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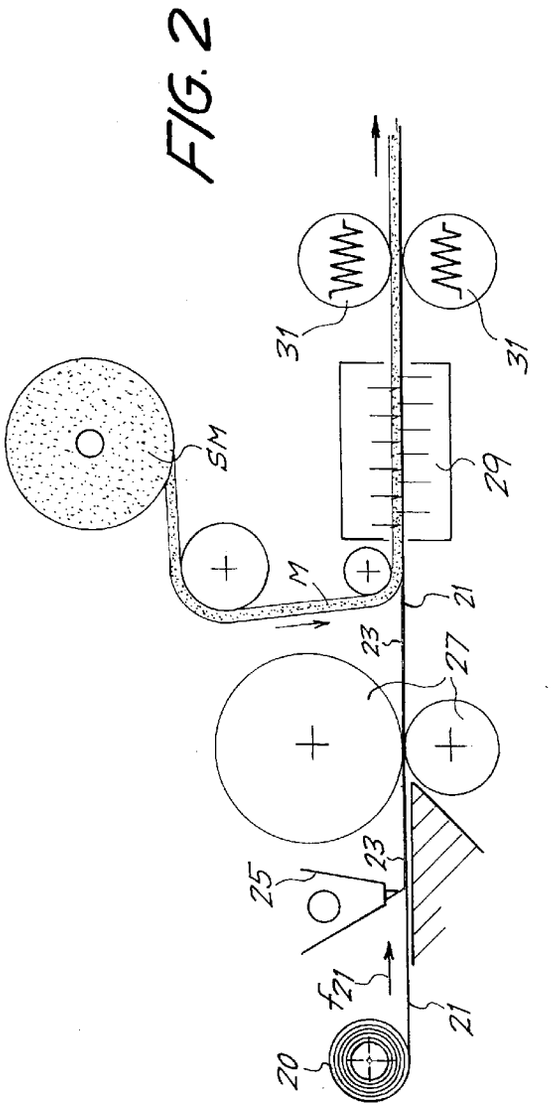
(54) Method for the manufacture of recyclable stitched pile articles.

(57) For the production of sheet articles with fibres stitched onto a generally woven base with an anchoring resin, a thin layer (23) of thermoplastic resin is spread onto the base (21) and then the fibres are stitched (29) and the resin is heat-cured (31) and consequently to anchor the fibres.

FIG. 2



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The invention relates to a method for the manufacture of stitched pile articles, i.e. those articles which are manufactured by stitching loose fibres by means of equipment which is in itself known onto a base (generally a woven fabric base) with subsequent anchoring of the stitched fibres onto the base by means of an anchoring resin. At the present time for the production of articles of this type the base fabric, which may be a sheet of polypropylene or other material, is stitched so as to insert the layer of loose fibres into the base fabric, and after this stitching operation the stitched article is impregnated with resins, generally acrylic resins, in a bath, so as to anchor the stitched fibres onto the supporting base. This article firstly requires that a relatively high percentage of resin or latex is present and all the stitched fibres are impregnated with such resins. Secondly, these articles involve appreciable costs arising from disposal of the wastes, i.e. the industrial wastes which are produced in the use of such articles, which are generally cut to provide e.g. insoles for footwear or the like. Whatever the use or destination of these articles, waste is generated, and because it is not recoverable in a convenient way, or in any event in an economic way, it has to be disposed of. Such waste is also especially polluting.

The invention is designed to overcome the aforesaid problems both as regards the cost and consumption of anchoring resin, and as regards the cost of disposal, reducing the problem of the destruction of wastes, in particular of wastes of industrial origin, to a minimum.

This and other objects will become evident from a reading of the following text.

Substantially the first subject of the invention is a method for the production of sheet articles with fibres stitched onto a generally woven base with an anchoring resin, in which:

- a thin layer of thermoplastic resin is spread onto the base,
- the fibres are stitched onto the base that has been supplemented in this way, and
- the stitched article is then heat-treated in order to cure the layer of resin and consequently to anchor the fibres.

By this means anchorage is achieved with minimum consumption of resin, avoiding impregnation of the fibres as far as possible. The material, and in particular the waste material, can therefore be recovered and recycled, thus overcoming the problems of disposal. Environmental pollution is avoided and an economic return which covers or exceeds the cost of recovering the fibres is obtained.

The curing is in practice a thermoplastic curing, which can be achieved by means of a heated calender, which rolls the article.

Although the layer of resin could be applied as a film onto the base, it is advantageously formed of a thermoplastic resin which is spread especially by rolling. The resin in the said layer may advantageously be polyethylene.

Another subject of the invention is an article which is stitched on a generally woven base and obtained by using a layer of resin, for anchoring the stitched fibres, which is spread onto the base and cured in order to anchor the stitched fibres which pass through it.

The anchoring resin may be polyethylene, and the supporting base may be a woven raffia or polypropylene fabric.

Another subject of the invention is a machine for the production of an article stitched by the above method, the machine substantially comprising in succession:

- means to spread a thin layer of curable resin onto the generally woven base,
- means for stitching fibres fed to the said stitching means onto the said base, and
- means for curing the said layer of resin to anchor the stitched fibres.

The said curing means may be heating means and may comprise a heated calender which cures the layer in order to anchor the fibres.

The means for spreading the layer of resin may comprise a melting vessel with distribution nozzles and a squeezing calender to form the layer on the supporting base.

It is clear that with the arrangement defined above it is possible to achieve efficient anchoring of the fibres without a high consumption of anchoring resin and without impregnating the stitched fibres as occurs when the anchoring resin is applied by impregnation in a bath. This achieves two results: in the first place a reduction in the consumption of resin, and in the second place and in particular the possibility of recovering the fibres and reusing them in further stitching operations for the production of materials of the same type. This solves the problem of the disposal of wastes, especially industrial wastes which are produced by the cutting of the articles, e.g. for the production of insoles for footwear and other purposes in which it is necessary to obtain cut and shaped components from a continuous sheet, or in any event a sheet of large size, with the consequent production of waste.

The invention will be made clearer by the attached description and drawing, which shows a non-restrictive illustrative embodiment of the said invention. In the drawing:

Figure 1 shows a diagram of the structure of the article, and

Figure 2 shows a diagram of a possible machine for the production of the article in question.

As illustrated in Figure 1, 11 indicates the supporting base for the article, which may be a woven fabric of raffia or other suitable material, or some other support of suitable consistency which can be stitched

with the fibres. 13 shows diagrammatically and indicatively the layer of resin which is spread onto the base 11 in a limited quantity per unit surface area, and therefore with limited consumption of the said resin and a limited thickness for the layer itself. The fibres are stitched through the complex 11, 13 so formed, as shown indicatively by 15. When this is heated after stitching, curing of the material in the layer 13 takes place and the fibres are thus anchored to the base 11 by means of the thermoplastic resin in the layer 13. This result is achieved with a very small quantity of resin on the stitched fibres 15, which can therefore easily be recovered for the subsequent production of stitched material such as that indicated or another equivalent material.

A simplified diagram of a machine for the production of an article of the aforesaid type using the aforesaid method is indicated in Figure 2. 20 shows a quantity of material for the base of the stitching, such as a woven support, which is indicated by 21 and is caused to advance in the direction of arrow f21. The layer 23 of resin from a melting vessel 25 which distributes it through nozzles or by other suitable means, with scraping (or the like), in what are comparatively very small quantities is distributed over the advancing base 21. The supporting base 21 with the layer 23 passes through a calender 27 which distributes the material placed on the base to produce the layer as shown by 13. 29 indicates a unit of a known type for stitching by the alternating penetration of needles through the supporting base and through a layer or mattress of fibres M delivered from a container SM, so that the fibres are stitched through the supporting base 21 and the layer 23 of resin which has previously been spread over the base 21. The stitched complex is subjected to heat treatment, e.g. by a heated calender 31, to cure the layer 13 by heat and effect the anchorage.

The resin in the layer 13 (or 23), which may be polyethylene, is located in the region in which the fibres are anchored, and the fibres are coated with very little resin and can therefore be reused for stitching, with the possibility that waste can therefore be recycled with reuse of the fibres.

The base for the material may be a woven fabric of raffia or a woven resin fabric of the polypropylene or other type.

The heat treatment following stitching may also be carried out in a way other than using a heated calender as in 31. When a heated calender is used the distance between the cylinders of the calender can be adjusted to achieve curing and reduce crushing of the stitched fibre material.

It is to be understood that the drawing shows only an illustrative example, given purely as a practical demonstration of the invention, which may vary in form and arrangement without thereby going beyond the scope of the concept underlying the invention.

Claims

1. Method for the production of sheet articles with fibres stitched onto a generally woven base with an anchoring resin, characterised in that a thin layer of thermoplastic resin is spread onto the base, the fibres are stitched onto the base that has been supplemented in this way and the stitched article is treated in order to cure the resin and consequently to anchor the fibres.

2. Method according to the previous claim, characterised in that the curing is a thermoplastic curing, achievable by means of a heated calender, which rolls the article.

3. Method according to the foregoing claims, characterised in that the layer of resin is formed of a thermoplastic resin which is spread especially by rolling.

4. Method according to the foregoing claims, characterised in that the resin in the layer is polyethylene.

5. Article stitched on a generally woven base obtained by the method according to Claims 1 to 4, having a layer of resin, for anchoring the stitched fibres, which is spread onto the base and cured in order to anchor the fibres.

6. Article according to Claim 5, characterised in that the anchoring resin is polyethylene.

7. Article according to Claim 5, characterised in that the supporting base is a woven raffia fabric.

8. Machine for the production of a stitched article using the method according to one or more of Claims 1 to 4, characterised in that it comprises in succession: means to spread a thin layer of curable resin onto the generally woven base, means for stitching fibres fed to the said means onto the said base and means for curing the said layer of resin to anchor the stitched fibres.

9. Machine according to Claim 8, characterised in that the said curing means are heating means such as a heated calender.

10. Machine according to Claim 8, characterised in that the said means for spreading the layer of resin comprise a melting vessel with distributing nozzles and a squeezing and spreading calender.

FIG. 2

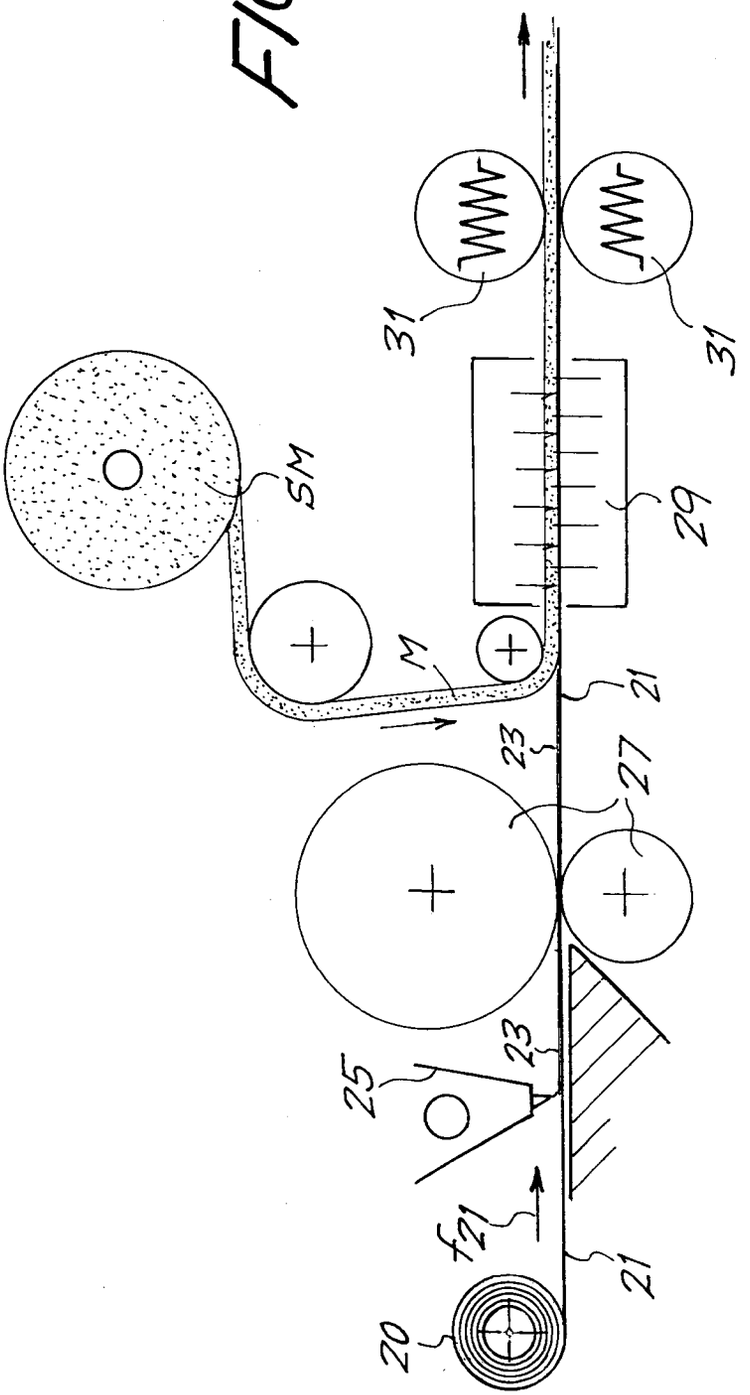
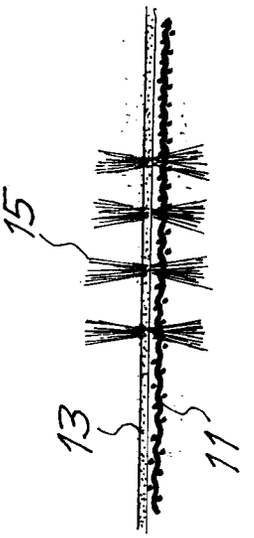


FIG. 1



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EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0213

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	US-A-3 476 636 (D.W. CROSBY) * column 5, line 5 - line 49 * * column 9, line 64 - column 10, line 7 *	1-10	D04H11/08
X	US-A-3 506 530 (D.W. CROSBY) * column 7, line 6 - line 14 *	1-10	
X	US-A-3 347 736 (C.R. SISSONS) * column 3, line 55 - column 4, line 53 *	1-10	
A	GB-A-1 087 203 (IMPERIAL CHEMICAL INDUSTRIES LIMITED) * page 4, line 6 - line 42; claims; figures *	1-10	
A	GB-A-1 150 451 (SINGER-COBBLE LIMITED)		
A	EP-A-0 177 144 (EXXON RESEARCH AND ENGINEERING COMPANY)		
A	US-A-2 908 013 (W.R. KEEN ET AL)		
A	US-A-1 726 634 (P.S. SMITH)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) D04H D05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 AUGUST 1992	D HULSTER E.W.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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