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(54) **Title:** DISABLING DEVICE INCLUDING ADHESIVE TO DISABLE AN ELECTRICAL INTERFACE

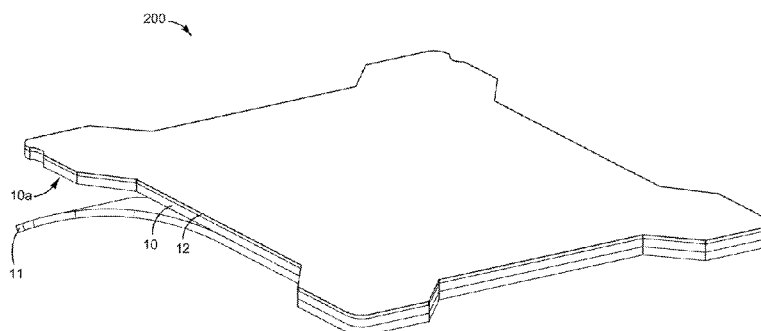


FIG. 3

(57) **Abstract:** A disabling device usable with an electrical interface having electrical contacts of a printed circuit assembly to receive a removable, configurable component, the disabling device comprising: an adhesive layer including a non, electrically-conductive adhesive to contact the electrical contacts of the electrical interface; a backing layer removably coupled to the adhesive layer; and an upper layer coupled to the adhesive layer.



DISABLING DEVICE INCLUDING ADHESIVE TO DISABLE AN ELECTRICAL INTERFACE

BACKGROUND

[0001] Electrical devices such as servers, and the like, may include printed circuit assemblies. The printed circuit assemblies include multiple, electrical interfaces to receive removable, configurable components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] The present embodiments will now be described, by way of example, with reference to the accompanying drawings, in which:

[0003] FIG. 1 is a block diagram illustrating a disabling device according to an example.

[0004] FIG. 2 is a perspective view illustrating a disabling device according to an example.

[0005] FIG. 3 is a schematic view illustrating the disabling device of FIG. 2 with a backing layer partially removed therefrom according to an example.

[0006] FIG. 4 is a block diagram illustrating a printed circuit assembly according to an example.

[0007] FIG. 5 is a schematic view illustrating the printed circuit assembly of FIG. 4 according to an example.

[0008] FIG. 6 is a flowchart of a method of disabling an electrical interface including electrical contacts of a printed circuit assembly to receive a removable, configurable component according to an example.

DETAILED DESCRIPTION

[0009] Electrical devices such as servers, and the like, may include printed circuit assemblies. The printed circuit assemblies include multiple, electrical interfaces to receive removable, configurable components. The removable, configurable component is an electrical component that is added to the printed circuit assembly after the primary manufacturing process of the printed circuit assembly. Removable, configurable components may include processor chips, socketed programmable components, switch components, and/or application-specific integrated circuits (ASIC), and the like.

[0010] However, at times, the use of a particular removable, configurable component may not be desired and/or authorized for certain printed circuit assemblies and/or customers. Typically, disablement of respective removable, configurable components include building a circuit on the printed circuit assembly or firmware/software to disable/enable the removable, configurable component from being used therein. However, such disablement may increase components, board area, and design time of the printed circuit assemblies. Further, a firmware/software solution may be circumvented and/or not meet desired criteria such as licensing terms.

[0011] In examples, the disabling device is usable with an electrical interface having electrical contacts of a printed circuit assembly to receive a removable, configurable component. The disabling device includes an adhesive layer, a backing layer, and an upper layer. The adhesive layer includes a non, electrically-conductive adhesive to contact the electrical contacts of the electrical

interface. The backing layer removably couples to the adhesive layer. The upper layer couples to the adhesive layer. The upper layer includes a tamper-proof member to enable at least a portion of the non, electrically-conductive adhesive to remain on the electrical contacts and/or cause damage to the electrical contacts in response to removal of the upper layer therefrom. Thus, the disabling device enables the permanent disablement of electrical interfaces without redesigning the printed circuit assembly or manufacturing method thereof in a cost-effective manner. Thus, additional board space, development time, and versions of the printed circuit assembly is not necessitated.

[0012] FIG. 1 is a block diagram illustrating a disabling device according to an example. Referring to FIG. 1, in some examples, the disabling device 100 is usable with an electrical interface having electrical contacts of a printed circuit assembly to receive a removable, configurable component. The electrical interface, for example, may include a housing surrounding electrical contacts to receive a removable, configurable component. The removable, configurable component is an electrical component that is added to the printed circuit assembly after the primary manufacturing process of the printed circuit assembly.

[0013] The addition of a removable, configurable may provide additional functionality to the printed circuit assembly. Removable, configurable components may include processor chips, socketed programmable components, switch components, and/or application-specific integrated circuits (ASIC), and the like. The disabling device 100 includes an adhesive layer 10, a backing layer 11, and an upper layer 12. The adhesive layer 10 includes a non, electrically-conductive adhesive to contact the electrical contacts of the electrical interface.

The backing layer 11 removably couples to the adhesive layer 10. That is, the backing layer 11 is a removable, adhesive liner. The upper layer 12 couples to the adhesive layer 10.

[0014] FIG. 2 is a perspective view illustrating a disabling device according to an example. FIG. 3 is a schematic view illustrating the disabling device of FIG. 2 with a backing layer partially removed therefrom according to an example. The disabling device 200 includes the adhesive layer 10, the backing layer 11, and the upper layer 12 previously described with respect to the disabling device 100 of FIG. 1. In some examples, the disabling device 200 includes a disabling device circumference 200a that corresponds to a component circumference of the electrical interface. For example, the disabling device 200 may conform to and occupy the space intended for the removable, configurable component. Additionally, in some examples, the disabling device 200 having a shape corresponding to the component circumference may provide other desired functionality such as a heat sink function, an airflow baffle function, a structural component function, and the like. The backing layer 11 removably couples to the adhesive layer 10. In some examples, the backing layer 11 includes plastic, vinyl, glossy paper, and the like.

[0015] Referring to FIGS. 2 and 3, in some examples, the adhesive layer 10 includes a non, electrically-conductive adhesive 10a to contact the electrical contacts of the electrical interface. For example, the non, electrically-conductive adhesive 10a strongly sticks to the electrical contacts. In some examples, the non, electrically-conductive adhesive 10a includes an adhesive strength of at least twenty-five pounds per square inch (psi). In some examples, the non,

electrically-conductive adhesive 10a includes an acrylic adhesive, a rubber-based adhesive, and the like.

[0016] Referring to FIGS. 2 and 3, in some examples, the upper layer 12 couples to the adhesive layer 10. In some examples, the upper layer 12 includes a tamper-proof member to enable at least a portion of the non, electrically-conductive adhesive 10a to remain on the electrical contacts in a response to removal of the tamper-proof member from the electrical interface. For example, the tamper-proof member may include the upper layer 12 having sufficient adhesion with the adhesive layer 10 such that the upper layer 12 separates from the adhesive layer 10, when removed by a user, leaving behind at least a portion of the non, electrically-conductive adhesive 10a on the electrical contacts.

[0017] Alternatively, the tamper-proof member may enable the non, electrically-conductive adhesive to at least one of break and bend the electrical contacts. For example, the tamper-proof member may include the upper layer 12 having sufficient adhesion with the adhesive layer 10 such that the upper layer 12 adheres to the adhesive layer 10 which adheres to the electrical contacts, when pulled on from a user, enabling the electrical contacts to also be pulled and damaged. In some examples, the upper layer 12 includes a polycarbonate material, and the like. In some examples, the upper layer 12 has a thickness in a range of 0.25 millimeters (mm) to 1.0 mm.

[0018] FIG. 4 is a block diagram illustrating a printed circuit assembly according to an example. FIG. 5 is a schematic view illustrating the printed circuit assembly of FIG. 4 according to an example. Referring to FIGS. 4 and 5, in some examples, the printed circuit assembly 401 includes a printed circuit board

41, a plurality of electrical components 44, an electrical interface 43, a disabling device 400, and a label 42. The electrical interface 43 includes electrical contacts 43a to receive a removable, configurable component. In some examples, the electrical contacts 43a include at least one of electrical pins and electrical pads.

[0019] Referring to FIGS. 4 and 5, in some examples, the removable, configurable components may include processor chips, socketed programmable components, switch components, and/or application-specific integrated circuits (ASIC), and the like. The disabling device 400 includes a self-hardening material 40 to contact the electrical contacts 43a to disable the electrical interface 43 from receiving the removable, configurable component. In some examples, the self-hardening material 40 includes a non, electrically-conductive adhesive. In some examples, the self-hardening material 40 includes an epoxy, and/or cyanoacrylate adhesive, and the like. The label 42 conveys information to a user. The label 42 may include images, symbols, alpha-numeric characters, and the like.

[0020] FIG. 6 is a flowchart of a method of disabling an electrical interface including electrical contacts of a printed circuit assembly to receive a removable, configurable component according to an example. The method is associated with examples of the disabling devices 100, 200, and 400 illustrated in FIGS. 1-5 and the related description above. In block S610, a backing layer removably coupled to an adhesive layer of a disabling device is removed from the adhesive layer. In block S611, a first side of the adhesive layer formerly coupled to the backing layer of the disabling device is exposed.

[0021] In block S612, the first side of the adhesive layer including a non, electrically-conductive adhesive is placed on the electrical contacts of the electrical interface to disable receiving the removable, configurable component. For example, at least a portion of the non, electrically-conductive adhesive is enabled to remain on the electrical contacts of the electrical interface. That is, in response to a removal of an upper layer coupled to the adhesive layer of the disabling device from the electrical interface. The electrical interface is disabled from receiving the removable, configurable component. Further, in some examples, an upper layer coupled to the adhesive layer of the disabling device is placed to have a label attached to the upper layer face away from the electrical interface.

[0022] It is to be understood that the flowchart of FIG. 6 illustrates architecture, functionality, and/or operation of examples of the present disclosure. Each block may represent one or several blocks to implement the specified function(s). Although the flowchart of FIG. 6 illustrates a specific order of execution, the order of execution may differ from that which is depicted. For example, the order of execution of two or more blocks may be rearranged relative to the order illustrated. Also, two or more blocks illustrated in succession in FIG. 6 may be executed concurrently or with partial concurrence. All such variations are within the scope of the present disclosure.

[0023] The present disclosure has been described using non-limiting detailed descriptions of examples thereof that are not intended to limit the scope of the general inventive concept. It should be understood that features and/or operations described with respect to one example may be used with other

examples and that not all examples have all of the features and/or operations illustrated in a particular figure or described with respect to one of the examples. Variations of examples described will occur to persons of the art. Furthermore, the terms "comprise," "include," "have" and their conjugates, shall mean, when used in the disclosure and/or claims, "including but not necessarily limited to."

[0024] It is noted that some of the above described examples may include structure, acts or details of structures and acts that may not be essential to the general inventive concept and which are described for illustrative purposes. Structure and acts described herein are replaceable by equivalents, which perform the same function, even if the structure or acts are different, as known in the art. Therefore, the scope of the general inventive concept is limited only by the elements and limitations as used in the claims.

CLAIMS

What is claimed is:

1. A disabling device usable with an electrical interface having electrical contacts of a printed circuit assembly to receive a removable, configurable component, the disabling device comprising:

an adhesive layer including a non, electrically-conductive adhesive to contact the electrical contacts of the electrical interface;

a backing layer removably coupled to the adhesive layer; and

an upper layer coupled to the adhesive layer.

2. The disabling device of claim 1, wherein the non, electrically-conductive adhesive includes an adhesive strength of at least twenty-five pounds per square inch (psi).

3. The disabling device of claim 1, wherein the upper layer comprises:
a label to convey information to a user.

4. The disabling device of claim 1, wherein the upper layer comprises:
a tamper-proof member to enable at least a portion of the non, electrically-conductive adhesive to remain on the electrical contacts in a response to removal of the tamper-proof member from the electrical interface.

5. The disabling device of claim 1, wherein the upper layer comprises:

a tamper-proof member to enable the non, electrically-conductive adhesive to at least one of break and bend the electrical contacts.

6. The disabling device of claim 1, further comprising:

a disabling device circumference that corresponds to a component circumference of the electrical interface.

7. The disabling device of claim 1, wherein the non, electrically-conductive adhesive comprises at least one of an acrylic adhesive and a rubber-based adhesive.

8. The disabling device of claim 1, wherein the backing layer comprises at least one of plastic, vinyl, and a glossy paper and the upper layer includes a polycarbonate material.

9. A method of disabling an electrical interface including electrical contacts of a printed circuit assembly to receive a removable, configurable component, the method comprising:

removing a backing layer removably coupled to an adhesive layer of a disabling device from the adhesive layer;

exposing a first side of the adhesive layer formerly coupled to the backing layer of the disabling device; and

placing the first side of the adhesive layer including a non, electrically-conductive adhesive on the electrical contacts of the electrical interface to disable receiving the removable, configurable component.

10. The method of claim 9, wherein the placing the first side of the adhesive layer including a non, electrically-conductive adhesive on the electrical contacts of the electrical interface further comprises:

enabling at least a portion of the non, electrically-conductive adhesive to remain on the electrical contacts of the electrical interface in response to a removal of an upper layer coupled to the adhesive layer of the disabling device from the electrical interface to disable receiving the removable, configurable component.

11. The method of claim 9, wherein the placing the first side of the adhesive layer including a non, electrically-conductive adhesive on the electrical contacts of the electrical interface further comprises:

placing an upper layer coupled to the adhesive layer of the disabling device to have a label on the upper layer face away from the electrical interface.

12. A printed circuit assembly, comprising:

a printed circuit board;

a plurality of electrical components coupled to the printed circuit board;

and

an electrical interface including electrical contacts to receive a removable, configurable component; and

a disabling device including a self-hardening material to contact the electrical contacts and disable the electrical interface from receiving the removable, configurable component.

13. The printed circuit assembly of claim 12, further comprising:
a label on the self-hardening material to convey information to a user.

14. The printed circuit assembly of claim 12, wherein the self-hardening material comprises at least one of an epoxy or a cyanoacrylate adhesive.

15. The printed circuit assembly of claim 12, wherein the electrical contacts comprise:

at least one of electrical pins and electrical pads.

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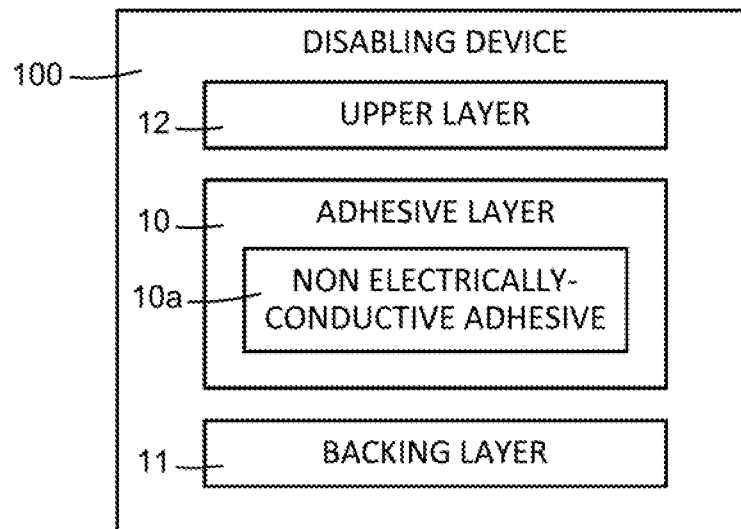


FIG. 1

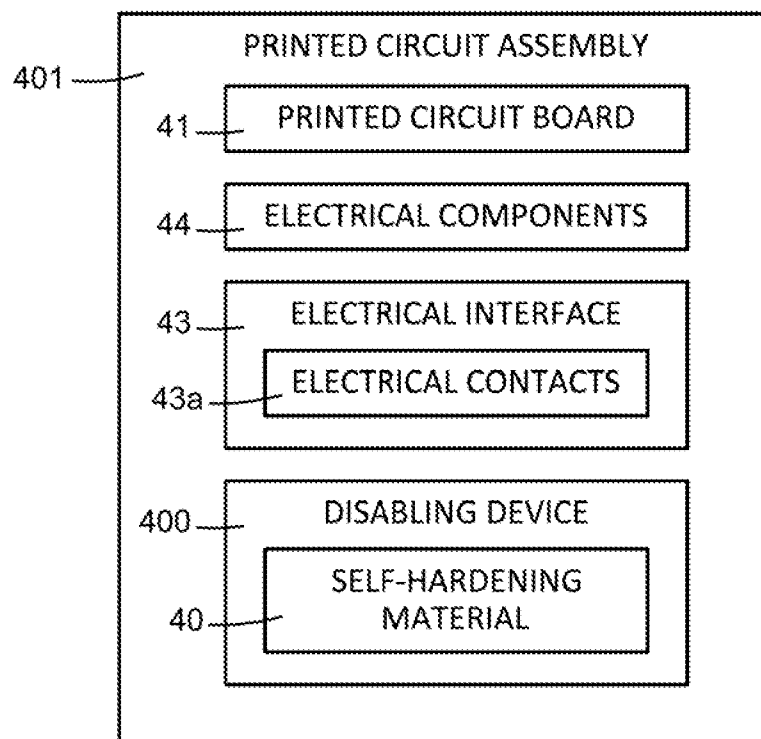


FIG. 4

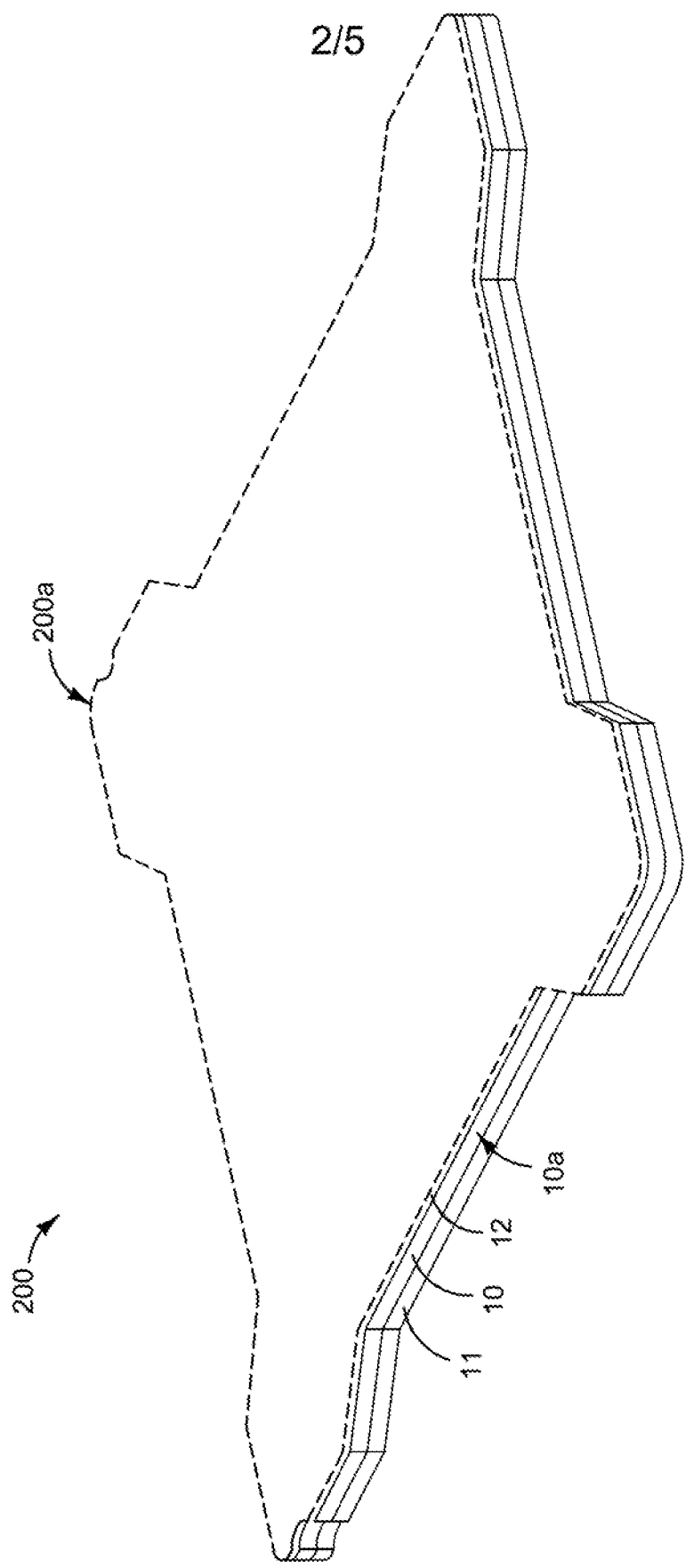


FIG. 2

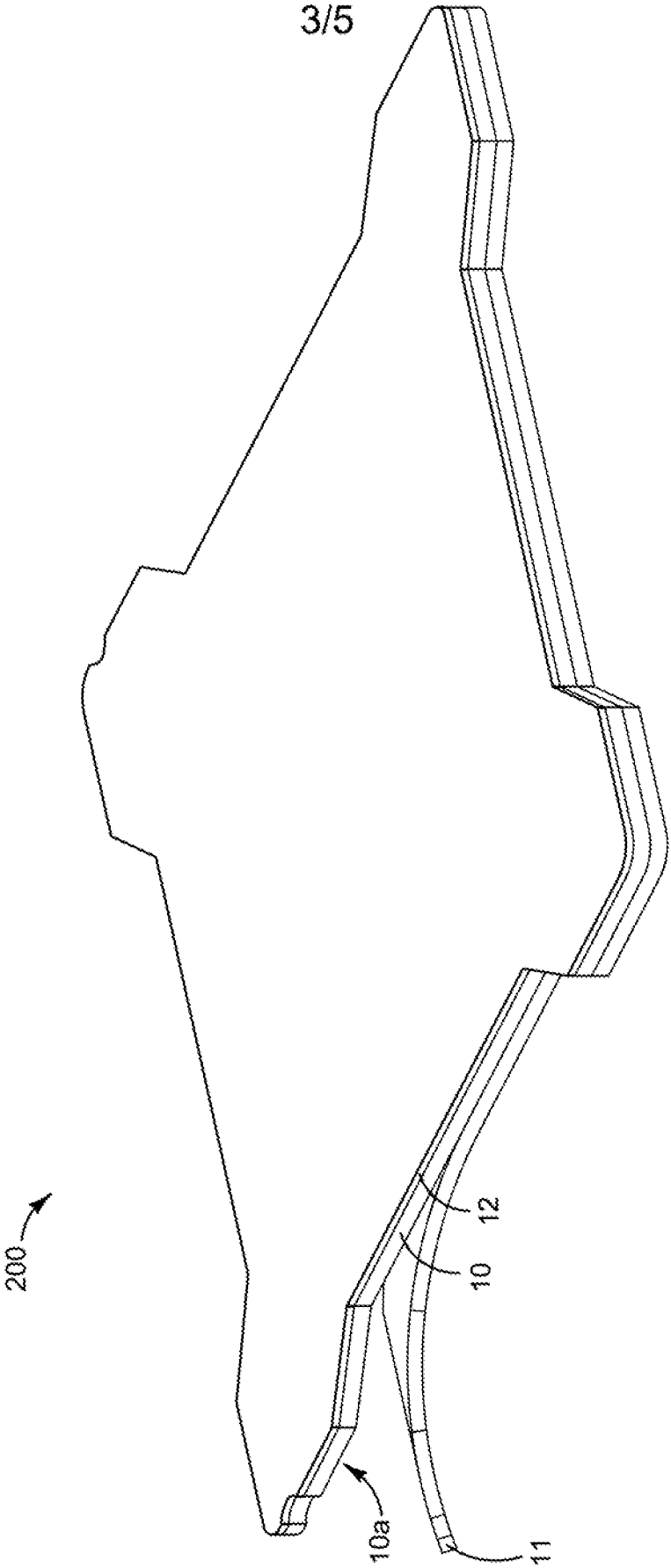


FIG. 3

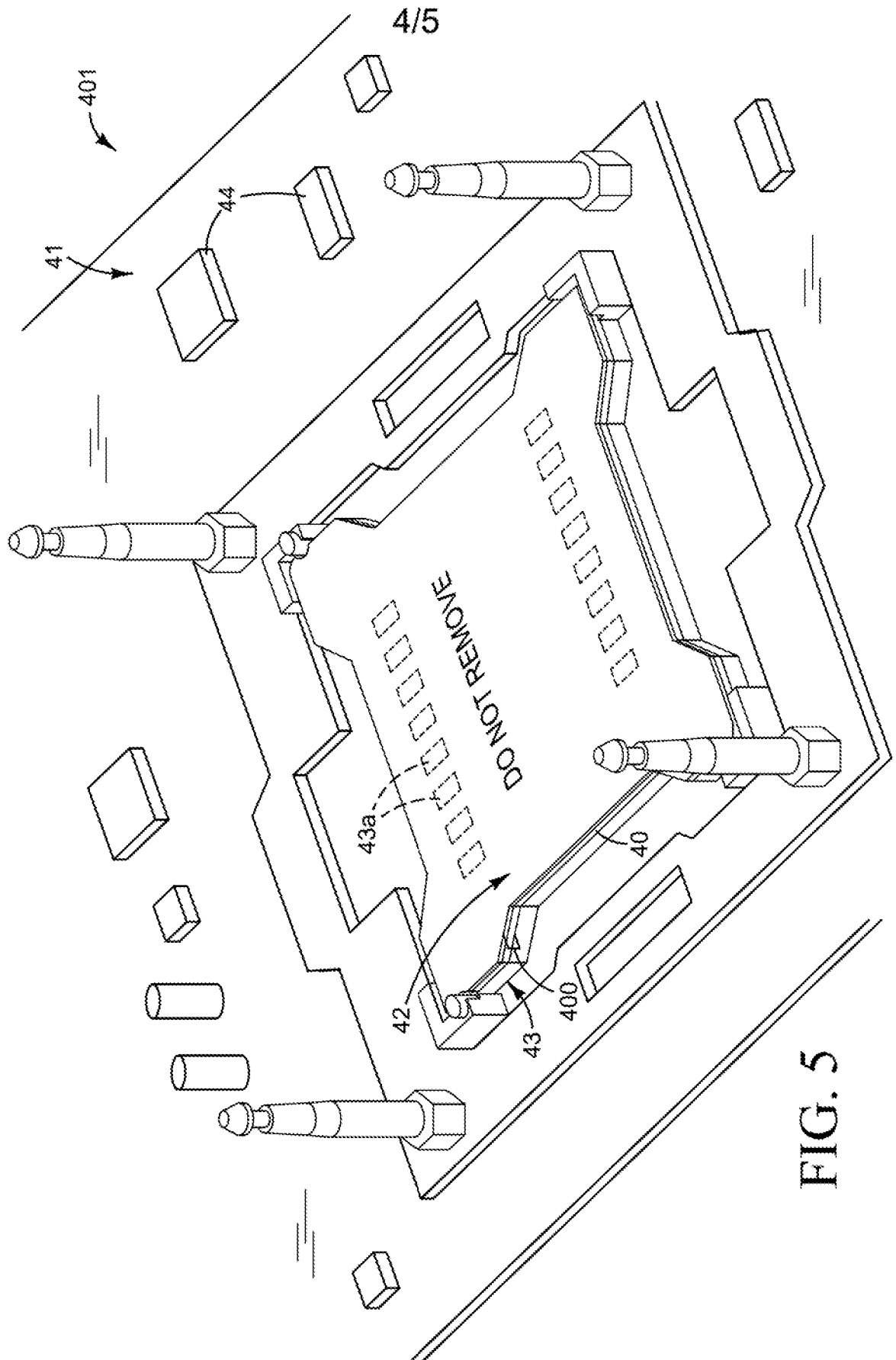


FIG. 5

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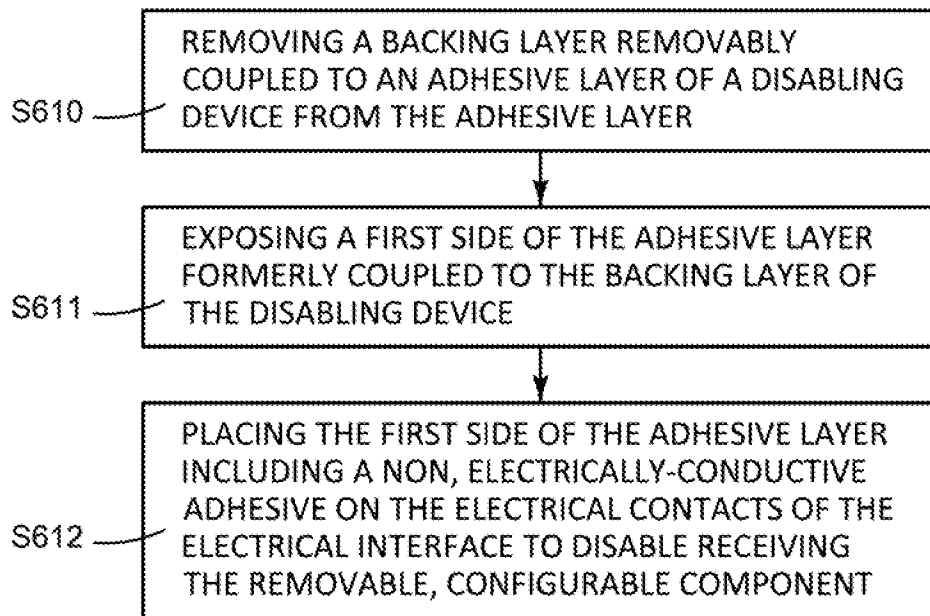


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/070830**A. CLASSIFICATION OF SUBJECT MATTER****H05K 7/12(2006.01)i, H01R 12/71(2011.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H05K 7/12; B32B 9/00; G09C 3/00; B42D ; H04L 9/32; B32B 7/12; H01R 12/71

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: disabling device, tamper-proof, adhesive layer, non electrically-conductive adhesive, printed circuit board

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005-0019519 A1 (LIPING GUO et al.) 27 January 2005 See paragraphs [0001]-[0007], [0014]-[0026], [0034]-[0037], [0059], claim 1, table 9, and figures 1-2.	1-11
Y		12-15
Y	WO 2004-089642 A2 (KAHN, ARI) 21 October 2004 See page 3, and claims 10, 13.	12-15
A	US 2011-0020641 A1 (PRADIP HIRALAL SHROFF et al.) 27 January 2011 See paragraphs [0007]-[0014], and claims 1-2, 7.	1-15
A	US 2005-0230960 A1 (WAYNE LOUIS BILODEAU et al.) 20 October 2005 See paragraphs [0025]-[0032], claim 1, and figures 4-8.	1-15
A	US 2003-0009683 A1 (GARY SCHWENCK et al.) 09 January 2003 See paragraphs [0017]-[0030], and claims 1-4.	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

15 September 2015 (15.09.2015)

Date of mailing of the international search report

17 September 2015 (17.09.2015)

Name and mailing address of the ISA/KR

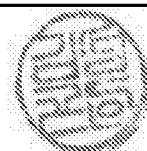
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2014/070830

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