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(54) Wrapping materials

(57) A length of wrapping material (10) of the kind comprising at least one layer of a corrugated sheet material (15) and at least one other layer of a flexible sheet material (14) which layers are bonded together to form a composite material, has at least one line of weakness (20) formed therein to extend along the length of the material in a direction transverse to the corrugations, whereby folding of the material about said line of weakness (20) is facilitated. The lines of weakness are preferable formed as gaps in the layer of corrugated material (15) and the material (10) The material may be formed into a roll (11) in the normal manner. In use the material can be folded around articles of much greater length than the width of the material by drawing off a suitable length (12) of the material from the roll (11) and folding it on the lines of weakness (20) to enclose the articles.

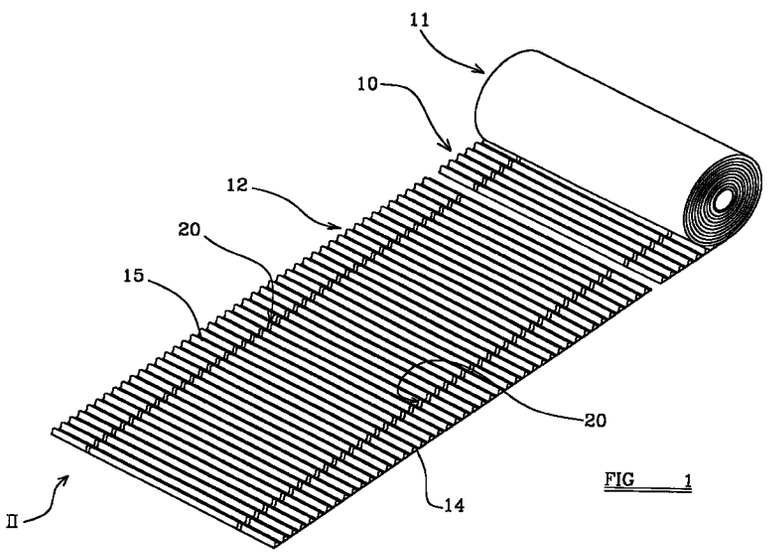

FIG 1

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Description

[0001] This invention relates to wrapping materials of the kind comprising at least one layer of a corrugated sheet material and at least one further layer of a flexible sheet material bonded together to form a composite material. Typically, the layers may be bonded by adhesives such as starch, polyvinyl acetate, sodium silicate and/or blends thereof. Typically, the further layer comprises a flat sheet material, but it may alternatively comprise a creped sheet and/or a creped/flat laminant. The composite material may have cohesive adhesive or other coatings on either surface for subsequent sealing. Such wrapping materials are supplied in rolls or in large sheets and are commonly used to enclose and protect a wide range of articles.

[0002] Since the material is more flexible about lines parallel to the corrugations than about lines transverse thereto, it is formed into rolls centred on an axis parallel to the corrugations and in the roll or sheet as supplied to the user the corrugations extend across the width of the material.

[0003] Again because of the greater flexibility of the material along lines parallel to the corrugations, in use it is normally wrapped around articles by bending it about such lines rather than about lines transverse to the corrugations. Thus the width of the material in the roll in effect defines the maximum length of article that can conveniently be wrapped using such material. Typically, the maximum width available is not more than about 2 meters, but there is a requirement for packaging articles of much greater length, for example bundles of tubing, rods, pipes, channel sections and the like in lengths of perhaps 4 to 6 meters. This can be achieved by wrapping several successive lengths of such corrugated material around the articles, but this is time-consuming and difficult, and as a result it has in the past been preferred to use boxes to package such long articles.

[0004] However, the use of boxes has a number of disadvantages. In particular the dimensions of a box are pre-determined and must be tailored to the product being wrapped, whereas articles such as extrusions, tubes and channel sections may be made in various lengths. Also, boxes are normally stored in a flat condition and erecting large flat boxes prior to use may be relatively difficult.

[0005] It is accordingly an object of the present invention to enable corrugated wrapping material to be used more readily in place of boxes for the wrapping of elongate articles.

[0006] According to one aspect of the present invention we provide a length of wrapping material of the kind comprising at least one layer of a corrugated sheet material and at least one other layer of a flexible sheet material which are bonded together to form a composite material, wherein at least one line of weakness is formed therein to extend along the length of the material in a direction transverse to the corrugations, whereby folding of the material about said line of weakness is facilitated.

[0007] For storage and transportation prior to use, a length of such wrapping material may be formed into a roll centred on an axis parallel to the corrugations with said line of weakness extending along the length of the material in the roll.

[0008] In accordance with the invention we further provide a roll of wrapping material of the kind comprising at least one layer of a corrugated sheet material and at least one other layer of a flexible sheet material which are bonded together to form a composite material, wherein at least one line of weakness is formed therein to extend along the length of the material in the roll and in a direction transverse to the corrugations whereby, after a length of material has been severed from the roll, folding of said length of the material about said line of weakness is facilitated.

[0009] The line of weakness may be formed by scoring the layer of corrugated material in a generally conventional manner, but in accordance with a particularly preferred feature of the invention the line of weakness is formed by a discontinuity in the (or each) corrugated layer of the composite material. Such discontinuity may be formed by wholly or partially removing a strip of the corrugated material, but preferably separate pieces of corrugated material are secured to the layer of the other material with a spacing corresponding to the required gap.

[0010] Typically, at least two such discontinuities are provided. Where there are two discontinuities the material can in use be folded into a channel section of predetermined width, and two pieces of such folded material can be employed to enclose for example elongated articles formed into a bundle of rectangular shape in transverse section. However, if there are four discontinuities, the material can be folded in one piece entirely around such a bundle of articles.

[0011] It will be understood that the spacing between the discontinuities can be set to correspond to the size of the bundle to be wrapped. However, it is possible to form additional discontinuities, for example at regular intervals across the width of the material, so that the material can be folded at a number of alternative positions to suit differing widths of bundles. Moreover by providing such discontinuities at regular intervals across the entire width of the material, the material can be used for wrapping elongate articles formed into bundles of circular or other non-rectangular shape in transverse section.

[0012] The width of the discontinuity may be varied according to the angle and direction of the fold to be produced as hereinafter described.

[0013] Where the composite material includes additional layers of the corrugated material, a discontinuity is required in each additional layer, but the width of each discontinuity at the same fold line may be different. Where there are additional layers of the other material,

a discontinuity may be formed in at least some of such additional layers, but it is possible for all layers of the other material to extend across the fold line without any discontinuity.

[0014] Alternatively, the line of weakness may be formed by crushing a strip of the layer of corrugated material. This has the advantage of providing greater strength at the fold line than would be afforded by the other layer of material alone, but may decrease the ease of folding, particularly in the case of very long lengths of the material.

[0015] According to a further aspect of the invention we provide a method of wrapping elongate articles by using a length of wrapping material of the kind comprising at least one layer of a corrugated sheet material and at least one other layer of a flexible sheet material which are bonded together to form a composite material, and wherein a plurality of parallel lines of weakness is formed the material to extend along the entire length of the material in a direction transverse to the corrugations and thereby facilitate folding of the material about said lines of weakness, arranging said material in juxtaposition with said article with the corrugations extending transverse to the length of the article, and folding said material about at least some of said lines of weakness and at least partially around said article.

[0016] These and other features of the invention will now be described by way of example with reference to the accompanying drawings, wherein

FIGURE 1 is a perspective view of a roll of a first embodiment of wrapping material and a length of such material cut therefrom ready for use,

FIGURE 2 is a fragmentary end view of the cut length of the material in the direction of arrow II if figure 1 and showing the construction of a "hinge",

FIGURE 3 is a view similar to that of figure 2 showing the material after bending about the hinge,

FIGURE 3a is a view similar to that of figure 3 showing a modification of the first embodiment,

FIGURE 3b is a further view similar to that of figure 3 showing a further modification of the first embodiment,

FIGURE 4 is a view similar to that of figure 2 showing a second embodiment,

FIGURE 5 is a view showing the material of figure 4 after bending about the hinge,

FIGURE 6 is a view similar to that of figure 2 showing a third embodiment,

FIGURE 7 is a view showing the material of figure 6 after bending about the hinge,

FIGURE 8 is a view similar to that of figure 2 showing a further embodiment,

FIGURE 9 is a view showing the material of figure 8 after bending about the hinge,

FIGURE 10 is a perspective view of a package of articles wrapped by two lengths of a material as shown in figure 1,

FIGURE 11 is a perspective view of a package of articles wrapped by single length of a modified version of the material as shown in figure 1,

FIGURE 12 is an end view of a further modified version of the material as shown in figure 1 shown in a folded condition,

FIGURE 13 is a view corresponding to figure 11 showing an alternative arrangement whereby end closure flaps may be constructed, and

FIGURE 14 is a view similar to figure 13 showing an end closure.

[0017] Referring firstly to figure 1, corrugated wrapping material 10 in accordance with the invention is shown in the form of a roll 11, from which the material is drawn off and a suitable length 12 is cut. The material in this embodiment comprises a base layer 14 of a flexible material, which may be a flat material , a creped sheet or a creped/flat laminant, adhesively bonded to a layer 15 of corrugated material. As can be seen, the corrugations in the layer 15 extend transversely across the width of the material in the roll 11.

[0018] In accordance with the invention, lines of weakness are formed in the material along the length thereof and transverse to the corrugations. In the embodiment shown in figure 1, there are two such lines of weakness, but as hereinafter described there may be a greater number. Whilst the lines of weakness may be formed by scoring the material or by a line of intermittent cuts, they are preferably formed by gaps 20 in the corrugated layer 15 as shown more clearly in figure 2 so that the portion 21 of the base layer 14 across the gap 20 can serve as a hinge portion about which the material can be folded as hereinafter described.

[0019] The gaps 20 are most conveniently formed by securing separate lengths of the corrugated material to the base layer 14 with the required gap between each length. However it would alternatively be possible to remove strips of appropriate width from a full-width corrugated layer 15 subsequent to its attachment to the base layer 14, and in this case the depth of the removed strip could in some cases be less than the full depth of the corrugated material so as to increase the stiffness of the hinge portion 21.

[0020] In the embodiment illustrated in figure 2 the width X of the gap 20 is sufficient to enable the layer 14 to be folded through 90° to bring the edges of the corrugated material towards one another as shown in figure 3 to form as "inside" corner with the corrugated material on the inner side, say $\pi/2$ times the depth of the corrugated layer. However, the width X may be varied. Thus, in the modification shown in figure 3a the gap is decreased to a value significantly less than the depth of the corrugated material and the base material is folded about the narrower hinge portion 22 in the opposite direction to form an "outside" corner with the corrugated material in the outer side. Further, by increasing the dimension X it is possible to fold the layer 14 inwardly

about the wider hinge portion 23 through more than a right angle as shown in figure 3b. Additionally, the number and spacing of the gaps 20 or other lines of weakness may be varied. In this way it is possible to customise the wrapping material to individual requirements.

[0021] In the embodiment illustrated in figure 4 the material 10a includes a second layer 16 of the base material secured to the corrugated layer 15 on the face opposite to the first base layer 14. A portion 24 of the second layer 16 extends across the gap 20, and the material can be folded in either direction. As illustrated in figure 5, the portion 21 of the layer 14 serves as the hinge and the portion 24 of the other layer 16 buckles either inwardly into the gap 20 as the material is folded as shown, or outwardly. However, if desired, the layer 16 may be formed with a discontinuity at the gap 20, in the form of either a gap or a slit if it is required to avoid increasing the stiffness of the hinge portion 21.

[0022] In the embodiment illustrated in figure 6 the material 10b includes a second layer 17 of the corrugated material secured to the layer 14 on the face opposite to the first layer of corrugated material 15, and a narrower gap 22 is provided in the second corrugated layer. The material can be folded about the portion 21 in the manner illustrated in figure 7 to bring the corrugated material 15 on opposite sides of the gap 20 towards one another.

[0023] In the embodiment illustrated in figure 8 in the material 10c outer layers 16 and 18 of the base material ale secured to respective corrugated layers 15 and 17 carried on opposite faces of the layer 14. A portion 24 of the second layer 16 extends across the gap 20 in the corrugated layer 15, and a portion 25 of the third layer 18 extends across the wider gap 23 in the second corrugated layer 17. As illustrated in figure 9, the portion 24 of the layer 16 in this case serves as the hinge and the portions 21 and 25 of the other layers 14 and 18 buckle inwardly or outwardly as the material is folded. To facilitate such buckling, the portions 14 and 18 may be scored as appropriate. However, if desired, the layers 14 and/or 18 may be formed with a discontinuity at the gap 20, in the form of either a gap or a slit if it is required to avoid increasing the stiffness of the hinge portion 24.

[0024] In use, two lengths 12 of the material 10, or of the materials 10a, 10b, 10c as above-described and having two gaps 20, may be folded to channel section around opposite sides of a rectangular-section bundle of articles A as shown in figure 10, the spacing between the gaps 20 corresponding to the width of the bundle, and secured in place by means of adhesive tape for example.

[0025] In a modification, applicable to all embodiments described above, the material may be formed with four gaps 20 and be of an appropriate width to enable a single length 12A of the material to be wrapped as shown in figure 11 around the bundle of articles A in one piece.

[0026] As shown in figure 12, the hinge portions may be modified as indicated at 21a to be of greater width in order to afford greater flexibility at the corners of the package, whereby variations in the cross-sectional size of the bundle can be accommodated. In this way it is possible to package bundles of articles, or single articles, that taper in width or vary in some other way from uniform cross-section.

[0027] If it is required to enclose the ends of the package, this can be achieved by the use of a separate end closure which is secured in place in any appropriate manner.

[0028] Alternatively, the material can be cut to a length that exceeds the length of the articles to be packaged and cuts 26 can then be made along the hinge portions where they extend beyond the ends of the articles as shown in figure 13 so as to form end closure flaps 27 that can be folded in the manner shown in figure 14 and secured in place in any suitable manner.

[0029] Where the bundle of articles is of different shape in section, the gaps may be arranged as appropriate to the cross-sectional shape. In particular, any combination of gaps can be provided to correspond to an article, or bundle, of any cross-sectional shape. Thus by providing equal gaps of regular spacings, the material may be adapted for wrapping articles of circular cross-section. By providing a combination of appropriately spaced gaps of different width, to accommodate different angles of bending, both internal and external, the material may be adapted for wrapping articles of complex shapes, for example L-shaped or U-shaped.

[0030] The features disclosed in the foregoing description, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A length of wrapping material of the kind comprising at least one layer of a corrugated sheet material and at least one other layer of a flexible sheet material which layers are bonded together to form a composite material, wherein at least one line of weakness is formed therein to extend along the length of the material in a direction transverse to the corrugations, whereby folding of the material about said line of weakness is facilitated.

2. A length of wrapping material according to Claim 1 wherein the line of weakness is formed by a discontinuity in the corrugated layer of the composite material.

3. A length of wrapping material according to Claim 2 wherein at least two such discontinuities are pro-

vided.

4. A length of wrapping material according to Claim 2 wherein the composite material includes at least two layers of the corrugated material, and each said discontinuity is formed in each of said corrugated layers.

5. A length of wrapping material according to Claim 1 wherein the composite material comprises at least one additional layer of the other material, and a discontinuity is formed on said line of weakness in at least one of such additional layers.

6. A length of wrapping material according to Claim 1 wherein the line of weakness is formed by crushing a strip of the layer of corrugated material.

7. A length of wrapping material according to any one of the preceding claims formed into a roll centred on an axis parallel to the corrugations with said line of weakness extending along the length of the material in the roll.

8. A method of wrapping an elongate article by using a length of wrapping material according to any one of claims 1 to 6 comprising the steps of arranging said length of wrapping material in juxtaposition with said article with the corrugations extending transverse to the length of the article, and folding said material about at least some of said lines of weakness and at least partially around said article.

9. A method according to Claim 8 where there are two of said lines of weakness formed the material and two pieces of the material are each folded into a channel section of pre-determined width, and said two pieces of such folded material are arranged to enclose said elongate articles.

10. A method according to Claim 8 wherein there are four of said lines of weakness formed in the material and a single piece of said material is folded entirely around said article.

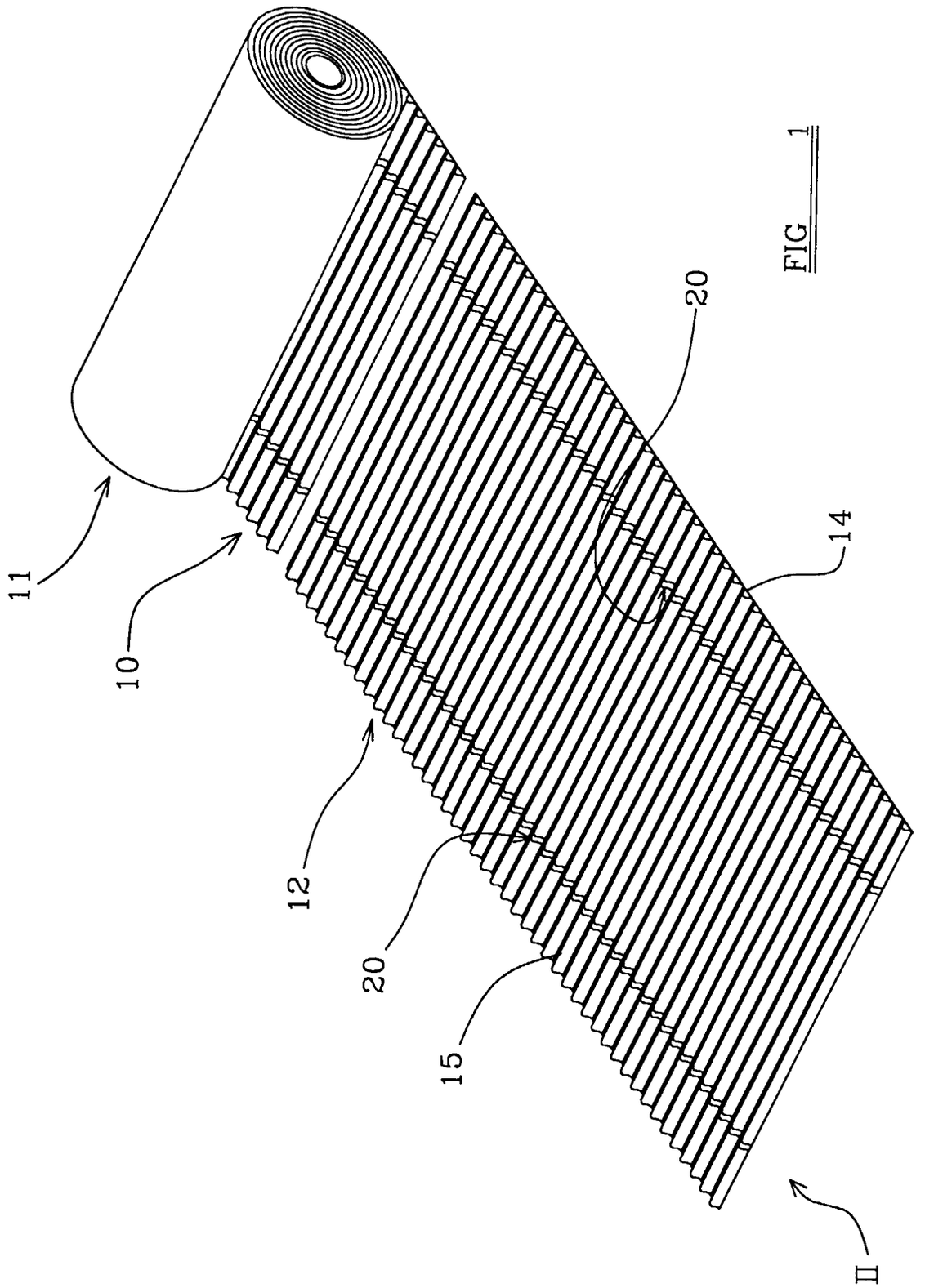


FIG 1

FIG 2

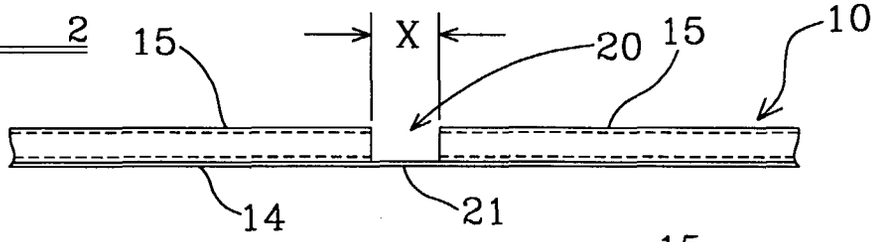
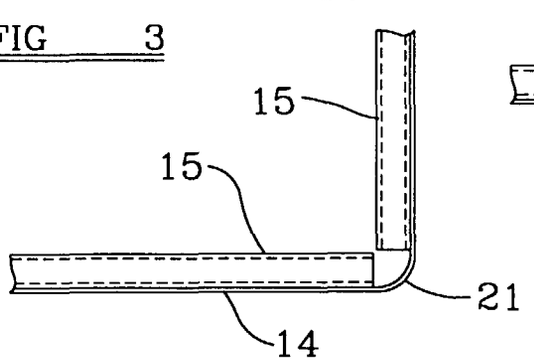


FIG 3



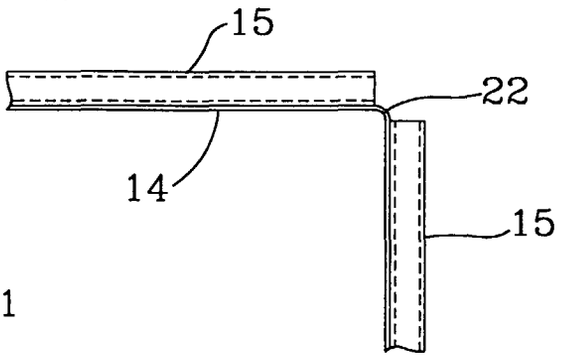


FIG 3a

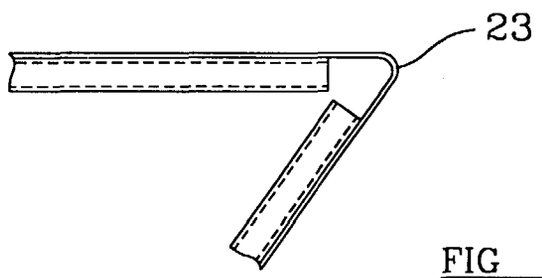


FIG 3b

FIG 4

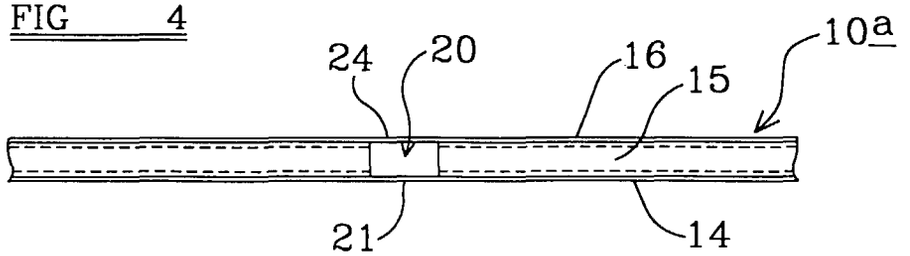


FIG 5

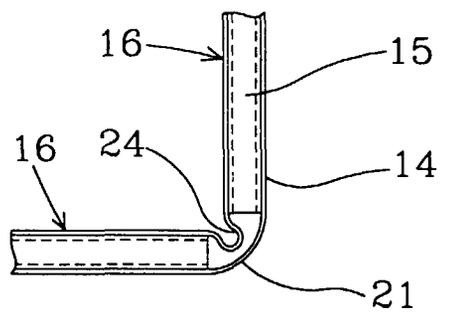


FIG 6

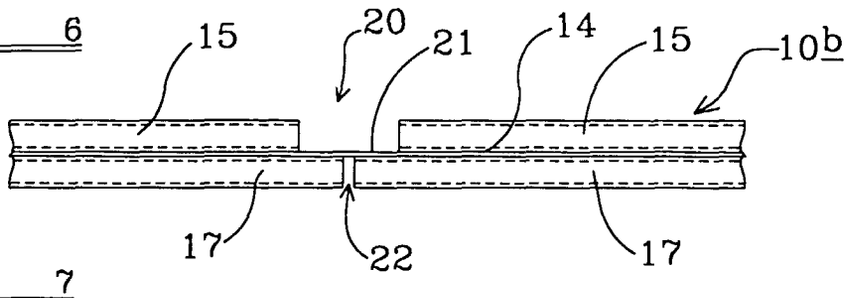


FIG 7

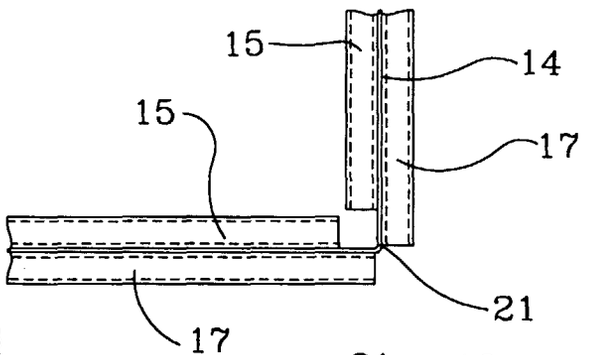


FIG 8

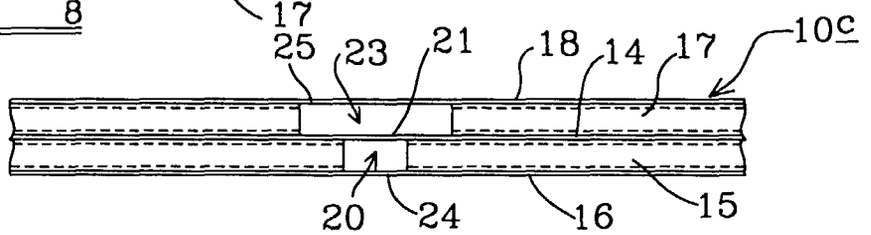


FIG 9

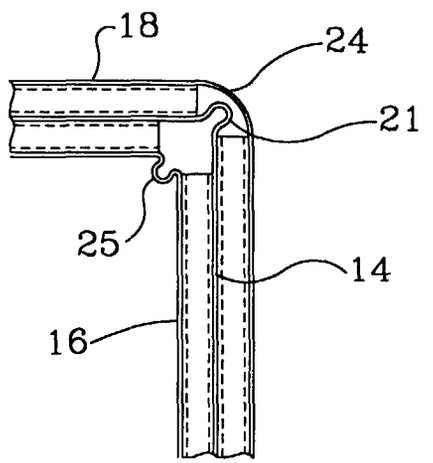


FIG 10

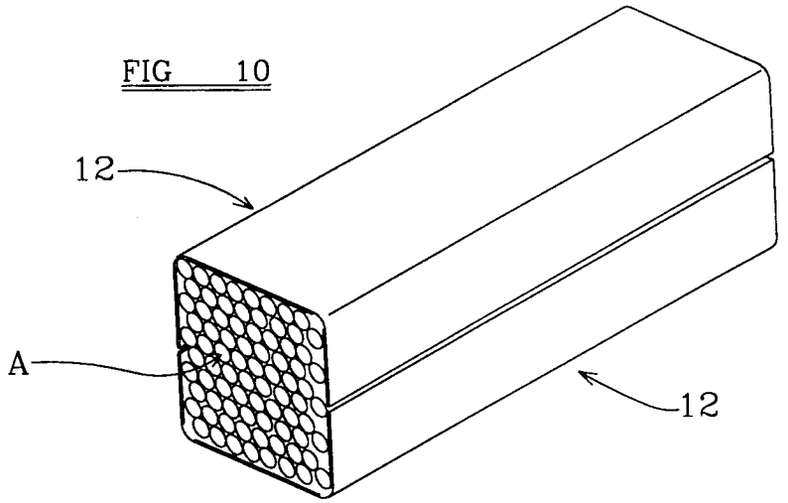


FIG 11

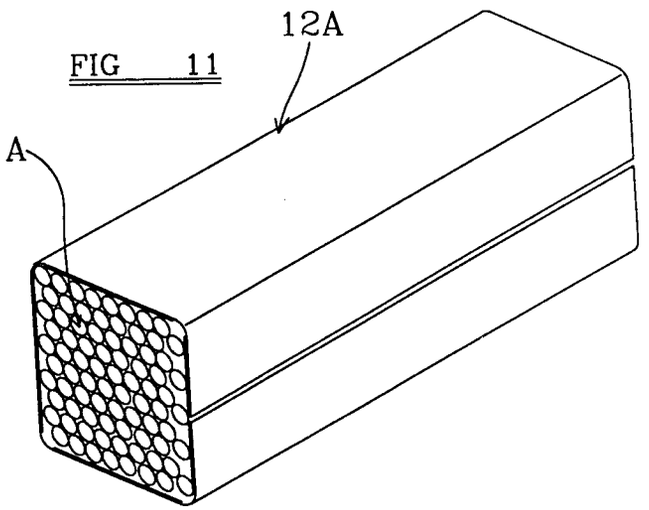


FIG 12

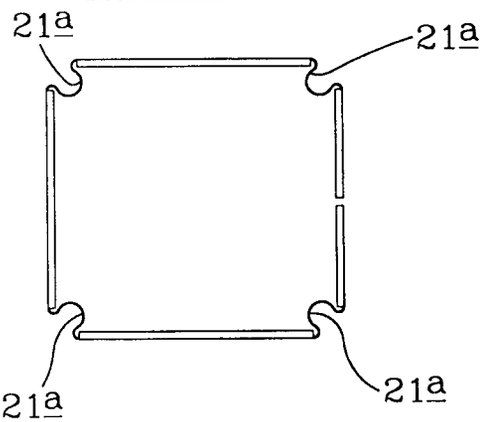


FIG 13

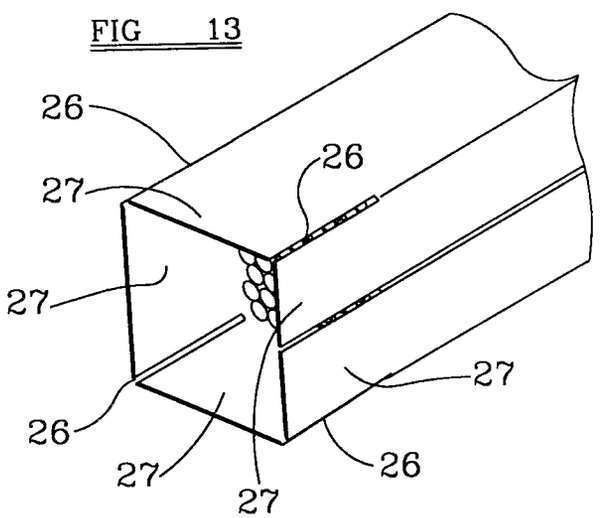
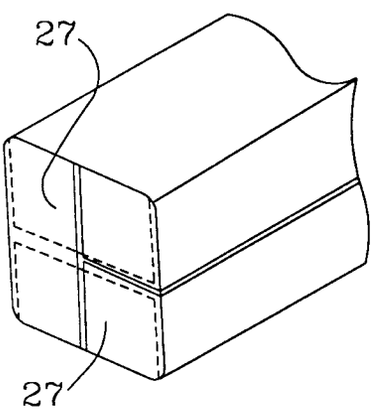


FIG 14



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 11 6863

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	* figures 1-5 *		
A		1	

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	* column 2, line 16 - line 23 *		
	* column 3, line 48 - line 55; figures 1-9 *		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	30 December 1998	Spettel, J

CATEGORY OF CITED DOCUMENTS

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