Variable stiffness orthotic shell

INVENTORS: Andrea Baldoni
Matteo Cianchetti
Nicola Vitiello
Simona Crea

PATENT STATUS: Granted

PRIORITY N°: 102019000024301

PRIORITY DATE: 17/12/2019

PUBLISHED AS: IT; PCT

Invention

In recent decades, biomedical tools are becoming more and more successful with new innovative technologies that make devices more and more performing. Also in the field of splints or braces there is a need to improve performance by advancing the state of the art and it is precisely the case of this patent that protects a fabric that can easily adapt to different curvatures and then stiffen and have structural characteristics comparable to a rigid brace and/or plaster.

The patent protects a star-shaped element with at least three flaps which, when suitably interconnected with other adjacent ones and in several layers, constitutes an innovative layar jamming fabric. Thanks to the shape of the single element, the fabric is able, locally, and consequently also globally, to assume the most disparate shapes (such as a saddle: typically very difficult to obtain with jamming technology) and stiffen thanks to a pressure of vacuum applied. The behavior is comparable to the current technologies for manufacturing splints (eg thermoforming materials) with the difference that this invention allows to restore the initial shape and then be stiffened again.

Main advantages are:

- Reuse of the material for different applications
- No application difficulties (ie: hot water, plaster, etc.)
- Low cost of construction and operation
- Technology comparable with the current ones

Drawings
& pictures

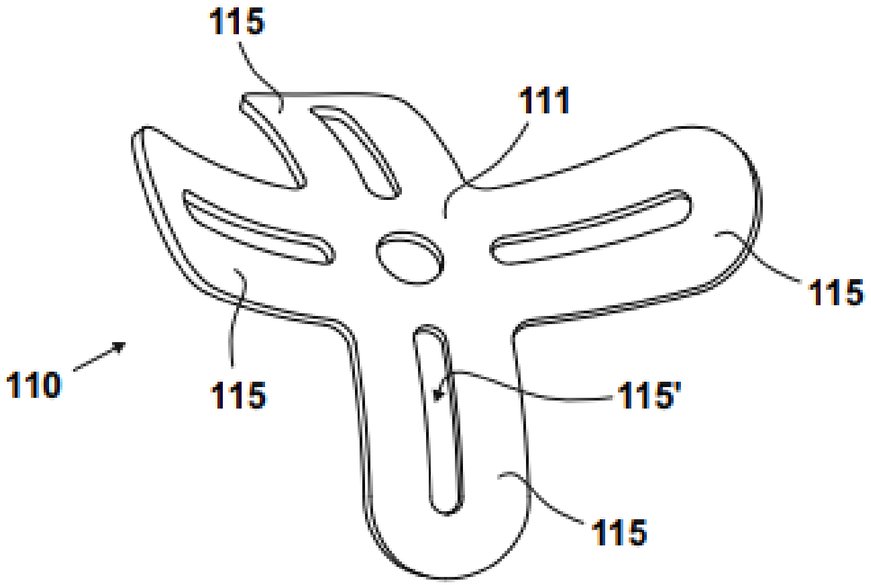

Fig. 2A

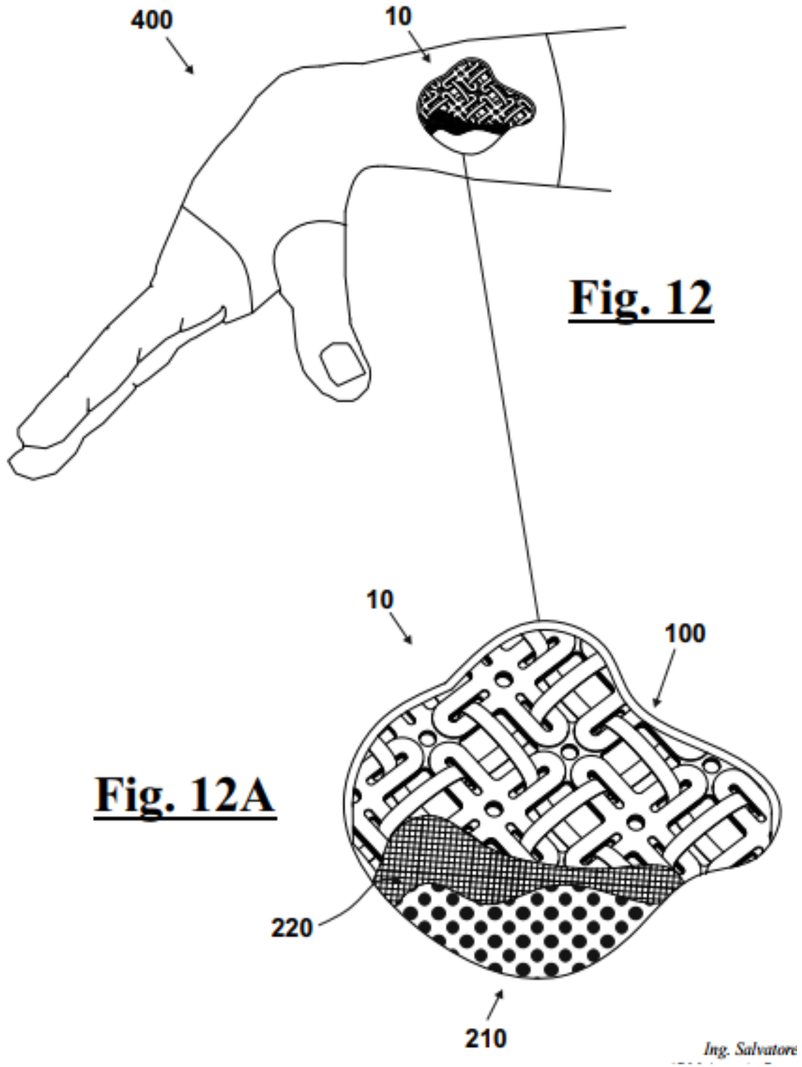

Fig. 12

Fig. 12A

Ing. Salvatore

Industrial applications

The main applications are:

- Reversible brace
- Layer jamming
- Wearable robotics chassis

Possible developments

The technology underlying the patent is in a development phase that is not yet fully mature for the market with the respective products.

The TRL is still to be considered low (eg: 2/3) suitable for experimental validation prototypes but has a great potential to enable the technology.

Still numerous other insights are needed by the research team to make the technology effectively applicable to a product.

For more information:

Tech Transfer Office of Scuola Superiore Sant'Anna di Pisa

Headquarters: Piazza dei Martiri della Libertà, 33 - Pisa

Web site : https://www.santannapisa.it/it

E-mail: uvr@santannapisa.it

For more information:

Ufficio Regionale di Trasferimento Tecnologico

Headquarters: Via Luigi Carlo Farini, 8 50121 Firenze (FI)

E-mail: urtt@regione.toscana.it

SANT'ANNA SCHOOL OF ADVANCED STUDIES PISA

REGIONE TOSCANA

urtt Ufficio Regionale di Trasferimento Tecnologico