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(54) Titre : BANDE ABSORBANTE POUR REPRIMER DES LIQUIDES
(54) Title: ABSORBENT LIQUID CONTROL STRIP

(57) Abrégé/Abstract:
The present invention relates to absorbent liquid control strips of indeterminate length for comprising a sleeve of non-woven polypropylene or polyethylene or the like with a substrate in one or more layers within the sleeve. The substrate is impregnated or otherwise seeded with a super absorbent polymer such as sodium polyacrylate. The sleeve and substrate are perforated at periodic lengths to permit selection of a strip of the desired length with the substrate treated to de-activate the super absorbent polymer in areas adjacent the perforations. Liquid control strips can be used to contain spills prior to cleaning, minimize damage from leaks or control floor stripping chemical solution. Suitable for a wide range of cleaning applications including: refrigerator leaks, floor stripping, kitchen, restroom, window, swimming pool, hospital room and many more applications.

## ABSTRACT

The present invention relates to absorbent liquid control strips of indeterminate length for comprising a sleeve of non-woven polypropylene or polyethylene or the like with a substrate in one or more layers within the sleeve. The substrate is impregnated or otherwise seeded with a super absorbent polymer such as sodium polyacrylate. The sleeve and substrate are perforated at periodic lengths to permit selection of a strip of the desired length with the substrate treated to de-activate the super absorbent polymer in areas adjacent the perforations. Liquid control strips can be used to contain spills prior to cleaning, minimize damage from leaks or control floor stripping chemical solution. Suitable for a wide range of cleaning applications including: refrigerator leaks, floor stripping, kitchen, restroom, window, swimming pool, hospital room and many more applications.

# TITLE: ABSORBENT LIQUID CONTROL STRIP

## BACKGROUND OF THE INVENTION

### FIELD OF THE INVENTION

[0001] This invention generally relates to a liquid control strips utilizing super absorbent polymers impregnated or otherwise seeded in a substrate and improvements in the substrate impregnated or otherwise seeded with a super absorbent polymer. Liquid control strips can be used to contain spills prior to cleaning, minimize damage from leaks or control floor stripping chemical solution. Suitable for a wide range of cleaning applications including: refrigerator leaks, floor stripping, kitchen, restroom, window, swimming pool, hospital room and many more applications. In one embodiment the disclosure relates to a substrate for use in a liquid control strip impregnated or otherwise seeded with a super absorbent polymer where the substrate is treated to de-activate the super absorbent polymer in selected areas. In another embodiment the disclosure relates to liquid control strips of indeterminate length, perforated at periodic lengths to permit selection of a strip of the desired length with a substrate treated in areas adjacent the perforations to de-activate the super absorbent polymer.

### DESCRIPTION OF THE PRIOR ART

[0002] Liquid control strips currently available used to control liquid spills in hospital, school and industrial applications typically provide a sleeve of non-woven polypropylene or polyethylene or the like with a substrate within the sleeve. The substrate is typically made from an absorbent material in one or more layers. To increase the absorbent capacity the substrate is impregnated or otherwise seeded with a super absorbent polymer such as sodium polyacrylate. The edges of the sleeve are typically sonic welded. The strip is made in long lengths such as 100 ft. perforated at regular intervals such as 12 – 24 inches.

[0003] The super absorbent polymer such as sodium polyacrylate can absorb up to 500 times its weight in liquid. On absorption, the sodium polyacrylate forms a gel.

[0004] When a length of the liquid control strip is removed from a longer length along a perforation, the substrate impregnated or otherwise seeded with the super absorbent polymer is exposed along the perforation. It is possible for gel to ooze from the strip after absorption of the liquid.

## SUMMARY OF THE INVENTION

[0005] In one embodiment the invention provides a substrate for use with liquid control strips impregnated or otherwise seeded with a super absorbent polymer where the substrate is treated in selected areas to de-activate the super absorbent polymer in the selected areas.

[0006] In another embodiment this invention relates to liquid control strips of indeterminate length comprising a sleeve of non-woven polypropylene or polyethylene or the like with a substrate in one or more layers within the sleeve. The substrate is impregnated or otherwise seeded with a super absorbent polymer such as sodium polyacrylate. The sleeve and substrate are perforated at periodic lengths to permit selection of a strip of the desired length with the substrate treated to de-activate the super absorbent polymer in areas adjacent the perforations.

[0007] In another embodiment the invention relates to a liquid control strip comprising a sleeve with a substrate in one or more layers within the sleeve wherein the substrate is impregnated or otherwise seeded with a super absorbent polymer; wherein the sleeve is formed with pleats along its outer edges with indicia in the pleat that is exposed when the control strip is hydrated.

[0008] In another embodiment the invention relates to A liquid control strip comprising a sleeve with a substrate in one or more layers within the sleeve wherein the substrate is

impregnated or otherwise seeded with a super absorbent polymer; wherein the sleeve is formed with indicia on the sleeve that is visible only when the control strip is hydrated

[0009] In another embodiment the invention relates to a method of forming the substrate according to the present invention with selected areas of the super absorbent polymer deactivated.

[0010] In another embodiment the invention relates to a method of forming the sleeve for a liquid control strip having pleats along its outer edges with indicia in the pleat that is exposed when the control strip is hydrated.

[0011] In another embodiment the invention relates to a method of forming a liquid control strip according to one or more embodiments of the present invention..

[0012] Further features of the invention will be described or will become apparent in the course of the following detailed description.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In order that the invention may be more clearly understood, embodiments thereof will now be described in detail by way of example, with reference to the accompanying illustrations, in which:

Fig. 1 is a perspective view of one embodiment of an end section of a liquid control strip of indeterminate length according to the present invention .

Fig. 2 is a perspective view of the ends of a substrate formed of layers of cellulose material, each layer having a super absorbent polymer impregnated within each layer;

Fig. 3 is another perspective view of a substrate formed of layers of cellulose material, each layer having a super absorbent polymer impregnated within each layer;

Fig. 4 is a perspective view of a portion of the liquid control strip of Fig. 1 before hydration;

Fig. 5 is a perspective view of the portion of the liquid control strip of Fig. 4 after hydration;

Fig. 6 is an end view of the liquid control strip of Fig. 1 showing both the substrate un-treated and treated to de-activate the super absorbent polymer;

Fig. 7 is a side view of the liquid control strip of Fig. 1 with area adjacent a perforation treated to de-activate the super absorbent polymer;

Fig.8 is a perspective view of another embodiment of a liquid control strip according to the present invention with a different indicator means when the strip should be replaced; and

Fig. 9 is a schematic drawing of one process of making a liquid control strip of Fig. 4 and 5.

[0014] Similar references are used in different figures to denote similar components.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] Referring to the Figs, one embodiment of a liquid control strip 1 of indeterminate length according to the present invention is illustrated. The liquid control strip 1 comprises a sleeve 2 with a substrate 3 in one or more layers within the sleeve. The sleeve 2 can be formed from non-woven polypropylene or polyethylene or non-woven synthetic fibres of polythene and rayon or spun bound fibres. The outer surface of the sleeve is marked for the application it is intended to control. Each jurisdiction has regulations regarding the colour of the sleeve and warning symbols and other indicia on the sleeve. In the embodiment illustrated in Fig. 1 the sleeve is a yellow colour indicating it is to be used for water based liquids. If the strip was intended to control different



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substances it may be a different colour such as orange if used for Hazmat applications. Warning symbols in Fig 1 include the symbol 4 warning of slippery conditions.

[0016] The substrate 3 can be any material typically used in absorbent liquid strips such as cellulose or lofty hydrophilic polypropylene as two examples. The substrate 3 is impregnated or otherwise seeded with a super absorbent polymer such as sodium polyacrylate. Other known super absorbents can be used depending on the application.

[0017] The substrate 3 used in the illustrated embodiment as best illustrated in Figs 2 and 3 comprise a series of elongated strips 5 of cellulose fibre 6. Each cellulose strip 5 has a super absorbent polymer embedded in the strip. In the embodiment illustrated each strip has a layer of super absorbent polymer sandwiched between layers of the cellulose fibre. The embodiment illustrated uses sodium polyacylate as the super absorbent polymer.

[0018] Superabsorbents have been made from chemically modified starch and cellulose and other polymers like poly(vinyl alcohol) PVA, poly(ethylene oxide) PEO all of which are hydrophilic and have a high affinity for water. When lightly cross-linked, chemically or physically, these polymers became water-swellable but not water-soluble.

[0019] Currently superabsorbent polymers are typically made from partially neutralised, lightly cross-linked poly(acrylic acid), which is generally believed to give the best performance versus cost ratio. The polymers are manufactured at low solids levels for both quality and economic reasons, and are dried and milled in to granular white solids. In water they swell to a rubbery gel that in some cases can be up to 99wt% water.

[0020] Natural super absorbent polymers may also be used. One reported example is a material developed by Exotech Bio Solutions in Israel.

[0021] As noted above the liquid control strip 1 of Fig. 1 is made in long lengths such as 100 ft. perforated at regular intervals such as 12 – 24 inches. When a length of the liquid control strip is removed from a longer length along a perforation, the substrate impregnated or otherwise seeded with the super absorbent polymer is exposed along the

perforation. It is possible for gel to ooze from the strip after absorption of the liquid. This can create a hazard. Efforts to address the problem have so far proven less than satisfactory.

[0022] In the present disclosure it has been determined that the super absorbent can be treated to de-activate the super absorbent polymer in areas adjacent the perforations. The super absorbent polymer used in the illustrated embodiment (**Sodium Polyacrylate**) may be deactivated by applying slurry of starch and salt on the cellulose fibre strip on either side of the location where the perforation will be before its inserted into the sleeve. In the embodiment illustrated the starch and salt were mixed 50-50 by weight but variation in the composition is possible. In the embodiment illustrated the super absorbent polymer is deactivated two inches on either side of where the perforation will be. Variation in the distance is possible as long as the substrate when hydrated does not leak from the exposed end of the control strip but the strip is still able to absorb the liquid along its length without the liquid seeping under the control strip.

[0023] Figs 6 and 7 show an embodiment of the liquid control strip where the super absorbent polymer has selected areas deactivated. Fig 6 shows an exposed end of a conventional liquid strip 8 after being severed from the long length. The conventional strip 8 on the left utilized a substrate that was untreated to deactivate the super absorbent polymer. The strip 9 on the right in Fig 6 utilized a substrate that was treated to deactivate the super absorbent polymer according to the present invention thereby preventing any SAP (**Sodium Polyacrylate**) from spilling on to the floor from the exposed end creating a slip and fall hazard. The front of the strip 9 on the right in Fig. 6 shows a section of the substrate that has been treated to deactivate the SAP. Fig 7 shows the strip 9 from the side and shows that the section 10 of the strip 9 with the substrate that has been treated rests on the horizontal surface, preventing any liquid from seeping under the strip before being absorbed. The section 10 includes a treated perforation area on either side of the perforation that is treated to de-activate the super absorbent polymer. The perforation area may be treated for 2 inches on either side of a perforation.

[0024] In the embodiment illustrated in Figs 4 and 5, the sleeve is formed with a pleat 13 on its edges 11, 12. Fig. 4 shows the absorbent strip 1 before hydration. Note that the strip 1 lies flat before use as shown in Fig 4. The pleat 13 is closed hiding the indicia of the words "REPLACE" inside the pleat 13. Fig. 5 shows the absorbent strip 1 after hydration. When the liquid is absorbed the pleat 13 opens as shown in Fig 5 to expose the word "REPLACE" printed

on the sleeve within the pleat. This indicates the liquid control strip has absorbed liquid and should be replaced. In Fig. 5, the absorbent strip 1 shown is fully hydrated and has expanded opening the pleat 13 and exposing the words "REPLACE".

[0025] In Fig. 8 another embodiment of the invention is illustrated. In this embodiment the indicia provided for indicating the control strip should be replaced is printing the word REPLACE in an invisible ink on top of the strip that will show up when the strip gets wet.

[0026] As noted earlier known liquid control strips form the sleeve by sonic welding the outer edges of a top and bottom sheet. In the embodiment illustrated in Fig. 1 the sleeve is formed by wrapping the material around the substrate and gluing the overlap using an adhesive that is impervious to all chemical attack from the liquids to be absorbed.

[0027] In Fig. 9 one process for forming the substrate according to the present invention with selected areas of the super absorbent polymer deactivated, is illustrated. A plurality of rolls 20, 21, 22, 23, 24, 25 of elongated strips 26, 27, 28, 29, 30, 33 of cellulose fibre are provided. Fewer or more rolls than are illustrated can be used. Each cellulose strip 26, 27, 28, 29, 30, 33 has a super absorbent polymer embedded in the strip. Each strip is passed through a dosing station 31 where a slurry of starch and salt is applied at periodic locations along the strips surrounding where the perforations will be when the liquid control strip is formed. The super absorbent polymer in the areas treated is deactivated. The elongated strips are pulled through nip rolls 32 to form a substrate 3. A roll 34 of material to form the sleeve 2 is pulled from the roll and the pleat is formed at stage 35. The sleeve 2 passes below substrate 3 through nip rolls 36 after which the outer edges are folded over glued and sealed at glue head 37. The liquid control strip 1 is perforated across its width at 38 every 12 or 24 inches corresponding to the locations where the super absorbent polymer was deactivated. The finished control strip 1 is wounded on rewinder 39.

[0028] While the principles of the invention have been shown and described in connection with specific embodiments, it is to be understood that such embodiments are

by way of example and are not limiting. As is evident from the foregoing description, certain aspects of the present invention are not limited by the particular details of the mobile stand illustrated in the drawings. Other modifications and applications, or equivalents, will occur to those skilled in the art. The terms "having", "comprising" and "including" and similar terms as used in the foregoing specification are used in the sense of "optional" or "may include" and not as "required". Many changes, modifications, variations and other uses and applications of the present construction will, however, become apparent to those skilled in the art after considering the specification and attached drawings. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims that follow. The scope of the disclosure is not intended to be limited to the embodiments shown herein, but is to be accorded the full scope consistent with the claims, wherein reference to an element in the singular is not intended to mean "one and only one" unless specifically so stated, but rather one or more. All structural and functional equivalents to the elements of the embodiment described throughout the disclosure that are known or later come to be known to those of ordinary skill in the art are intended to be encompassed by the claims.



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CLAIMS:

1. A liquid absorbent strip for use in absorbing a liquid, the liquid absorbent strip comprising:

a) a longitudinally extending sleeve having an outer surface and a longitudinally extending pleat; and,

b) an interior portion comprising an absorbent layer housed within the sleeve, the absorbent layer comprising a superabsorbent polymer;

wherein the strip is transitionable between an unused configuration in which the pleat is folded and a used expanded configuration in which the pleat is unfolded.

2. The liquid absorbent strip of claim 1, wherein, when exposed to liquid, the interior portion swells and has a transverse cross sectional area and a transverse cross sectional area of the sleeve in the used expanded configuration is larger than the transverse cross sectional area of the interior portion when swollen.

3. The liquid absorbent strip of any one of claims 1 and 2, wherein the liquid absorbent strip has first and second longitudinally spaced apart ends and the pleat extends between the longitudinally spaced apart ends.

4. The liquid absorbent strip of any one of claims 1 to 3, further comprising an indicia formed on the outer surface of the sleeve, the indicia indicating an operating condition of the strip.

5. The liquid absorbent strip of claim 4, wherein the indicia is obscured from view when the strip is in the unused folded configuration and the indicia is visible when the strip is in the used expanded configuration.

6. The liquid absorbent strip of any one of claims 4 and 5, wherein the indicia becomes visible upon exposure to the liquid.

7. The liquid absorbent strip of any one of claims 4 to 6, wherein the indicia is formed within a fold of the pleat.



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8. The liquid absorbent strip of any one of claims 1 to 7, wherein the liquid absorbent strip has first and second longitudinally spaced apart ends and the liquid absorbent strip further comprises a plurality of perforations extending transversely across the first and second longitudinally spaced apart ends.

9. The liquid absorbent strip of claim 8, further comprising means for preventing flow of the superabsorbent polymer adjacent each perforation.

10. The liquid absorbent strip of claim 9, wherein the means for preventing flow of the superabsorbent polymer comprises a treatment provided at each of the first and second longitudinally spaced apart ends.

11. The liquid absorbent strip of any one of claims 1 to 10, wherein the absorbent layer is impregnated with the super absorbent polymer.

12. The liquid absorbent strip of any one of claims 1 to 11, wherein the interior portion comprises a plurality of absorbent layers.

13. A roll of liquid absorbent strips for use in absorbing a liquid, the roll comprising:

a) a longitudinally extending sleeve having an outer surface and a longitudinally extending pleat, the sleeve being transitionable between an unused configuration in which the pleat is folded and a used expanded configuration in which the pleat is unfolded; and

b) an interior portion comprising an absorbent layer housed within the sleeve, the absorbent layer comprising a superabsorbent polymer;

wherein a liquid absorbent strip comprising a longitudinally extending section of the sleeve and the interior portion is detachable from the roll.

14. The roll of claim 13, wherein, when exposed to liquid, the interior portion swells and has a transverse cross sectional area and a transverse cross sectional area of



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the sleeve in the used expanded configuration is larger than the transverse cross sectional area of the interior portion when swollen.

15. The roll of any one of claims 13 and 14, wherein the roll has first and second longitudinally spaced apart ends and the pleat extends between the longitudinally spaced apart ends.

16. The roll of any one of claims 13 to 15, further comprising an indicia formed on the outer surface of the sleeve, the indicia indicating an operating condition of the liquid absorbent strip.

17. The roll of claim 16, wherein the indicia is obscured from view when the sleeve is in the unused folded configuration and the indicia is visible when the sleeve is in the used expanded configuration.

18. The roll of any one of claims 16 and 17, wherein the indicia becomes visible upon exposure to the liquid.

19. The roll of any one of claims 16 to 18, wherein the indicia is formed within a fold of the pleat.

20. The roll of any one of claims 13 to 19, wherein the roll has first and second longitudinally spaced apart ends and the roll further comprises a plurality of separation regions at regular intervals between the first and second longitudinally spaced apart ends, each separation region comprising a plurality of perforations extending transversely across the first and second longitudinally spaced apart ends.

21. The roll of claim 20, further comprising means for preventing flow of the superabsorbent polymer adjacent each separation region.

22. The roll of claim 21, wherein the means for preventing flow of the superabsorbent polymer comprises a treatment provided at each separation region.

23. A method for manufacturing liquid absorbent strips, the method comprising:



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a) providing a longitudinally extending length of non-woven material, the non-woven material having first and second transversely spaced apart longitudinally extending sides;

b) forming a longitudinally extending pleat in the non-woven material;

c) positioning an absorbent layer on an inner surface of the non-woven material, the absorbent layer comprising a super absorbent polymer;

d) moving a longitudinally extending side transversely and encasing the absorbent layer in the non-woven material whereby the absorbent layer is secured within the non-woven material without fully expanding the pleat.

24. The method of claim 23, further comprising forming an indicia on the outer surface of the non-woven material, the indicia indicating an operating condition of the strip.

25. The method of claim 24, wherein the indicia is formed on the outer surface prior to forming the pleat.

26. The method of any one of claims 24 and 25, wherein the indicia is formed on the outer surface at a surface location that is formed into a fold of the pleat.

27. The method of any one of claims 23 to 26, further comprising perforating the non-woven material transversely across the strip and the absorbent layer at regular intervals whereby a region of separation is provided.

28. The method of claim 27, further comprising treating the strip to prevent flow of the superabsorbent polymer adjacent the regions of separation.

29. The method of claim 28, wherein a means for preventing flow of the superabsorbent polymer is applied to each absorbent layer prior to perforating the non-woven material and the perforations are aligned with the means for preventing flow of the superabsorbent polymer.



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30. The method of any one of claims 28 and 29, wherein applying the means for preventing flow of the superabsorbent polymer comprises applying a surface treatment to each absorbent layer.



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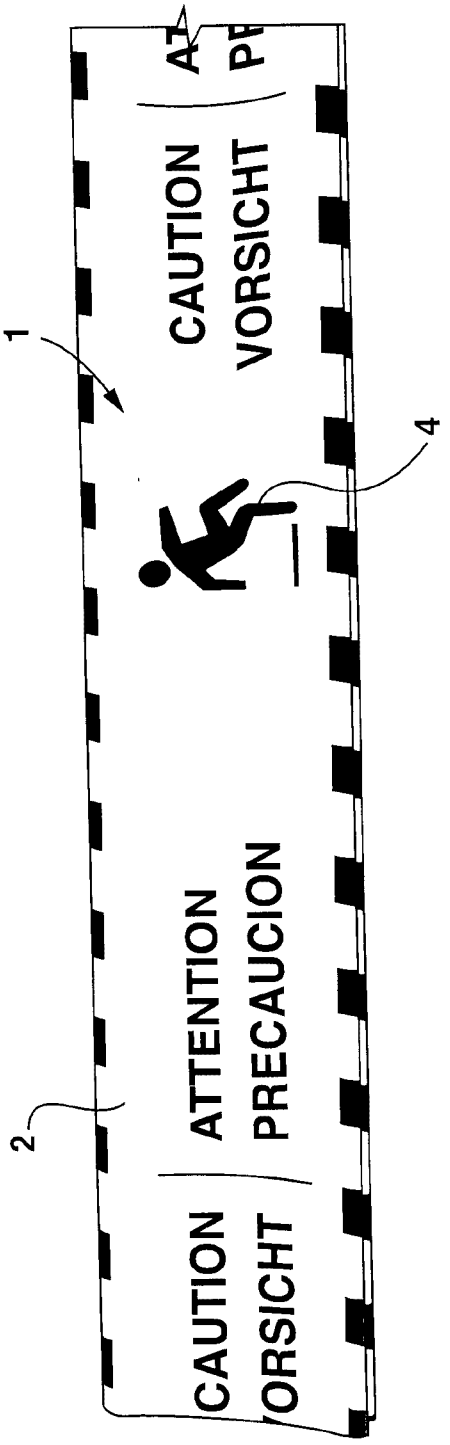
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4
CAUTION
VORSICHT
ATTENTION
PRECAUCION
CAUTION
VORSICHT

FIG. 1

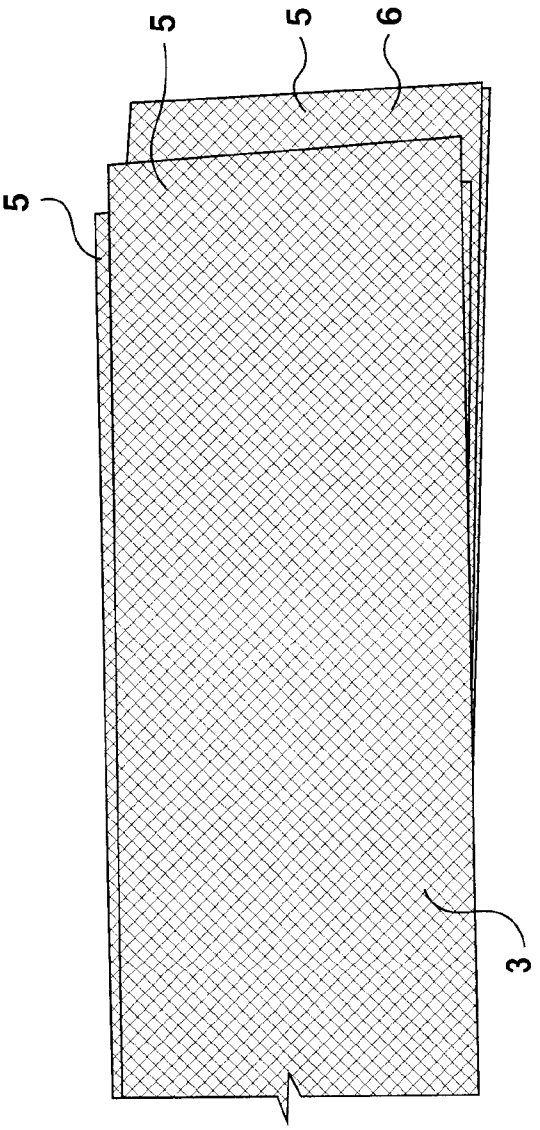
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FIG. 2

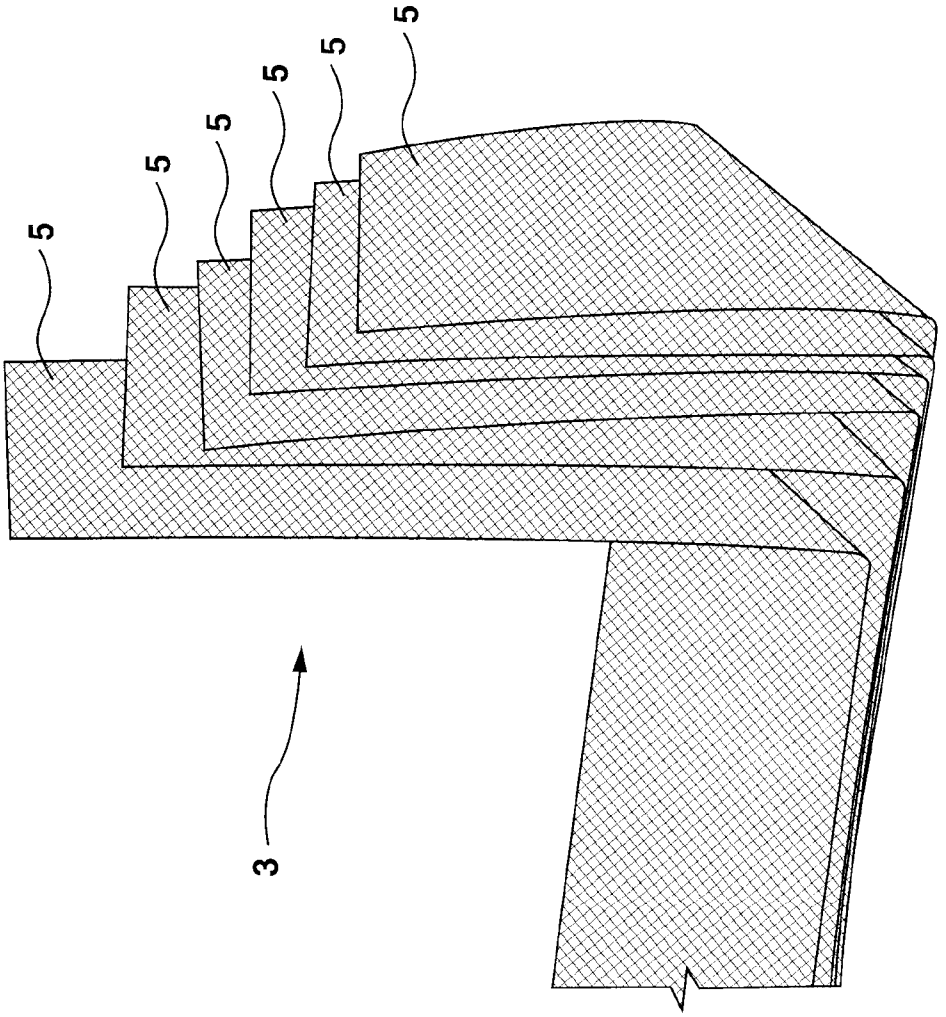


FIG. 3

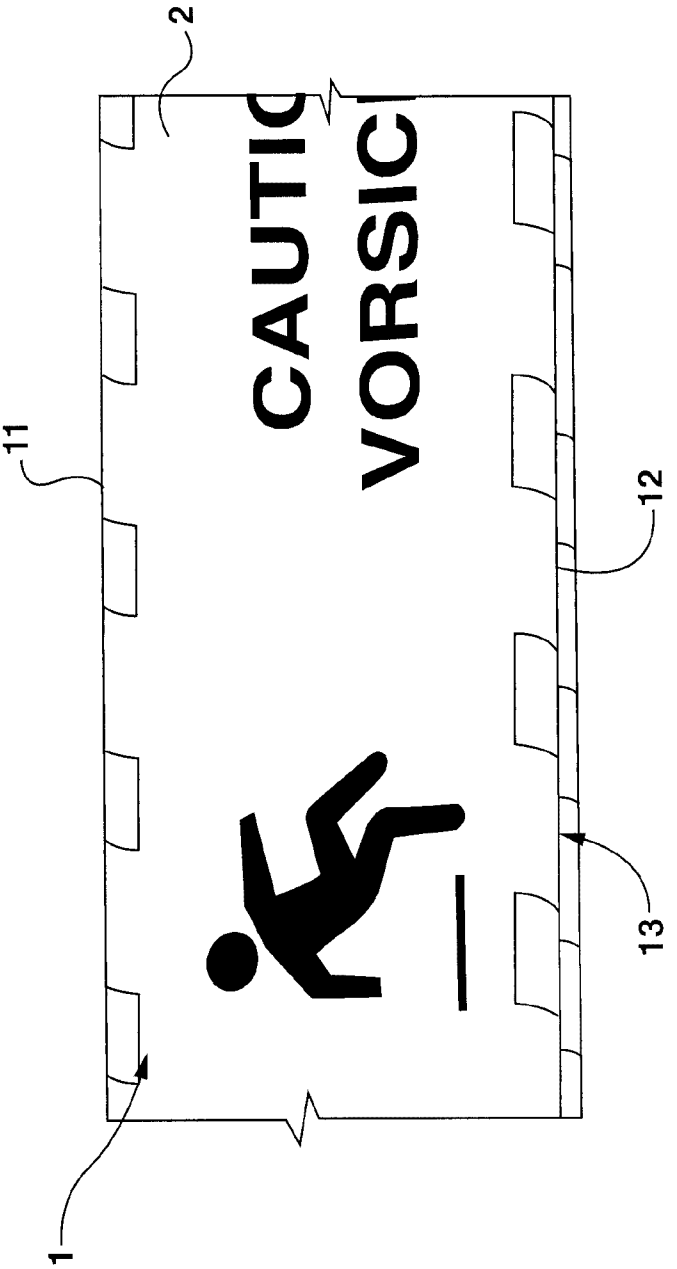


FIG. 4

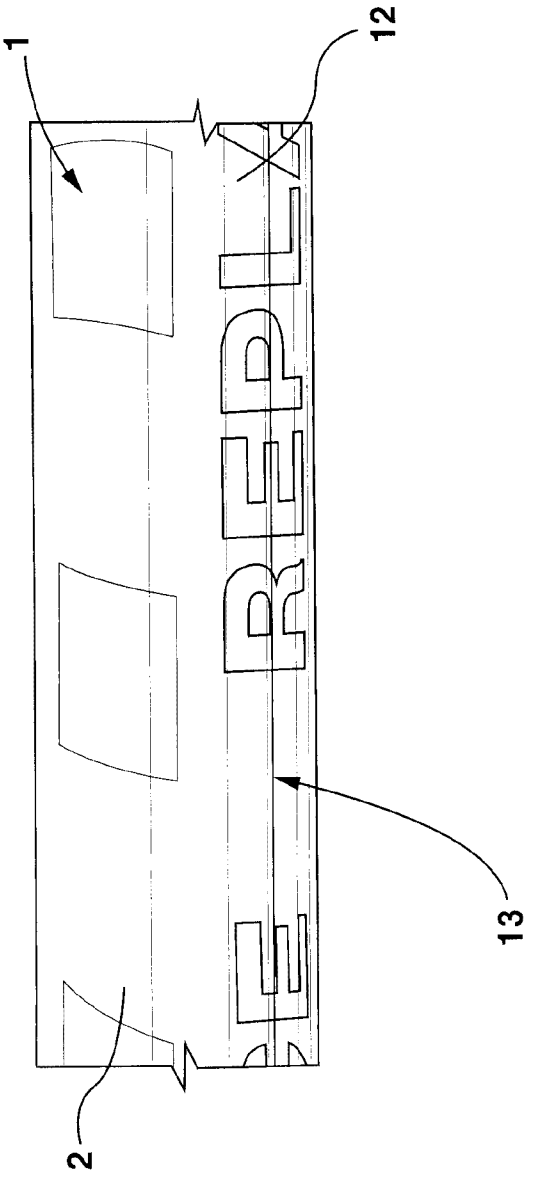


FIG. 5

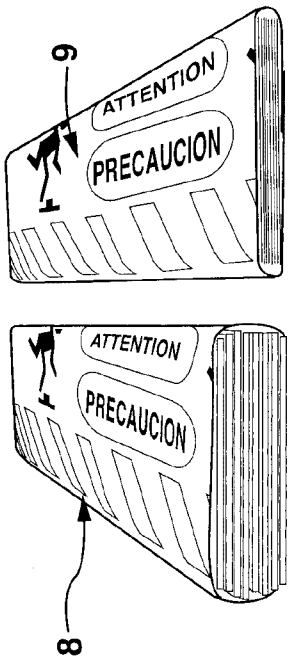


FIG. 6

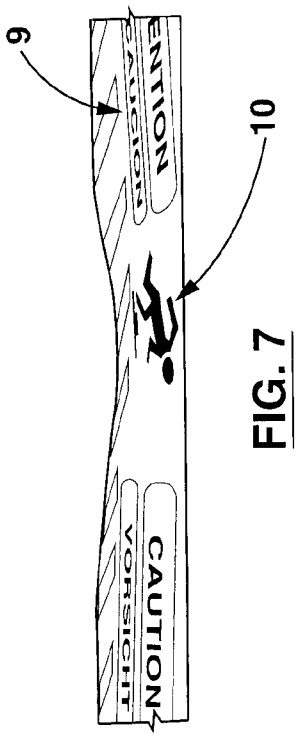


FIG. 7

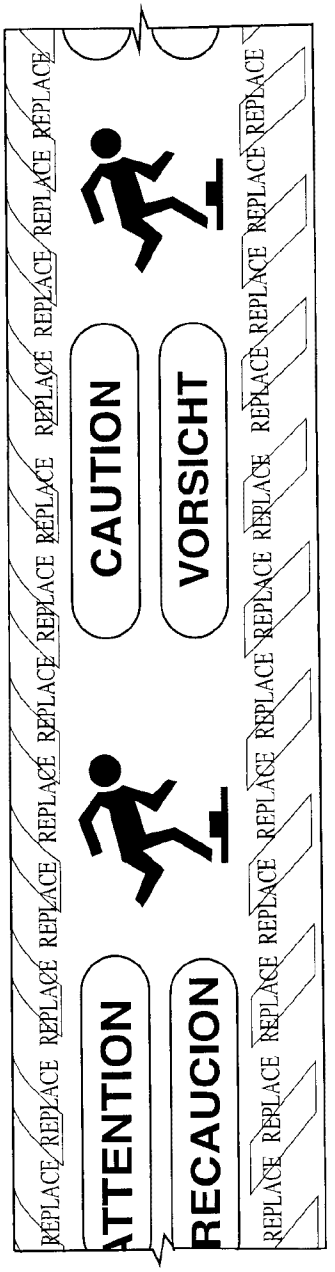


FIG. 8

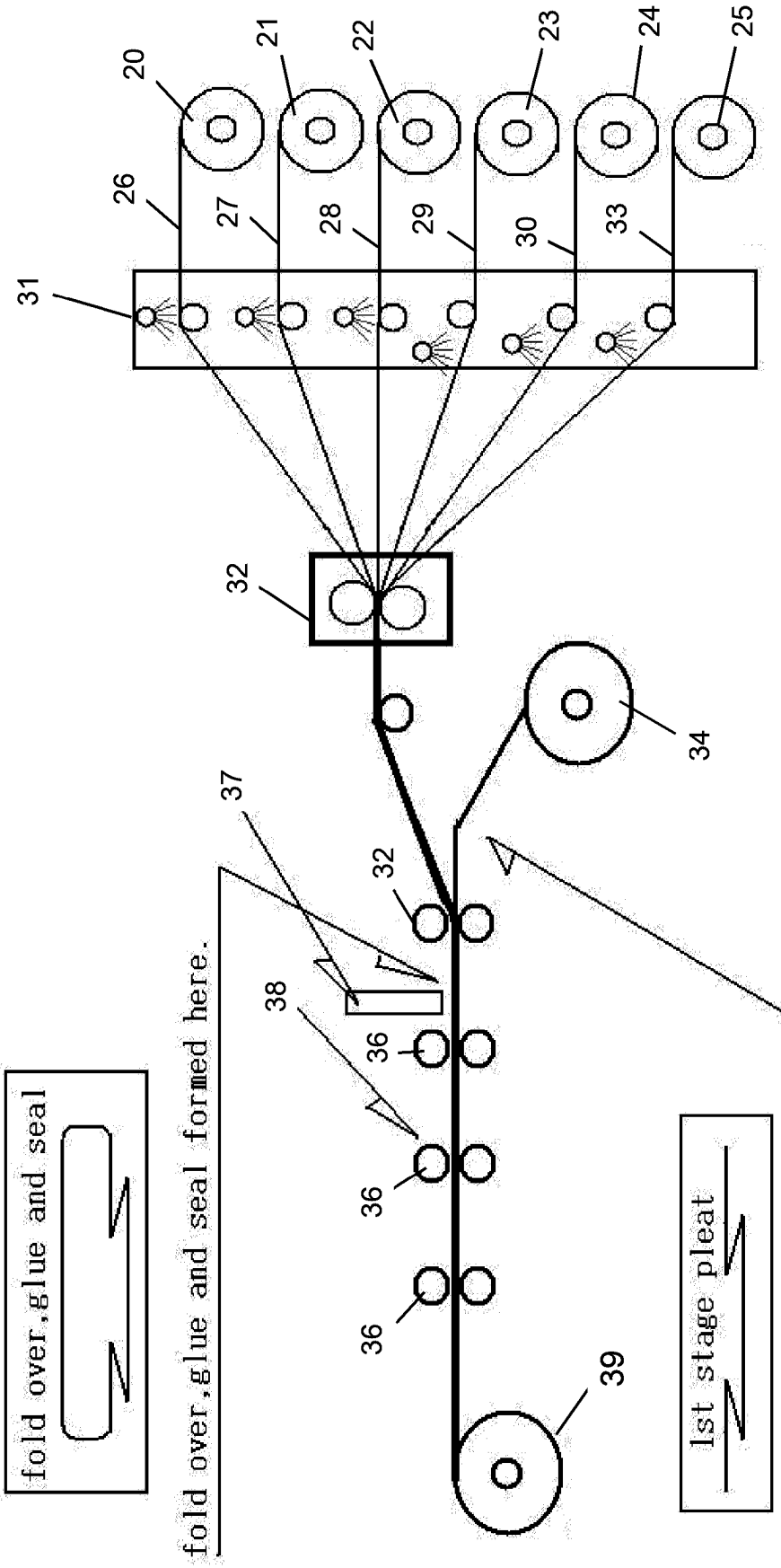


FIG. 9

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