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### (54) Fabric and process for obtaining it

(57) The invention relates to a knitted fabric configured by joined mesh columns, forming areas (5) of smooth, compact and regular fabric of non-etchable thread (1), with regularly distributed holes (3) closed by an etchable thread (2) of artificial fiber, and areas (4) of smooth and open-worked fabric comprising the run-proof fabric of non-etchable thread (1) with the open holes (3). The process consists of: - weaving in a warp knitting loom

comprising non-etchable threads (1) and etchable threads (2), the non-etchable threads (1) configuring a fabric with a plurality of joined mesh columns and a plurality of edge holes (3) closed by the etchable threads (2), - dimensional stabilization of the fabric and preparation for its dyeing, - printing with a "devore" chemical product in certain areas (4) to cause the selective destruction of the etchable threads (2), opening the defined holes (3).

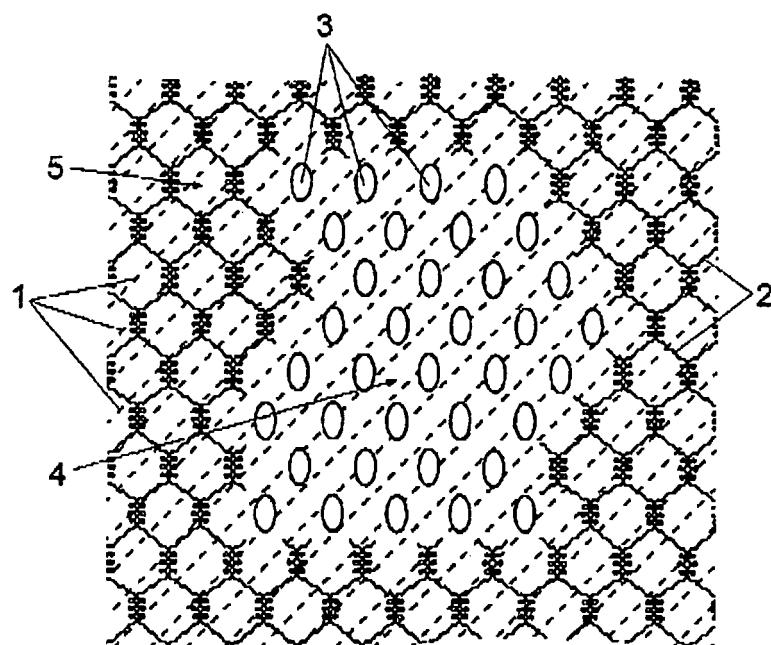


Fig. 1

**Description**Object of the Invention

**[0001]** As indicated in the title of this specification, the object of the present invention consists of a fabric and a process for obtaining it, the fabric being intended for manufacturing mainly sports garments, among other applications, even industrial garments, in which the garments have smooth, compact and regular areas and open-worked areas.

Background of the Invention

**[0002]** The existence and use of T-shirt type garments for playing sports is known to date, which garments combine an area of smooth fabric, with areas of net fabric, preferably located in the area of the armpits, and other areas, to facilitate the perspiration causing sweating derived from practicing physical exercise.

**[0003]** This duality of areas with different characteristics generates problems consisting of having to make more than one manufacturing pattern for the garment, since it has different fabrics to be sewn to one another, with two patterns, the garment being manufactured upon joining them to one another. One piece or template for the actual T-shirt and another piece or template for the net of the areas of the armpits, such that both templates must be manufactured and sewn to one another.

**[0004]** Furthermore, these is also the difficulty of the joining between both fabric being perfect, since such joining is generally carried out by sewing, whereby a thicknessed seam of the superimposed fabrics is formed in the transition areas, or by sticking or heat sealing, these adhesions being prone to deteriorating with washing and over time.

**[0005]** The "devoré" technique is also known in the production of fabrics and perforations, according to which textures are configured in a fabric made by means of applying a "devoré" solvent chemical product or the like, which affects the fiber of the fabric, for example a natural or artificial fiber, completely or partially dissolving it, the untreated fabric subsequently remaining undamaged. This chemical product can be, for example, a sodium hydroxide solution or any other suitable solvent or corrosive for the fiber which is to be eliminated. An example of this production process is described in invention patent ES377298 for "Improvements applied in the devoré printing process on a mixed fabric of wool and synthetic fibers" of the company S.A. de Estampados Especiales, R.S.F., which describes improvements in the "Devoré" system in which wool or natural material fibers and synthetic material fibers are used which are closely joined in the spinning or by braiding for their subsequent use in the manufacture of a knitted fabric, on which the "devoré" is applied, forming on a visible face areas with a different texture and appearance corresponding to the areas in which the treatment has or has not been applied, the fabric

maintaining an optimal texture and strength.

Description of the Invention

**[0006]** The fabric and process for obtaining it, object of this invention, has technical particularities aimed at facilitating the task of manufacturing garments with areas of smooth, regular and compact areas and areas of breathable and open-worked or net fabric, such as sports garments, with a single manufacturing pattern, thus reducing the process for manufacturing it.

**[0007]** The fabric comprises: - areas of smooth, compact and regular fabric, formed by a non-etchable thread defining in the fabric an open-worked structure, with a plurality of holes, and by an etchable thread maintaining the holes of the open-worked structure defined by the non-etchable fabric closed and, - areas of smooth and open-worked fabric (1) and in which areas of smooth and open-worked fabric the holes of the open-worked structure, defined in the fabric by the non-etchable thread, are open, as the etchable thread is eliminated.

**[0008]** The structure of the fabric is based on joining the mesh columns made with the non-etchable thread by means of a suitable weave with an etchable thread to generate the smooth, regular and compact knitted fabric, which can be configured as appropriate by means of the selective elimination in areas of the mentioned etchable thread. The mentioned problems are thus solved, since it configures a single fabric, made in one and the same industrial process, combining the conventional smooth, regular and compact knitted fabric, with the open-worked or net fabric without a solution of continuity. A single pattern can thus be available for manufacturing a garment, and as a result said garment has a minimum of seams.

**[0009]** The fabric has the etchable thread eliminated in certain areas, the holes being configured between the free mesh columns and therefore configuring the area of open-worked or perspiration fabric.

**[0010]** The fabric is formed in a warp knit in a Raschel or Ketten type machine with two bars, using a 1-0/1-2/1-0/1-2/2-3/3-4/4-5/4-3/4-5/4-3/3-2/2-1 weave in the first bar and a 4-5/4-3/4-5/4-3/3-2/2-1/1-0/1-2/1-0/1-2/2-3/3-4 weave in the second bar, these weaves can be changed according to the final open-working to be obtained. The open-worked areas, more open due to the lack of joining of the mesh columns, are of one thread with a completely run-proof structure.

**[0011]** These new effects of open-worked areas and other smooth and compact areas provide possibilities that were unknown up until now, therefore they are truly trusted for manufacturing mainly sports garments, among other industrial or another type of use or applications.

**[0012]** The fabric is obtained by a process comprising the phases of:

- weaving in a warp knitting loom of a fabric comprising non-etchable and etchable threads, the non-etchable threads configuring a fabric with a plurality of intermittently joined mesh columns with a plurality of edge holes closed by the etchable threads. This fabric is smooth, compact and regular, such as a conventional fabric, but it has the advantage of being able to be treated as desired to open the holes by means of eliminating the etchable thread closing them in the interested areas.
- dimensional stabilization of the fabric and preparation for its possible dyeing,
- application of a "devoré" chemical product in certain areas to cause the selective destruction or dissolution of the etchable threads, opening the defined holes in said area, over the structure formed by means of the non-etchable thread. In this process, the holes on which the "devoré" is applied are released from their binding, allowing to show the open-worked configuration existing between the joined mesh columns.

**[0013]** These new effects of open-worked areas and other smooth and compact areas provide possibilities that were unknown up until now, therefore the use for manufacturing garments and the use for which they are believed to be suitable, industrial, geotextile uses, etc. are appropriate.

**[0014]** The "devoré" chemical product causing the opening of the holes can preferably be applied by printing, which allows using simple and highly accurate printing machines. The fusion of the threads in certain areas by the printing process makes the uniform holes in the fabric be exposed, in order to obtain ventilation areas, with respect to the compact and smooth areas.

**[0015]** It has also been provided that the process comprises a dyeing and color printing of the fabric before or after the application of the "devoré" chemical product. This color printing can coincide with the areas of open-worked fabric configured in the fabric formation process or be completely independent with great ease, as the fabric is completely continuous.

#### Description of the Drawings

**[0016]** To complement the description which is being made and with the aim of facilitating the understanding of the features of the invention, a set of drawings is attached to this specification, in which the following has been shown with an illustrative and non-limiting character:

Figure 1 shows a diagram of a detail of the fabric in which an open-worked area with open holes is observed in the fabric with a smooth, compact and reg-

ular constitution.

Figure 2 shows a diagram of the process for manufacturing a garment from a piece of smooth fabric untreated with "devoré", the formation of the areas of open-worked fabric and the manufacture of a garment.

#### Preferred Embodiment of the Invention

**[0017]** As can be observed in the referenced figures, the fabric is formed by a warp knitted fabric comprising non-etchable threads (1), more specifically made of polyester synthetic fiber in this case, and etchable threads (2), more specifically made of rayon artificial fiber in this case, in a Raschel type knitting machine. The warp knitting in said Raschel machine has two bars, using a 1-0/1-2/1-0/1-2/2-3/3-4/4-5/4-3/4-5/4-3/3-2/2-1 weave in the first bar and a 4-5/4-3/4-5/4-3/3-2/2-1/1-0/1-2/1-0/1-2/2-3/3-4 weave in the second bar. Said weaves can be modified according to the open-working to be obtained.

**[0018]** The non-etchable threads (1) configure a smooth and regular knitted fabric, formed by intermittently joined run-proof mesh columns, between which there is a plurality of small holes (3), arranged in a staggered formation, while the etchable threads (2) close said holes (3) by moving their edges closer to one another, configuring a smooth, compact and regular fabric in which areas (4) of open-worked fabric can be made between the smooth, compact and regular areas (5) of the rest of the fabric.

**[0019]** As shown in Figure 2, once the duly dimensionally stabilized initial smooth, compact and regular fabric has been made, the "devoré" chemical product is applied, areas (4) of open-worked fabric being configured between the areas (5) of smooth, compact and regular fabric, said areas (4) of open-worked fabric being configured by the open holes (3) as the etchable holes (2) closing them have been destroyed or dissolved. Once the manufacturing piece has been made, the templates are cut and the garment is configured conventionally with a single fabric.

**[0020]** Having sufficiently described the nature of the invention, as well as a preferred embodiment, it is stated for the relevant purposes that the materials, shape, size and arrangement of the described elements can be modified, provided that this does not involve an alteration of the essential features of the invention which are claimed below.

#### **Claims**

1. A fabric, of the type formed by a warp knit comprising a plurality of joined mesh columns, **characterized in that** it comprises:
  - areas (5) of smooth, compact and regular fab-

ric, formed by a non-etchable thread (1) defining in the fabric an open-worked structure, with a plurality of holes (3), and by an etchable thread (2) maintaining the holes of the open-worked structure defined by the non-etchable fabric closed and,  
 - areas (4) of smooth and open-worked fabric formed only by the non-etchable thread (1) and in which areas (4) the holes (3) of the open-worked structure defined by the non-etchable thread are open. 10

2. The fabric according to claim 1, **characterized in that** the fabric is formed in a warp knit in a Raschel or Ketten type machine with two bars, using a 1-0/1-2/1-0/1-2/2-3/3-4/4-5/4-3/4-5/4-3/3-2/2-1 weave in the first bar and a 4-5/4-3/4-5/4-3/3-2/2-1/1-0/1-2/1-0/1-2/2-3/3-4 weave in the second bar, or other weaves which can make different open-works, larger or smaller or arranged in a different manner. 15

3. The fabric according to claim 1, **characterized in that** etchable thread (2) comprises viscose, rayon or other chemically etchable artificial fibers or combinations thereof. 20

4. The fabric according to claim 1, **characterized in that** the etchable thread (2) comprises a natural fiber. 25

5. The fabric according to claim 1, **characterized in that** the non-etchable thread (1) comprises polyester, polyamides, acrylic, another synthetic fiber thread or combinations thereof. 30

6. A process for obtaining the fabric of the previous claims, **characterized in that** it comprises the phases of:  
 - weaving in a warp knitting loom of a fabric comprising non-etchable threads (1) and etchable threads (2), the non-etchable threads (1) configuring a fabric with a plurality of intermittently joined mesh columns, a plurality of edge holes (3) closed by the etchable threads (2) being configured, 40  
 - dimensional stabilization of the fabric and preparation for its possible dyeing,  
 - application of a "devoré" chemical product in certain areas (4) to cause the selective destruction or dissolution of the etchable threads (2), opening the defined holes (3) in said area, over the structure formed by means of the non-etchable thread (1). 45

7. The process according to claim 6, **characterized in that** the "devoré" chemical product is applied by printing. 50

8. The process according to claim 6, **characterized in that** it comprises a dyeing and color printing of the fabric before or after the application of the "devoré" chemical product. 55

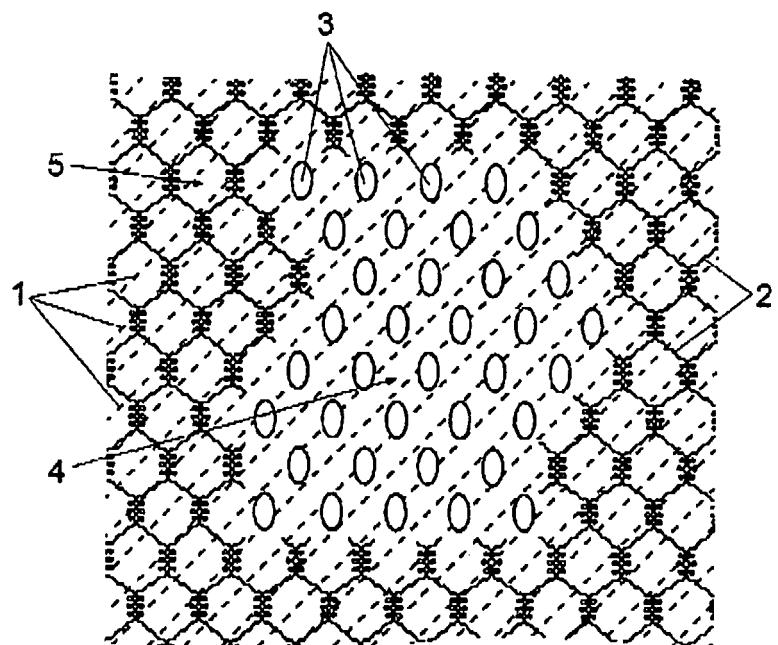


Fig. 1

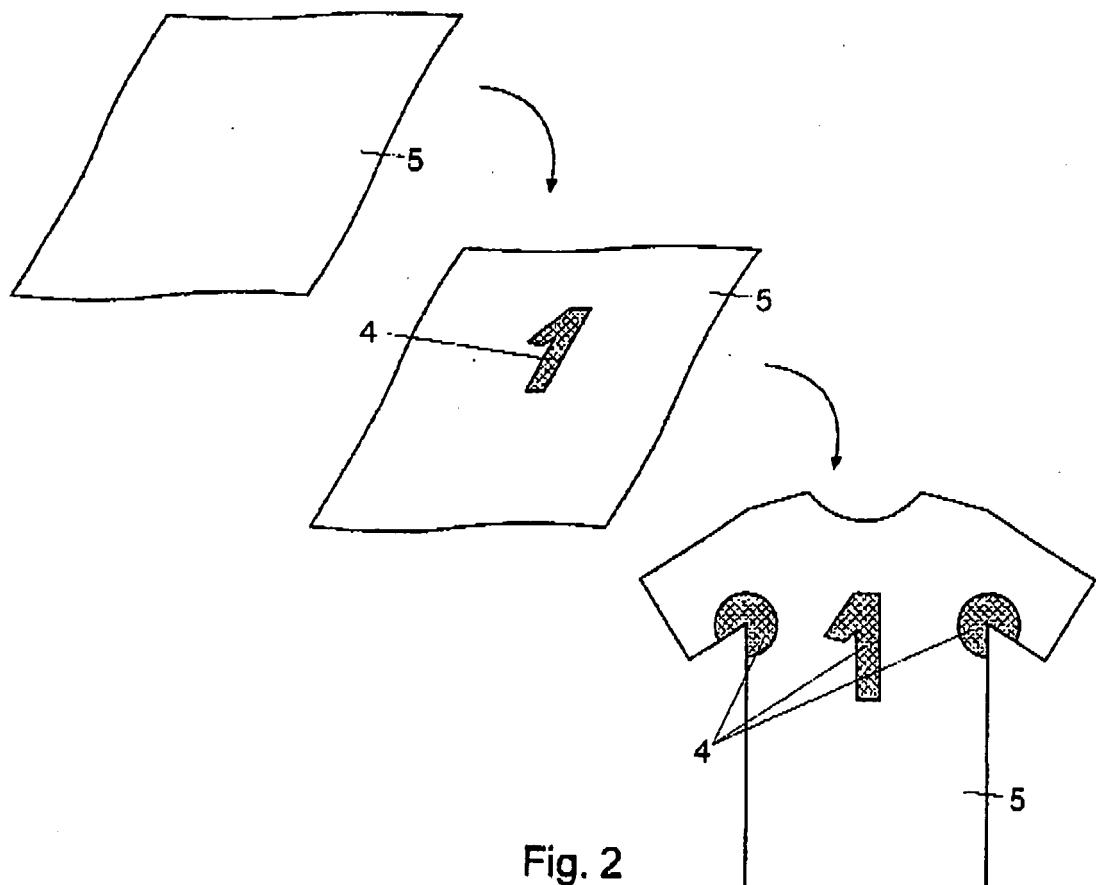


Fig. 2



## EUROPEAN SEARCH REPORT

Application Number  
EP 08 02 0173

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US 3 874 958 A (SCHOLTIS WALTER ET AL) 1 April 1975 (1975-04-01) * column 2, line 5 - column 6, line 13; figures 2,5,7; example 1 * -----	1-3,5-7	INV. D04B21/12  ADD. D06Q1/02
A	DE 41 09 263 A1 (BAYER AG [DE]) 24 September 1992 (1992-09-24) * page 1, lines 33-42; claims 8,9; example 5 *	1-7	
A	US 4 527 404 A (NAKAGAKI NOBORU [JP] ET AL) 9 July 1985 (1985-07-09) * column 4, line 37 - column 5, line 60; figures 6,7 *	1,6	
			TECHNICAL FIELDS SEARCHED (IPC)
			D04B D06Q
2 The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		19 May 2009	Sterle, Dieter
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 08 02 0173

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19-05-2009

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3874958	A	01-04-1975	NONE	
DE 4109263	A1	24-09-1992	NONE	
US 4527404	A	09-07-1985	NONE	

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- ES 377298 [0005]