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(71) Applicant: **Mares S.p.A.**
16035 Rapallo (GE) (IT)

(72) Inventor: **LORENZI, GIORGIA**
00135 ROMA (IT)

(74) Representative: **Karaghiosoff, Giorgio Alessandro**
c/o Praxi Intellectual Property S.p.A. - Savona
Via F. Baracca 1R, 4° piano
"Il Gabbiano"
17100 Savona (IT)

(54) **HEAT RETAINING SWIMSUIT**

(57) A bathing or swimming suit that has an external surface ex-posed to the external environment, an internal surface of shape and dimensions substantially similar to the external surface to which it is joined and which points towards the body of the wearer, which suit is equipped with an external layer made with one or more traditionally known fiber fabrics and a thermal-insulating layer, said insulating layer being made with materials of the heat-containing type agents by reflection towards the body of the infrared radiation emitted by the body of the user itself.

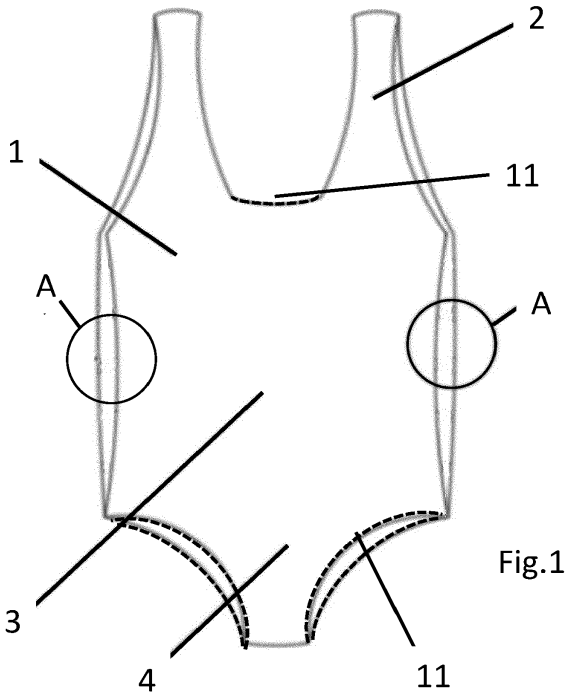

Fig.1

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Description

[0001] The present invention concerns the technical field of the clothing for bathing or swimming, such as swimming suit, and in particular clothing designed to improve the comfort of the user in terms of heat containment that in normal bath clothing is dispersed due to contact with water normally at a temperature lower than body temperature and which is rapidly dispersed as a consequence of the high convective water capacity.

[0002] Swimming suit are known for both female and male use and they are designed for non-sporting use such as the practice of bathing in fresh or salty waters as well as for amateur or professional swimming activity. There are various types of swimming suit, made with different aesthetic, shape, size and fit characteristics. The present invention finds better application in swimming suit adhering to the body and of the so-called full lenght type, that is, which covers most of the body from the chest to the hips, however the use is not limited to this specific type and can still bring benefits to other models of clothing from the same technical field.

[0003] The waters wherein the suit is used can be more or less warm but commonly have temperatures lower than normal human body temperature and do not rarely have temperatures lower than the air of the surrounding environment. Contact with water therefore involves a non-negligible loss of heat and, although the muscle movement involves a greater heat generation, it gives rise to a non -optimal condition of permanence in the water whence derives a low level of comfort and potentially of discomfort or risk to the health of those who are immersed.

[0004] The main purpose of the invention is therefore to offer swimming suit that improve the comfort of the user by introducing thermal protection to limit the heat dispersion and prevent or at least reduce the unwanted cooling of the body when diving or when coming out of the water.

[0005] This invention solves this and other technical problems by means of a bathing or swimming suit that has an external surface exposed to the external environment, an internal surface of shape and dimensions substantially similar to the external surface to which it is joined and pointing towards the body of the user, which is equipped with an external layer made with one or more traditionally known fiber fabrics and an internal thermal insulating layer, with said internal insulating layer of heat-containing type acting by reflection towards the body of infrared radiation emitted by the body of the user.

[0006] In fact, it is known how the human body emits heat in the form of radiation in the spectral range of the infrared with a substantial share of this energy emitted in the portion of a band referred as far infrared. Advantageously, the arrangement of a layer capable of reflecting these radiation allows not to disperse heat and therefore to contain the unwanted lowering of body temperature. The invention therefore provides for the existence of a layer of external material that is in contact with the water or the air of the surrounding environment and of an internal layer contained between said external layer and the user's body when the swimming suit is in use. Regarding the external layer, there are no limits about the shape or type of material which is expected to be of the known type and usually used for this type of applications; the external layer is combined with an internal layer preferably made with similar dimensions and forms that introduces the characteristic of thermal insulation by containing the radiation that is reflected towards the emitting human body.

[0007] In a first embodiment, said internal layer is combined with said external layer by conjunction along one or more perimeter edges of the suit and along one or more joint lines defined on the suit. According to this embodiment the isolation layer is therefore joined with the external layer along lines or junction routes that run along the peripheral edges of the suit and along specific joint lines that are defined from time to time depending on the actual form of the suit that is intended to be made. The junction of the layers along these junction lines takes place preferably by seaming but alternative arrangements are not excluded which can also be of a non-permanent type such as with a hook and loop Velcro® type closure by introducing the advantage of being able to remove the internal layer for replacement or better sanitization of the suit.

[0008] Alternatively, the external layer and said internal layer are made by interlaced texture such as a texture of the double front type.

[0009] In a preferred embodiment, the suit is equipped with an in-ternal layer which is shaped in the form of a flat woven or non-woven-type artifact and wherein the fibers of said artifact are laminated with materials capable of heat containment or coated, at least on the side facing the user, with materials capable of heat containment. This embodiment therefore provides a layer of composite material that can be laminated or interlaced with filaments of a material with heat reflecting characteristics or covered by a coating based on this material or materials. In the first case, the aim is to create a texture or in any case an interlace of fibers in the production phase of the artifact to create the internal layer while in the second case it is also possible to create a non-thermo-insulating artifact to which a treatment is applied (film coating, impregnation, spray application or others) aimed at providing the artifact of the fundamental characteristics for the invention. This treatment can be performed in such a way as to result in application of the thermo insulating product only on one side or on both sides to increase the effect of reflection of the thermal waves or to prevent direct contact with the skin of the user.

[0010] Preferably, said materials for heat containment comprise:

- gold;
- silver;

- aluminum;
- allotropic carbon forms such as graphene.

[0011] These materials can also be used to select a combination or sub-combination according to the desired technical and economic goals. The invention includes other possible and future materials that are considered suitable by the skilled technician to be used for clothing subject to invention.

[0012] If the isolation layer is at least partially placed in contact with the user's skin, it is advantageously selected of a physiologically compatible and preferably antibacterial and/or anti-allergenic and/or antimicrobiotic type. The benefits of this choice are evident and important in consideration of the continuous contact of the body with marine waters or in any case potentially not pure.

[0013] In a further embodiment of the invention, the insulating lay-er is made by application of one or more films of material to cover the unexposed surface of the external layer and/or to cover at least a surface of a layer of internal material.

[0014] In the drawings enclosed to this application, a possible em-bodiment is shown in accordance with the invention. Figure 1 is a representation of a possible swimming suit for women while Figure 2 illustrates an exemplary composition with two layers of a section of the swimming suit of figure 1.

[0015] Therefore, referring to figures 1 and 2, a swimming suit 1 is made up of shoulder straps 2, a top 3 and shorts 4, integrated to form said swimming suit 1. This form is convenient for female use. The fabric of the body of swimming suit 1 is composed of an external layer 5 and a thermo-insulating and possibly antibacterial layer. The external layer 5 has an area exposed to the external environment and is made of tissue or elastic fiber material such as polyester fiber which has high resistance and elasticity. A possible alternative among the numerous materials traditionally involved in this type of application is nylon.

[0016] Internally to the external layer 5 a layer of thermal insulation 6 is set according to one or more of the characteristicks listed above. The layer 6 in the figure is meant to be in contact with the user's body, however the invention does not exclude that there is a further layer arranged both between layer 5 and layer 6, for example for padding or further protection purposes from the external elements, or more internally to layer 6, for example when layer 6 has limited physiological compatibility.

[0017] The form shown here provides that the thermal insulation layer is exposed towards the body and that this layer is suitable for being in contact with the epidermis. A possible material involved in this realization is silver, thanks to its disinfectant and biocompatible properties.

[0018] In figure 2 the two layers 5 and 6 are represented as spaced by an empty area 7; the drawing is designed to emphasize a realization wherein layer 6 is superimposed on layer 5 with the junction of the same only in some specific areas such as the perimeter edges 11 where there are rims and seams of the suit fabric. Not shown in the figure, other junction lines may be present to stabilize the internal layer to the external one.

[0019] The effect of the internal layer is therefore to create a surface reflecting the infrared rays emitted by the body of the user and therefore to contain the heat associated with them in the direction of the body itself, limiting its cooling when immersed in fluids at a lower temperature. The internal layer, or one of the internal layers, can present features shielding ultraviolet rays by introducing the benefit of protecting the skin from such radiation during the use of the suit, that can take place both inside and outside the water.

[0020] The object of the invention is susceptible to numerous modi-fications and variants, all falling within the inventive concept expressed in the enclosed claims. Although the object has been described with particular reference to the enclosed figures, the reference numbers used in the description and claims are used to improve the comprehension of the invention and do not constitute any limitation of the scope of claimed protection.

Claims

1. A bathing or swimming suit having an external surface ex-posed to the external environment, an internal surface with shape and size substantially similar to the external surface to which it is joined and that faces the suit wearer body, which suit is provided with an outer layer made with one or more traditionally known fiber fabrics and is provided with a thermal insulation layer, said thermal insulation layer being made with heat-containing type materials preferably acting by reflection towards the wearer's body of the infrared radiation emitted by the same body.

2. The suit according to claim 1 wherein said thermal insula-tion layer is joined to said outer layer by junction along one or more perimetral edges of the suit and along one or more seams defined on the suit.

3. The suit according to claim 1 wherein said outer layer and said insulation layer are made by weaving of the double-faced type.

4. The suit according to claim 1 or 2, wherein the insulation layer is a flat-surfaced fabric of the woven or non-woven type and wherein the fibers of said fabric are laminated with heat-containing materials or are covered with heat-containing materials.

5. The suit according to one or more of the preceding claims wherein said heat-containing type materials comprise:

    - gold;
    - silver;

- aluminum;
- allotropic forms of carbon such as graphene.

6. The suit according to one or more of the preceding claims wherein the thermal insulation layer is at least partially placed in contact with the wearer's epidermis and is preferably anti-bacterial and/or anti-allergenic and/or anti-microbiotic.

7. The suit according to one or more of the preceding claims wherein said thermal insulation layer is made by applying one or more films of heat-containing material arranged to cover the unexposed surface of the external layer and/or to cover at least one surface of a layer provided as further internal layer.

8. The suit according to one or more of the preceding claims made by joining three or more layers wherein at least one is of the heat-containing type.

9. The suit according to one or more of the preceding claims comprising an intermediate filling layer placed between said outer layer and said thermal insulation layer in one or more portions of the suit.

10. The suit according to one or more of the preceding claims comprising a protective layer for shielding or limiting ultra-violet rays from the external environment and directed to the user's body.

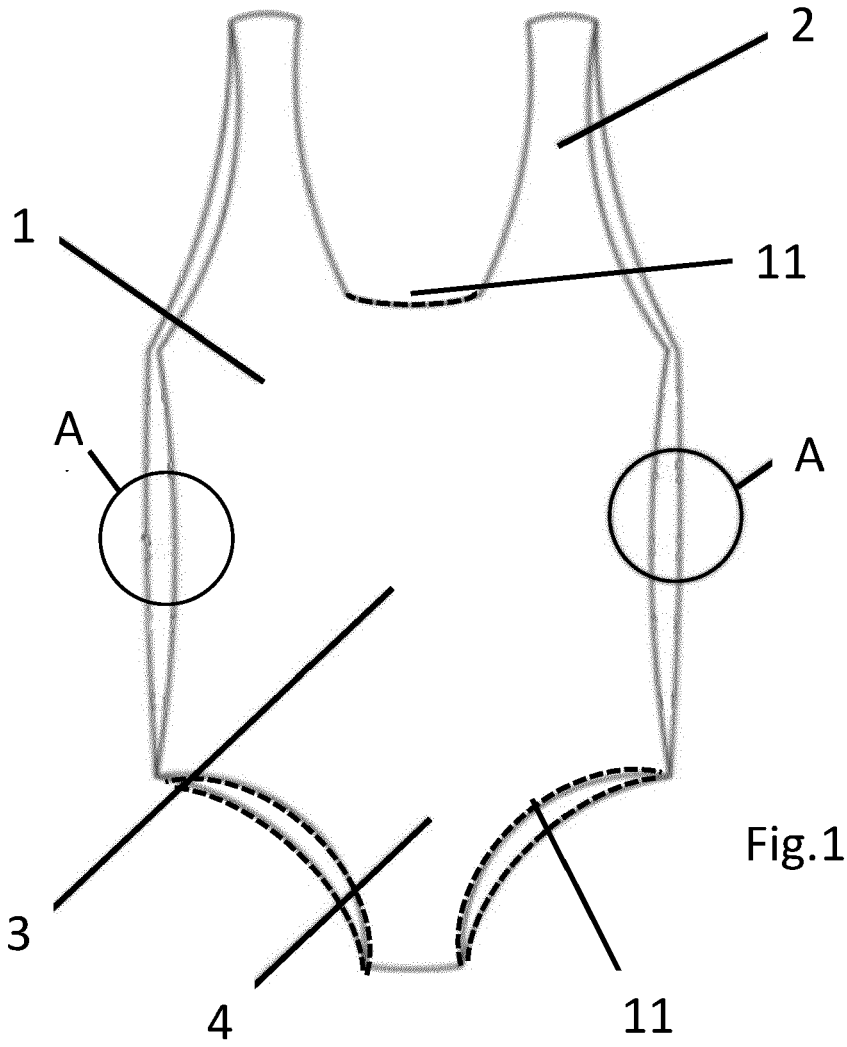

Fig.1

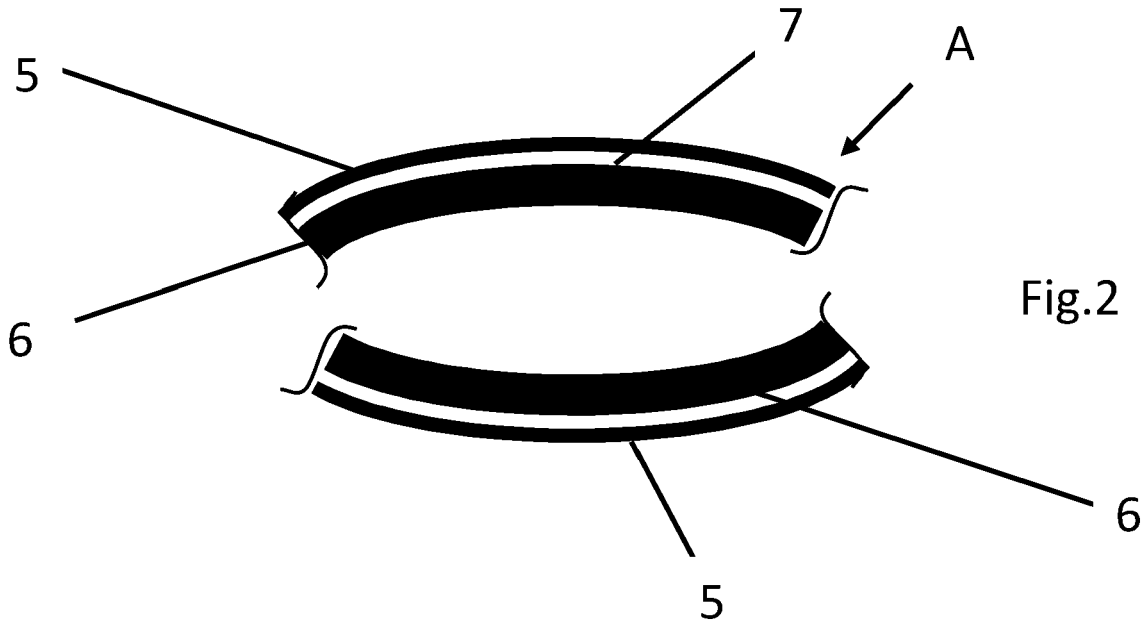

Fig.2

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 2349

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 28 13 489 A1 (WEBER UNGER GEORG) 27 September 1979 (1979-09-27) * figures 1,3,4 * * page 3 and 5 *	1-10	INV. A41D7/00 A41D13/005 A41D31/06
X	US 2013/216774 A1 (CONOLLY BRIAN JOHN [AU] ET AL) 22 August 2013 (2013-08-22) * paragraph [0056]; figure 1d *	1	
X	WO 2018/032113 A1 (POMMELLO INC [CA]) 22 February 2018 (2018-02-22) * paragraph [0032]; figure 1A *	1	
A	CN 107 128 047 A (TAIZHOU HONGKAI KNITTING CO LTD) 5 September 2017 (2017-09-05) * the whole document *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

A41D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 May 2023	Krüger, Sophia

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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19-05-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 2813489 A1	27-09-1979	NONE	
US 2013216774 A1	22-08-2013	GB 2501358 A	23-10-2013
		US 2013216774 A1	22-08-2013
WO 2018032113 A1	22-02-2018	CA 3032994 A1	22-02-2018
		EP 3500122 A1	26-06-2019
		JP 2019531211 A	31-10-2019
		US 2019183189 A1	20-06-2019
		WO 2018032113 A1	22-02-2018
CN 107128047 A	05-09-2017	NONE	

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