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(54) **Protection device, in particular for motorcycle clothing**

(57) A protection device (10), in particular for motorcycle clothing and for protecting the shoulders and/or the elbows and/or the knees of a user, is made with a foam reticulated plastic material (EVA) with at least two layers (11, 12) having different hardnesses.

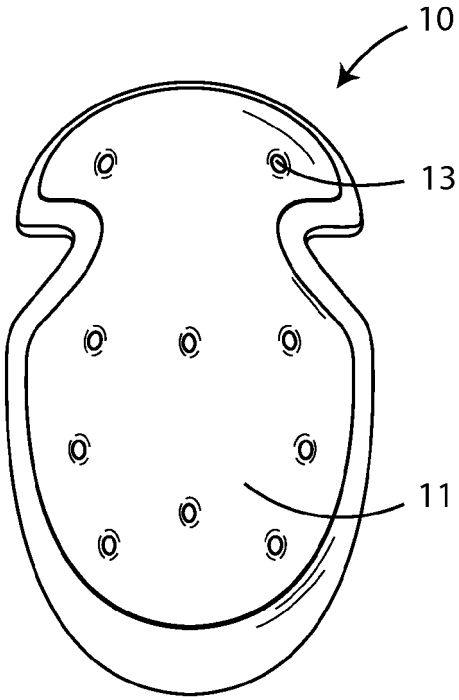

Fig. 1

EP 2 620 063 A1

Description

[0001] The present invention relates to a protection device usable, in particular, for motorcycle clothing. Particularly, the present invention relates to a protection device which can be inserted in motorcycle garments, such as jackets and/or suits for use by those who drive a motorcycle.

[0002] Nowadays, different types of protective equipment for motorcycle uses, which must comply with certain standards and regulations, such as EN 1621, are known. The protective devices available on the market have an outer shell made of plastic material, in particular polyurethane, which is internally associated with a bonded and foam fabric, or a body made of polyurethane foam, or, alternatively, a multi-body composed of different plastic materials.

[0003] In particular the protection devices made of polyurethane foam are those which maintain a better degree of elasticity at different temperatures, thus ensuring a better adaptation to the body part to be protected (such as the shoulder and/or the elbow and/or the knee), a perfect fit and an improved comfort, and reducing the overall dimensions with respect to the user's movements.

[0004] Serious limits of said known protective devices are given by the need to increase the thickness of the body depending on the impact absorption capacity to be obtained, thereby increasing the overall dimensions and the weight at the expense of a suitable wearability and comfort for users.

[0005] In the meantime, protective devices manufacturers have studied basic plastic materials to overcome the limits set out in the above, with technical results which however are not yet fully satisfactory.

[0006] An object of the present invention is therefore to overcome the technical drawbacks described above and, in particular, to provide a protective device, in particular for motorcycle clothing, which is able to maintain a good elasticity at different temperatures, thus ensuring an excellent conformation on the body part to be protected (such as, for example, the shoulder and/or the elbow and/or the knee), a good lightness and an excellent comfort and fit for the wearer.

[0007] Another object of the invention is to provide a protective device, in particular for motorcycle clothing, which reduces the overall dimensions to the user's movements, with respect to the prior art.

[0008] A further object of the present invention is to provide a protective device, in particular for motorcycle clothing, which has reduced thickness, said thickness being however compatible with the impact absorption standards that are required, and lower weight, with respect to the known protective devices.

[0009] Another object of the present invention is to provide a protective device, in particular for motorcycle clothing, which ensures a high efficiency and reliability and that allows to limit the total costs, taking into account the relevant advantages achieved. These and other objects, which will become clear in the foregoing, are achieved by a protective device for motorcycle clothing, according to the appended claim 1. Further technical detailed features are contained in the subsequent dependent claims.

[0010] Advantageously, the protection device according to the invention is realized by using a foam cross-linked or reticulated material called EVA (Ethylene-Vinyl-Acetate); said materials (EVA) are cross-linked materials and they are expandable materials containing modified polyolefins with high quality elastomers and allow to make articles lighter than the articles made with PVC, thermoplastic rubbers and/or polyurethane with two components.

[0011] Moreover, the EVA products also have a higher aesthetic quality and can be used in a wider range of colors with respect to the foam polyurethanes.

[0012] Experimental tests have shown that a protection entirely made with EVA with a single hardness of 30/35 ShA (Shore) and with the same thickness of a known protective device made of foam polyurethane does not guarantee the same impact capacity which is required by regulations (EN 1621) and that said requirements can only be achieved by increasing the thickness or the hardness of the EVA material at the expense of the comfort.

[0013] However, if a protective device is made with a EVA material with two layers and with two different hardnesses, results are substantially improved, thus providing enhanced shock absorption capacities, with respect to the protective devices made with foam polyurethane.

[0014] The invention will now be described for illustrative but not limitative purposes, with particular reference to the preferred embodiment which follows, as well as to the drawings of the enclosed figures, in which:

- figure 1 shows a front view of the protective device, in particular for motorcycle clothing, according to the present invention;
- figure 2 shows a rear view of the protective device of figure 1, according to the present invention;
- figure 3 shows a section side view of the protective device of figure 1, according to the present invention.

Referring to the above mentioned figures, the protective device 10 according to the present invention is shown in a first embodiment and is usable for motorcycle clothing and, in particular, for the protection of shoulders and/or of the elbows and/or of the knees of a user.

[0015] The above-mentioned protection device 10 comprises a first external layer 11 made with a first plastic material, preferably EVA (Ethylene-Vinyl-Acetate), with a hardness between 75 ShA and 65 ShA and preferably equal to 70 ShA, and a second internal layer 12, internal, made with a second plastic material, preferably EVA, having a hardness between 30 ShA and 40 ShA and preferably equal to 35 ShA.

[0016] The above mentioned first and second plastic

materials may be different or they may be of the same type. Furthermore, the protective device 10 has a plurality of through holes 13, thus allowing ventilation of the surface protected by the protective device 10 and determining a closing section between the two layers 11 and 12 to ensure the achievement of a better performance to the tests of the EN 1621 regulations. Finally, for making said protective device 10, a double injection molding process has been provided, with a suitable mold, which includes the following steps:

a. injection of plastic materials in different hardness in two separate molds;
b. superposition of the molds with the plastic material still in a gel form;
c. injection/heating of the mold at temperatures between 200/240° for a time ranging between 5 and 8 minutes for providing a cross-linking process with the cohesion of the two hardnesses;
d. removal of the protective device thus obtained. From the above description the technical features of the protective device which is the object of the present invention are clear, as well as clear are the related advantages.

[0017] In particular, using the protective device according to the invention, it is possible to ensure best capacities for absorbing impacts and/or shocks, other physical/technical features being equal, with respect to the prior art and, in particular, with respect to the protective devices made with simple plastic material, such as polyurethane foam.

[0018] Furthermore, the invention thus conceived is susceptible of numerous modifications and variations, all falling within the inventive concept, and all the details may furthermore be replaced with other technically equivalent.

[0019] Finally, the materials employed, provided they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0020] Where the features and techniques mentioned in any claim are followed by reference signs, said reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly said reference signs do not have any limiting effect on the interpretation of each element identified by way of example by said reference signs. Finally it should be noted that, even if previously have been described preferred embodiments of the invention, it is to be understood that those skilled in the art can make modifications and changes without departing from the relevant scope of protection, as defined by the appended claims.

Claims

1. Protection device (10), in particular for motorcycle clothing and able to protect the shoulders and/or the elbows and/or the knees of a user, **characterized in that** said protection device (10) is made of a foam reticulated plastic material with at least two layers (11, 12) having different hardness.

2. Protection device (10) as to claim 1, **characterized in that** said foam reticulated plastic material is made of polyolefin modified with elastomer.

3. Protection device (10) as at least one of the preceding claims, **characterized in that** said foam reticulated material consists of EVA (Ethylene-vinyl-acetate) or reticulated elastomeric polyolefin (POE).

4. Protection device (10) as at least one of the preceding claims, **characterized in that** a first layer (11) of the protection device (10), facing outward relative to the user, is made of a first foam reticulated plastic material.

5. Protection device (10) as at least one of the preceding claims, **characterized in that** said first layer (11) of the protection device (10), facing outward relative to the user, has a hardness between 75 and 65 ShA and preferably equal to 70 ShA.

6. Protection device (10) as at least one of the preceding claims, **characterized in that** a second layer (12) of the protection device (10), internal and facing the user, is made of a second foam reticulated plastic material.

7. Protection device (10) as at least one of the preceding claims, **characterized in that** said second layer (12) of the protection device (10), internal and facing the user, has a hardness between 30 and 40 ShA and preferably equal to 35 ShA.

8. Protection device (10) as at least one of the preceding claims, **characterized in that** said protection device (10) has a plurality of through holes (13), which allow ventilation of the area protected by the device (10) and which identify a closing section between said layers (11, 12).

9. Method for double-injection molding of a protection device (10), in particular for motorcycle clothing, as at least one of the preceding claims, **characterized in that** it includes at least the following steps:

• injection of two plastic materials in different hardness in two separate molds;
• overlap said molds with the plastic material still in a gel form;
• injection/heating of the mold at temperatures between 200 and 240°C for a time ranging from 5 to 8 minutes for completing the reticulation

process with the cohesion of the two hardness;
• removal of the protective device thus obtained.

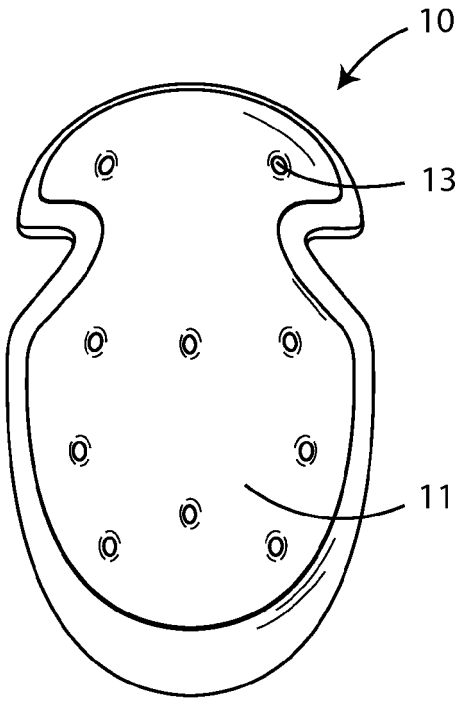

Fig. 1

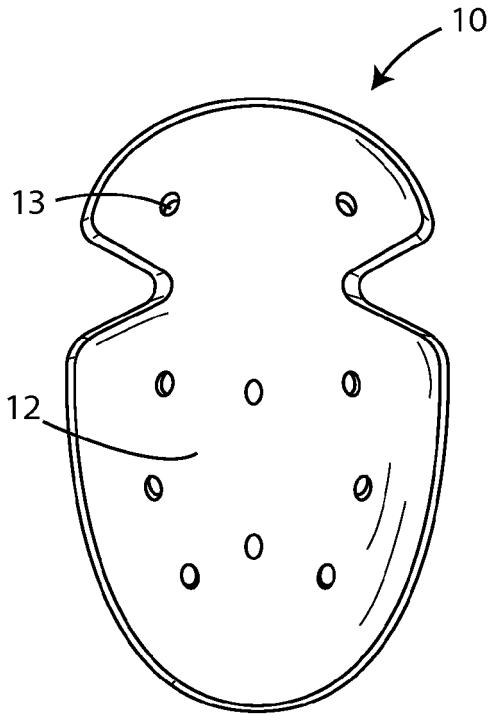

Fig. 2

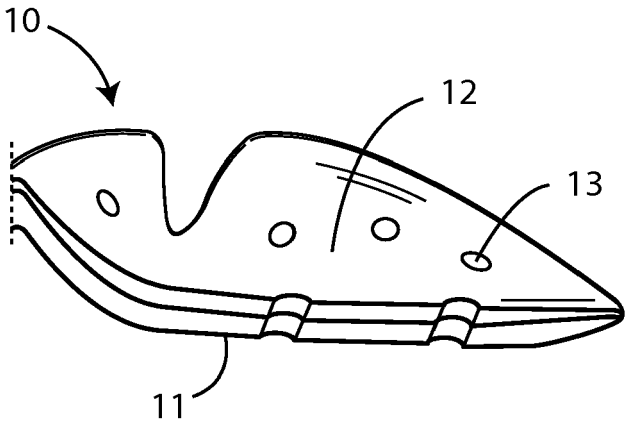

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 13 42 5017

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 May 2013	da Silva, José

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 42 5017

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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