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(54) **PRODUCT LABELLING**

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ETIQUETAGE DE PRODUITS

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Description

[0001] This invention relates to processes for furnishing each of a plurality of products with a respective label and an article carried on that label. The invention further relates to a web of converted labels suitable for use in such processes, and to apparatus for performing those labelling processes.

[0002] In order to increase the amount of information which may be carried by a label attached to a product, it is known to adhere to the product a label having a portion which may be unfolded away from the main part of the label, and possibly removed altogether from the main part. That portion may be produced separately and then adhered to the label during the manufacture thereof, or may be formed integrally with the label, during that manufacturing process, and in effect increases the area available for carrying information.

[0003] The manufacture of a strip of essentially identical labels as described above, comprising a carrier web on which the labels are releasably supported end-to-end and each of which has an adhesive face in contact with the carrier, is relatively expensive, owing to the additional complexity imposed on the manufacturing process by the incorporation in each label of the folded portion. There is however a demand for product labels to be able to carry ever more information, and manufacturers are encountering difficulties in ensuring consumers are provided with all necessary information relating to their products. This problem has become more acute particularly in the pharmaceutical industry, where legislation may require manufacturers to give users of various pharmaceutical preparations and substances full information relating to those products.

[0004] EP-A-0154057 describes a process for furnishing a plurality of products passed through a labelling station with a respective label and article carried on that label. The labels are drawn from a reel to a conventional labelling machine, each label having a respective article adhered thereto during label manufacture, before the labels are wound into a reel. US-A-4605459 discloses a process for securing a leaflet to a container by use of a band segment the two end portions of which are adhered to the container and the leaflet being trapped between the container and the band segment.

[0005] It is a principal aim of the present invention to provide a labelling process whereby a manufactured product may be furnished with a label which carries a folded leaflet or even some other article, which process is relatively easy and simple to operate, and which utilises labels that can be manufactured relatively simply and hence cheaply. A further aim of the present invention is to provide converted labels suitable for use in such processes, and apparatus to perform those processes.

[0006] According to one aspect of the present invention, there is provided a process for furnishing a plurality of products passed through a labelling station

with a respective label and article carried on that label, which process comprises: feeding a strip of converted labels releasably supported on a carrier web towards the label-applying station; arranging the exposure of an area of adhesive on the face of each fed label directed away from the carrier web, each said area being of a size smaller than the area of the label; and then, in either order: applying to each said area of adhesive a respective article, in a controlled relationship to the label so that the article adheres to the adhesive; and applying each label to a respective product passed through the label-applying station.

[0007] Though the process of this invention could be used to furnish a label with more or less any article of a size and weight appropriate for the product being labelled (for example, with a free sample of some product other than the product being labelled, the free sample perhaps being contained in a sachet), nevertheless it is envisaged that a principal use of the labelling process of this invention is to furnish a label with a product information leaflet, suitably folded. Consequently, in the following references will be made solely to such leaflets, though it will be understood that the invention has a wider application and the term "leaflet" should be construed accordingly.

[0008] The manufacture of a strip of labels ready to apply to a product is conventionally performed in two stages. Initially, a paper or plastics manufacturer or processor may produce a roll of blank label material having pressure sensitive adhesive on one face and which is covered by a strippable backing sheet. Subsequently, in a process known as conversion, the printed labels are formed in a typical conversion process, the roll of blank label material is un-reeled, the label material is printed as required, the labels are die-cut, the unwanted label material is stripped away, and the carrier (strippable backing sheet) supporting the finished labels is re-rolled, ready for use by a labelling machine.

[0009] A reel of converted labels for use in the process of this invention may be manufactured by conventional label conversion machinery, as conventional labels. As such, the labels are relatively cheap to manufacture and so the process of this invention may be performed economically. Moreover, the labels themselves are not significantly more bulky than conventional labels, so facilitating the manufacture, storage, and general handling of a reel of those labels.

[0010] In the process of this invention, though the leaflet may be applied to said area of adhesive on a label immediately after the label has itself been applied to an article, nevertheless it is envisaged that the process would mainly be operated by applying a leaflet to a respective label immediately before that label is itself applied to a product. In this way close control of the relative disposition of a label and its leaflet may be maintained, so ensuring that the leaflet lies exactly where required, on the labelled product.

[0011] It is preferred that the adhesive is applied to

a defined area of the label, during the label conversion process in which the labels are printed and cut ready for subsequent use in the labelling process. In this case, the adhesive employed on said area may be an activatable adhesive which displays very low, or no, tack properties until activated. For example, a heat-seal adhesive may be employed, which adhesive is activated by exposing said area of each label to heat, as the labels are advanced to the labelling station.

[0012] As an alternative, a web of a strippable liner may be laminated over the converted labels during the label conversion process, the exposure of the area of adhesive being performed by striping away the liner as the labels are fed to the labelling station. In this case, an active adhesive, such as a hot-melt adhesive, may be employed, which remains tacky at ordinary temperatures. Where the labels are to be used on non-food and non-pharmaceutical products, it may instead be possible to employ solvent-based or emulsion-based adhesives which also remain tacky, at least until exposed and then contacted by a leaflet.

[0013] Yet another alternative is to provide a release compound, such as a silicone compound coating, on the reverse face of the carrier web remote from the labels, whereby that carrier web acts as a strippable liner for the areas of adhesive on the converted labels when the carrier web together with the supported labels are reeled. In this case, the act of unreeling the strip of converted labels on feeding the labels to a labelling station exposes the area of adhesive on each label, in turn.

[0014] A further possibility is to coat the pre-defined area of each label with an adhesive during the label feeding step itself, substantially immediately prior to a leaflet being applied to that area. Though this has the advantage that wholly conventional converted labels may be employed, there is the disadvantage that it is necessary to furnish an adhesive applicator in or adjacent the labelling station, where space may be restricted and in any event the presence of the adhesive there could lead to problems in performing the process.

[0015] According to another aspect of this invention, there is provided apparatus for performing a process according to this invention as defined above, which apparatus comprises: means to unreel a strip of converted labels and to expose adhesive applied to a pre-defined area of the printed face of each label; feeding means to feed the labels to a labelling station where the labels are applied one to each of a series of products also fed through the labelling station; and means to present to the exposed adhesive area of each label a respective article whereby the presented article adheres to the label and is thereafter carried thereby.

[0016] By way of illustration only, certain specific examples of this invention will now be described in greater detail, reference being made to the accompanying drawings, in which:-

matic longitudinal sectional views of a part of a strip of converted labels according to a first example;

Figures 3 and 4, 5 and 6, and 7 and 8 are respective plan and diagrammatic longitudinal sectional views similar to those of Figures 1 and 2, but of second, third and fourth examples of labels;

Figure 9 diagrammatically shows a label application machine for use with labels as shown in Figures 1 and 2; and

Figures 10, 11 and 12 are all views similar to that of Figure 9, but of machines intended for use with labels of the second, third and fourth examples respectively, as mentioned above.

[0017] Referring initially to Figures 1 and 2, it can be seen that the first example of labels of this invention comprises an elongate web 10 of a conventional backing material or liner, which may be made from a variety of materials such as a paper or a plastics film. The web 10 carries a coating 11 of a suitable silicone compound, having regard to the nature of a pressure sensitive adhesive 12 used in conjunction with labels 13, carried by the web 10, so that the labels 13 may be stripped from that web with the adhesive remaining tacky and on the labels 13. Typically, a formulation of a hot-melt adhesive may be employed for this purpose, in a manner well-known in the art.

[0018] Material for the manufacture of labels is conventionally supplied with the web 10 and a continuous strip of label material adhered thereto; in a subsequent label-manufacturing (conversion) step, the labels are printed and die-cut to an appropriate shape and size; very often, the label conversion step also includes the removal of the excess (unwanted) label material, so leaving a line of labels arranged end-to-end on the web 10, but spaced one from the next adjacent labels, as shown in Figure 1.

[0019] In the example of labels of this invention shown in Figures 1 and 2, each label carries on an area 14 an adhesive coating which is non-sticky until appropriately activated. For example, a heat-seal adhesive may be employed, which may be activated by the application of heat thereto.

[0020] Following the manufacture of the labels by the label conversion step, the labels may be reeled for storage and subsequent use. As the adhesive coating 14 is non-sticky until activated, the reeling and subsequent unreeling gives rise to no difficulties.

[0021] Referring now to Figures 3 and 4, there is shown a second example of converted labels of this invention and like components with those of the example of Figures 1 and 2 will be given like reference characters; those components will not be described again below.

[0022] In the example of Figures 3 and 4, the web 10 is coated on both sides with a silicone compound, as shown at 11 and 15. Each label 13 carries on area 14 a coating of an active adhesive which remains sticky fol-

Figures 1 and 2 are respectively plan and diagram-

lowing its application to the area. During subsequent reeling of the web 10, the adhesive coatings on areas 14 lie against the silicone coating 15 on the web 10; on subsequent unreeling of the strip, the web 10 peels away from the adhesive, leaving the tacky surface thereof on each area 14 fully exposed.

[0023] In the case of the example shown in Figures 5 and 6, a web 10 similar to that of Figures 1 and 2 is employed, but a protective liner 16 having a silicone coating 17 is laminated over the labels 13, once an active adhesive coating has been applied to the areas 14 thereof. This liner 16 may be stripped away during the label application step, so exposing the active adhesive, which remains tacky.

[0024] The labels shown in Figures 7 and 8 are essentially conventional, except that each label has a defined area 14 on which an adhesive is to be applied during a step subsequent to the label conversion step, as will be described below with reference to Figure 12.

[0025] Referring now to Figure 9, there is shown diagrammatically a machine for affixing labels and leaflets to products advanced along a path 20 in the direction of arrow A, those products being in the form of containers 21. The machine is adapted for labels as described with reference to Figures 1 and 2; the labels 13 are thus provided on a web of backing material, wound into a reel 22 supported on the machine, and do not, at that stage carry the leaflets.

[0026] The web 23 of converted labels is unwound and passed round rolls 24, 25 and 26 and then passes over a tensioning device 27, which typically may be a vacuum tensioner. From there, the web is guided by rolls 28 and 29 to pass an adhesive activation device 30, whereby the areas 14 of adhesive coating on the labels are activated. In a case where a heat-seal adhesive is employed, the activation device would comprise a heater arranged to raise the temperature of the adhesive sufficiently render that adhesive tacky.

[0027] The web is then guided by a further roll 31 past a pick-and-place device 32 (known per se) which includes a magazine 33 for folded leaflets (not shown). The pick-and-place device takes the lowermost leaflet from the magazine and places it on a respective label 13 (Figures 1 and 2) as the label moves past the pick-and-place device. To permit the accurate placement of a leaflet on a label, appropriate means (known in the art) are provided to monitor the progress of the labels to the pick-and-place device and to cause the pick-and-place device to operate in a timed relationship to the progress of those labels. Such means may also monitor the labels themselves to ensure they are correctly printed and, for example, to read a bar code on each label to ensure the label is of a desired kind, for the leaflet to be attached thereto.

[0028] Roll 31 guides the web 23 supporting the labels with attached leaflets on to a beak 34, which serves to peel the labels from the web, for application to containers being advanced along the path 20, past the

nose of the beak. The labels are wiped on to the containers by means of brushes, rollers, or other suitable means well known and understood in the labelling art. From the beak 34, the web 23 is rewound on to a further reel 35, the web being drawn by means of a power-driven roller nip 36, and then being guided by rolls 37, 38 and 39 to reel 35.

[0029] The above described machine serves to furnish each label 13 with a leaflet immediately prior to that label being applied to a container 21, which leaflet may subsequently be removed by an ultimate purchaser of the product, for unfolding and reading.

[0030] In a case where the activatable adhesive coating on each area 14 is other than a heat-seal adhesive, a suitable activating method other than the use of heat may be employed by the activation device 30.

[0031] The machine of Figure 10 is essentially the same as that of Figure 9 and like components are given like reference characters; those components will not be described again here. The machine of Figure 10 is intended for use with labels described with reference to Figures 3 and 4 and thus which have an active adhesive on the areas 14 thereof. Consequently, the activation device 30 of the Figure 9 machine may be omitted, in this example. Instead, the adhesive areas are exposed by the act of unwinding the labels from the reel 22.

[0032] The machine of Figure 11 is intended for use with labels as shown in Figures 5 and 6. Again, like components with those of the machine of Figure 9 are given like reference characters and will not be described again here. The machine of Figure 11 differs in that it includes a rewind arrangement 40 for liner 16 together with its silicone coating, this rewind arrangement including guide rolls 41 and 42 and a rewind roll 43, whereby the liner 16 is stripped from the web and the active adhesive on each label is thereby exposed prior to the labels passing the pick-and-place device 32, to receive a leaflet.

[0033] The machine of Figure 12 is similar to that of Figure 9, but differs in that the adhesive activation device 30 (Figure 9) is replaced by an adhesive application system 45 configured and arranged to apply adhesive just to area 14 of each label, as the label passes that system 45. Each label having the applied and exposed adhesive is then guided past the pick-and-place device 32, to receive a leaflet prior to the label being applied to a container 21 being advanced along the path 20, as in the case of the previous examples.

Claims

1. A process for furnishing a plurality of products (21) passed through a labelling station with a respective label (13) and article carried on that label, which process comprises:

feeding a strip of converted labels (13) releasably supported on a carrier web (10) towards the

- label-applying station;
 arranging the exposure of an area (14) of adhesive on the face of each fed label directed away from the carrier web (10), each said area (14) being of a size smaller than the area of the label; and then, in either order:
 applying to each said area (14) of adhesive a respective article, in a controlled relationship to the label (13) so that the article adheres to the adhesive; and
 applying each label (13) to a respective product (21) passed through the label-applying station.
2. A process as claimed in Claim 1, wherein the adhesive is applied to a defined area (14) of the label (13) during a prior label-conversion process.
 3. A process as claimed in Claim 2, wherein the adhesive employed is an activatable adhesive which displays very low or no tack properties until activated.
 4. A process as claimed in Claim 3, wherein the exposure of the area (14) of adhesive on each label (13) is performed by applying an activator to the adhesive immediately prior to the application of the article to the label.
 5. A process as claimed in Claim 4, wherein a heat-seal adhesive is employed and the adhesive is activated by exposing said area (14) of each label (13) to heat as the labels are advanced to the labelling station.
 6. A process as claimed in Claim 2, wherein a strippable liner (16) is applied over the converted labels (13) during a prior label conversion process, and the exposure of the area of adhesive is performed by stripping the liner (16) away as the labels are fed to the labelling station, prior to the application of the articles to the respective labels.
 7. A process as claimed in Claim 6, wherein the face of the strippable liner (16) which confronts the adhesive area (14) of each label (13) is coated with a silicone compound to assist the release of the liner (16) from that adhesive.
 8. A process as claimed in Claim 2, wherein the reverse face of the carrier web (10) remote from the labels is coated with a silicone compound (15) whereby the carrier web acts as a strippable liner for the areas (14) of adhesive on the converted labels (13) when the carrier web and labels are reeled, the area of adhesive of each label being exposed on unreeling of the web for feeding the labels to the labelling station.
 9. A process as claimed in Claim 1, wherein a pre-

defined area (14) of each label is coated with an adhesive during the label feeding step substantially immediately prior to the article being applied thereto.

10. A process according to any of the preceding Claims, wherein the article applied to each label (13) comprises a printed and folded leaflet.
11. Apparatus for performing a method as claimed in Claim 1, comprising means (23-29) to unreel a strip (23) of converted labels (13) and to expose adhesive applied to a pre-defined area (14) of the printed face of each label, feeding means (31,34,36) to feed the labels (13) to a labelling station where the labels are applied one to each of a series of products (21) also fed through the labelling station, and means (32) to present to the exposed adhesive area of each label a respective article whereby the presented article adheres to the label (13) and is thereafter carried thereby.

Patentansprüche

1. Verfahren, um eine Vielzahl von Produkten (21), die durch eine Etikettierstation geführt werden, mit einem zugehörigen Etikett (13) und einem auf diesem Etikett gehaltenen Gegenstand zu versehen, wobei das Verfahren umfaßt:
 Zuführen eines Streifens aus umgeformten Etiketten (13), die ablösbar auf einer Trägerbahn (10) gehalten sind, zu der Etikettierstation;
 Ausbilden einer freiliegenden Klebefläche (14) auf der Seite von jedem zugeführten Etikett, die von der Trägerbahn (10) wegzeigt, wobei jede Fläche (14) eine Größe hat, die kleiner ist als die Fläche des Etiketts; und dann in beliebiger Reihenfolge:
 Aufbringen eines entsprechenden Gegenstandes auf die Klebefläche (14) in einer gesteuerten Beziehung zu dem Etikett (13), so daß der Gegenstand an dem Klebstoff klebt; und
 Aufbringen von jedem Etikett (13) auf ein zugehöriges Produkt (21), das durch die Etikettierstation geführt wird.
2. Verfahren nach Anspruch 1, bei dem der Klebstoff während eines vorhergehenden Etiketten-Umformungs-Verfahrens auf eine bestimmte Fläche (14) des Etiketts (13) aufgetragen wird.
3. Verfahren nach Anspruch 2, bei dem der verwendete Klebstoff ein aktivierbarer Klebstoff ist, der bis zur Aktivierung sehr geringe oder keine Klebeigenschaften hat.
4. Verfahren nach Anspruch 3, bei dem die freilie-

gende Klebefläche (14) auf jedem Etikett (13) aktiviert wird, indem unmittelbar vor dem Aufbringen des Gegenstandes auf das Etikett ein Aktivator für den Klebstoff aufgetragen wird.

5. Verfahren nach Anspruch 4, bei dem ein Heißklebstoff verwendet und der Klebstoff aktiviert wird, indem die Fläche (14) von jedem Etikett (13) Wärme ausgesetzt wird, wenn die Etiketten zur Etikettierstation bewegt werden.

6. Verfahren nach Anspruch 2, bei dem während eines vorhergehenden Etiketten-Umformungs-Verfahrens ein abziehbarer Überzug (16) auf die umgeformten Etiketten (13) aufgebracht und die freiliegende Klebefläche aktiviert wird, indem vor der Aufbringung der Gegenstände auf die jeweiligen Etiketten der Überzug (16) abgezogen wird, wenn die Etiketten zu der Etikettierstation bewegt werden.

7. Verfahren nach Anspruch 6, bei dem die Seite des abziehbaren Überzugs (16), die der Klebefläche (14) von jedem Etikett (13) gegenüberliegt, mit einer Silikonverbindung beschichtet ist, um das Abziehen des Überzugs (16) von dem Klebstoff zu erleichtern.

8. Verfahren nach Anspruch 2, bei dem die von den Etiketten entfernte Rückseite der Trägerbahn (10) mit einer Silikonverbindung (15) beschichtet ist, wodurch die Trägerbahn als ein abziehbarer Überzug für die Klebeflächen (14) auf den umgeformten Etiketten (13) dient, wenn die Trägerbahn und die Etiketten aufgerollt sind, wobei die Klebefläche jedes Etiketts freigelegt wird, wenn die Bahn abgerollt wird, um die Etiketten der Etikettierstation zuzuführen.

9. Verfahren nach Anspruch 1, bei dem eine vorbestimmte Fläche (14) von jedem Etikett während des Etiketten-Zuführschritts und im wesentlichen unmittelbar vor dem Aufbringen der Gegenstände mit einem Klebstoff beschichtet wird.

10. Verfahren nach einem der vorhergehenden Ansprüche, bei dem der auf jedes Etikett (13) aufgebraachte Gegenstand ein bedrucktes und gefaltetes Prospekt enthält.

11. Vorrichtung zur Durchführung eines Verfahrens nach Anspruch 1, mit Einrichtungen (23-29) zum Abrollen eines Streifens (23) aus umgeformten Etiketten (13) und zum Freilegen eines Klebstoffs, der auf einer vorbestimmten Fläche (14) der bedruckten Seite von jedem Etikett aufgebracht ist, Zuführ-
einrichtungen (31, 34, 36) zum Zuführen der Etiketten (13) zu einer Etikettierstation, in der die

Etiketten jeweils einzeln auf eine Reihe von Produkten (21) aufgebracht werden, die ebenfalls der Etikettierstation zugeführt werden, und mit Einrichtungen (32) zum Zuführen eines entsprechenden Gegenstandes zu der freiliegenden Klebefläche, wobei der zugeführte Gegenstand an dem Etikett (13) klebt und anschließend von diesem gehalten wird.

10 Revendications

1. Procédé pour munir une pluralité de produits (21) que l'on fait passer à travers un poste d'étiquetage, d'une étiquette respective (13) et d'un article porté par celle étiquette, lequel procédé comprend :

- acheminer une bande d'étiquettes transformées (13) portées de manière détachable sur un ruban porteur (10) en direction du poste d'application d'étiquette;
- faire apparaître une aire (14) d'adhésif sur la face, de chaque étiquette acheminée, qui est dirigée à l'opposé du ruban porteur (10), chaque telle aire (14) étant de moindre taille que l'aire de l'étiquette; puis, dans l'un ou l'autre ordre :
- appliquer à chaque aire précitée (14) d'adhésif un article respectif dans une relation maîtrisée avec l'étiquette (13), de façon que l'article adhère à l'adhésif; et
- appliquer chaque étiquette (13) à un produit respectif (21) que l'on fait passer à travers le poste d'application d'étiquette.

2. Procédé selon la revendication 1, dans lequel l'adhésif est appliqué à une aire définie (14) de l'étiquette (13) pendant un procédé préalable de transformation d'étiquettes.

3. Procédé selon la revendication 2, dans lequel l'adhésif employé est un adhésif activable qui présente des propriétés d'adhésivité très faible ou nulle jusqu'à ce qu'il soit activé.

4. Procédé selon la revendication 3, dans lequel on fait apparaître l'aire (14) d'adhésif sur chaque étiquette (13) en appliquant un activateur à l'adhésif juste avant d'appliquer l'article sur l'étiquette.

5. Procédé selon la revendication 4, dans lequel on utilise un adhésif de thermo-soudage, et on active l'adhésif en exposant ladite aire (14) de chaque étiquette (13) à la chaleur à mesure que l'on fait avancer les étiquettes vers la station d'étiquetage.

6. Procédé selon la revendication 2, dans lequel un film pelable (16) est appliqué sur les étiquettes transformées (13) pendant un procédé préalable de

transformation d'étiquettes, et l'étape consistant à faire apparaître l'aire d'adhésif est réalisée en ôtant le film (16) par pelage à mesure que les étiquettes sont acheminées à la station d'étiquetage, préalablement à l'application des articles sur les étiquettes respectives. 5

7. Procédé selon la revendication 6, dans lequel la face du film pelable (16) qui est tournée vers l'aire d'adhésif (14) de chaque étiquette (13) est revêtue d'un composé siliconé pour favoriser l'enlèvement du film (16) de sur l'adhésif. 10
8. Procédé selon la revendication 2, dans lequel la face arrière du ruban porteur (10) éloignée des étiquettes est revêtue avec un composé siliconé (15) de sorte que le ruban porteur se comporte comme un film pelable pour les aires (14) d'adhésif sur les étiquettes transformées (13) lorsque le ruban porteur et les étiquettes sont enroulés, l'aire d'adhésif de chaque étiquette se trouvant exposée lorsqu'on déroule le ruban pour acheminer les étiquettes au poste d'étiquetage. 15 20
9. Procédé selon la revendication 1, dans lequel une aire prédéfinie (14) de chaque étiquette est revêtue d'un adhésif pendant l'étape d'acheminement des étiquettes sensiblement juste avant que l'article y soit appliqué. 25 30
10. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'article appliqué sur chaque étiquette (13) comprend un feuillet imprimé et plié. 35
11. Appareil pour la mise en oeuvre d'un procédé selon la revendication 1, comprenant des moyens (23-29) pour dérouler un ruban (23) d'étiquettes transformées (13) et pour exposer de l'adhésif appliqué à une aire prédéfinie (14) de la face imprimée de chaque étiquette, des moyens d'acheminement (31, 34, 36) pour acheminer les étiquettes (13) à une station d'étiquetage où les étiquettes sont appliquées chacune à l'un des produits d'une série de produits (21) également acheminés à travers le poste d'étiquetage, et des moyens (32) pour présenter à l'aire d'adhésif exposée de chaque étiquette un article respectif de sorte que l'article présenté adhère à l'étiquette (13) et est ensuite porté par celle-ci. 40 45 50

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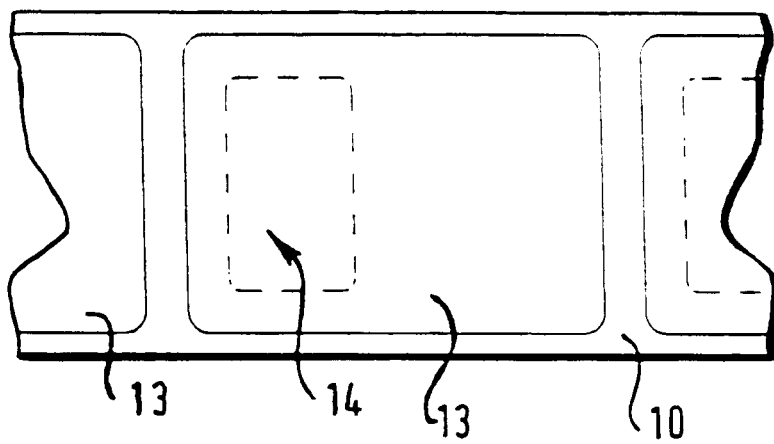


FIG. 1

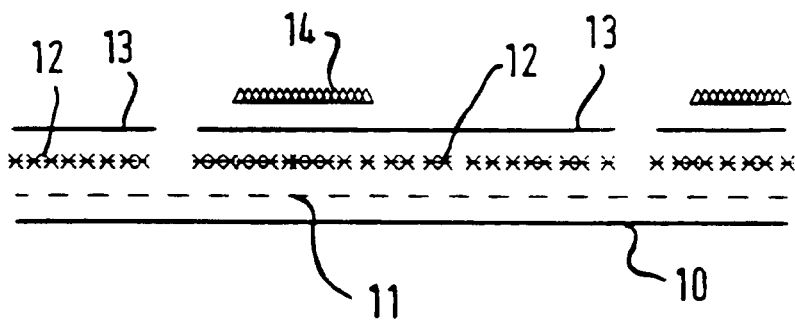


FIG. 2

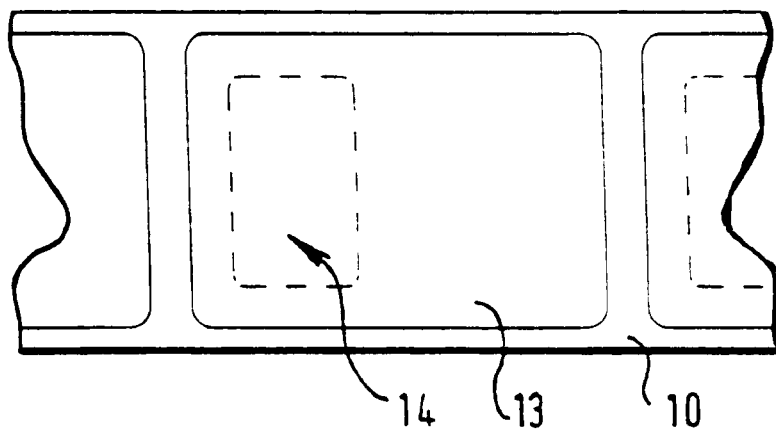


FIG. 3

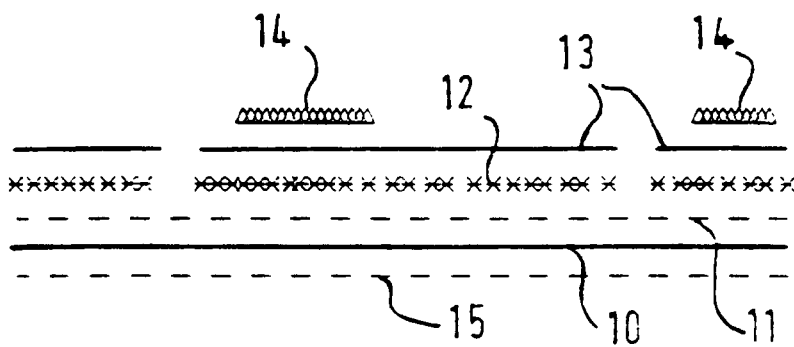


FIG. 4

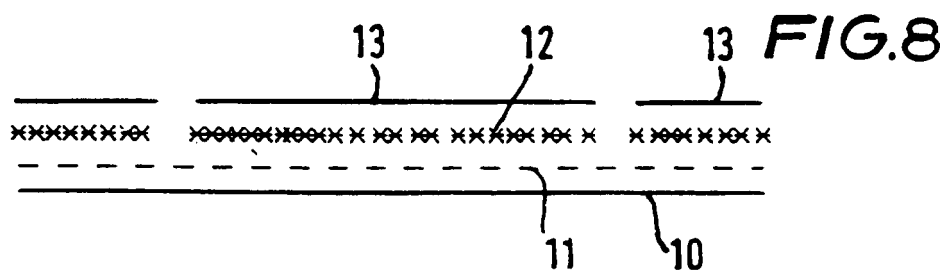
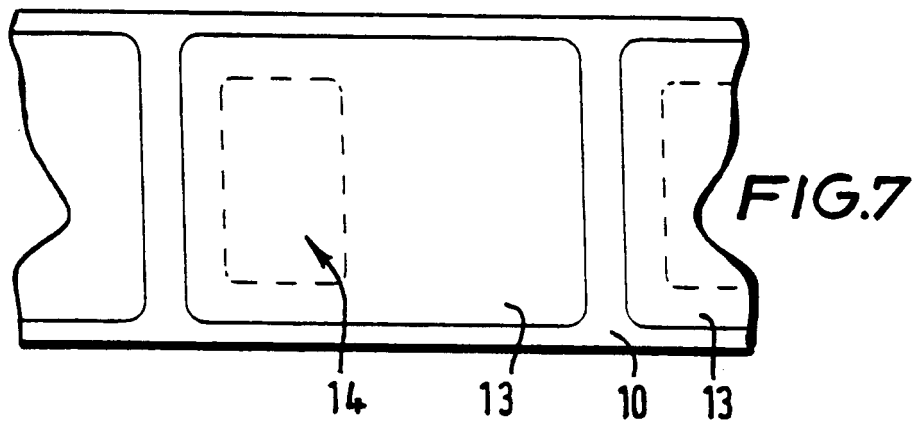
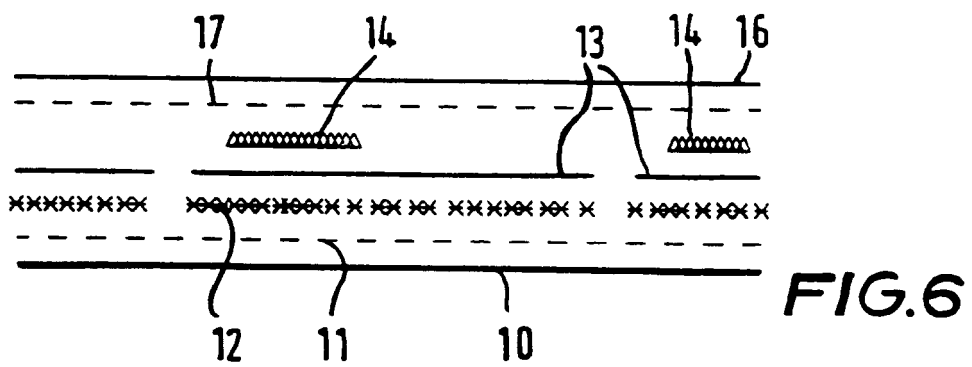
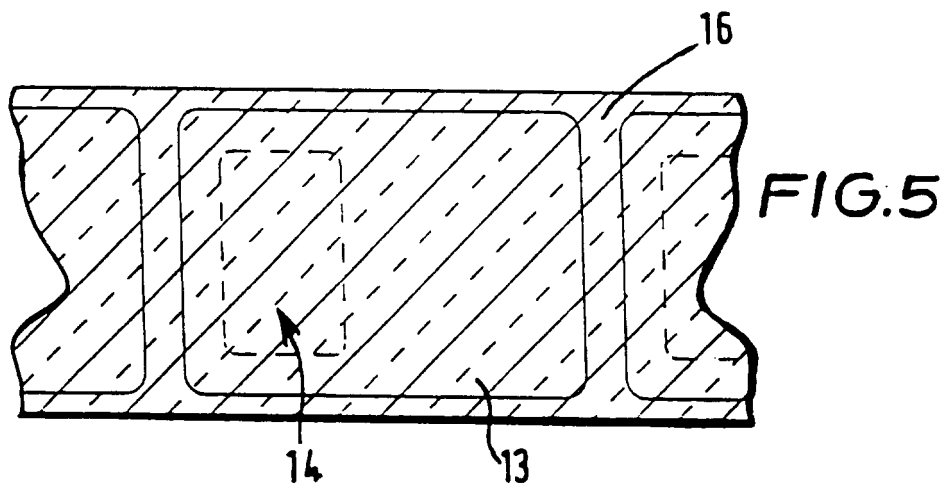


FIG.9

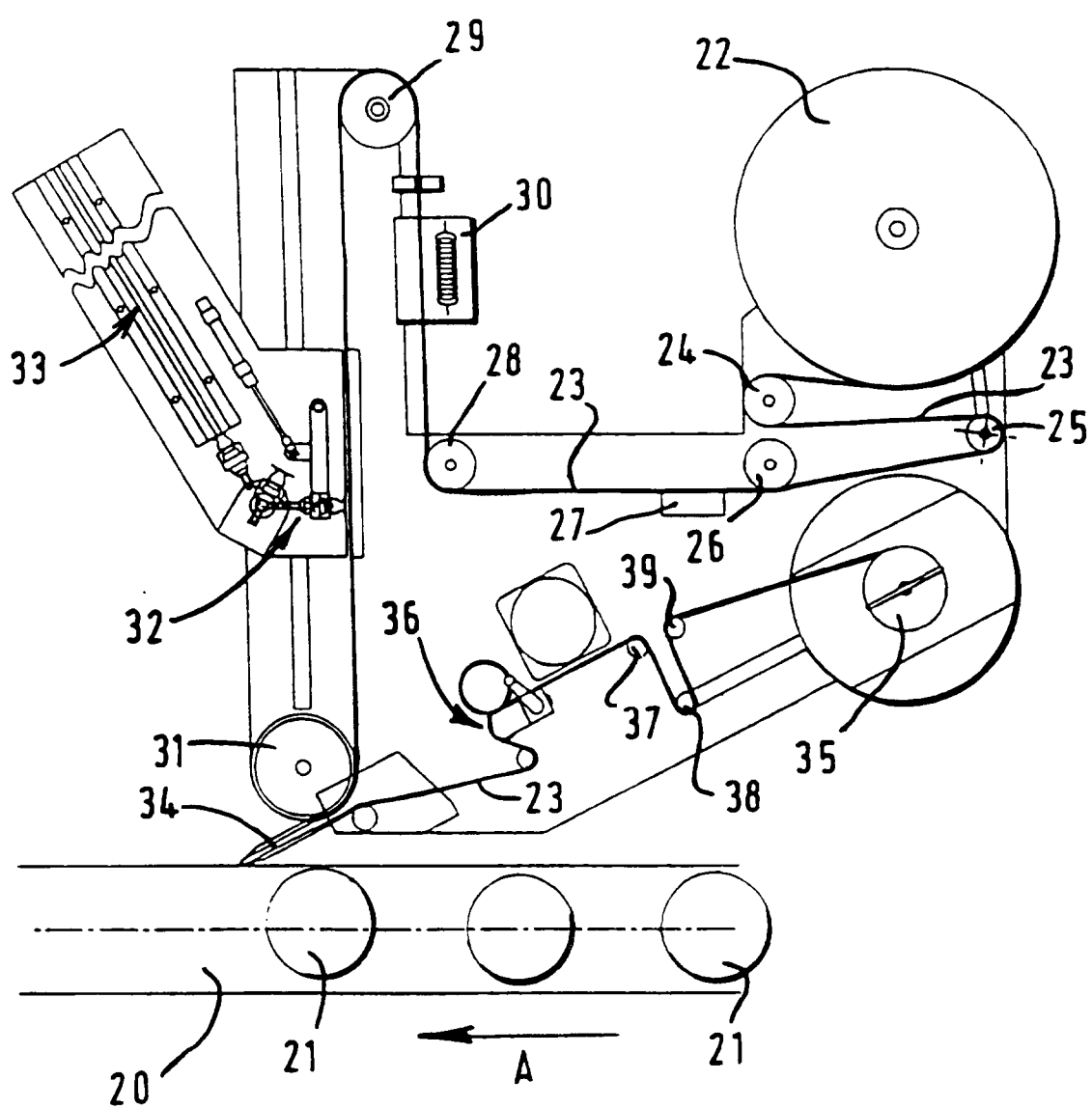


FIG.10

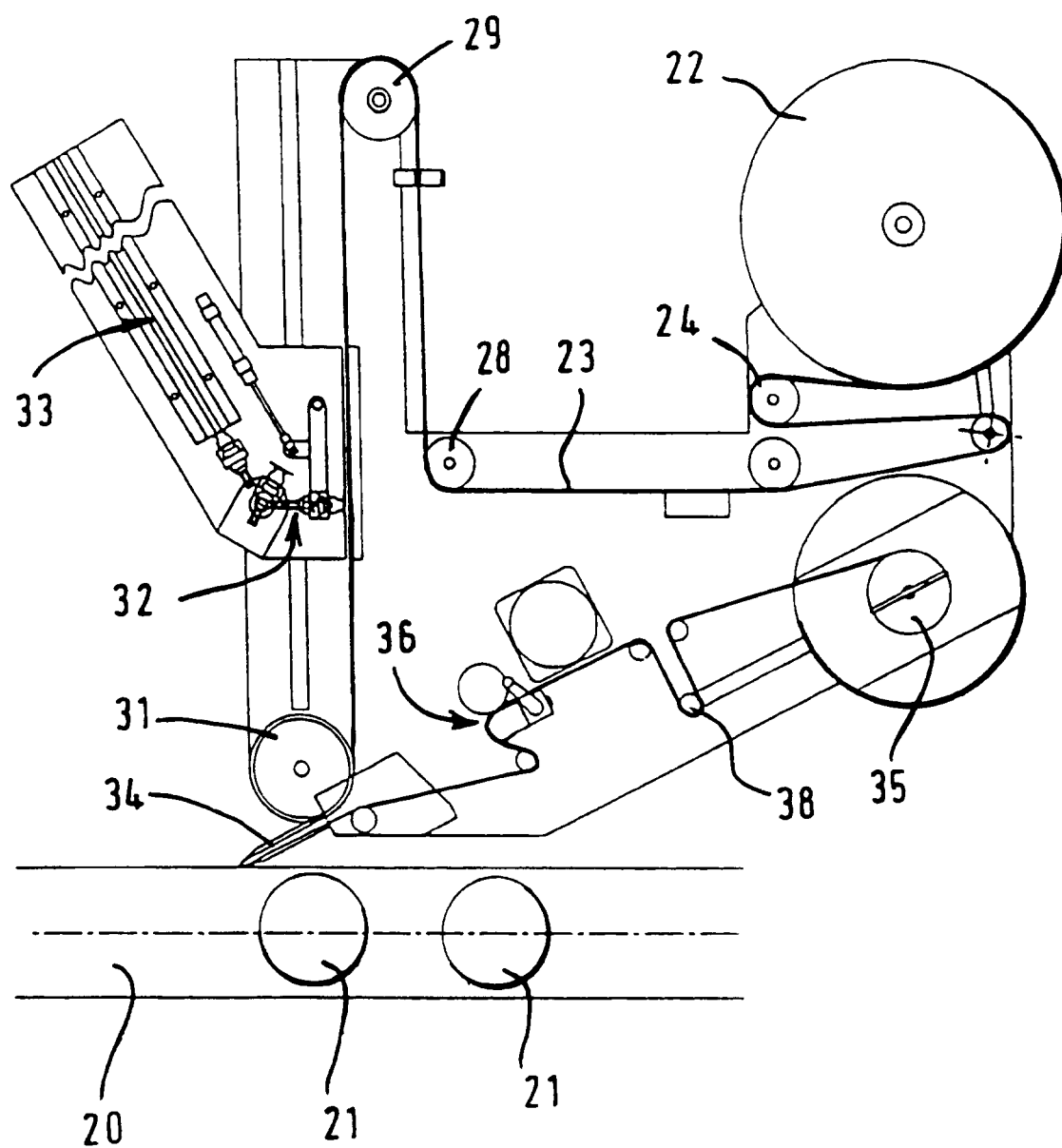


FIG. 11

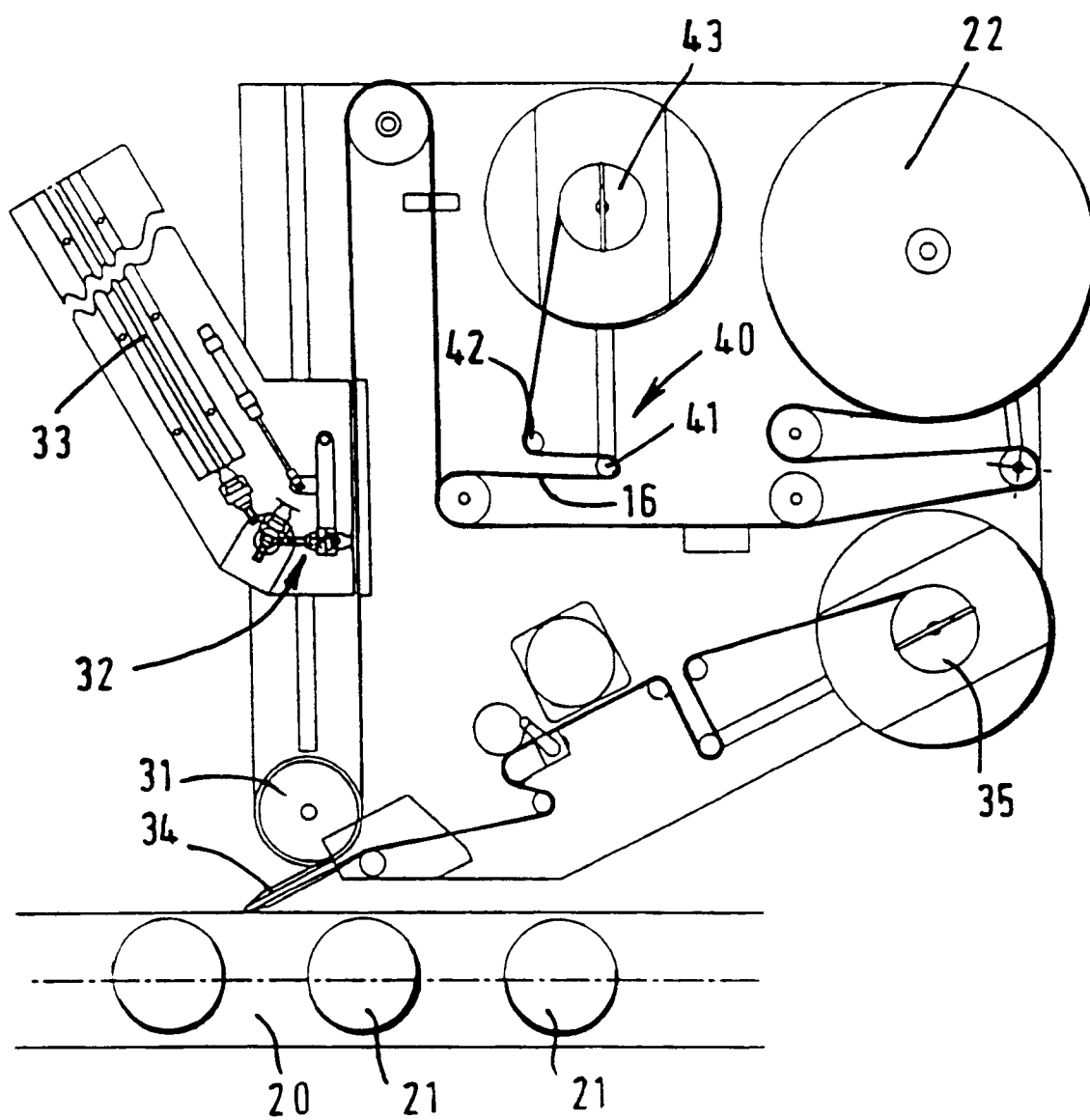


FIG.12

