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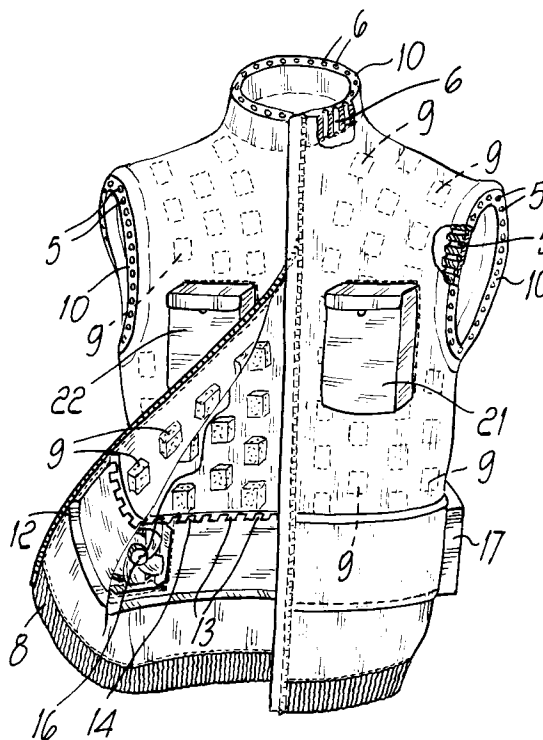
(11) Publication number:

0 490 347 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91121183.7**(51) Int. Cl.⁵: **A41D 13/00**(22) Date of filing: **10.12.91**(30) Priority: **12.12.90 IT 2235690**(43) Date of publication of application:
17.06.92 Bulletin 92/25(84) Designated Contracting States:
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I-20123 Milano(IT)**(54) **Cooling garment, particularly of the jacket type or the like.**

(57) The cooling garment includes a body (2) which is suitable for surrounding at least one body portion of the user and is provided with spacer elements (9) which define an interspace between the body surface, or the underlying clothes, and the inner surface of the garment. Passages (5,6) are defined in the garment body (2) and connect the interspace to the outside. The garment is furthermore provided with fans (16) for extracting air from the interspace in order to generate a flow of air through the passages from the outside toward the inside of the interspace and from the interspace back outward.

*Fig. 4***EP 0 490 347 A1**

The present invention relates to a cooling garment, particularly of the jacket type or the like.

As is known, the human body has a thermal autoregulation system. In particular, in the presence of a high ambient temperature, sweating occurs, conveying water to the surface of the skin; said water, by evaporating, removes the vaporization heat from said surface, thereby cooling the parts beneath the skin and providing benefit for the entire body.

The activity of this phenomenon is proportional to the completeness of the conversion into steam of the water contained in the sweat as it rises to the skin, and an even moderate ventilation is the best way to achieve it, especially when the ambient temperature is proximate to, or even higher than, the surface temperature of the human body.

In the presence of stagnant air, sweat does not evaporate, while the body continues to produce it, drenching clothes and increasing the feeling of heat and discomfort in the person.

In order to obviate the uncomfortable effects described above, in closed or small rooms one usually resorts to forced ventilation, exposing the free parts of the body, usually the head, the neck and the upper part of the chest, to a strong air current which ensures an immediate cooling effect but can be the cause of cold exposure-related diseases or articular pains.

The aim of the present invention is instead to provide a garment which is capable of eliminating the discomfort arising from excessive heat by effectively performing a cooling function and without creating hazards for the health of the user due to excessive ventilation.

Within the scope of this aim, an object of the invention is to provide a garment which allows the human body to perform its thermoregulation function even in unfavorable environmental conditions, facilitating the evaporation of sweat in extensive regions of the human body where there are large muscle masses which are heavily supplied by blood circulation and allow to transmit the cooling action to the other body parts.

Another object of the invention is to provide a garment which ensures coolness to its wearer in both enclosed and open spaces.

This aim, these objects and others which will become apparent hereinafter are achieved by a cooling garment, particularly of the jacket type or the like, characterized in that it comprises a body which is suitable for surrounding at least one body portion of a person and is provided with spacer means which define an interspace between the body surface, or the underlying items of clothing, and the inner surface of the garment, passages being defined in said garment body for connecting said interspace to the outside of said garment,

means being furthermore provided for extracting air from said interspace in order to generate a flow of air through said passages from the outside to the inside of said interspace and from said interspace back outward.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of the garment according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a view of a jacket according to the invention during use;

figure 2 is a perspective view of a portion of the jacket taken from the inner side;

figure 3 is a sectional view of a portion of the jacket, taken along a vertical plane proximate to the region of the shoulder and of the armpit;

figure 4 is a perspective view of the jacket; and

figure 5 is a transverse sectional view of the jacket, taken in the waist region.

With reference to the above figures, the jacket according to the invention, generally designated by the reference numeral 1, comprises a body 2, preferably made of waterproof material and shaped like a sleeveless jacket, so as to embrace the chest and abdomen of a person. Spacer means 3 are provided on the inner surface of the jacket and define an interspace 4 between the jacket and the surface of the body or the underlying clothes which are covered by the jacket.

Passages 5 and 6 are defined in the jacket and connect the interspace 4 to the outside; means 7 are furthermore provided for extracting air from the interspace 4 in order to create a flow of air through the passages 5 and 6 from the outside toward the inside of the interspace and from said interspace back outward.

More particularly, the jacket is provided, proximate to its lower end, with an elastic belt 8 for keeping the jacket close to the user's body in this region, providing a certain seal together with the underlying clothes.

The spacer means 3 can be constituted by continuous or discontinuous longitudinal raised portions 9 which are present on the inner surface of the jacket and are mutually spaced so as to prevent the complete adhesion of the inner surface of the jacket to the underlying clothes and simultaneously allow the passage of a flow of air through the interspace 4.

The passages for the inflow of air into the interspace 4 are constituted by passages 5 defined along the ring which surrounds the shoulder and armpit of the user and by passages 6 defined at the neck. The regions of the jacket at these passages are appropriately stiffened in order to avoid excessive deformations which might lead to the

closure of said passages. The passages 5 and 6 can, for example, be defined in borders 10 which rest around the shoulder or neck of the user.

Conveniently, an air manifold 11 is provided above the elastic belt 8 in the waist region, extends around said waist region and is delimited downward by an adequately rigid closed partition 12 which protrudes from the inner surface of the jacket so as to rest against the underlying clothes, and is delimited upward by an also rigid partition 13 which protrudes inside the jacket, but in which passages 14 are defined and connect the interspace 4 to the manifold 11.

The air extraction means 7 are constituted by two electric fans 15 and 16 which are arranged laterally and are connected to the manifold 11 with their intakes. Conveniently, the electric fans 15 and 16 can be of the variable-speed type in order to allow to adjust the flow of air along the interspace 4 according to the requirements.

The electric fans 15 and 16 can be arranged in pockets 17 and 18 applied outside the jacket and are connected to the outside through their outlet.

In order to actuate the electric fans 15 and 16, there are accumulators 19 and 20 accommodated in front pockets 21 and 22 or, due to the low power required for actuating said electric fans, it is possible to provide known solar cells applied to the outer surface of the jacket.

So that it can be put on quickly, the jacket is provided with a front opening which can be closed with a zip fastener or with a tear-open tape of the type known by the trade-name "Velcro", which ensure adequate tightness.

The operation of the jacket according to the invention is as follows.

When the jacket is worn correctly, the interspace 4 is defined between the underlying clothes and its internal surface. Said interspace is connected to the outside through the passages 5 and 6 and to the manifold 11 through the passages 14.

By actuating the electric fans 15 and 16, the air contained in the manifold 11 is extracted, drawing air from outside through the passages 5 and 6. A flow of air is thus produced through the interspace 4, and said flow progressively removes the sweat which passes through the underlying clothes and then evaporates. Continuous removal of the sweat facilitates the evaporation of further sweat, thus facilitating the thermal autoregulation function of the user's body, which receives an immediate benefit even if the outside environment has a temperature proximate to, or higher than, the body temperature. Furthermore, by virtue of the fact that the jacket surrounds large muscle masses well supplied by blood vessels and thus facilitates their cooling, said cooling effect is transmitted to the entire body in a short time.

In practice it has been observed that the garment according to the invention fully achieves the intended aim, since by allowing the evaporation of sweat even in unfavorable conditions it allows the user's body to effectively perform its thermal auto-regulation action and allows the user to bear without discomfort even with high ambient temperatures; furthermore, by not striking the body with a strong air current but by simply facilitating its normal sweating, it is not harmful for the user's health.

The garment thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; thus, for example, by means of the same concept it is possible to manufacture trousers, suits, etc.; all the details may furthermore be replaced with technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements and the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Cooling garment, characterized in that it comprises a body (2) which is suitable for surrounding at least one body portion of a person and is provided with spacer means (3) which define an interspace (4) between the body surface, or the underlying clothes, and the inner surface of the garment, passages (5,6) being defined in said garment body (2) for connecting said interspace to the outside of said garment, means (15,16) being furthermore provided for extracting air from said interspace (4) in order to generate a flow of air through said passages from the outside toward the inside of said interspace and from said interspace back outward.
2. Garment according to claim 1, characterized in that said air extraction means are constituted by at least one electric fan (15,16) associated with said garment body (2) and provided with an intake which is connected to said interspace (4) and with an outlet which leads outward of said garment.
3. Garment according to claim 1, characterized in that said spacer means (3) comprise raised portions (9) which are mutually spaced and

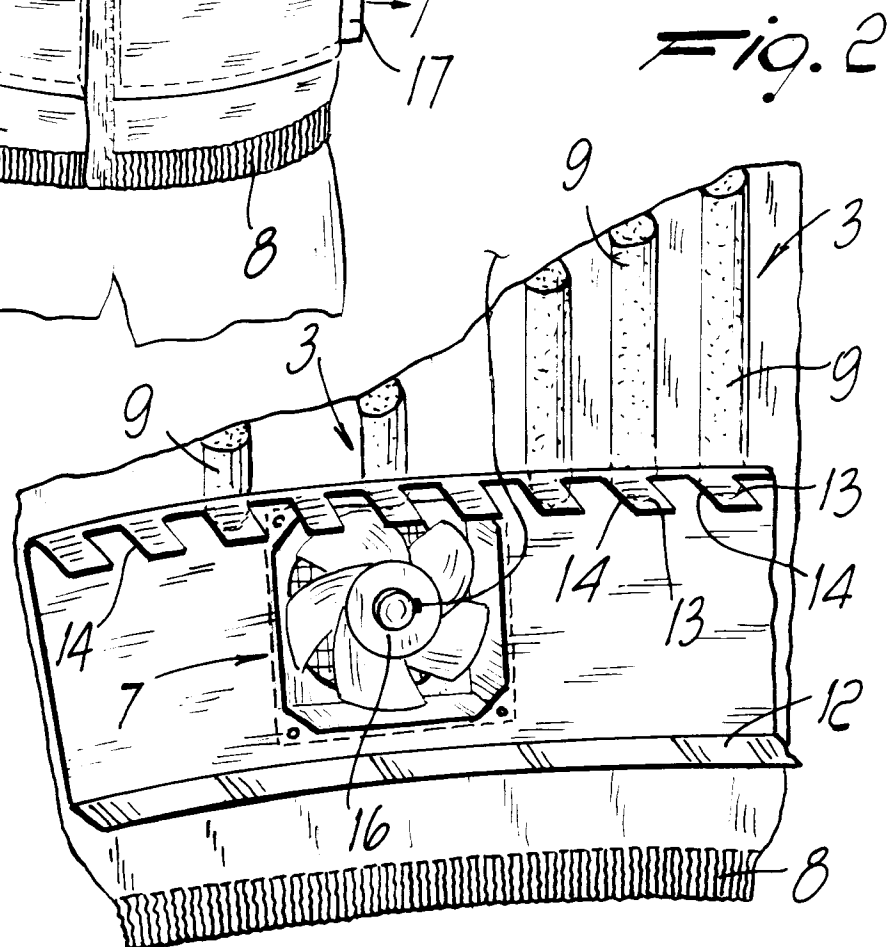
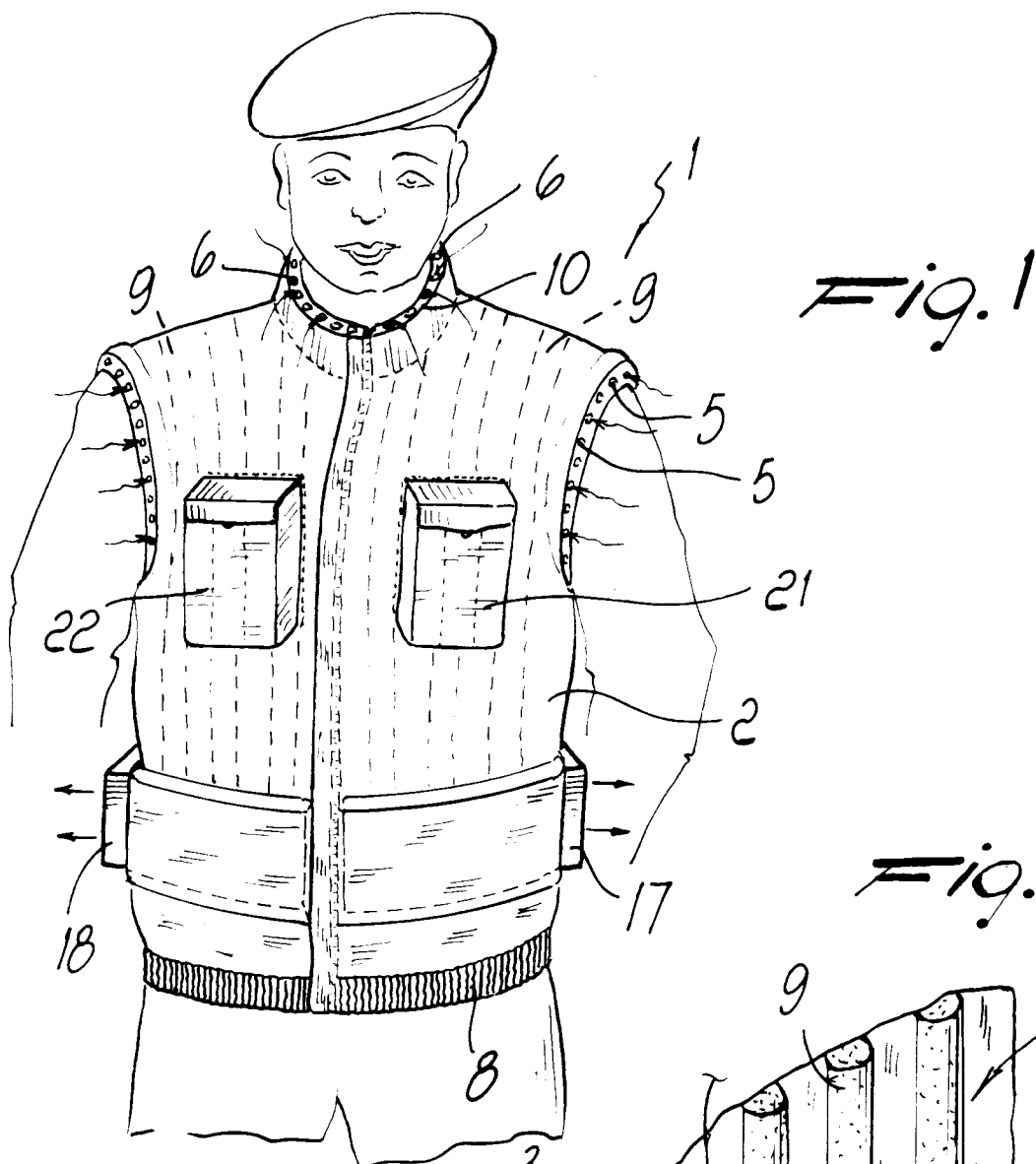
protrude from the inner surface of the garment body (2).

4. Garment according to one or more of the preceding claims, characterized in that said garment body (2) is shaped substantially like a sleeveless jacket (1). 5
5. Garment according to one or more of the preceding claims, characterized in that said garment body (2) has an elastic belt (8) proximate to its lower end which can be engaged against the person's body in order to delimit said interspace (4) downwardly. 10
6. Garment according to one or more of the preceding claims, characterized in that said passages (5) are defined along the armhole ring of the garment. 15
7. Garment according to one or more of the preceding claims, characterized in that said passages (6) are defined along the neck-hole ring of the garment. 20
8. Garment according to one or more of the preceding claims, characterized in that an air manifold (11) is provided proximate to said elastic belt (8) and extends along the entire transverse extension of the garment in order to surround the body of the person above the hips, said manifold (11) being delimited downward by a closed partition (12) which protrudes from the inner surface of the garment and being delimited upward by a perforated partition (13) for connecting said manifold (11) to said interspace (4). 25
9. Garment according to one or more of the preceding claims, characterized in that the intake of said electric fan is connected to said manifold (11). 30
10. Garment according to one or more of the preceding claims, characterized in that said passages (5,6) are defined in stiffened regions (10) of the garment. 35
11. Garment according to one or more of the preceding claims, characterized in that said garment body (2) is provided with a longitudinal front opening which can be closed tight. 40
12. Garment according to one or more of the preceding claims, characterized in that said garment body (2) is provided with pockets (21,22) for containing electric power supplies for said electric fan. 45

13. Garment according to one or more of the preceding claims, characterized in that solar cells are applied along the outer surface of said garment body (2) for supplying power to said electric fan.

14. Garment according to one or more of the preceding claims, characterized in that said garment body (2) is made of impermeable material.

15. Garment according to one or more of the preceding claims, characterized in that said electric fans (15,16) have a variable actuation speed.



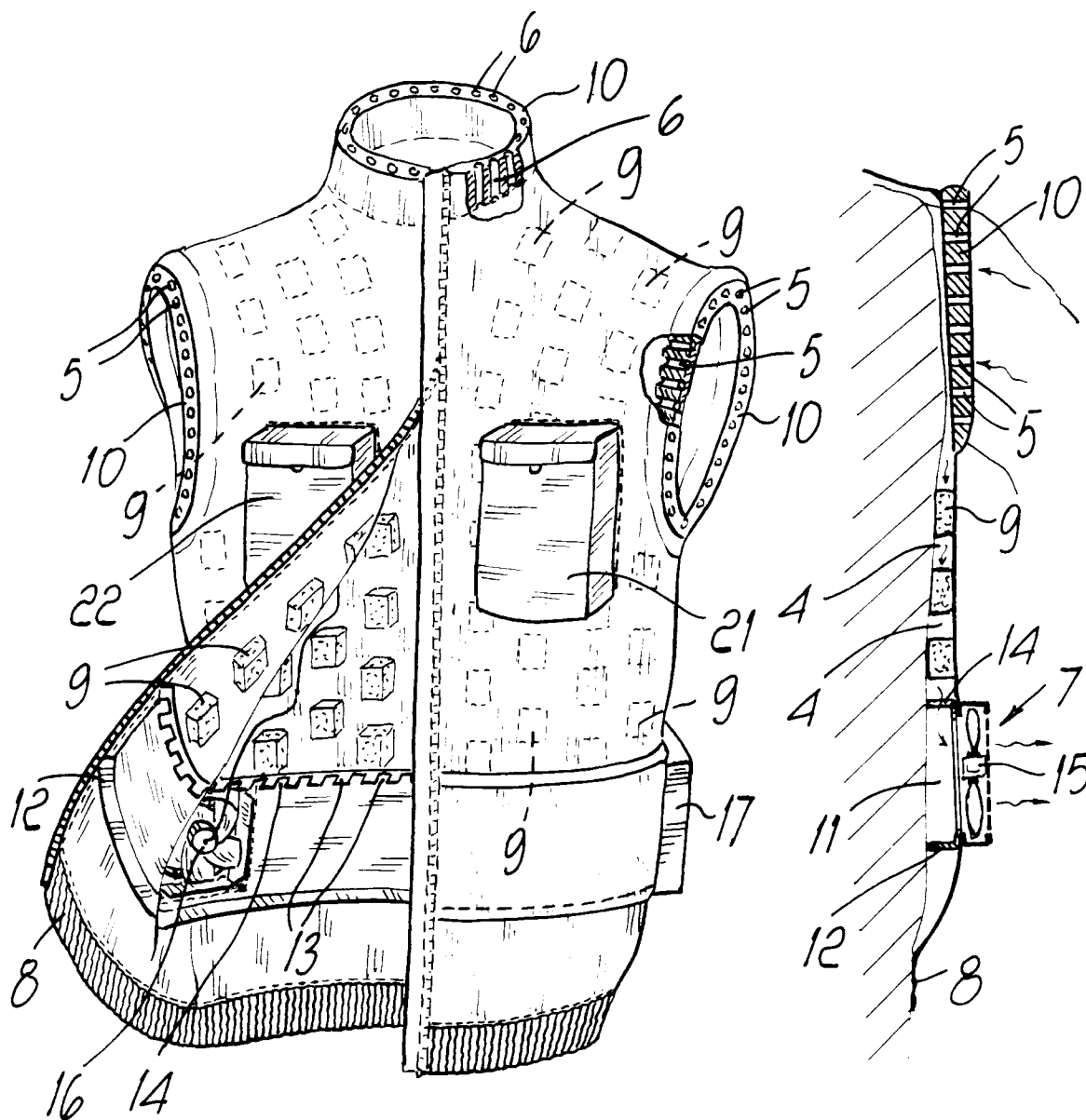


Fig. 4

Fig. 3

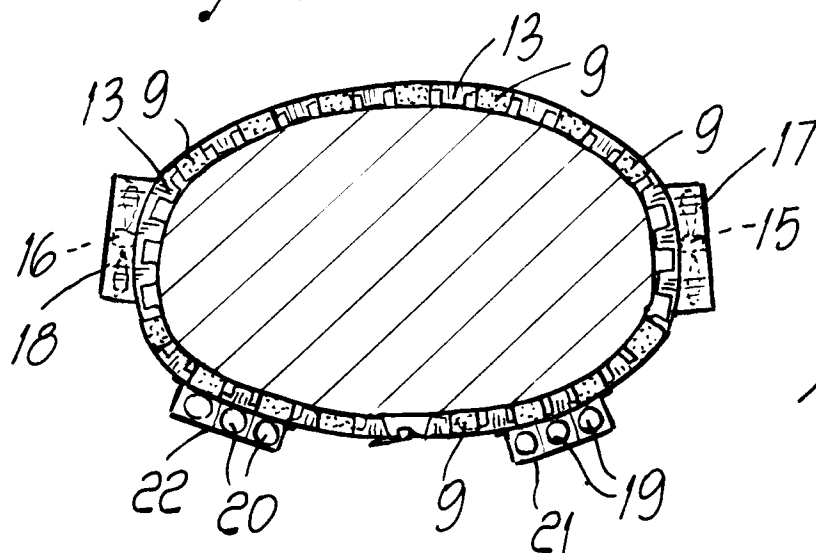


Fig. 5



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EUROPEAN SEARCH REPORT

Application Number

EP 91 12 1183

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 217 107 (A. MANSOUR) * column 3, line 3 - line 35; claims 1-4; figures 1,2 * ---	1,2,4	A41D13/00
X	US-A-3 468 299 (C. D'AMATO) * column 2, line 10 - column 3, line 23; figures 1-4 * ---	1,14	
X	US-A-2 826 758 (A. KAHN) * the whole document * ---	1,14	
A	US-A-3 710 395 (L. A. SPANO) * column 2, line 21 - column 4, line 8; figures 1-7 * ---	1,6-8 11,14	
A	FR-A-1 155 985 (AERAZUR CONSTRUCTIONS AERONAUTIQUES) * the whole document * ---	1	
A	FR-A-2 577 116 (MOSCOVICI) * claims 1,2; figure 1 * -----	13	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A410
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 MARCH 1992	Examiner GARNIER F.M.A.C.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			