG. **3**

15) The of device claim **2** further comprised of a means to retain the said device to the wearer' foot can be fabricated as a combined structure whereas the said lower sole **7** and the said upper component **10** are permanently attached resembling a slipper. Shown FIG. **4**

16) The device of claim **2** further comprised of dimensions cut to the said lower sole **7** larger than the profile of the wearers' foot to provide a protective boundary **3** whereas the dimensions are purposely designed to prevent the wearer' foot to become struck and impacted by means of feeling the surrounding environment. Shown FIG. **2**

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