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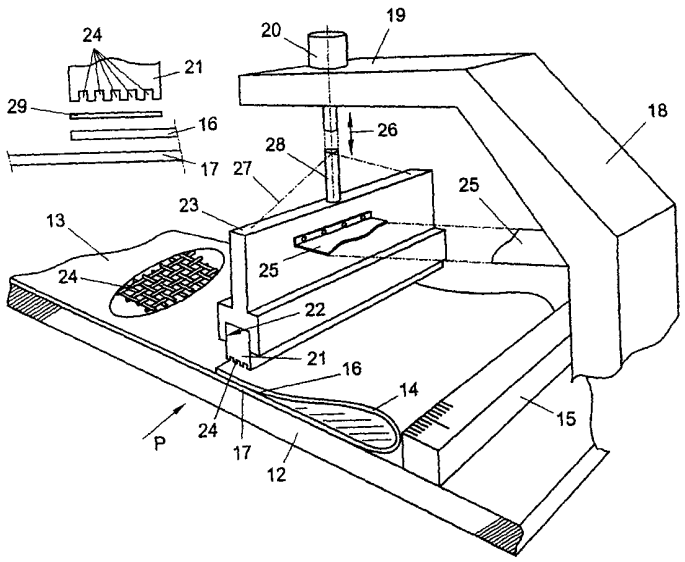
(54) Title: METHOD FOR TAILORING ENDS OF CLOTH, APPARATUS TO BE USED AND TAILORED CLOTH MANUFACTURED ACCORDING TO THIS METHOD



(57) Abstract: Method for tailoring of the cloth edges of rollable decoration screens such as indoor and outdoor sunscreens. The cloth edges on top and bottom will be subsequently folded back inwardly and then are interconnected to the single base cloth, which side edges are reinforced over their entire length. This is effected by integrating and interconnecting a relatively narrow band or a strip by means of heat welding connected to the cloth edge whereby the total thickness of the edge obtained by such method is equal to or does not exceed the thickness of the single base cloth. The improvement also relates to the apparatus applied for the heat welding as well as to the cloth resulting from said method.

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Method for tailoring ends of cloth, apparatus to be used and tailored cloth manufactured according to this method

The invention relates to a method of manufacturing and an apparatus respectively and tailored cloth thus obtained. Tailored cloth, a.o., is used for rollable screens such as outdoor sunscreens, protection against insects, wind- and rain, light reducing screens as well as for a broad variety of technical and decorative purposes. The screens are usually made of artificial material, either provided with or without fiber reinforcement as i.e. is used for insect screens, polyethylene foil, truck cover cloths, and the like.

Operating the screens by means of winding them up and down along a horizontal or a vertical roller axis may result in a number of various technical problems that mainly consist of disturbances during opening and closing of the screens. A primary requirement for any screen is its ability to roll out and onto the roller tightly, whereas the required cloth quality must withstand all kinds of mechanical influences (wind, collisions, etc.) in order to support a perfect winding up and down without signs of uneven rolling, creases or other material deformations. Failing of the screen to these requirements eventually results in serious malfunctioning of the system. Most frequently, electrical motors driving a roller axis dysfunction so. It goes without saying that for decorative use, at the outside of buildings, the occurrence of such failures will discourage an architect to apply the screen concept again.

The purpose of invention is to fully solve the aforementioned problems. A simple analysis shows how the various problems can be classified:

a) side guiding of the screen stops or is missing at slanting;
b) winding up or down in the central section of the screen cloth is not tight;

c) winding up or down of the edges of the screen cloth is not tight;

d) the screen cloth tears at the seam connection with inserted string for connection with inserted roller;

e) the screen cloth tears at the seam connection with inserted weighted bottom profile;

f) the tubular motor seizes or burns out as a consequence of irregular (oval) winding up and warping.

Solving of the problems can principally only be achieved by the perception that according to the invention all attention should be given to the screen cloth to be tightly wound up and down along the roller over its entire width. The sole reasonable solution for the existing problems is, thus, to ensure the constant and uniform screen thickness, throughout its central section and towards the far ends of the edges. Besides, it should be observed that as much as possible an even spirally shaped wind up of the screen onto the roller must be achieved. This is obtained in that the interconnection between screen and roller will no additional irregularities causing undesirable winding up. In the latter event one should pay attention for specific screen material behavior when it is exposed to either high (sun) or low temperatures (outdoors during winter or inside freeze units).

The principal measure, according to invention, is based upon the said perception i.e. to provide both (cut) edges of the screen cloth over their entire length with a relatively narrow band or strip obtained by means of heat welding, whereby the total resulting thickness of the opposing side edges of the screen cloth does not basically differ from the single thickness of the used screen cloth material. This measure integrally solves all existing winding up problems related with the side guiding of the screen cloth whereby the required tightness of the winding up over the entire width of the screen is after all guaranteed. The method according

to invention can subsequently be applied on different ways that will be explained further by the description of the drawing and by the corresponding claims.

Another source of problems is encountered by winding up and down are the seam connections of the edges on top and bottom sides of the screen cloth. Such seam connections that depend on the predefined dimensions of the screen practically need to be manufactured for each individual case, which proves the option of weaving according to EP 0794275, however not feasible from a cost price point of view. If PVC as a screen cloth material is chosen it appears that the seam connection can be obtained by adding a heat welded reinforced fiber band or strip. Normally, a seam connection will be obtained by heat welding of the two sheets of screen cloth and on top of it the strip which will result in more than a double thickness. Contrary to this method, and as noted above, it is important that the total thickness of the composed seam connection, when applying the new method, principally does not exceed the double thickness of a single screen cloth. At present, tearing on either side of the screen cloth, primarily due to multiple composition of the thickness of the welded reinforced fiber band or strip increased by the double thickness of the screen cloth, also occurs because of increased rigidity of the composed seam connection. According to the invention the thickness of the seam connection will be limited to the double thickness of the single screen cloth which, also enabled by a proper choice of the material of the heat welded reinforced fiber band or strip results in a relatively flexible seam weld connection. Such a seam connection may, according to invention, be easily applied to the bottom side of screen cloth. On the other hand however, application of such seam connection to the topside of the screen cloth increases its rigidity in cases where the outer roller diameter equals e.g. 20 to 125 mm. This higher rigidity generally results in uneven and non-circular winding up of the screen cloth. The remedy for this problem could be found in the profile adjustment of the roller itself, i.e. by giving it a non-

circular shape (in order to compensate the uneven beginning of the winding), but such a measure is too expensive.

The solution of this problem, according to invention, is based on the perception that a seam connection in axial direction of the roller provides for higher flexibility by means of profiling the same in the structural shape that resembles a corrugated cardboard. Cardboard, after all, allows easy winding in a direction perpendicular to the waves; analogously thereto the corrugated seam connection will allow even deformation during winding up and a tight take-up will be achieved.

The screen cloth provided with a self-flexible heat welded seam connection has the advantage that during initial winding up it will flexibly adopt the smaller diameter of the roller - this is a spot where initial tearing takes place just there - which will gradually increase thereafter.

On the bottom side of the screen cloth this noted problem is less because the roller diameter of the screen cloth material is of sufficient size. All existing and above listed problems, by the new combination of measures exerting a surprising effect are now solved according to invention to a lesser extent (side edge effect) and to a greater extent (roller axis effect).

A screen cloth tailored according to the new method complies with all of the required conditions to provide a guaranteed winding up and down by which the life span of the screen cloth is substantially increased and related complaints became history.

The invention will be described hereinafter by means of the drawing of an embodiment.

Fig.1 shows schematically a tailored screen cloth manufactured according to the new method;

Fig.2 shows a cross section of the screen cloth according to the line II-II in Fig.1;

Fig.3 schematically shows a partial cross section in perspective view of one side edge of the screen cloth according to Fig.1;

Fig.4 shows a perspective view of the welded seam connection according to invention;

Fig.5 shows a perspective view of a particularly flexible welded seam connection in an axial direction according to invention;

Fig.6 shows a similar welded seam connection with a different profile, and

Fig.7 schematically shows a perspective drawing of the apparatus with which the new method according to invention can be performed.

In Figs. 1 - 6 a preferred embodiment of a screen cloth 1 realized in a woven artificial material is shown. Here a so-called sunscreen is shown with main dimensions 4 m (width) x 2.5 m (height). Both side edges 3 and 4 of the woven screen cloth 1 are provided with a narrow strip of glass fiber-reinforced material having a width of app. 8-10 mm. Applying heat-welding (e.g. high frequency) technology for joining two pieces made of artificial material together, the edge zone will be heat welded in such a manner that the woven screen cloth material and the glass fiber-reinforced material will be pressed together to obtain a close connection whereby the externally measured thickness will be equal to the thickness of the single screen cloth material. The equality of the thickness of the base screen cloth and the thickness of its reinforced side edges is already a first condition for achieving a virtually perfect and tight winding up of the screen cloth on both side ends of a roller axis (not shown).

The upper border edge 6 and the lower border edge 7 of the screen cloth 1 will be subsequently folded back over such a distance that a rod profile can be inserted in axial direction. In most cases for the upper border edge 6 this will be a rod profile which, together with border edge 6 can be positioned in an axially hollow recess of the roller; while for the lower border edge 7 in most cases it will be a flat metal strip (with a certain weight) in order to show a tight screen cloth when rolled out. Principally, the heat welding (e.g. high frequency welding) of both seam joints will be enhanced again by means of a strip made of glass fiber-reinforced material 9 where one needs to ensure that the integral thickness of both screen cloth parts 8 and 9 and of strip 9 after welding is not greater than the double thickness of the screen cloth material.

Depending on the chosen material, the purpose is to achieve the internal closed diffusion joint as already described for both side edges of the screen cloth. In case that the rigidity of the material after having been subjected to heat welding remains too high for the required winding flexibility, then it can be improved by giving a peculiar profiling to the welded seam joint which achieves after cooling a higher flexibility. In Fig.4 and 5 this is shown. Like shown in Fig.5, a rib-like profiling in axial direction creates a wave-like pattern 10 resulting in an extra flexibility in the bottom sections of the "waves". In Fig.6 there another profile pattern 11 has been chosen actually achieving the same effect of flexibility of the seam joint. The axially profiled welding border edges, which are obtained according to the new method, now seem to solve all existing winding up and down problems with screens. The realization of the new method can take place by making use of a solid pressing profile or by means of a profiled cylindrical roll. For the purpose of flat rolling of the seam joint in Fig. 4, only for the lower border edge 7 where a flat seam joint is sufficient, a smoothly outlined profile of the cylinder roll or a flat heat welding profile will be used. On the other side a ribbed cylinder roll or a ribbed welding profile will be used in Fig. 5 and 6. By using appropriately chosen materials for screen cloth and heat weld seam strip, any occurred problem regarding winding up and down the screen cloth systems can be solved by applying the new method. The term "screen cloth" includes in this context any other rollable foil screen from a different material whereby the same problems can be solved. Therefore it is not required that a "screen" is only made of woven textile material since in such woven textile material e.g. very narrowed strips of one-sided colored or non-colored aluminum foil can be woven-in. At the one side the aluminum side may be sun reflecting and at the other side it can have decorative purpose.

Fig. 7 shows the principle of a machine for carrying out the new working method. On the upper surface 12 of a tailoring table there is a sideward feed of a screen cloth 13 in direction of arrow P. This screen cloth 13 is initially fed through a border edge folding apparatus (not shown) and subsequently comes under a pushdown holder (known in the art) whereby the rounding of the border edge 14 rests at the side of the measuring ruler 15. The back folded border section 16 is now prepared, together with

its screen cloth section 17 underneath, to become interconnected by means of a heat welding process in situ. This can be obtained as follows.

Above the upper surface 12 of a tailoring table there is an extended arm of a usual heat-welding machine. The welding machine may be located behind the tailoring machine. This welding machine may be operated e.g. by a foot pedal whereby this arm 18 is supplying the operational machine part for carrying out the method. In Fig. 7 this is shown very schematically. At its free far end the arm 18 continues into a horizontal supporting part 19 provided with a hydraulic pressure cylinder 20. This pressure cylinder 20 is directly interconnected with a heat-welding beam 21 (copper/brass) that is located in the recessed part 22 of a Y-profile 23 turned upside down. The heat-welding beam 21 is here provided with a number of axially placed and relatively narrow recesses 24. The purpose of these is that during applying of heat and pressure in situ of the welding seam 16 and 17 they will obtain such a weld seam thickness of the double screen seam that the earlier explained flexibility of the welded joint will be achieved and thereby said disadvantages will be solved. Also depending on the specifications and composition of the tailored screen cloth material for the purpose of heat welding while using HF, a broad range between e.g. 50 Hz and 50 MHz may be desired. It appeared that the heat welding by means of HF welding now creates a significant saving on energy and time whereas the cooling time is also shorter.

Finally, in order to enhance the strength of the heat welded joint to the highest possible level while at the same time guaranteeing the desired flexibility at the circumferential direction of the roller, this heat welded joint may also be combined while positioning a separate strip which will so become integrated in the welded seam joint. This strip may be axially fed from a supply roll (not shown) underneath the heat-welding beam in order to become integrated with the textile 24. For the purpose of exemplification there is an enlarged detail in Fig. 7 showing screen cloth parts 16 and 17 and, the strip 29 to be pressed and integrated and the profiled heat welding beam 21.

The power feed for the heat-welding beam 21 from the heat welding apparatus takes place by means of a copper foil 25 which is connected with 360 V via the arm 18 into the heat welding apparatus. The HF technology, which via the copper foil 25 generates the heat inside the heat-welding beam, is of a harmless nature and no special safety precautions need to be taken accordingly.

Before a heat-welding beam was explained operating discontinuously, but there is also an option of a continuous heat-welding operation by means of a cylindrical roll whereby the circumference of the said cylindrical roll is provided with recesses or corrugations all in order to achieve the ultimate goal of creating a flexible profiled seam joint. For the purpose of tailoring it is, therefore, irrelevant whether the cylindrical roll takes a fixed position or if it moves with respect to the seam joint to be heat-welded. In Fig. 7 is up- and downward movement of the heat-welding beam 21 indicated with an arrow 26. The pressure beam 28 can exert the required pressing force only to a limited width over its entire length. In the event that the length of the heat-welding beam would be too great then it will be necessary to compensate for its deformation by applying the two tensioning devices 27 by which both ends of the heat-welding beam will be pressed downward via the Y-profiled holder 23.

CLAIMS

1. Method for tailoring edges of cloth applicable in production of rollable screens used as e.g. indoor end outdoor sunscreens, whereby the top and the bottom edges of such a cloth are subsequently folded back inwardly and then are attached back to the single base cloth, the side edges of the cloth being reinforced, characterized in that the cloth side edges are provided over their entire length with a relatively narrow band or strip which by means of heat welding provide to the cloth side edge such a reinforcement as a result of which the total thickness of the inwardly folded edges does neither supersede nor scarcely supersede the single thickness of the single base cloth.

2. Method according to claim 1, characterized in that the relatively narrow band or strip is obtained by means of the application of both roll-in in situ and partial deformation of the cloth material in such a manner that the resulting total thickness of this side edge of the cloth is no larger than the thickness of the single base cloth.

3. Method according to claim 2, characterized in that the cloth material is laminated one sided, by adding a separate band or strip of such thermoplastic material, which provides for a close interconnection of the materials obtained by heat welding.

4. Method according to claim 3, characterized in that the separate band or strip is provided with a fiber reinforcement in its longitudinal direction.

5. Method according to claims 1 through 4, characterized in that the edges of the cloth perpendicularly directed to the said side edges, are firstly folded back inwardly and thereafter are interconnected upon the single base cloth by means of heat welding to provide for a relatively narrow heat weld whereby the resulting

total thickness of the cloth layers is less or at the highest equal to the double thickness of a single cloth, regardless whether a separate band or strip has been applied.

6. Method according to claim 5, characterized in that both the heat welded seam joint and/or both side edges are interconnected by means of frequency heat welding, with an applied frequency range between 50 Hz and 50 MHz.

7. Method according to claim 5, characterized in that the welded seam joint is obtained by simultaneously feeding a separate heat welding band or strip underneath the heat welding beam or heat welding roller.

8. Method according to claim 5, characterized in that the welded joint in its transversal direction (axially), i.e. perpendicular to its longitudinal axis, is provided with at least two, lengthwise continuously running rib-like bulges having a greater height than the thickness of the single cloth as defined in claim 5, one and the other in such a way that the resulting flexibility of the welded joint in a direction perpendicular to the roller axis of the said screen cloth is substantially increased.

9. Method according to claim 8, characterized in that the rib-like bulges extend until the far ends of the side edges of the cloth.

10. Tailored cloth, obtained by applying the method according to any of the foregoing claims, characterized in that the cloth edges are provided with a heat welded relatively narrow band or strip having a thickness which is equal or less than the thickness at the cloth, whereby the welded seam joints at the cloth ends perpendicularly these to these have a resulting total thickness which is less than or at the highest equal to the thickness of the single cloth.

11. Tailored cloth according to claim 10, characterized in that the welded seam joints have a profiled intersection, i.e. showing alternating series of grooves which,

instead of a flat seam connection now provide for sufficient flexibility in cross section.

12. Heat welding band or strip provided with a fiber reinforcement applicable for manufacturing reinforced side edges of screen cloths as well as for manufacturing welded seam joints for top and bottom end edges of the screen cloths.

13. Apparatus for heat welding of the screen cloth material by using a welding beam characterized in that by applying the new method according to any of the foregoing claims 1 - 9 whereby the tailoring table is provided with heat welding equipment, particularly whereby the required welding heat is generated, at the one side to achieve the heat welded seam joint and at the other side to provide for the required flexibility for the screen cloth material rolling direction, consists of applying LF or HF frequency within the range of 50 Hz and 50 MHz, which is being transferred to the heat welding beam by means of a plate foil made of copper/brass.

14. Apparatus according to claim 13, characterized in that by applying the method according to any of the foregoing claims 1 - 9 between one through nine for heat welding a heat welding disc roll is applied whereby the tread of heat welding disc roll is provided with a series of corrugations in order to create flexibility of the welded seam joint in a direction perpendicular to the roller axis.

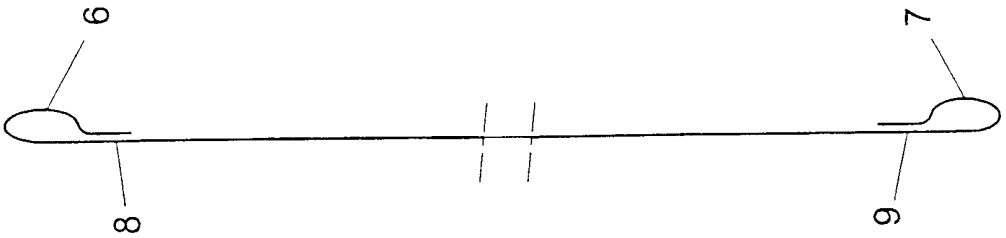

FIG. 2

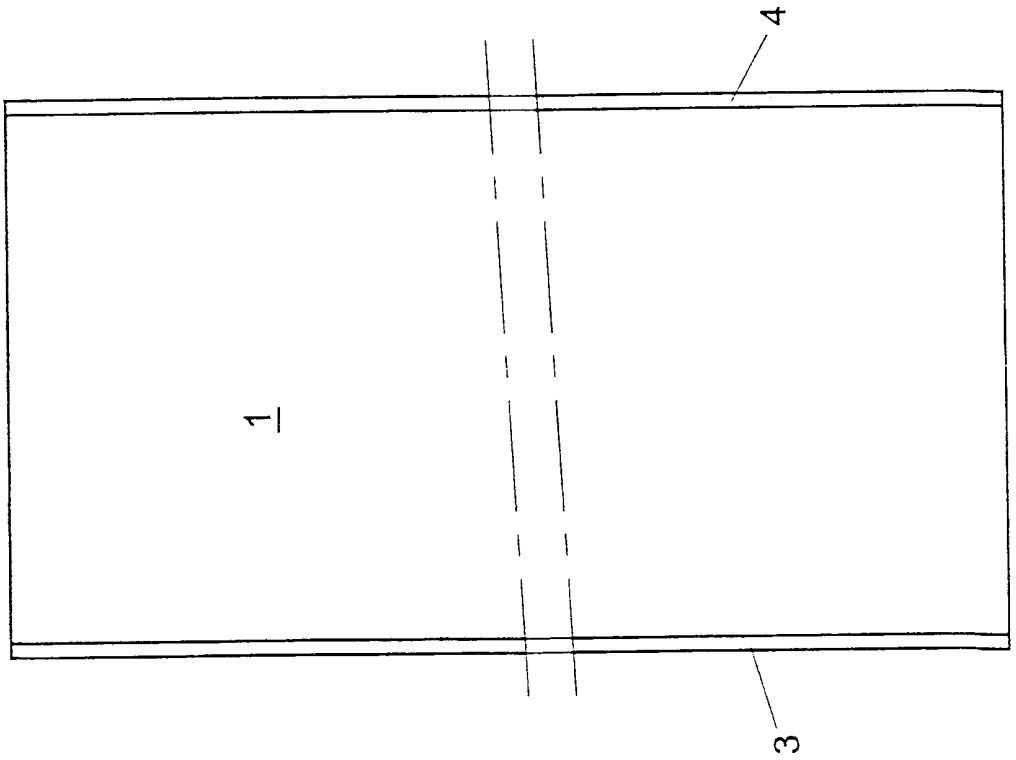

FIG. 1

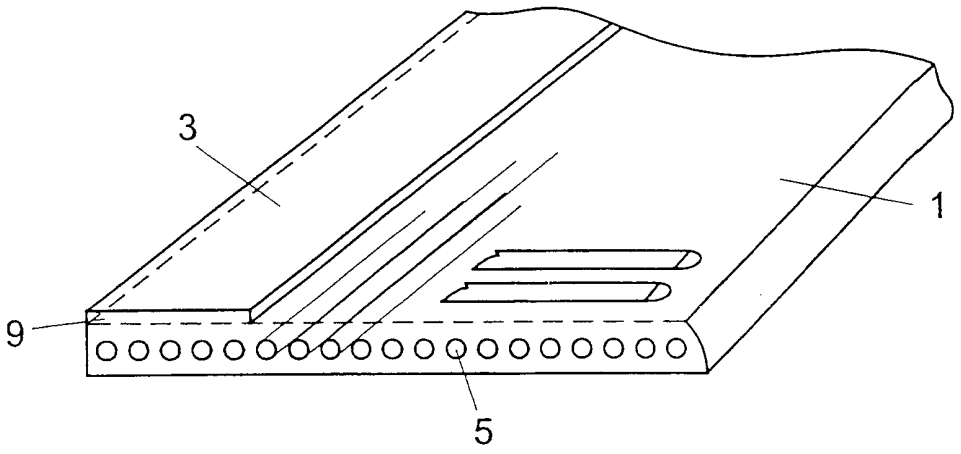

FIG. 3

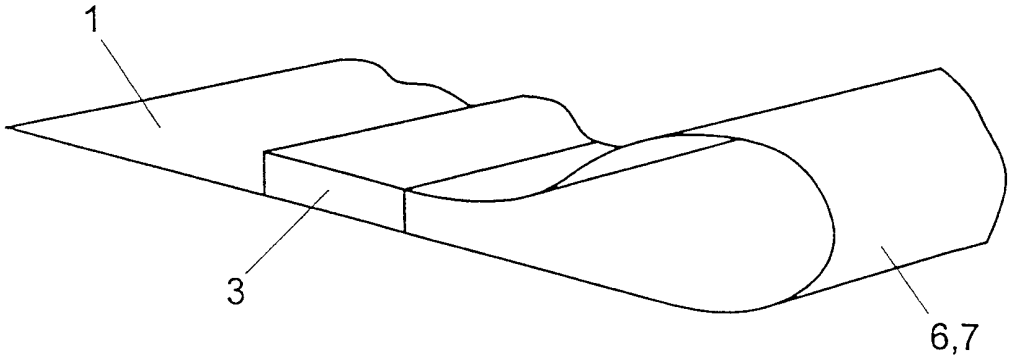

FIG. 4

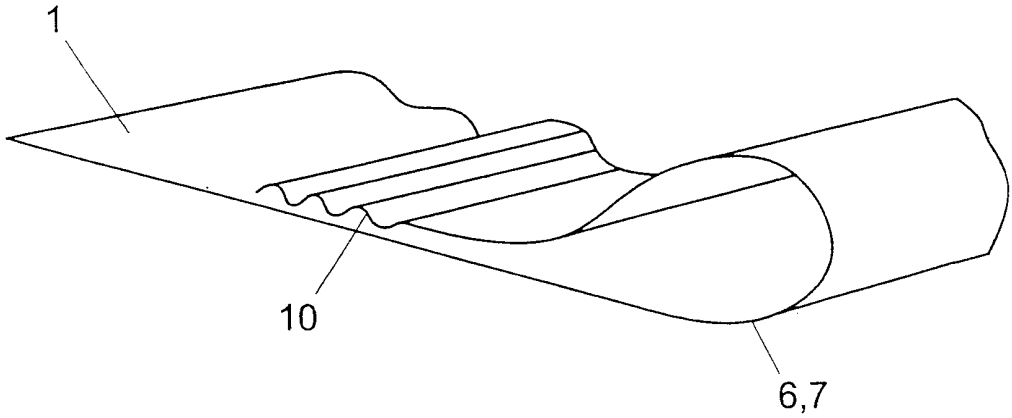

FIG. 5

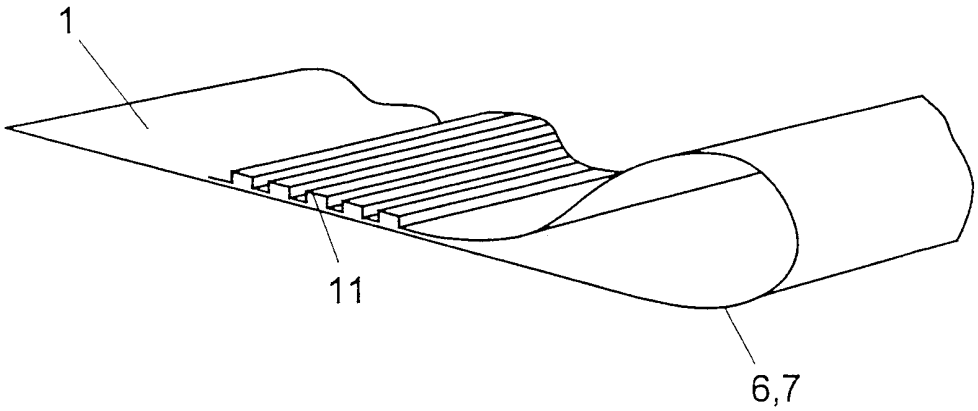

FIG. 6

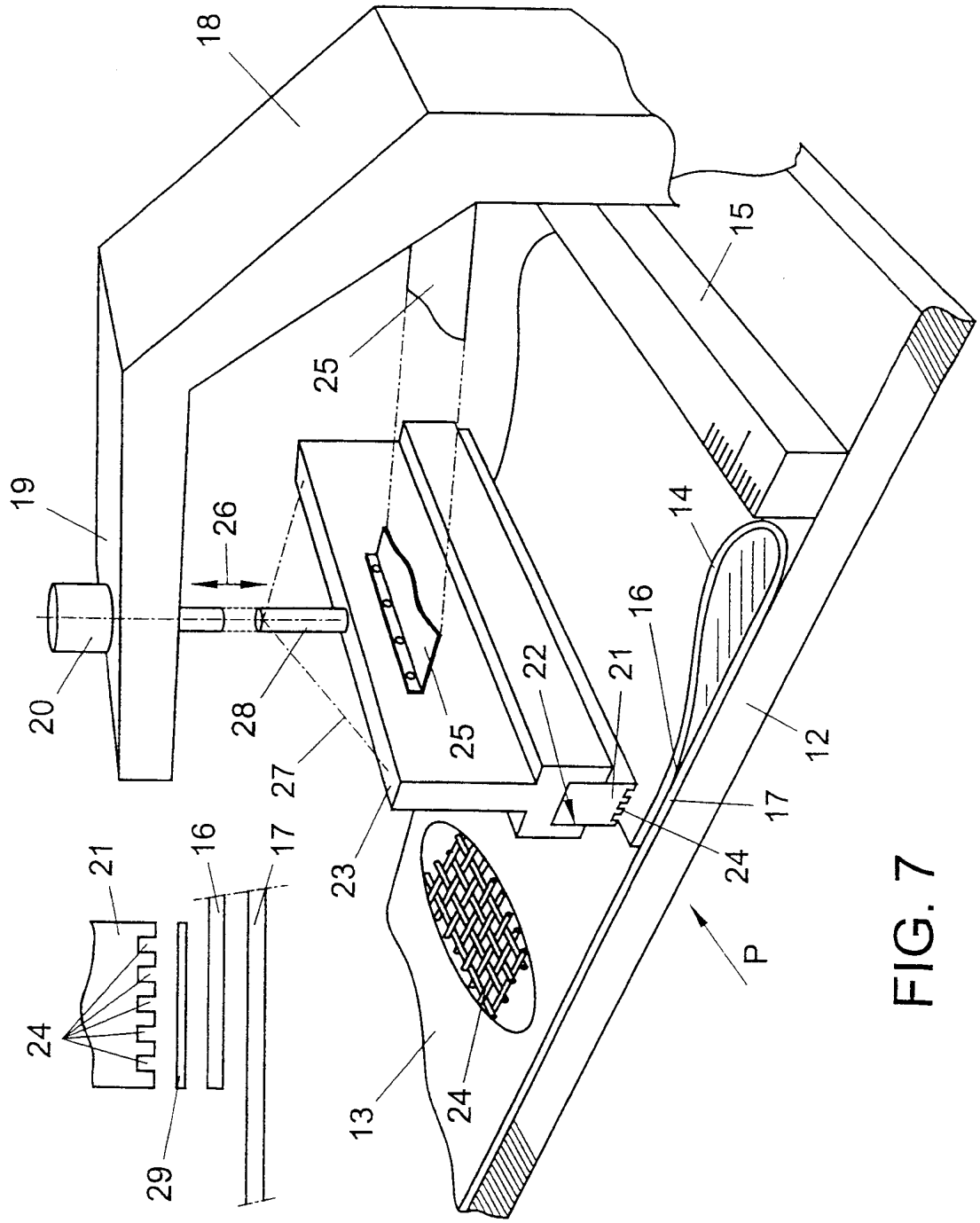

FIG. 7

INTERNATIONAL SEARCH REPORT

Inte ional Application No
PCT/EP 00/11374

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E06B9/40 E04F10/02 B29C67/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E06B E04F B29C A47D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 443 563 A (HINDEL JOSEF ET AL) 22 August 1995 (1995-08-22) column 4, line 20 - line 31; figures 2,3A	1,12
A	DE 16 29 604 A (REICHLOD ALBERT CHEMIE) 14 January 1971 (1971-01-14) page 6, last paragraph -page 7, line 5	1,12
A	DE 31 23 436 A (BAECKMANN REINHARD ING GRAD) 30 December 1982 (1982-12-30) abstract; figure 2	1,12

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
27 March 2001	03/04/2001

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. ional Application No
PCT/EP 00/11374

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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