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APPLICATION TYPE	ORDINARY APPLICATION
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APPLICANT NAME	1 . Dr. Manu Goyal 2 . Dr. N. K. Batra 3 . Ms. Satnam Kaur 4 . Ms. Priyanka
TITLE OF INVENTION	AN APPARATUS OF STATIC PNEUMATIC ANKLE FOOT ORTHOSIS (SPAFO)
FIELD OF INVENTION	BIO-MEDICAL ENGINEERING
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PUBLICATION DATE (U/S 11A)	26/06/2020

Application Status	
APPLICATION STATUS	Awaiting Request for Examination

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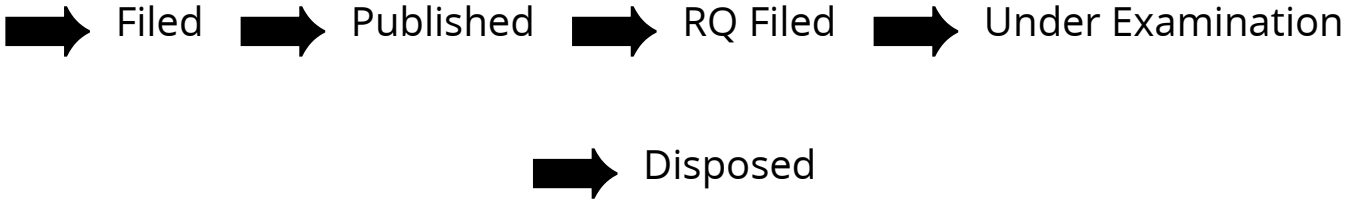

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FORM 2
THE PATENTS ACT 1970
(39 of 1970)
&
THE PATENT RULES, 2003
COMPLETE SPECIFICATION
(See section 10 and rule 13)

1. **TITLE OF THE INVENTION: -**

AN APPARATUS OF STATIC PNEUMATIC ANKLE FOOT ORTHOSIS (SPAFO)

2. **APPLICANT(S)**

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3. **PREAMBLE OF THE DESCRIPTION**

The following specification particularly describes the invention and the manner in which it is to be performed

FIELD OF THE INVENTION

This invention is related to the biomedical engineering which is more particular concerned with static pneumatic ankle foot orthosis (SPAFO) ankle brace which is used to stabilise and protect the joint and structures surrounding the joint.

BACKGROUND OF THE INVENTION

Ankle Foot Orthosis is a type of brace which is made for the stabilization, alignment and protection of the joint that is weak and that needs support for the proper functioning of gait or activities of daily living. There are many Ankle Foot Orthosis for support of joint but there is no orthosis for the protection of joint and pumping of venous blood in the flaccid muscles or unconscious patients. So, in those patients the active foot movements are not possible and leads to major and fatal complications of edema accumulation which further leads to swelling around joint and pressure sore and deep vein thrombosis.

US4289122A discloses an ankle-foot orthosis made of thin-sheeted polypropylene material which comprises a foot section and a leg section articulately attached to one another on each side of the ankle in order to facilitate dorsi-flexion. The leg section has a flanged lower lip overlapping the upper edge of the foot section. The overlap provides a stop for the backward movement of the leg section around the articulation point, thus limiting plantar flecion and foot drop.

US8287477B1 discloses an Active Ankle Foot Orthosis (AAFO) is provided where the impedance of an orthotic joint is modulated throughout the walking cycle to treat ankle foot gait pathology, such as drop foot gait. During controlled plantar flexion, a biomimetic torsional spring

control is applied where orthotic joint stiffness is actively adjusted to minimize forefoot collisions with the ground. Throughout late stance, joint impedance is minimized so as not to impede powered plantar flexion movements, and during the swing phase, a torsional spring-damper (PD) control lifts the foot to provide toe clearance. To assess the clinical effects of variable-impedance control, kinetic and kinematic gait data were collected on two drop foot participants wearing the AAFO. It has been found that actively adjusting joint impedance reduces the occurrence of slap foot, allows greater powered plantar flexion, and provides for less kinematic difference during swing when compared to normals.

US8048012B1 discloses a custom articulated ankle-foot orthosis (AFO) system is disclosed that is formed on a cast of the wearer's foot. The custom articulated AFO has an adjustably tightenable calf section hingedly connected to an adjustably tightenable foot section. The custom articulated AFO is made of thermally formable plastic sheet, is lined inside and outside, and is padded inside. The brace permits dorsal/plantar flexion while supporting the ankle against supination and pronation. The apparatus and methods of manufacture are disclosed.

As compared to above prior arts, no reference either alone or in comparison teaches what the present invention discloses. The present invention solves the long standing problem as Static Pneumatic Ankle Foot Orthosis (SPAFO) is designed with focusing on distribution of pressure by help of pneumatic mechanism and also help in contracture prevention. SPAFO protects & supports the whole foot, ankle joint and calf muscle and also controls inversion & eversion component with extra back support.

SPAFO is going to give a total support as it has DOUBLE SUPPORTING SYSTEM i.e. by means of Velcro and three straps. There is no existing AFO with pumping mechanism which helps to return venous blood by compressing calf muscles. As we know that in unconscious patients & in patients with flaccid lower limb muscles, there is no contraction which leads to accumulation of venous blood which further cause deep vein thrombosis, & compartment syndrome. So, SPAFO is going to prevent all fatal complications and improves quality of life.

SUMMARY OF THE INVENTION

The present invention in field of ankle foot orthosis helps to improve venous return, support, and performance of joint, comfortability level and reduces contractures, heel sores & deep vein thrombosis. A pneumatic sheet enclose foot, ankle joint & calf which is closed with help of Velcro and three straps. An internal surface provided with inflation and deflation mechanism. Thereby, reduces the skin irritation and distribute pressure equally around the area and reduces friction level between foot and static pneumatic ankle foot orthosis (SPAFO).

The SPAFO opens up from the front side therefore it can be easily wearable around the ankle joint and calf. SPAFO is suitable for all individual and for any sizes. The foot and leg is placed within the orthosis which is then closed with help of Velcro and straps. The SPAFO is secure, safeguarding and supportive from external hazard, increase durability of the product and no irritable. It is a new invention that provide a pumping and weight distribution mechanism and which is tightly fit around the ankle joint that provides compression. Additional information and uses of the invention have been given in detailed description and drawings.

The present invention is going to prevent oedema accumulation hence protecting the soft tissues from further damage. This Ankle Foot Orthosis is made up with bubble mattress which have the property to inflate and deflate which helps in three main functions i.e. prevention of pressure sore and pumping of calf muscle which promotes venous return and improves lymphatic drainage which helps to reduce swelling.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a frontal perspective view of the Static Pneumatic Active Foot Orthosis (SPAFO)- FIG. 1(A) illustrates valve to inflate and deflate the mattress; FIG. 1(C, E, and J) illustrates the straps to lock the movement of ankle; FIG 1(C, E, and G) illustrates the straps to lock the movement of ankle; FIG 1(H) represents the pneumatic sheet.

FIG. 2 is a back perspective view thereof;

FIG. 3 is a back perspective view thereof.

DETAILED DESCRIPTION OF THE INVENTION

The static ankle foot orthosis (SPAFO) helps to improve venous return, support, and performance of joint, comfortability level and reduces contractures, heel sores & deep vein thrombosis. A pneumatic sheet enclose foot, ankle joint & calf which is closed with help of Velcro and three straps.

The present invention in field of ankle foot orthosis helps to improve venous return, support, and performance of joint, comfortability level and reduces contractures, heel sores & deep vein

thrombosis. A pneumatic sheet enclose foot, ankle joint & calf which is closed with help of Velcro and three straps. An internal surface provided with inflation and deflation mechanism. Thereby, reduces the skin irritation and distribute pressure equally around the area and reduces friction level between foot and static pneumatic ankle foot orthosis (SPAFO).

The SPAFO opens up from the front side therefore it can be easily wearable around the ankle joint and calf. SPAFO is suitable for all individual and for any sizes. The foot and leg is placed within the orthosis which is then closed with help of Velcro and straps. The SPAFO is secure, safeguarding and supportive from external hazard, increase durability of the product and no irritable. It is a new invention that provide a pumping and weight distribution mechanism and which is tightly fit around the ankle joint that provides compression. Additional information and uses of the invention have been given in detailed description and drawings.

The mattress consists of inflation and deflation mechanism and consist of various air bubbles which are placed parallel. Together, these air bubbles make form a mattress with air circulation. Material of inner pneumatic sheet is made up of Polyvinyl Chloride (PVC). The material has sufficient strength and sturdiness to support the weight. The electrical pump is used to inflate and deflate the mattress and control the pressure of air among the bubbles to distribute the pressure equally on the foot.

USE OF INVENTION-

The present invention is designed with a focus to distribute pressure with the help of pneumatic mechanism to improve venous return and prevent contracture. SPAFO protects & supports the

whole foot, ankle joint and calf muscle and also controls inversion & eversion component with extra back support.

This invention helps in:

- Prevention of heel sore
- Helps in venous return
- Prevention of deep vein thrombosis(DVT)
- Stabilisation of joint
- Relieves the pressure of bone on soft tissues
- Prevent edema collection

We Claim:

1. An apparatus of Static Pneumatic Ankle Foot Orthosis (SPAFO) comprises a pneumatic sheet enclose foot, ankle joint & calf which is closed with help of Velcro and three straps; wherein an internal surface provided with inflation and deflation mechanism; and reduces the skin irritation and distribute pressure equally around the area and reduces friction level between foot and static pneumatic ankle foot orthosis (SPAFO).

2. The apparatus as claimed in claim 1, wherein SPAFO opens up from the front side therefore it is easily wearable around the ankle joint and calf; wherein the foot and leg is placed within the orthosis which is then closed with help of Velcro and straps.

3. The apparatus as claimed in 1, wherein mattress consists of inflation and deflation mechanism and consist of various air bubbles which are placed parallel; wherein together, these air bubbles make form a mattress with air circulation.

4. The apparatus as claimed in 1, wherein Material of inner pneumatic sheet is made up of Polyvinyl Chloride (PVC).
5. The apparatus as claimed in 1, wherein an electrical pump is used to inflate and deflate the mattress and control the pressure of air among the bubbles to distribute the pressure equally on the foot.

Dated this 7th day of April 2020

(Ashish Sharma)
Authorized Agent for the Applicant
Indian Patent Agent Regn No. IN/PA-3021

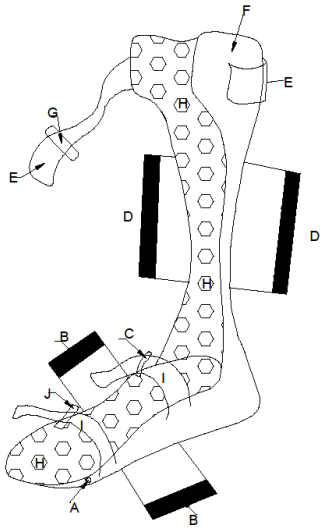

Figure 1: FRONTAL PERSPECTIVE VIEW

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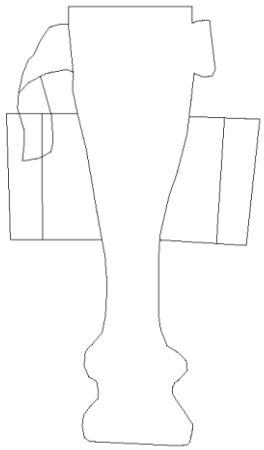

Figure 2: Back perspective view

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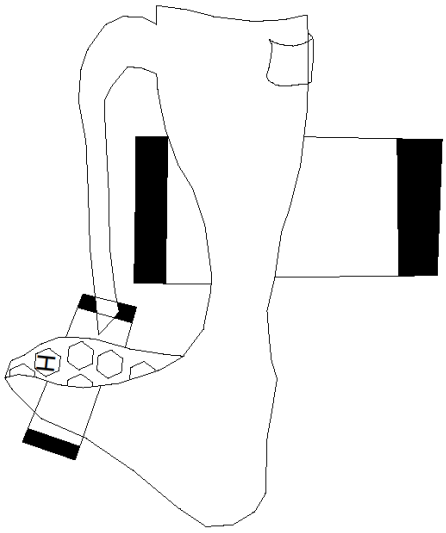

Figure 3: Side perspective view

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ABSTRACT

AN APPARATUS OF STATIC PNEUMATIC ANKLE FOOT ORTHOSIS (SPAFO)

Disclosed herein an apparatus of static pneumatic ankle foot orthosis (SPAFO) ankle brace which is used to stabilise and protect the joint and structures surrounding the joint. The present invention in field of ankle foot orthosis helps to improve venous return, support, and performance of joint, comfortability level and reduces contractures, heel sores & deep vein thrombosis. A pneumatic sheet enclose foot, ankle joint & calf which is closed with help of Velcro and three straps. An internal surface provided with inflation and deflation mechanism. Thereby, reduces the skin irritation and distribute pressure equally around the area and reduces friction level between foot and static pneumatic ankle foot orthosis (SPAFO).