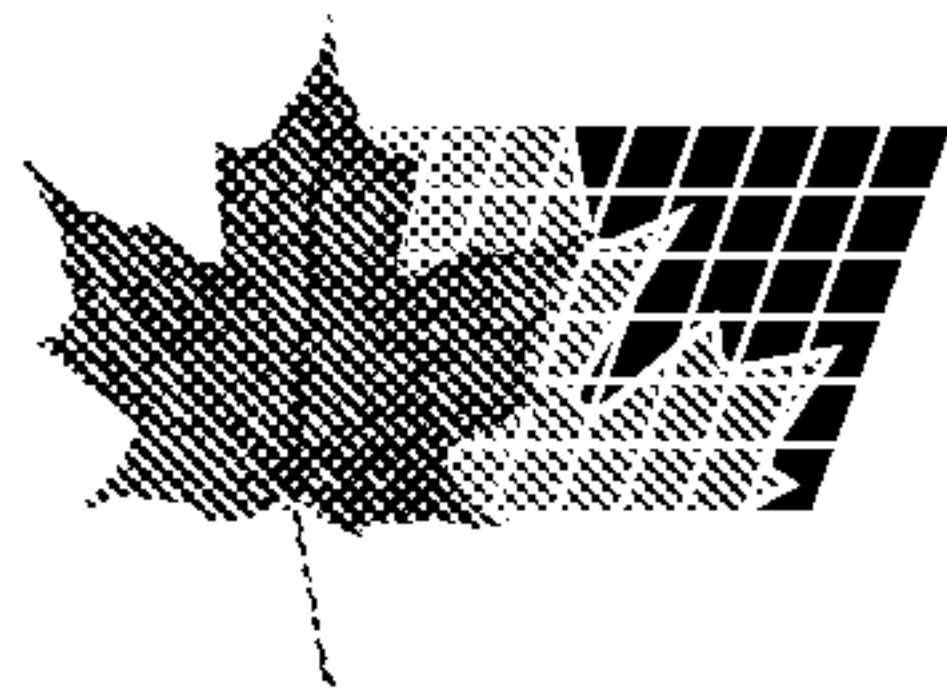
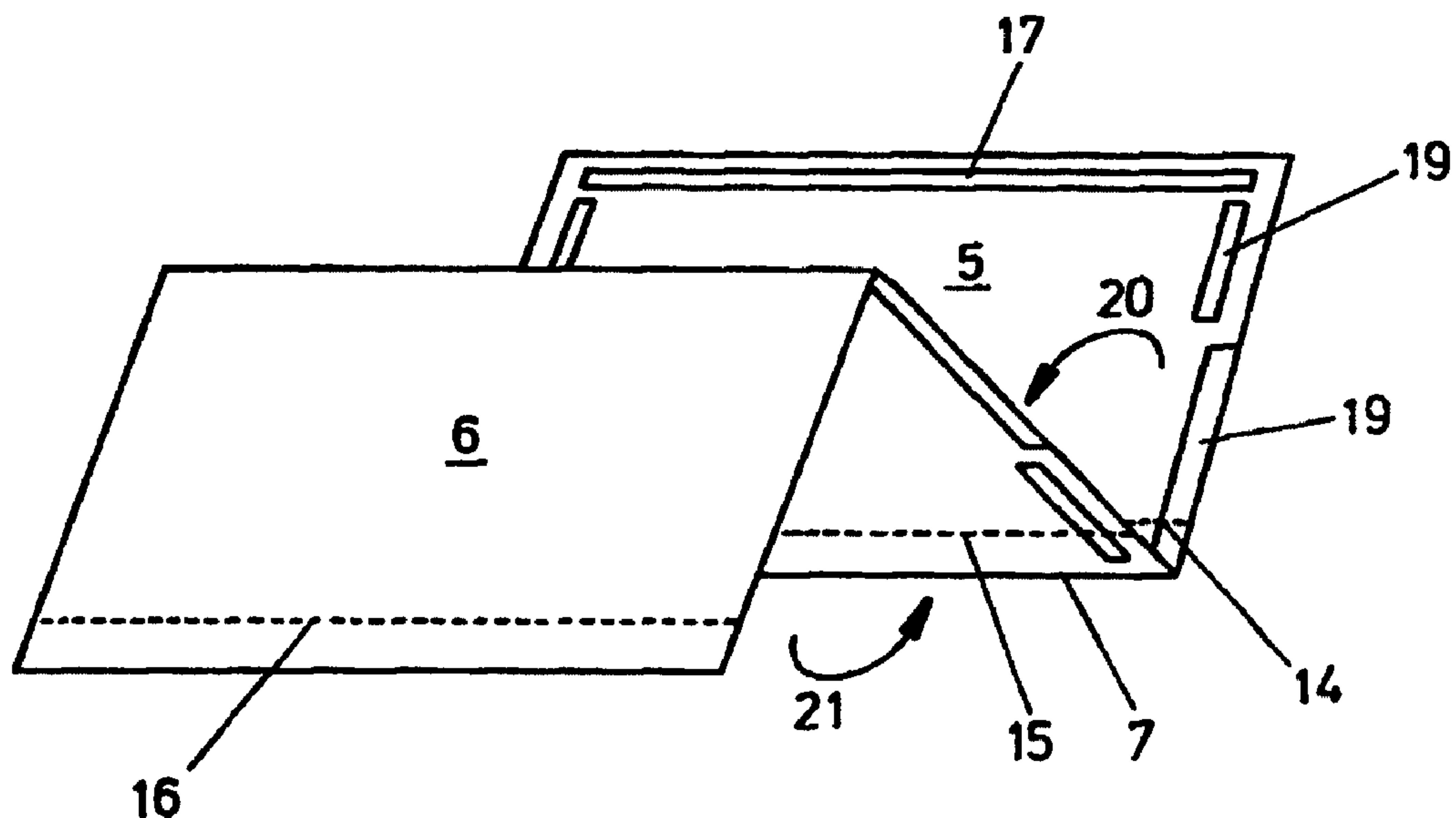


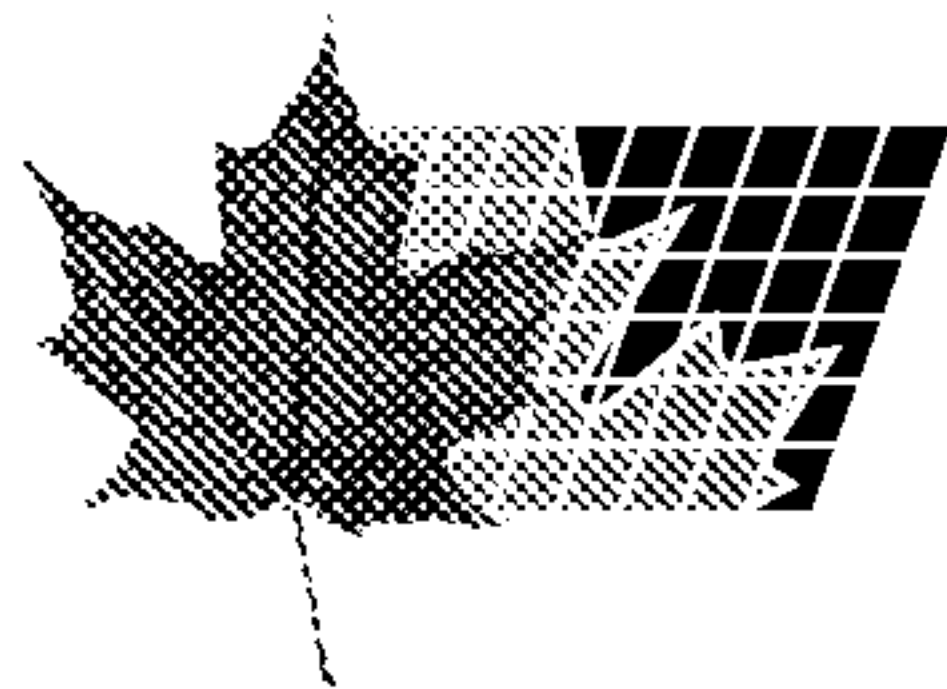


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(30) 1998/06/24 (9813517.1) GB
(54) **FORMULAIRE SCELLE PAR PRESSION**
(54) **PRESSURE SEALED FORMS**



(57) Au moins une surface d'un formulaire (2) pouvant être scellé par pression présente une ou plusieurs zones de scellement par pression, distribuées de façon que quand ledit formulaire est plié d'une manière prédéterminée, au moins deux régions recouvertes d'adhésif autocollant (17, 18, 19) entrent mutuellement en contact. Le pouvoir adhésif de l'adhésif utilisé pour fabriquer ces formulaires (2) est un facteur très important pour faciliter leur production, ainsi que pour mettre en évidence une éventuelle tentative d'ouverture non autorisée, par exemple par déchirure du substrat papier d'un formulaire scellé. De nombreux adhésifs étaient

(57) At least one surface of a pressure seal form (2) will comprise one or more areas of pressure seal adhesive distributed such that when the form (2) is folded in a predetermined manner at least two regions of pressure seal adhesive (17, 18, 19) come into contact with each other. The strength of adhesive used in making such forms (2) is a highly critical factor in facilitating their production while providing evidence of unauthorised tampering, e.g. by tearing of the paper substrate of a sealed form (2). Many adhesives were previously regarded as unsatisfactory, for example in giving an adhesive to adhesive bond weak enough to permit the



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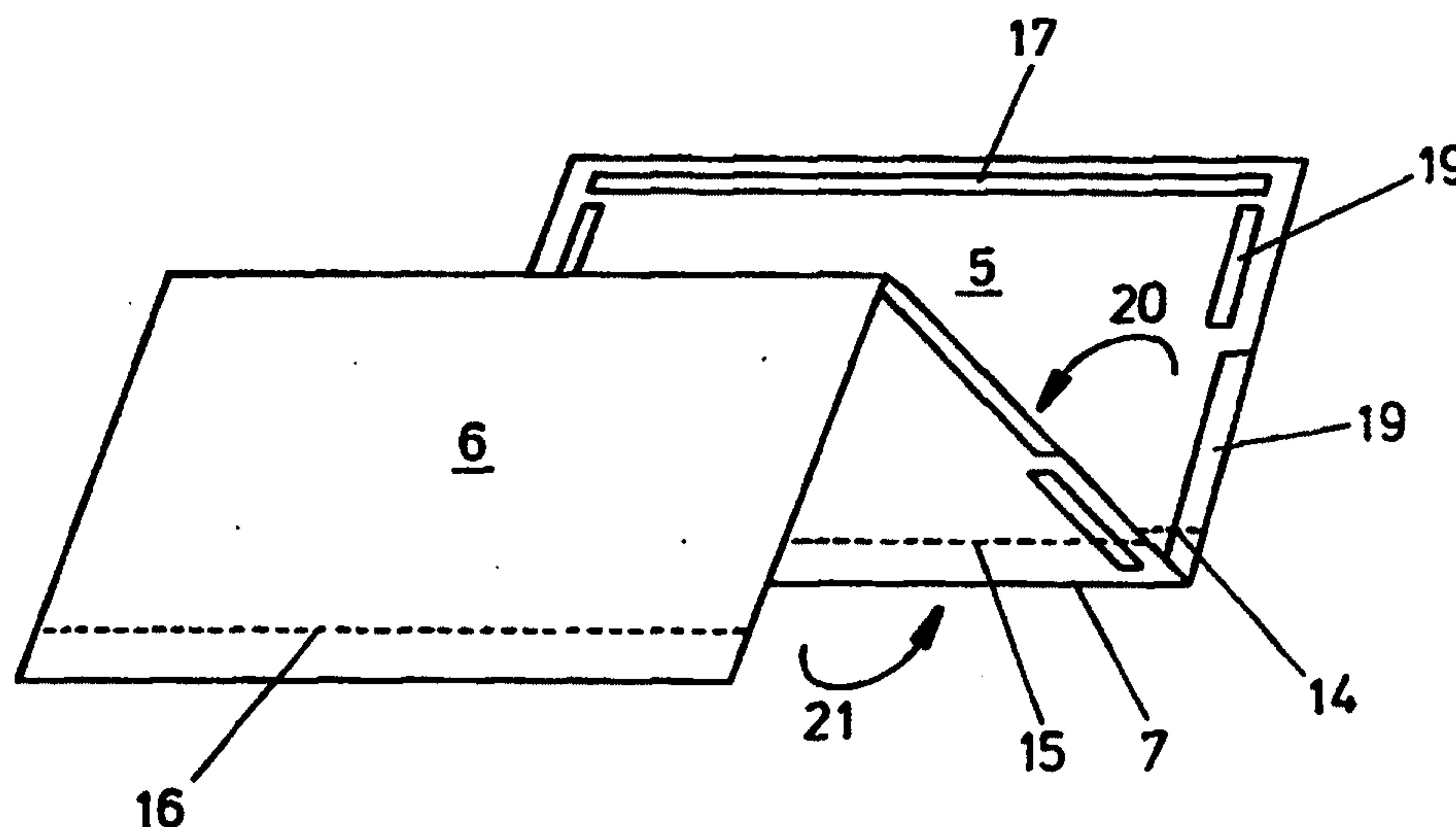
jusque-là considérés comme insatisfaisants, entre autres parce qu'ils donnaient une liaison adhésif-adhésif suffisamment faible pour permettre l'ouverture d'un formulaire non affaibli sans indication concomitante d'une tentative d'ouverture. L'affaiblissement local du formulaire (2) dans au moins une partie desdites régions permet d'utiliser une plus grande variété d'adhésifs, notamment au moins certains de ceux qui étaient rejetés. L'affaiblissement peut se faire par découpeure/perforation partielle ou totale ; éraflure, grattage, rayure ou abrasion ; rainage ou gaufrage.

opening of an unweakened form (2) without any indication that tampering has occurred. The provision of a local weakening of the form (2) in at least a part of a said region enables the use of a larger range of adhesives, including at least some of those previously rejected. The weakening could take the form (2) of partial or complete cutting/perforation; scuffing, scratching, scoring or abrading; or creasing or embossing.

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(21) International Application Number: PCT/GB99/01576 (22) International Filing Date: 18 May 1999 (18.05.99) (30) Priority Data: 9810941.6 22 May 1998 (22.05.98) GB 9813517.1 24 June 1998 (24.06.98) GB (71) Applicant (for all designated States except US): DAVIDSON, Allan, Fleming [GB/GB]; Fluellin, Ash House Lane, Little Leigh, Northwich, Cheshire CW8 4RG (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): HARDY, Philip, Miles [GB/GB]; Printing Specialities Co., Merril Grove, Heathylee, Longnor, Nr Buxton, Derbyshire SK17 0QY (GB). GREENWAY, Peter [GB/GB]; 22 Lincoln Avenue, Springbourne, Bournemouth BH1 4QS (GB). (74) Agents: GODDARD, David, John; Harrison Goddard Foote, 1 Stockport Road, Marple, Stockport SK6 6BD (GB) et al.		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: PRESSURE SEALED FORMS**(57) Abstract**

At least one surface of a pressure seal form (2) will comprise one or more areas of pressure seal adhesive distributed such that when the form (2) is folded in a predetermined manner at least two regions of pressure seal adhesive (17, 18, 19) come into contact with each other. The strength of adhesive used in making such forms (2) is a highly critical factor in facilitating their production while providing evidence of unauthorised tampering, e.g. by tearing of the paper substrate of a sealed form (2). Many adhesives were previously regarded as unsatisfactory, for example in giving an adhesive to adhesive bond weak enough to permit the opening of an unweakened form (2) without any indication that tampering has occurred. The provision of a local weakening of the form (2) in at least a part of a said region enables the use of a larger range of adhesives, including at least some of those previously rejected. The weakening could take the form (2) of partial or complete cutting/perforation; scuffing, scratching, scoring or abrading; or creasing or embossing.

Pressure Sealed Forms

It has become an increasingly common practice to transmit sensitive or privileged information in hard or paper form by applying the information to a form which is
5 thereafter folded and sealed in such a manner as to conceal the sensitive information within the folded form. The information could be applied by printing or handwriting, for example.

To ensure that the sealed form has not been opened and resealed by an unauthorised
10 party, the form is designed as far as possible to be "tamper-evident".

In certain cases, the completion of the form, i.e. the application of the sensitive information and the subsequent folding and sealing, is accomplished on an individual basis. For example, an individual may required to complete a questionnaire and
15 return it in the post. Here, the sealing could be effected by the wetting of one or more adhesive areas which have been pre-printed on the form, following the writing in of the requested information and folding of the form.

Normally, the adhesive areas are one or more strips located near the periphery of the
20 form, and when the form is folded the wetted adhesive is bonded to an opposed surface of the form. This opposed surface does not normally require any special treatment. The area containing the sensitive information is enclosed within the folded and sealed form by the adhered regions, and often also by one or more folds in the form, and information thereon cannot be obtained without opening the form.

25

Since it is extremely difficult to unseal the adhered regions without detection, and the only other way to open the form is to tear it, tampering can be readily detected in most instances.

30 However, there are many cases where a run of forms needs to be completed by entry of the sensitive information, and possibly additional non-sensitive information (such

as an address), folding and sealing. Typical examples would be the issue of PIN numbers or pay slips.

5 In those circumstances it is clearly beneficial to be able to automate the process of information entry, folding and sealing as far as possible, and it is known to effect these steps by a sequence of printer, folder and sealer machines, either as individual entities or as a partial or completely integrated system. The forms could be provided as individual sheets, or, for example, as a continuous run of separable documents in fan form.

10

Such a system does not lend itself to the use of wettable adhesives, and accordingly pressure seal adhesives are used. Pressure seal adhesives are often natural and/or synthetic latexes or derivatives thereof. After application to a surface, for example by a printing process, a layer of this type of adhesive feels generally dry, or slightly tacky to the touch. It tends not to bond strongly to most commonly occurring materials, but does bond relatively strongly to another layer of the same adhesive, particularly when pressure is applied.

15

Thus unlike a form containing a wettable adhesive, a pressure seal form will contain pressure seal adhesive so distributed that on folding the form areas of adhesive will come into contact with one another and form a seal when pressure is applied thereto.

20

A practical requirement is that the printed adhesive should be sufficiently dry so as not to interfere with the other steps in the preparation of the form, or in the completion of the form, while opposed strips should nevertheless provide a secure seal between opposed parts of the form after folding and sealing by applied pressure. Ideally, the strength of the local bond between two parts of the form where it is should exceed the local strength of the form itself, so that any attempt to part the seal causes obvious and irreversible damage to the form.

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In practical terms, these two requirements are, to a significant extent, conflicting. Many adhesive compositions which give a sufficiently strong bond under applied pressure give rise to printed areas which are excessively "wet" or tacky. They interfere with the other steps in form preparation and/or are very difficult to apply in
5 the first case.

Other adhesive compositions, which give sufficiently dry printed areas so as not to interfere with the other form preparation or completion steps, do not give a sufficiently strong seal. In this case, a sealed form could be opened by parting the
10 opposed sealed adhesive areas, and then resealed without leaving any indication that opening has taken place, and the "tamper-evident" requirement is missing.

This has resulted in the few particular adhesive preparations which heretofore have been used with a degree of success as being regarded with proprietary interest by the
15 manufacturers and users, and the nature of their composition, and the conditions of use, have been protected accordingly. In at least some case high security precautions have been taken by manufacturer and authorised user to prevent access to trade secrets by third parties.

20 Even with these few adhesive preparations, it is difficult to achieve a consistent high performance in the resulting sealed forms, particularly given the variations found in sealing machines and paper products.

It would therefore be advantageous to be able to use existing readily available
25 pressure seal adhesive preparations for pressure seal forms.

The invention provides an unsealed pressure seal form in which at least one surface of the form comprises one or more areas of pressure seal adhesive distributed such that when the form is folded in a predetermined manner at least two regions of pressure
30 seal adhesive come into contact with each other, wherein in at least part of a said region the form is locally weakened. For example, the form may be weakened by

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being perforated or cut or partially perforated or cut; or by being creased, embossed, crimped, scratched or scuffed.

5 The invention also provides a method of preparing an unsealed pressure seal form comprising the steps of applying a layer of pressure seal adhesive to at least one area on at least one side of the form, and also locally weakening the form in at least a part of said area before during or after the application of said adhesive.

10 By locally weakening the form in an area where the adhesive is applied, there is considerably more likelihood that any attempt to open the form by parting the adhesively joined areas will result in tearing, even where the pressure seal is relatively weak compared with the strength of the form (substrate) per se.

15 This enables pressure seal adhesives to be used which were previously regarded as providing an insecure seal, but which nevertheless do produce printed areas which are sufficiently "dry" or non-tacky not to interfere with the remainder of the form preparation and/or completion system.

20 The invention will be described in greater detail with reference to the accompanying drawings, in which:

Figure 1 shows a first side of a typical pressure seal form prior to sealing;

25 Figure 2 shows the second of the form of Figure 1;

Figure 3 shows the form of Figures 1 and 2 folded prior to pressure sealing;

30 Figures 4 and 5 show first and second pattern of partial cuts which could be used in the invention.

In the particular design of paper form shown in the Figures, all the intelligible printed information appears on the side 1 of the Form shown in Figure 1, and the reverse side of the form 2 shown in Figure 2 contains only a meaningless printed design 3 and a message 4 that opening instructions are overleaf.

5

The side 1 of the form comprises an upper inner area 5 and a lower inner area 5' both of which are hidden when the form is folded and sealed, and which cannot be accessed without opening the form. These areas can contain printed matter, including any sensitive information, and they are spaced by a margin 5". There is a second inner area 6 which remains visible when the form is folded and sealed, suitable for containing a name and address, for example, or other non-sensitive information.

10

There is a first horizontal fold line 7 extending across the centre of the margin 5" and a second horizontal fold line 8 in a margin dividing areas 5 and 6. Both fold lines extend across the entire width of the form and comprise a series of perforations made partly or wholly through the thickness of the paper in known manner. The positions of the fold lines are also marked by printed indices 9, 10 and they occur at or close to one third and two thirds of the height of the form.

15

The inner areas 5, 5', 6 and their dividing margins are laterally bounded by first and second vertical fold/tear lines 11, 12, again of partial or complete perforations, which extend the entire height of the form, leaving margins 13, and there are also two horizontal fold/tear lines 14, 15, 16 which extend across the width of the form and come into register when the form is folded along the lines 7, 8. Printed indices are provided for all these lines, as shown.

20

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On the first surface 1 of the form at the top and bottom of the area 5 are applied horizontal stripes 17, 18 of pressure seal adhesive, and there are vertical stripes 19 of pressure seal adhesive in the margins adjacent the area 5. The stripes 17, and 18, and the stripes 16 come into register when the form is folded about fold line 6 as in Figure

30

3, so that upon application of pressure the stripes seal together and the information on area 5 is sealed from view within the seals and fold.

5 A similar pattern of horizontal and vertical stripes 17', 18', 19' is provided on the surface 2 of the form so that formation of a fold along line 8 in a reverse direction 21 to that 20 of the fold 7, as in Figure 3, and application of pressure seals the lower part of the form to the rest of the form.

10 The pressure seal adhesive used in this type of application is conventionally a natural or synthetic latex or latex derivative or a mixture thereof. However, as explained previously, most adhesives are either too weak, so that the form can be opened and resealed undetectably by a third party, or they are too tacky, thereby causing difficulties in the remainder of the form preparation system, or in the printing of the adhesive.

15

It is now proposed to weaken the form, and in an embodiment of the invention this is effected by partially or wholly perforating or cutting the paper substrate of the form in at least some of the regions where the pressure sensitive adhesive is applied. As a consequence, it is possible to use a pressure seal adhesive which would previously
20 have been rejected as not providing a sufficiently strong seal, although sufficiently non-tacky to present no problems during the remainder of the form preparation.

Preferably, the perforating or cutting is only partially through the thickness of the paper. Most preferably, the perforating or cutting is effected only partially through
25 the thickness of the paper from the side containing the associated adhesive region.

Cutting, i.e. along elongate lines as opposed to punctiform perforation, is preferred to perforation as weakening the form more effectively. In a preferred embodiment, the cutting is effected along lines which extend in at least two non-parallel directions,
30 such lines either being discrete or connected.

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The exact extent of cutting or perforation needs to be controlled so as to provide the necessary weakening without weakening the form to such an extent which could give rise to problems in the form completion system, for example separation or tearing and jamming in a printer or folder. This will clearly be controlled by the precise nature of the form substrate, the form design, and the pressure seal adhesive properties and distribution, inter alia.

The cutting or perforation may be effected simultaneously with the formation of the fold lines and tear strip lines, or before or after such step(s).

10

The pressure seal adhesive may be applied to the form at any stage during its preparation. Where, as is commonly the case, the prepared (but not completed) form contains printed matter, this is preferably applied prior to application of the adhesive.

15 While it can be effected at any time, the cutting or perforation is preferably performed prior to application of the adhesive, in which case it is believed it will tend to enter the cuts or perforations to an extent. However, the adhesive could be applied before cutting/perforation. Clearly this is a further factor which will determine the extent to which cutting/perforation could and should be effected.

20

The cutting or perforation associated with the pressure seal areas may be performed at the same time or before or after the formation of the fold and fold/tear lines. However, for accuracy of location, it is preferred to effect some or all of these operations close to, and preferably just prior to, a sheeting or fan fold step, in which a continuous paper or other web is converted to individual form sheets, or to a continuous fan fold web, each part of the fan comprising a form.

25

With regard to the form substrate, the form is preferably but not necessarily of paper. The paper could be of the single wire type, but more preferably it is of the twin or multiple wire type, which has its own plane or planes of weakness in the thickness of

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the paper parallel to the paper surfaces, along which it will tend to tear if tampering occurs.

5 The paper could be treated with a polymer to increase water resistance and/or resistance to tearing across its entire thickness (as opposed to delamination in the case of a twin-wire paper for example), in which case the pressure seal adhesive area with cuts/perforations is preferably on the (inner form) surface opposed to the treated (outer form) surface. Other known paper treatments, e.g. the provision of a silicone layer on the outer form surface, are also possible.

10

Figures 4 and 5 show typical patterns of cuts to be formed in the adhesive regions. In Figure 4 the cut is continuous but has portions 22, 23 extending at an angle to each other, as shown at 90°. An alternative would be a curved or meandering cut. In Figure 5 there are a number of discrete cuts distributed over the whole area of the adhesive strip, each composed of three sections 24, 25, 26 which extend in different directions. 15 Another possibility would be a pattern in which each cut is rectilinear, but at least two cuts extend in different directions (such as by separating the sections 24, 25 and 26).

20 The precise pattern and orientation of the cuts should be optimised bearing in mind the grain of the paper, in a manner which will be evident to the skilled reader, but a general principle is that it is advisable for the cuts to extend along at least two (Figure 4) or more (Figure 5) directions to make opening of the pressure seal difficult from all directions.

25 The cuts/perforations may be provided in only one of two opposing adhesive regions, but are preferably present in both. Preferably the cuts/perforations are distributed over substantially the entire area of pressure seal adhesive, or at least over one half that area which complements or seals to the other half area when the form is folded and sealed.

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In practice it is frequently found that the sealing, or the ability of a sealed form to give evidence of any tampering, along one direction of the form (normally the sides of the form) is superior to that along the other direction (normally across the form). In part, this may be due to the fact that the sealing mechanism involves rollers which
5 provide a longer dwell time for the sealing to take place in one direction rather than the other direction, so giving a stronger seal in the one direction. However, another factor in this respect may be the preferred orientation of the paper fibres, which anisotropy will manifest itself in, for example, a preferred tearing direction.

- 10 The form can be produced as a blank (but optionally comprising agreed pre-printed matter) for supply to a user for entry of the sensitive matter, folding and sealing. Alternatively, it would be possible to integrate the form production system with a folder and sealer. A printer or printers would be provided in such a system both for printing any predetermined matter and also for printing the sensitive information.
- 15 The order of application of the printed matter(s), the application of the pressure seal adhesive, and the provision of the various cuts/perforations/fold lines can be varied according to requirements.

It should be understood that the particular design of form illustrated in Figures 1 to 3,
20 and the shape of the cuts shown in Figures 4 and 5, are merely by way of illustration, and do not constitute any limitation on the scope of the invention. In addition to the common Z-fold form illustrated, double fold forms with both folds in the same sense ("letter fold") and forms with a single fold are well known. The pressure adhesive areas can occur at any location on the form, not only at its periphery.

25

Although an embodiment has been described which involves local weakening by cutting or perforating the paper, other weakening techniques known per se, such as scuffing, scratching, embossing, crushing, crimping, scoring, abrading or creasing, could be used. The local weakening could extend beyond the adhesive area, if
30 desired.

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When both regions of pressure seal adhesive are, or include parts which are, locally weakened, such parts may or may not be in register when the form is folded in its
5 intended (predetermined) manner.

Although the invention has been described in terms of a development in relation to the preparation of a run of forms, it should be clear that forms according to the invention could be prepared / used on an individual basis.

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CLAIMS:

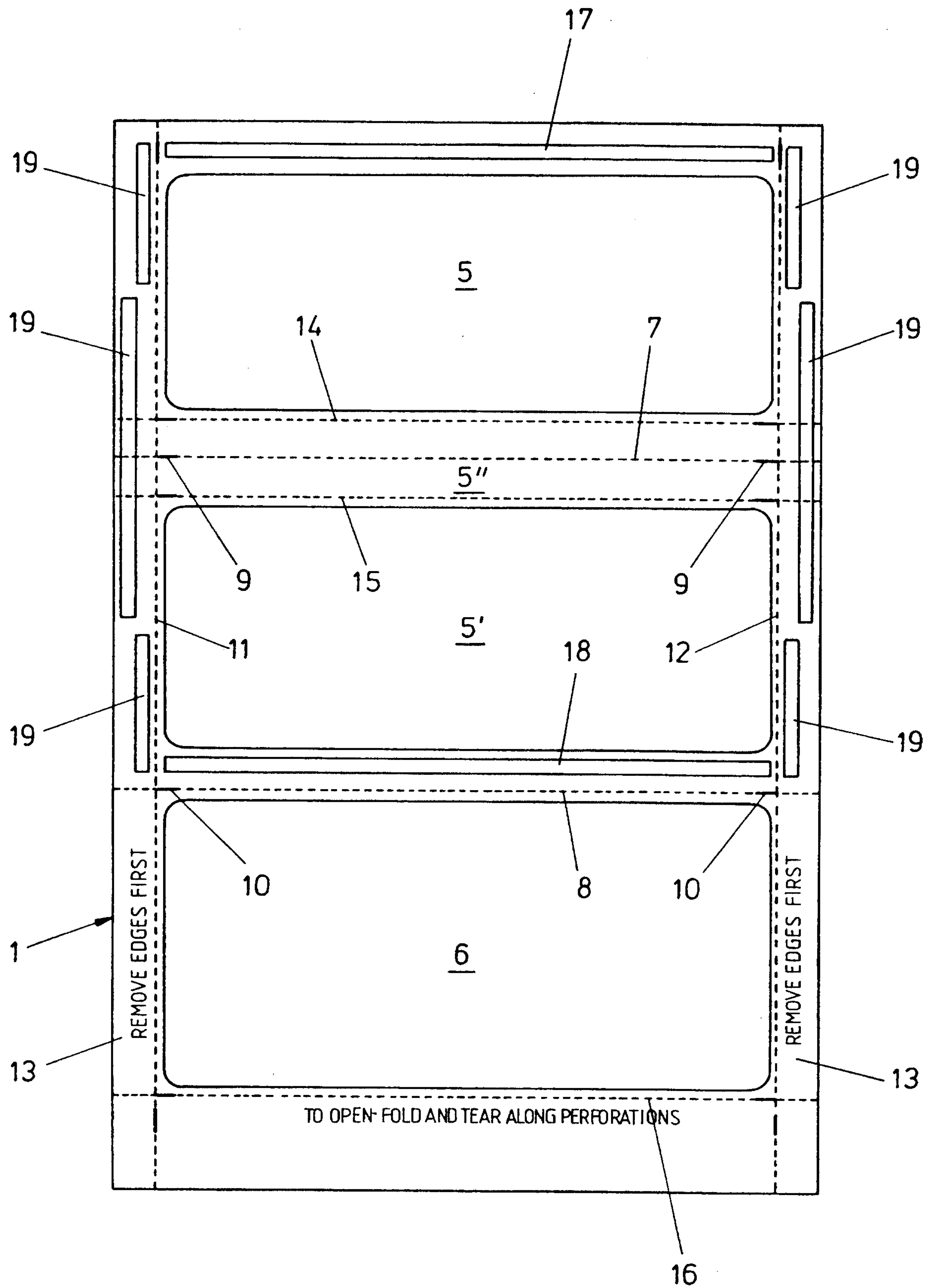
1. An unsealed pressure seal form in which at least one surface of the form comprises one or more areas of pressure seal adhesive distributed such that when the
5 form is folded in a predetermined manner at least two regions of pressure seal adhesive come into contact with each other, wherein in at least part of a said region the form is locally weakened.
2. A form according to claim 1 wherein the form is weakened in at least a part of
10 the other said region.
3. A form according to claim 1 or claim 2 wherein the form is locally weakened by being perforated; or cut; or partially perforated; or partially cut; or crimped; or embossed; or creased; or crushed; or scuffed; or scratched; or abraded; or scored; or
15 any combination thereof.
4. A form according to claim 3 wherein the form is locally weakened by being cut or partially cut, said cut being in the form of a pattern of discrete cuts.
- 20 5. A form according to claim 4 wherein said pattern is distributed over substantially the whole of said region(s).
6. A form according to claim 4 or claim 5 wherein said cut or cuts extend, or include portions which extend, in at least two different directions.
25
7. A form according to claim 3 or claim 4 wherein the form is locally weakened by being cut or partially cut, and at least one cut is non-rectilinear, or extends along at least two directions.
- 30 8. A form according to any preceding claim wherein the form is of paper.

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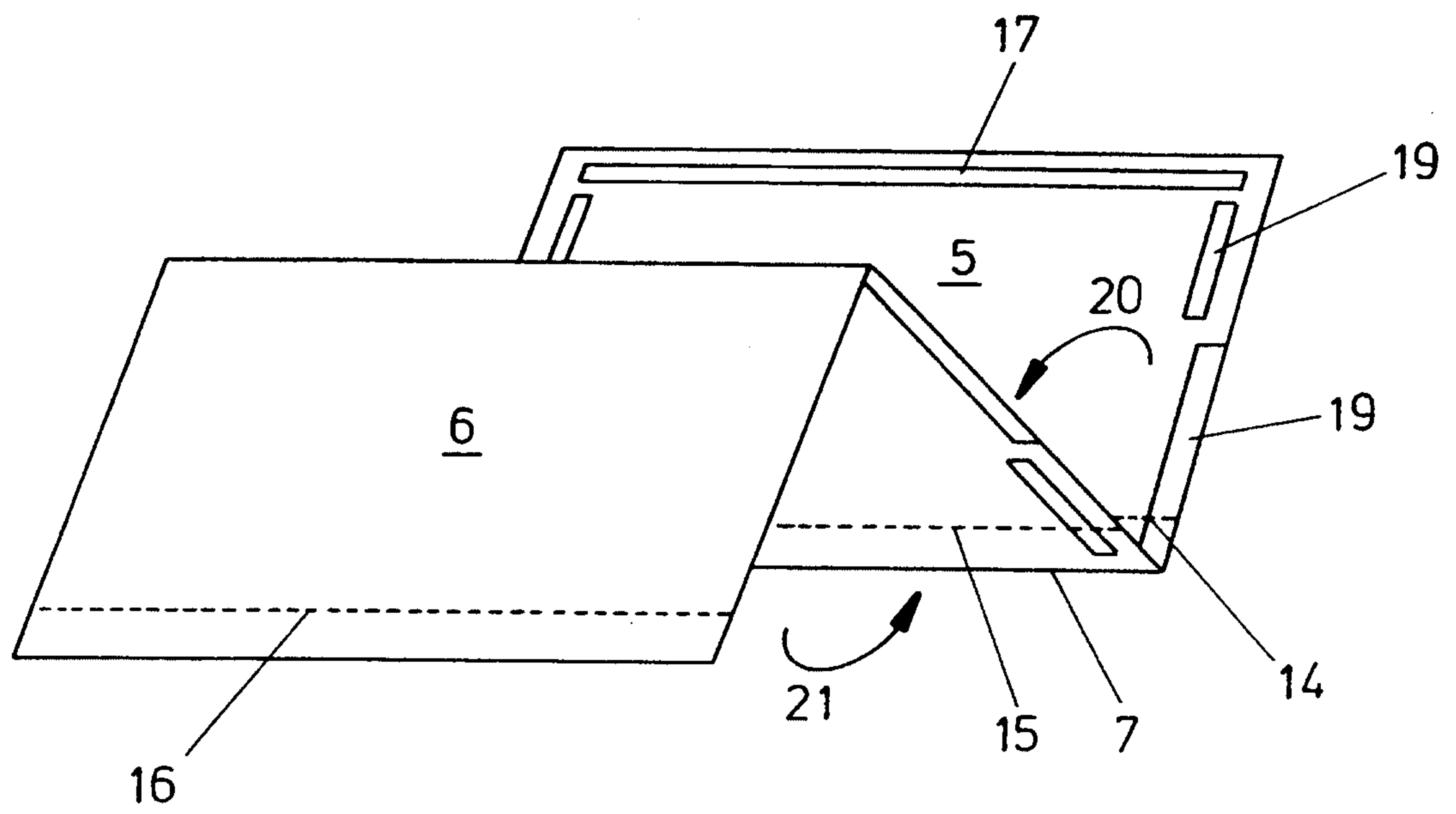
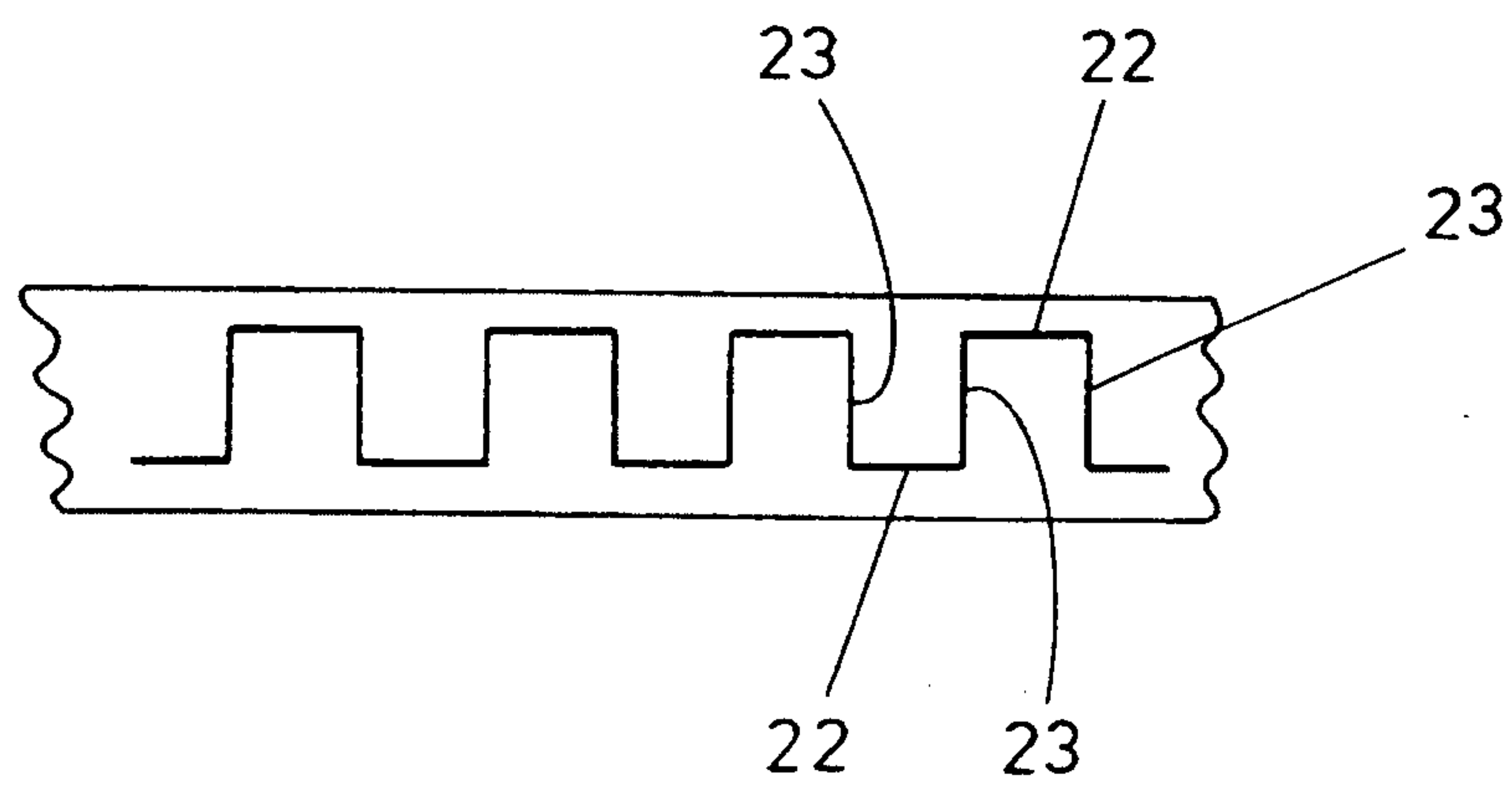
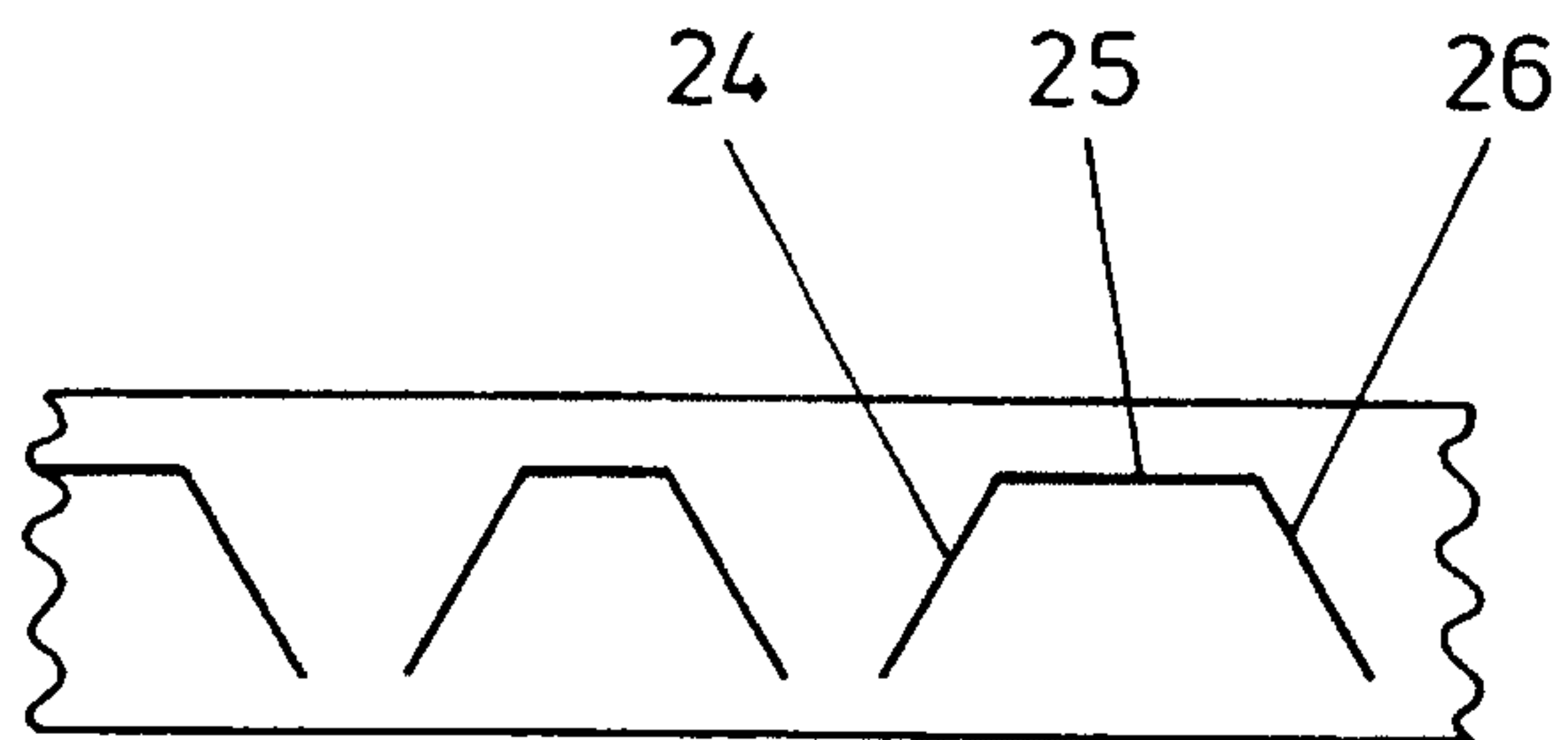
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9. A form according to claim 8 wherein the paper is of the twin or multiple wire type.
10. A form according to any preceding claim wherein the form is locally
5 weakened from the side of the form bearing said adhesive.
11. A form according to any preceding claim wherein pressure seal adhesive is applied to both surfaces of the form.
- 10 12. A form according to any preceding claim wherein the pressure sensitive adhesive is distributed so that when the form is folded and pressure sealed there is an area on at least one surface of the form which is substantially bounded by pressure sealed adhesive and/or folds.
- 15 13. A form according to any preceding claim wherein fold lines are provided to facilitate folding of the form.
14. A form according to any preceding claim wherein fold/tear lines are provided to facilitate opening of the sealed form.
- 20 15. A method of preparing an unsealed pressure seal form comprising the steps of applying a layer of pressure seal adhesive to at least one area on at least one side of the form, and also locally weakening the form in at least a part of said area before during or after the application of said adhesive.
- 25 16. A method according to claim 15 wherein said locally weakening is effected by providing one or more cuts or perforations extending wholly or partially through the form, or by creasing, abrading, scuffing, scratching or embossing.
- 30 17. A method according to claim 15 or claim 16 wherein the weakening is effected prior to application of the pressure seal adhesive.

-1/3-

FIG. 1

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FIG. 3FIG. 4FIG. 5

