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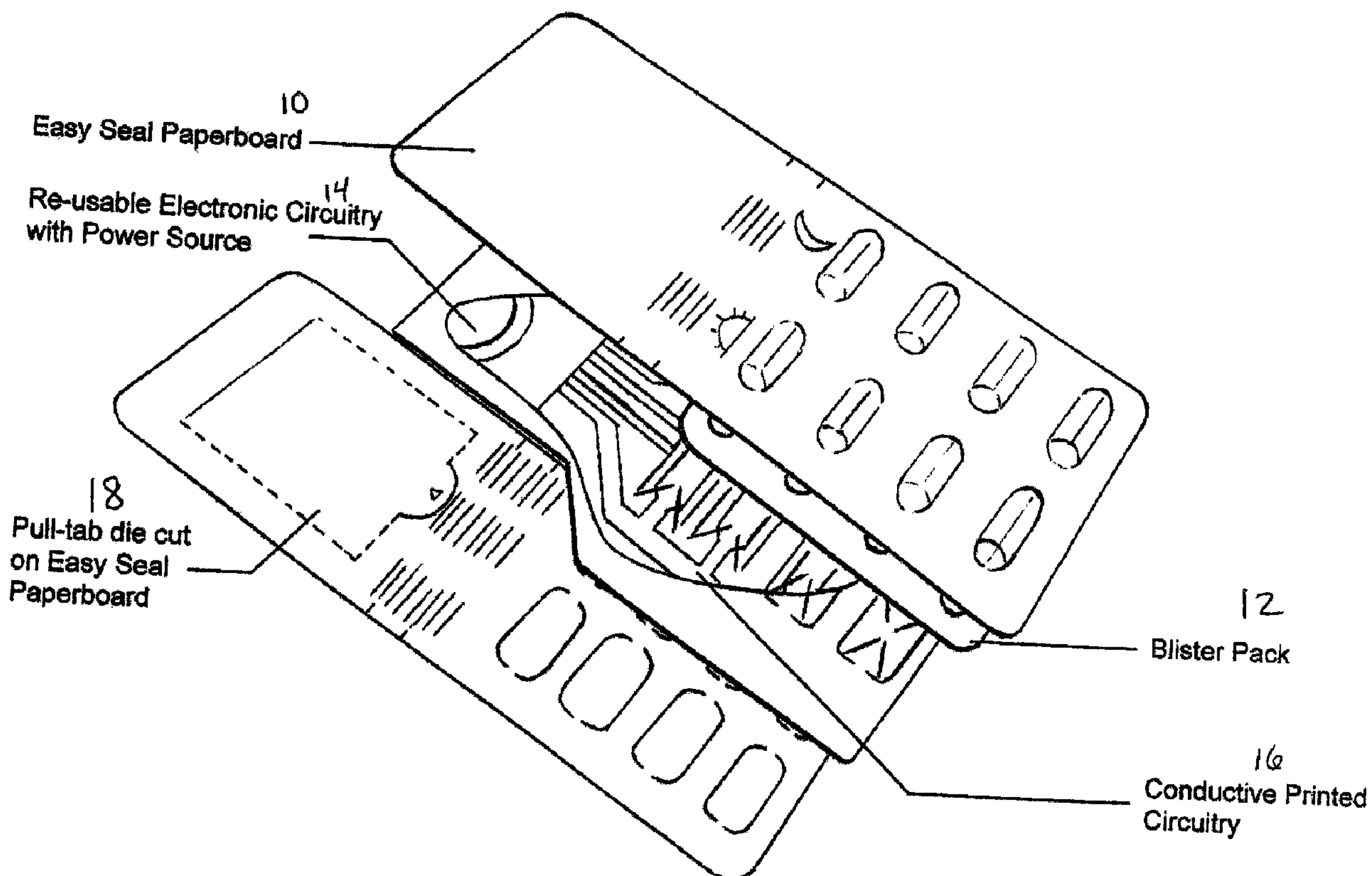
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(54) Titre : TROUSSE DE SURVEILLANCE DE L'UTILISATION D'UN CONTENU JETABLE EQUIPÉE D'UNE CARTE DE CIRCUITS ELECTRONIQUES AMOVIBLE REUTILISABLE

(54) Title: A DISPOSABLE CONTENT USE MONITORING PACKAGE WITH A REMOVABLE RE-USABLE ELECTRONIC CIRCUIT BOARD



(57) Abrégé/Abstract:

There is provided a content use monitoring package and method of making the same. The package includes a cover layer followed by a blister pack layer. The third layer includes a flex circuit connector having an electronic sensor monitoring tag attached to a

**(57) Abrégé(suite)/Abstract(continued):**

rupturable layer imprinted with a conductive grid so as to ensure precise and reliable electrical continuity between the tag and the grid. The tag includes re-usable electronic circuitry and a power source. The grid is printed on a substrate and is aligned with associated blisters in the blister pack. The fourth and bottom layer is a backing which contains a mechanism to tear open the package and remove the flex circuit connector. Once removed, the tag can then be easily separated from the substrate for re-use of the tag.

## ABSTRACT

There is provided a content use monitoring package and method of making the same. The package includes a cover layer followed by a blister pack layer. The third layer includes a flex circuit connector having an electronic sensor monitoring tag attached to a rupturable layer imprinted with a conductive grid so as to ensure precise and reliable electrical continuity between the tag and the grid. The tag includes re-usable electronic circuitry and a power source. The grid is printed on a substrate and is aligned with associated blisters in the blister pack. The fourth and bottom layer is a backing which contains a mechanism to tear open the package and remove the flex circuit connector. Once removed, the tag can then be easily separated from the substrate for re-use of the tag.

## A DISPOSABLE CONTENT USE MONITORING PACKAGE WITH A REMOVABLE RE-USABLE ELECTRONIC CIRCUIT BOARD

### BACKGROUND INFORMATION

Alan Wilson, Michael Petersen, Ehrensvaerd Jakob and Grip Stina, amongst others, have described devices for monitoring, recording and downloading medication dispensing histories for blister packaged medication; see for example U.S. Patent Nos. 7,113,101, 7,178,417, 6,628,199, 6,244,462, 7,170,409, 6,616,035, 7,616,116 and 7,772,974 along with PCT application having publication number WO/2009/135283. Also see Canadian application No. 2353350 and U.S. Publication Nos. 20070278285, 20080191174 and 20080053222.

Such devices broadly comprise sensor detecting/monitoring electronic tags, sensor grids printed with conductive ink, means of connecting the two and means of inserting the device in a pharmaceutical blister package.

Despite having been marketed and tested for ten years, the success of any current technology for medication monitoring of blister packages has been severely limited. A need has been identified for further refinements of such devices to address problems with the current technologies. These include:

- instability of conductive inks printed on paperboard substrates yielding unreliable electrical characteristics;
- tendency of printed conductive inks to crack under repeated deformation (bending)
- cost of conductive inks
- difficulty tearing or breaking the substrate with tablet expulsion
- cost of the sensor monitoring tag
- difficulty connecting the flexible substrate grid physically and electrically to the tag

The pharmaceutical market wants a medication monitoring device that is:

- cheap
- 100 percent reliable
- fits seamlessly in the packaging process
- is easy for the consumer to use
- has a reusable electronic module
- allows for the use of breakable substrates to facilitate consumer use
- allows for the use of thin substrates to minimize package bulk

## SUMMARY OF THE INVENTION

The present invention addresses the limitations of prior art and meets the criteria set forth herein. The invention contemplates in one aspect a means of attaching a sensor monitoring electronic tag to a printed flexible substrate so as to ensure precise and reliable electric continuity between the two. Tags can then be used to monitor either digital or analog printed grids.

Such means is also reversible to allow reuse of the tag with new printed grids in new packages, thereby reducing cost.

This means allows the use of ultra thin (e.g.: Mylar<sup>TM</sup>, etc.) printed grid substrates facilitating consumer use by easy breaking of the substrate and grid by tablet expulsions from the associated blister. Such non paperboard substrates are humidity stable and give more reliable electrical characteristics to the printed grid.

Thin substrates also contribute to easy consumer use by minimizing package size.

The present means uses a zero insertion force (ZIF) flex circuit connector to connect to the input pads of an electronic sensor monitoring tag and its matching unit to the o/p traces of a conductive grid printed on thin Mylar substrate. At the time of assembly the two components of the flex circuit connector are snapped together.

This confers major advantages to prior art:

- 1) Robust electrical continuity from grid to tag.
- 2) Precise alignment of electrical contacts permitting the use of multiple conducting traces for either digital or analog grid designs.
- 3) Accurate alignment facilitates thinner conducting traces for more complex blister package designs.
- 4) Thinner conducting traces save on the cost of conductive ink lowering package costs and reducing the cost to the environment.
- 5) After use blister package can be disassembled and tag separated from grid and reused with a new grid in a new package saving considerable cost (up to 99% if re-used 100 times).
- 6) Use of thin breakable grid substrate facilitates the breaking of the grid during table expulsion from the blister contributing to user friendliness.
- 7) Use of thin robustly attached grids contributes to seamless insertion into the blister package during assembly.

## BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be further understood from the following description with reference to the attached drawings in which:

Figures 1 shows the content use monitoring package in a disassembled state, showing each layer therein.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

One embodiment of the present invention includes a content use monitoring package, such as used for monitoring the use of blister-packaged medication doses. The package has a removable re-usable electronic circuit board and also contains a rupturable layer imprinted with conducting and/or sensing circuitry printed thereon by additive conductive flexographic, inkjet, offset, gravure or screen printing methods. The circuitry is no thicker than 2 micron and typically less than 1 micron, available from Conductive Inkjet Technology. The circuitry is printed on a tough and resilient Mylar base material.

The removable re-usable electronic circuitry contains a power source, communication interface and/or RFID wireless interface antenna, central processor, and connector to the printed flexible circuit, such as a 2mm AMP-LATCH Tyco ribbon cable to rigid PCB connectors. Preferably, the connectors, integrated circuit, battery and/or other devices on the removable electronic circuit shall not exceed the height of 2.5 mm so as to enable complete and seamless integration of the removable circuit into the consumer package.

The package also contains a means of easy access and removal of the electronic circuit after package content has been consumed, such as a pull-tab or other mechanism to tear open the package and remove the tag for re-use. Moreover, the battery can be replaced occasionally allowing even more frequent re-use of the circuit.

Figure 1 of the present invention shows the various layers of the package. The cover 10 or top layer is an easy seal paperboard or other similar material. This is followed by a blister

pack 12 underneath containing medication, each blister aligned with each bubble in the cover 10. The third layer comprises a flex circuit connector that is made up of an electronic sensor monitoring tag having re-usable electronic circuitry and a power source 14 connected to a rupturable layer 16 imprinted with a conductive grid printed on a thin Mylar substrate or substrate made of similar material. The rupturable layer 16 is aligned with the associated blisters. The fourth and bottom layer is a backing made of easy seal paperboard or other similar material and which contains a pull-tab die cut 18 or other mechanism to tear open the package and remove the flex circuit connector. Once removed, the tag can then be easily separated from the grid for re-use of the tag.

It will be appreciated by one skilled in the art that variants can exist in the above-described material and package layout.

What is claimed is:

1. A content use monitoring package as described in the description and shown in the drawing.
2. A method of making a content use monitoring package comprising the steps of:
  - aligning a blister pack with a cover having bubbles, so that the bubbles in the cover are aligned with the respective blisters in the blister pack;
  - connecting an electronic sensor monitoring tag having re-usable electronic circuitry and a power source to a conductive grid printed on a substrate to form a flex circuit connector;
  - arranging the flex circuit connector so that the conductive grid is aligned with the blisters;
  - obtaining a backing having punchable slots and an opening mechanism;
  - sealing the backing to the cover so that the slots are aligned with the bubbles and the opening mechanism is arranged to enable removal of the tag when the opening mechanism is opened.

Figure 1

