(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 June 2007 (21.06.2007)

PCT

(10) International Publication Number
WO 2007/070487 A2

(51) International Patent Classification:
B65D 83/04 (2006.01) *A61J 7/04* (2006.01)
A61J 1/03 (2006.01)

(21) International Application Number:
PCT/US2006/047278

(22) International Filing Date:
12 December 2006 (12.12.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/749,559 12 December 2005 (12.12.2005) US

(71) Applicant *(for all designated States except US)*: **INTERNATIONAL PAPER COMPANY** [US/US]; 6400 Poplar Avenue, Memphis, TN 38197 (US).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **BROLLIER, Brian, W.** [US/US]; 681 Brandy Way, Cincinnati, OH 45244 (US).

(74) Agents: **STEWART, Richard, C.** et al.; INTERNATIONAL PAPER COMPANY, 6285 Tri-Ridge Boulevard, Loveland, OH 45140 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

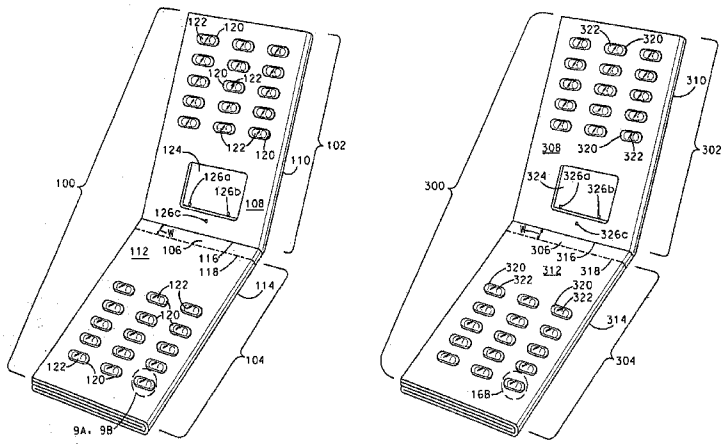
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** MOMENTARY SWITCH INTEGRATED IN PACKAGING OF AN ARTICLE



(57) **Abstract:** The present invention relates to a switch for use with an article formed from paperboard. The article includes a first panel and a second panel. The first panel and the second panel each have a sliding surface facing one another. The first and the second panels are in sliding relation to one another between a first position and a second position. The switch comprises a conductive pathway disposed on the sliding surface of the first panel and a first contact surface is disposed on the. sliding surface of the second panel and a second contact surface is disposed on the sliding surface of the second panel. The second contact surface is in spaced relation to the first contact surface so as to prevent electrical communication between the first and second contact surfaces. The conductive pathway of the first panel is in spaced relation to at least one of the first and second contact surfaces of the second panel when the first and second panels are in the first position. The conductive pathway bridges the first and second contact surfaces when the first and second panels are in the second position to thereby permitting electrical communication between said first and second contact surfaces.

WO 2007/070487 A2

MOMENTARY SWITCH INTEGRATED IN PACKAGING OF AN ARTICLE

FIELD OF THE INVENTION

The present invention relates generally to a package assembly for storing articles and more particularly, to a package assembly suitable for dispensing pharmaceutical articles such as capsules, tablets, and/or pills wherein the package includes a momentary switch for controlled indication of dispensing of the pills from the package assembly.

BACKGROUND OF THE INVENTION

Packages for drug doses in the form of capsules, tablets, and/or pills are available in a large variety of different sizes, with different numbers of pills contained therein, and with different spatial arrangements. These packages such as medicine storage packages usually include a blister package in which tablets, capsules, or pills are individually sealed between plastic molded pockets for pills and a rupturable foil glued or fused to the first foil. One example of such medicine storage package is disclosed in US Patent Nos. 4,988,004 and 7,093,716. Often, a memory unit is included in the medicine storage package to produce an acoustic and/or visual alarm signal when it is time to take the next pill.

A common method of detecting a pill being dispensed from a blister package is by breaking an electrical trace which is located in the pathway of the pill as it is pushed out of its blister cavity. For example, a gate is created behind the pill by perforating the

paperboard in a pattern like the blister cavity and the conductive trace is run across the gate, passing through some uncut areas in the perforations. There are several problems with this design that either causes a false signal when no pill is dispensed or make it very difficult to push the pill out. The problem with this design is that the uncut areas tend to crack during handling of the blister package over time. This causes a break in the conductive trace and thus a break in the circuit, which in turn, is registered as a pill being falsely dispensed when actually the pill has not been dispensed. Therefore, it is desirable to provide a medicine blister package in which the pill can be easily dispensed from the blister cavity and the package does not cause false signal when no pill is dispensed.

Another problem with the so called break-the-trace design is that the medicine storage package can limit the type of circuitry used to monitor the pills used. With one such configuration, if a user wishes to keep track of which pill is dispensed, the user needs to either use individual resistance levels to each pill (which is very difficult and ineffective for more than a few pills) or the user must have one conductive trace per each pill plus one common trace.. This design requires many connections that must be made to the monitoring circuitry thereby overcomplicating the circuitry suitable for a low-cost and easily manufacturable package design. It is therefore desirable to provide a monitoring circuitry switch for packaging of an article, e.g., medicaments that solve the problems, among others, of accidental breakage of the electrical trace which is located in the pathway of the pill and the difficulty in removing the pill from the blister package.

SUMMARY OF THE INVENTION

The present invention relates to a package assembly having an integrated momentary switch therein that is particularly useful in healthcare pharmaceutical packaging. In the preferred embodiment, the momentary switch circuit is defined by a swing door having a conductive contacting surface and two other conductive contact surfaces spaced apart from one another. The two contact surfaces can be printed on a periphery of a punch out. Alternatively, the two contact surfaces can be printed on a first swing door. When the electrical contacting surface is engaged with the other two electrical contact surfaces, the momentary switch circuit is completed. The package assembly is portable, easy to use, inexpensive, and effectively assists a patient in following a prescribed regimen for taking medication. The package assembly comprises a blank, a blister pack, and a momentary switch circuit. The blank is constructed from any suitable foldable material, such as paperboard, that is capable of being die-cut to form a generally rectangular configuration when the blank is in an unfolded position. The blank is divided into a plurality of panels by fold lines or score lines. The plurality of panels are folded along various fold lines in a continuous folding manner to enclose the pills. Two of the plurality of panels having conductive contacting and contact surfaces construct an integrated momentary switch. The blister pack includes a sheet of plastic layer formed into an 2D matrix of blister cavities which each cavity receives the patient's pills. A foil layer seals the open cavities of the blister sheet. The momentary switch permits the accessing of the patient's tablets or capsules in each cavity to be monitored.

Several variations of the assembly package having the momentary switch are provided, wherein the configuration and shapes of the swing doors are modified so as to

provide additional functionality for the package assembly; while remaining within the spirit and scope of the present invention. For example, the momentary switch may be integrated into the blister pack so as to reduce the number of panels used in the assembly package. Furthermore, the momentary switch can also be integrated into a container such as, for example corrugated box. Moreover, the package assembly may be equipped to communicate with a physician, pharmacist and/or caregiver to keep them abreast of a compliance of a patient to a prescribed regimen. Finally, the package assembly may include a Radio Frequency IDentification (RFID) tag for identification and / or RF transmitter so as to enable the package assembly to communicate with cell phones and Personal Data Acquisition devices such as palm pilot, blackberry, and the like.

One aspect of the present invention relates to a switch for use with an article formed from paperboard. The article includes a first panel and a second panel. The first panel and the second panel each have a sliding surface facing one another. The first and the second panels are in sliding relation to one another between a first position and a second position. The switch comprises a conductive pathway disposed on the sliding surface of the first panel and a first contact surface is disposed on the sliding surface of the second panel and a second contact surface is disposed on the sliding surface of the second panel. The second contact surface is in spaced relation to the first contact surface so as to prevent electrical communication between the first and second contact surfaces. The conductive pathway of the first panel is in spaced relation to at least one of the first and second contact surfaces of the second panel when the first and second panels are in the first position. The conductive pathway bridges the first and second contact surfaces

when the first and second panels are in the second position to thereby permitting electrical communication between said first and second contact surfaces.

Another aspect of the present invention relates to a package comprising at least one contact panel having a conductive pathway. At least one circuit panel having a first conductive contact surface and a second conductive contact surface spaced apart from one-another so as to prevent electrical communication between the first conductive contact surface and the second conductive contact surface. At least one blister cavity is capable of having an article therein is positioned relative to the contact panel such that dispensing the article from the blister cavity causes the conductive pathway to bridge the first and second conductive surfaces and to thereby permit electrical communication between the contact panel and the circuit panel.

Yet another aspect of the invention relates to a blank used to form a package. The package comprises first, second, and third score lines which divide the blank into at least one contact panel, at least one circuit panel, at least one blister panel, and at least exterior panel. The contact panel and the circuit panel are formed by the first score line. The blister panel and exterior panel are formed by the second score line. Third score line delimit the circuit panel and exterior panel from one another. The contact panel having at least one swing door is configured to pivot with respect to the contact panel. The circuit panel has at least one punch out therein. The exterior panel have at least one tear away door therein, and the blister panel have at least one punch out that is configured to receive a blister pack protruded therefrom and wherein the at least one contact panel, the at least one circuit panel, the at least one blister panel, and the at least exterior panel cooperate with one another to construct the package.

BRIEF DESCRIPTION OF THE DRAWINGS

A full understanding of the invention can be gained from the following description of the preferred embodiments when read in conjunction with the accompanying drawings in which:

Figure 1 is a perspective view of a package assembly adapted for use with pharmaceutical articles in accordance with a preferred embodiment of the present invention;

Figure 2 is a perspective view of the package assembly shown in Fig. 1, illustrating the package assembly in a folded position;

Figure 3A is a plan view of a blank used to form the package assembly shown in Figure 1;

Figure 3B is a close-up view of a portion of Fig. 3A illustrating an enlarged front view of one swing door;

Fig. 3C is a close up view of a portion of Fig. 3A illustrating the swing door being positioned within in a plane of the contact panel;

Fig. 3D is a close-up view of a portion of Fig. 3A illustrating the swing door being positioned out of the plane of the contact panel;

Fig. 4A is a perspective view of the blank in Fig. 3A illustrating the blank in a configuration partially folded;

Fig. 4B is a perspective view of the blank in Fig. 3A illustrating circuit and contact panels each being folded onto one of a plurality of exterior panels;

Fig. 5 is an exploded perspective view of a blister cavity with pills therein in spaced relation to a foil layer used to seal the blister pack in accordance to one embodiment of the present invention;

Fig. 6A is an exploded view of the blank shown in Fig. 4B and a pair of blister packs each facing downwardly towards one of the plurality of blister panels;

Fig. 6B is a partial sectional view of one blister pack shown along line 6B-6B of Fig. 6A;

Fig. 7A is a plan view of the blank shown in Fig. 3A, further including a circuitry unit applied to the circuit panels;

Fig. 7B is a detail view of the circuitry unit shown in Fig. 7A;

Fig. 7C is a perspective view of the blank in Fig. 7A illustrating the blank in a configuration partially folded;

Fig. 7D is an exploded view of the blank shown in Fig. 7A and a pair of blister packs each facing downwardly towards one of the plurality of blister panels;

Fig. 8 is a sectional view of one blister pack shown along line 8-8 of Fig. 7D;

Fig. 9A is an exploded perspective view of one blister pill unit of the package assembly in Fig. 1;

Fig. 9B is a partial perspective view of the blister pill unit shown in Fig. 9A;

Figs. 10A is a sectional view of Fig. 9B shown along line 10-10 illustrating the momentary switch in an open position;

Fig. 10B is the same as Fig. 10A illustrating the pill is causing the momentary switch to be activated and in a closed position;

Fig. 10C is the same as Fig. 10B illustrating the pill is dispensing from the assembly package;

Fig. 11 is a perspective view of a package assembly adapted for use with pharmaceutical articles in accordance with another embodiment of the present invention;

Figure 12 is a perspective view of the package assembly shown in Fig. 11, illustrating the package assembly in folded position;

Figure 13A is a plan view of a blank used to form the package assembly shown in Figure 11;

Figure 13B is a close-up view of a portion of Fig. 13A illustrating an enlarged front view of one swing door;

Fig. 13C is a close-up view of a portion of Fig. 13A illustrating the swing door being positioned out of the plane of the contact panel;

Fig. 13D is a close up view of a portion of Fig. 13A illustrating the swing door being positioned within in a plane of the circuit panel;

Fig. 13E is a close-up view of a portion of Fig. 13A illustrating the swing door being positioned out of the plane of the circuit panel;

Fig. 14A is a perspective view of the blank in Fig. 13A illustrating the blank in a configuration partially folded;

Fig. 14B is similar to Fig. 14A illustrating circuit and contact panels each being folded onto one of plurality of exterior panels and a pair of blister packs each facing downwardly towards one of the plurality of blister panels;

Fig. 15A is a plan view of the blank shown in Fig. 13A, further including a circuitry unit applied to the circuit panels;

Fig. 15B is a detail view of the circuitry unit shown in Fig. 15A;

Fig. 15C is a perspective view of the blank in Fig. 15A illustrating the blank in a configuration partially folded;

Fig. 15D is an exploded view of the blank shown in Fig. 15A and a pair of blister packs each facing downwardly towards one of the plurality of blister panels;

Fig. 16A is an exploded perspective view of one blister pill unit of the package assembly in Fig. 11;

Fig. 16B is a partial perspective view of the blister pill unit shown in Fig. 16A;

Fig. 17A is a sectional view of Fig. 16B shown along line 17-17 illustrating the momentary switch in an open position;

Fig. 17B is the same as Fig. 17A illustrating the pill is causing the momentary switch to be activated and in a closed position;

Fig. 17C is the same as Fig. 10B illustrating the pill is dispensing from the assembly package;

Fig. 18 is flow chart illustrating the operation of the momentary switch having a microprocessor in accordance to the embodiments of the present invention; and

Figs 19A-19D is the perspective view of a container having a momentary switch thereon in accordance to another embodiment of the invention.

DETAIL DESCRIPTION OF THE INVENTION

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail preferred embodiments of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the broad aspect of the invention to the embodiments illustrated.

Fig. 1 is a perspective view of a package assembly 100 adapted for use generally with pharmaceutical articles in accordance with the preferred embodiment of the present invention. The pharmaceutical articles used in the package assembly 100 are, for example, capsules, tablets, and/or pills for controlled indication of dispensing of the pharmaceutical articles from the package assembly 100. Although the package assembly 100 is used for storing capsules, tablets, and/or pills, but one of ordinary skill in art would appreciate that the package assembly 100 may be used for variety of other consumer products such as battery, electronic devices, candy and other foodstuffs.

The package assembly 100 includes a first portion 102 and a second portion 104 which are integrally attached to one another by a ridge 106. The first portion 102 includes a front side 108 and a back side 110. Similarly, the second portion 104 includes a front side 112 and a back side 114. The ridge 106 is defined by, not limited to, two substantially parallel non-continuous score lines 116 and 118. The width (W) of the ridge 106 is generally corresponds to the thickness of the first and second portions 102, 104 and will be described in greater detail below. Each of the respective first and second portions 102,104 respectively includes a blister pack 250 (not entirely visible in Fig. 1) having a 2D matrix of blister cavities 120. It should be noted that the present invention is

not limited to the 2D matrix of blister cavities, and depends on the needs of a user; the blister pack 250 can be any number of matrix. Blister pack 250 is shown more clearly in Fig. 5. At least one blister pack 250 is sandwiched between front and back sides 108, 110 respectively in the first portion 102 and at least one blister pack 250 is sandwiched between front and back sides 112, 114 respectively in the second portion 104. Each of the blister cavities 120 protrudes from the respective front sides 112, 114 of first portion 102 and the second portion 104. Each blister cavity 120 is sized to receive a pill 122 therein. Opening 124 in the first portion 102 is provided to receive a microprocessor 262 (Figs. 7A, 7B). The microprocessor 262 operates in corporation with a momentary switch, as described hereinafter to permit the accessing of the pill 122 in each blister cavity 120. Holes 126a, 126b are also provided to place light emitting diodes (LEDs) that are part of a circuitry unit 260 (Fig. 7B) of the package assembly 100. The holes 126a, 126b are located on the back side 110 and are exposed through the opening 124 of the front side 112.

The first portion 102 and the second portion 104 preferably connected to one another by ridge 106, although they may also be attached together by any suitable means including, but not limited to, by adhesives or mechanical means such as, for example, snapping connections, and inserting the tab on one portion into the slot of the second portion or vice versa. It should be noted that the first portion 102 and the second portion 104 can be separated and used individually without compromising the integrity and the function of the package assembly 100. When the first portion 102 and the second portion 104 are separated, each portion 102, 104 would include a separate circuitry unit. Generally, the size of the package assembly 100 depends on the number of pills 122

stored in the package assembly 100. The first portion 102 and the second portion 104 are preferably made of paper, paperboard, or cardboard, but any other suitable material may be used as well. The package assembly 100 is portable, easy to use, inexpensive, and effectively assists a patient in following a prescribed regimen for taking medication.

Fig. 2 illustrates the package assembly 100 of Fig. 1 which is folded in half. When folded in half, the package assembly 100 resembles a book. As noted above, the width (W) of the ridge 106 is provided to compensate for the thickness of the blister pack 250 and the circuitry unit 260 disposed therein. When the package assembly 100 is in the folded position, the ridge 106 permits the first and second portions 102, 104 to fold onto one another with ease and prevents possible tearing of non-continuous score lines 116 and 118 in the folded area. As will be appreciated from viewing Figs. 1 and 2, the back side 110 of the first portion 102 includes a 2D matrix of tear away doors 128 that are each defined by non-continuous score lines 130. The 2D matrix of tear away doors 128 are aligned with the corresponding blister cavities 120 when the blister pack 250 is positioned relative to the tear away doors 128 as shown in Fig. 1. The function and use of the tear away doors 128 are best understood by reference to Figs. 3, 8 and 9, and will be described in greater detail hereinafter.

Fig. 3A is a plan view of a blank 200 used to form the package assembly 100 of Fig. 1 in accordance with the preferred embodiment of the present invention. The blank 200 is constructed from any suitable foldable material, such as paperboard that can be die-cut to form a generally rectangular configuration when the blank 200 is in the unfolded position. It is well within the scope of this invention to use any suitable material well known or later developed in the art such as, for example, paper, plastic, or the like.

The blank 200 is divided into section I and section II by two longitudinal non-continuous score lines 116,118 extended along the length of the blank 200. It will be appreciated that the practice of this invention permits the section I and section II be separated from the one another so that each section I or section II can be folded to form a package assembly that would function in substantially the same manner as the package assembly 100 described herein.

In the exemplary embodiment of Fig. 2, when the blank 200 is folded, respective sections I and II are defined by respective first and second portions 102, 104. The longitudinal non-continuous score lines 116, 118 are extended from left edge 206 of the blank 200 to the central portion of the blank 200. The non-continuous score lines 116 and 118 are substantially parallel and cooperate with one another to form the ridge 106, as described above. A cut out 210 is formed from the central portion of the blank 200 to the right edge 212 of the blank 200. Transverse non-continuous score lines 214, 216, and 218 extend along the width of the blank 200 and cooperate with the longitudinal non-continuous score lines 116 and 118 to define a total of eight panels which are namely, two opposing contact panels 220a, 220b, two opposing circuit panels 222a, 222b, two opposing exterior panels 224a, 224b, and two opposing blister panels 226a, 226b. The central portion of the blank 200 is defined by intersection of non-continuous score lines 116,118 with the transverse non-continuous score line 216. It should be noted that the number of panels illustrated in Fig. 3 is strictly exemplary in nature and is in no way intended to limit the number of panels in the package assembly 100.

The contact panel 220b includes a rectangular cut out 228 which extends from an inner edge 227a of the panel 220b toward the outer edge 227b of the panel 220b. In the

exemplary embodiment of Fig. 3A, the contact panel 220a may have a cut out similar to the cutout 228 provided in contact panel 220b, in which the two panels 220a, 220b would be identical but opposing one another. The blister panel 226b includes the opening 124 which cooperates with the cut out 228 to permit the microprocessor 262 (Fig. 7A) to be exposed from the blister panel 226b when the blank 200 is folded to form the package assembly 100 as depicted in Fig. 1. It should be noted that the cut out 228 and the opening 124 are not critical to the practice of the invention. In the absent of the cut out 228 and the opening 124, the circuitry unit 260 is concealed between the blister panel 226a and contact panel 220a when the blank 200 is in the folded position as shown in Fig. 1.

Each of the contact panels 220a, 220b includes a 2D matrix of individual swing door 230 that are each defined by non-continuous score lines 232. Fig. 3A illustrates a total of fifteen swing doors 230 that are substantially oblong in shape and positioned approximately in the center of contact panels 220a, 220b. It should be noted that the number of swing doors 230 shown in Fig. 3A is strictly exemplary in nature and is in no way intended to limit the number of swing doors 230 that can be included in the package assembly 100. Furthermore, each swing door 230 preferably stands alone and is not connected with another swing door 230.

Referring to Figs 3B-3D, each of the swing doors 430 are defined by the non-continuous score line 232 having generally an oval body portion 234 with a generally rectangular tab 236 projected outwardly from the long side of the swing door 230. The non-continuous score line 232 is interrupted by a pair of nicks 238 so as to hold the swing door 230 to the contact panel 220a and to permit the swing door 230 to pivot in and out

of the plane of panel 220a as best depicted in Fig. 3D. An ordinary skill in the art would appreciate that the pair of nicks 238 functions like a typical door hinges which permit the swing door 230 to pivot along an axis aligned with a second long side of the generally oval portion 234 opposite the tab 236.

Each of the circuit panels 222a includes a 2D matrix of punch outs 240 that correspond to the number of swing doors 230 in the contact panels 220a. Each of the punch out 240 is aligned with the corresponding swing door 230 to be used in forming an electronic momentary switch 290 (shown in Fig. 9A, 9B, 10A-C) when the blank 200 is in the folded position. The function and use of the momentary switch 290 are best understood by reference to Figure 10A-10C and will be described in greater detail later. The punch outs 240 are positioned approximately in the center of circuit panels 222a, 222b. It should be noted that the number of punch outs 240 shown in Fig. 3A is strictly exemplary in nature and is in no way intended to limit the number of punch outs 240 that can be included in the package assembly 100. Furthermore, each punch outs 240 preferably stands alone and is not connected with another punch out 240. Although the punch outs 240 are illustrated as being oval, it should be noted that it is within the scope of this invention to provide punch outs 240 of any known shape, such as, for example, but not limited to, rectangular, circular, triangular, trapezoidal, square, and the like.

Each of the exterior panels 224a, 224b includes a 2D matrix of tear away doors 128 that are each defined by non-continuous score lines 130. The exemplary embodiment of FIG. 3A illustrates a total of fifteen tear away doors 128 that are substantially rectangular in shape and disposed approximately in the center of the exterior panels 224a. The shape of each tear away door 128 being rectangular is merely exemplary and it is

within the scope of this invention to use any known shape to define the tear away doors 128, such as, but not limited to, circular, oval, square, triangular, trapezoidal, and the like. The tear away doors 128 are aligned with the punch outs 240 in the circuit panels 222a, 222b when the blank 200 is in the folded position. It should be noted the number of tear away doors 128 illustrated is strictly exemplary in nature and is in no way intended to limit the number of tear away doors 128 that can be included in the assembly package 100. Furthermore, each tear away door 128 stands alone and is not connected with another tear away door 128. The exterior panels 224a, 224b form the back surface of the package assembly 100 when the contact panels 220a, 220b, circuit panels 222a, 222b, and the blister panels 226a, 226b are folded onto one another. The back surface 110 of the package assembly 100 may also be used to print, for example, a doctor's instruction, pharmacists' instructions, graphics, comments and the like.

Each of the blister panels 226a, 226b includes a 2D matrix of punch outs 246 that correspond to the number of the respective tear away doors 128, punch outs 240 and swing doors 230 when the blank 200 is in the folded position. When the contact panels 220a, 220b, circuit panels 222a, 222b, and the exterior panels 224a, 224b are folded onto one another, the respective blister panels 226a, 226b form the front surfaces 112, 108 of the package assembly 100 as best shown in Fig. 1. The 2D matrix of punch outs 246, in the blister panels 226a, 226b, receives a corresponding 2D matrix of the blister cavity 120 as best depicted in Figs. 5. The punch outs 226a, 226b are positioned approximately in the center of blister panels 226a, 226b. It should be noted that the number of punch outs 246 shown in Fig. 3A is strictly exemplary in nature and is in no way intended to limit the number of punch outs 246 that can be included in the package assembly 100.

Furthermore, each punch outs 246 preferably stands alone and is not connected with another punch out 246. Although the punch outs 246 are illustrated as being oval, it should be noted that it is within the scope of this invention to provide punch outs 246 of any known shape, such as, for example, but not limited to, rectangular, circular, triangular, trapezoidal, square, and the like.

Fig. 4A illustrates the manner in which the blank 200 of Fig. 3 is folded. Non-continuous score line 216 enables circuit panels 222a, 222b to be folded onto the exterior panels 224a, and 224b. Similarly, Non-continuous score line 214 enables contact panels 220a, 220b to be folded onto the circuit panels 222a, 222b. It should be noted that circuit panels 222a, 222b are sandwiched between the contact panels 220a, 220b and the exterior panels 224a, 224b as best depicted in Fig. 4B.

Fig. 6A illustrates an exploded view of the blank 200 and a pair of blister packs 250. The blank 200 is partially folded and the pair of blister packs 250 is positioned over the blister panels 226a, 226b. The pair of blister packs 250 is placed onto the blister panels 226a , 226b such that each of the blister cavities 120 protrudes from the punch outs 246 of the blister panels 226a, 226b as best depicted in Fig. 1. Then, the non-continuous score line 218 enables blister panels 226a, 226b to be folded onto the contact panels 220a, 220b along the non-continuous score line 218. It should be noted that the scope of this invention is not limited to the order of the above-described sequence of steps for folding the respective panels 220a, 220b, 222a, 222b, 224a, 224b, 226a and 226b onto each other. For example, depends on the number of panels to be folded, every permutation of possible folding sequences regarding the panels 220a, 220b, 222a, 222b,

224a, 224b, 226a and 226b along non-continuous score lines 214, 216, and 218 is considered to be within the scope of this invention.

For illustrative purposes, only a few blister cavities 120 is depicted in Fig. 6A, but generally the number of blister cavities 120 corresponds to the number of punch outs 246. Moreover, Fig. 6A depicts only two blister packs 250, but this invention can be practiced with any number of blister packs 250 and therefore, the two blister packs 250 are shown by way of example. Since the two blister packs 250 are substantially similarly, only one of the blister pack 250 is described below.

The blister pack 250 shown in Fig. 5 includes a blister layer 252 formed into a 2D matrix of blister cavities 120 which each cavity receives the pill122. A foil layer 254 is adhered to the blister pack 250 in a conventional manner. The blister layer 252 defines the top of the blister cavities 120 and is preferably a vinyl or PVC material, but can be any suitable material. The blister cavities 120 are preferably, but need not be, transparent so that the pill 122 housed by the blister cavity 120 can be seen. Although the blisters cavities 120 can take any orientation, size or shape, the blister cavities 120 are preferably oriented, sized, and shaped to correspond to the orientation, size, and shape of the pills 122. For example, in the embodiment shown in Fig. 5, the blister cavities 120 are oblong for housing a generally oblong pill 122 and the blister cavities 120 is slightly larger than the pills 122, so that the pills 122 will fit within the blister cavities 120 but will not be able to have a significant amount of room to move. Each blister cavity 120 is tear resistant, such that a pill 122 housed in the blister cavities 120 cannot be accessed by tearing the blister layer 252 without substantial effort or the use of a blade. It will be appreciated that a pill 122 can be removed from the blister cavity 120 by pushing the

blister cavity 120 and forcing the pill 122 to punch a hole in the foil layer 254 so that the pill 122 can be removed via the punched hole.

Fig. 7A is a plan view of the blank 200 having the circuitry unit 260 disposed therein and is used to form the package assembly 100 of Fig. 1 in accordance with the preferred embodiment of the present invention. The circuitry unit 260 is configured to be printed on circuit panels 220a, 220b of the blank 200. As noted above, the circuitry unit 260 in corporation with a momentary switch 290, as described hereinafter, permits the accessing of the pill 122 in each blister cavity 120 to be monitored. As best illustrated in Fig. 7B, the circuitry unit 260 comprises a microprocessor 262 having an audible piezo-alarm 266 and a light emitting diode 268, conducting circuits 264a, 264b, and other components such as a read-only-memory and a read-access-memory to keep track of the time to take the pill 122 and alert a patient if the pill 122 was not taken at the appropriate time. The microprocessor 262 may adhesively attached to the circuit panel 222b. The microprocessor 262 communicates with the package assembly 100 via conductive circuits 264a, 264b. Alternatively, one skilled in the art would appreciate that microprocessor 262 may be in optical communication with the package assembly 100. The respective conductive circuits 264a, 264b preferably consists of respective electrically conductive pathways 266a, 266b and 266c, 266d that are printed, for example, graphically in the form of printing ink or applied by another method, for example, in the form of foil, onto the circuit panels 222a and 222b as best depicted in the Fig. 7A.

Each of the conductive pathways 266a, 266b and 266c, 266d is configured to form a generally U-pattern conductive pathway. In the exemplary embodiment, the respective U-shaped conductive pathways 266a, 266b and 266c, 266d are generally

intertwined to minimize the space needed to print the conductive pathways 266a, 266b and 266c, 266d on their respective circuit panel 222a and 222b. The conductive circuits 264a, 264b functions similarly to that used, for example, in parallel switches. It will be appreciated that the parallel pattern configuration of conductive pathways 266a, 266b and 266c, 266d are only exemplary and by no means limited to parallel pattern. It is well within the scope of this invention that the conductive pathways 266a, 266b and 266c; 266d form other geometrical patterns with one another. Each of the conductive pathways 266a, 266b includes a plurality of conductive contact surfaces 268a and 268b. Similarly, each of the conductive pathways 266c, 266d includes a plurality of conductive contact surfaces 268c and 268d. In the exemplary embodiment of Fig 7A, the parallel pattern of the conductive circuits 264a, 264b correspond to the 2D matrix of the punch outs 240 contained in the circuit panels 222a, 222b. For example, in the circuit panel 222a, each punch out 240 includes a pair of contact surfaces 268a, 268b that is printed on one of the long sides of the punch out 240. Alternatively, the pair of contact surfaces 268a, 268b may be printed on one of the short sides of the punch out 240, provided that the respective conductive contacting surfaces 272a, 272b are re-configured such that the pair of contact surfaces 268a, 268b is symmetric with respect to the contacting surfaces 272a, 272b. For example, if the contact surfaces 268a, 268b are printed on one of the short sides of the punch out 240, then the respective conductive contacting surfaces 272a, 272b are also printed on the short side of the respective swing doors 230. The conductive contact surfaces 268a, 268b are spaced apart from one another as best shown in Fig. 7B. It should be noted that all of the contact surfaces 268a, are branched out from the conductive pathway 266a and the entire contact surface 268b, are branched out from the

conductive pathway 266b. Similarly, in the circuit panel 222b, each punch out 240 includes a pair of contact surfaces 268c, 268d that are printed on one of the long sides of the punch out 240. The contact surfaces 268c, 268d are spaced apart from one another as best shown in Fig. 7B. It should be noted that all the contact surface 268a are branched out from the conductive pathway 266a and the entire conductive contact surface 268b are branched out from the conductive pathway 266b. It should be noted that the parallel configuration of conductive pathways 266a, 266b and 266c, 266d substantially reduces the number of the electrical contacts needed to communicate with the microprocessor 262.

The conductive paths 266a, 266b are connected to the microprocessor 262 via a flexible circuit 270. The flexible circuit 270, due to its inherent toughness can resist a multiple folding without any damage to the wires. The flexible circuit 270 is connected to the conducting pathways 266a, 266b and 266c, 266d by a Z directional electrically conductive tape 280. The Z directional electrically conductive tape 280 is similar to a two sided tape that conducts electricity only up and down through its thickness "z-direction" as well known in the art. The Z directional conductive tape 280 does not conduct across the surface of the circuit panels 222a, 222b in the X and Y directions. Advantageously, the Z directional conductive tape 280 could be applied over two conductive traces that are next to each other without connecting them to each other or "shorting them out". One ordinary skilled in the art would appreciate that a Z directional conductive adhesive may be used for the practice of the present invention. The Z directional conductive tape 280 is also known as anisotropic electrically conductive tape. Alternatively, It should be noted that a standard conductive adhesive may be applied over two conductive traces that are

next to each other, however, one ordinary skill in the art would know that the standard conductive adhesive have to be applied in a manner that a small amount is applied to each conductive trace so it would not spread out and touch the other adjacent contact surfaces 268a, 268b and 268c, 268d. It should be noted that contact surface 266a can not be connected to contact surface 266b and contact surface 266c can not be connected to contact surface 266d.

The microprocessor 262 is programmed to keep track of the time to take the pill and alert a patient if the pill 122 was not taken at the appropriate time. The microprocessor 262 may be programmed to establish a desired pill schedule and to store in the memory the actual dispensing times of the pills 122. The audible piezo-alarm 264 sounds to indicate to the patient that it is time to take the pill according to the programmed pill schedule. The microprocessor 262 may be programmed to alert the patient to administer a pill every fixed time interval. The microprocessor 262 may also be programmed to keep track of the untaken pills by the patient. The light emitting diode (LED) 266 is a semiconductor that emits light when eclectically energized. The light emitting diode (LED) 266 acts as tiny light bulb and used as a small indicator light to alert a patient.

The swing doors 230 on the respective contact panels 220a, 220b receive respective conductive contacting surface 272a, 272b. As described above, each swing door 230 includes the oval portion 234 with the rectangular tab 236 projected outwardly from the long side of the swing door 230. The conductive contacting surface 272a is applied at the tip of the rectangular tab 236. Similarly, the conductive contacting surface 272b is applied at the tip of the rectangular tab 236b. Although the tab 236 is illustrated

as being rectangular, it should be noted that it is within the scope of this invention to provide tab 236 of any known shape, such as, for example, but not limited to, circular, triangular, trapezoidal, square, and the like.

The respective conductive contacting surfaces 272a, 272b are in electrical communication with the respective conductive contact surfaces 268a, 268b and 268c, 268d, when the tip of the rectangular tab 236 slides over the conductive contact surfaces 268a, 268b and 268c, 268d.

Fig. 7C illustrates the manner in which the blank 200 of Fig. 7A is folded. The blank 200 in Fig. 7A is folded exactly in the same manner as the exemplary embodiment described above with reference to Fig. 4A. With the exception of the circuitry unit 260 in circuit panels 222a, 222b and the conductive contacting surfaces 272a, 272b in the contact panels 220a, 220b, which are added to the blank 200 of Fig. 3A, the two exterior panels 224a, 224b, and two blister panels 226a, 226b in Fig. 7C are identical to that of Fig. 4A. As such, a detailed discussion of these panels will be omitted to avoid redundancy. It should be noted that in Fig. 7B, when the contact panels 220a, 220b overlay the circuit panels 222a, 222b, each of the respective swing doors 230 in cooperation with each of the punch out 240 forms a momentary switch 290 that is in an open position. The function and use of the momentary switch 290 are best understood by reference to Figure 10A-10C and will be described in greater detail later.

Fig. 7D illustrates an exploded view of the blank 200 including the circuitry unit 260 and a pair of blister pack 250. With the exception of the circuitry unit 260 which are added to the blank 200, Fig. 7D is exactly the same as Fig. 7A. Therefore, a detailed

discussion of incorporating the blister panels 250 onto the blank 200 will be omitted to avoid redundancy.

To construct the blank 200 illustrated in Fig. 7C to form the package assembly 100, the circuit panels 222a, 222b are folded onto the exterior panels 224a, and 224b along the Non-continuous score line 216. Next, the contact panels 220a, 220b are folded onto the circuit panels 222a, 222b along the Non-continuous score line 214. To enhance the integrity of package assembly 100, adhesive may be applied in certain area of the circuit panels 222a, 222b which would secure the contact panels 220a, 220b to the circuit panel and facilitate holding the circuit unit 260 to the circuit panels 222a, 222b. To ensure that the swing doors 230 are free to pivot, abhesive (anti-stick compound) may be applied on the back side of the contact panels 220a, 220b so that to prevent the swing doors 230 from sticking to the foil 254 of the blister pack 250. Similarly, abhesive may be applied on the back side of the tear away doors 128 so that to prevent the tear away doors 128 from sticking to the back side of the circuit panels 222a, 222b. It is preferred that respective circuit panels 222a, 222b and respective exterior panels 224a and 224b are heat sealed with one another. Next, the pair of blister pack 250 is fitted into the blister panels 226a, 226b so that the blister cavities are protruded from the punch out 245, and then the blister panels 226a, 226b are folded onto the contact panels 220a, 220b along the Non-continuous score line 218. Then, all the panels 220a, 220b, 222a, 222b, 224a, 224b, 226a and 226b having heat sealable surfaces are overlaid onto each other to be heat sealed to form the package assembly 100. As noted above, depends on the number of panels to be folded, every permutation of possible folding sequences regarding the panels

220a, 220b, 222a, 222b, 224a, 224b, 226a and 226b along non-continuous score lines 214, 216, and 218 is considered to be within the scope of this invention.

Fig. 9A is an exploded perspective view of one blister pill 122 having a momentary switch 290 attached thereto in according to a preferred embodiment of the present invention. Fig. 9A is a cut way portion of Fig. 11 for only illustration purposes. Fig. 9A illustrates the assembly procedure of one of the blister pills 122 in spaced relation to the momentary switch 290. One ordinary skilled in the art would appreciate that the package assembly 100 is constructed in the same manner as illustrated in Fig. 9B. As noted above, the package assembly 100 is constructed from the blank 200, the blister pack 250, and the circuit unit 260 all incorporated with one another. The package assembly 100 includes fifteen blister cavities 120, each blister cavity having a pill 122 housed therein and, of which, one blister incorporated the momentary switch 290 thereto is best depicted in Fig. 9B. The detail operation of the momentary switch 290 is now described. For illustrative purposes, only one blister cavity 120 having a pill 122 therein with a momentary switch 290 attached to the blister cavity 120 is discussed.

Figs. 10A-10C are cross sectional views taken along line 10-10 of Fig. 9b, illustrating the operation of momentary switch 290 in accordance to the preferred embodiment of the invention. Figs. 10A-10C shows only one blister pill 122 having a momentary switch 290 attached thereto, but one skill in the art appreciates that in the package assembly 100, each blister pill 122 has one momentary switch 290 attached thereto. As noted above, in the preferred embodiment of this invention, the momentary switch 290 is used to monitor the dispensing of pill 122 from the package assembly 100. Fig. 10A shows the momentary switch 290 in an opened position in which the conductive

contact surface 272a is spaced apart from the contacting surfaces 268a, 268b. As noted above, the respective contact surfaces 268a, 268b are symmetric with respect to the contacting surface 272a and the contact surfaces 268a, 268b are in the same plane, thus in the sectional views of 10A-10C, the contact surfaces 268a, 268b are present. A portion of the blister panel 226 with the blister cavity 120 having the pill 122 therein is protruded from the punch out 246. Fig. 10A clearly shows that the contact panel 220 and the circuit panel 222a are laid onto one anther. The contact panel 220 and the circuit panel 222a are sandwiched between the blister panel 226 and the exterior panel 224a. The tear away door 128 protects the circuit panel 222a from possible damage. Since the tear away doors 128 are only used for protection purposes, then the tear away doors 128 are not necessary component of the package assembly 100. As described hereinbefore with reference to Figs. 3A-3D, the swing door 230 having the substantially rectangular tab 236 pivots with respect to hinge point 296. When the pill 122 is push out of the blister cavity 120, the pills 122 breaks through the foil 252 and push down onto the swing door 230. In response, the swing door 230 pivots downwardly out of plane of panel 220a as best illustrated in Fig. 10B. It should be noted that the downward distance of the swing door 230 corresponds to the linear distance (L) in which the tab 236 moved away laterally with respect to the panel 220a. As the pill 122 continue to push out of the blister cavity 120, the tab 236 having conductive contacting surface 272a would come in contact in a sliding manner with the conductive contact surfaces 268a, 268b and put the momentary switch 290 in closed position. During the sliding motion of tab 236 over the contact surfaces 268a, 268b the momentary switch remained in closed positioned. As the pill 122 continue to move out downwardly from the blister cavity 120, the contacting surface

272a is disengaged from the contact surfaces 268a, 268b, which put momentary switch 290 back in the opened position and the tear away door is now separated from the exterior panel 224a. It is also possible to remove the tear away door prior to attempting to push the pill 122 out of the package. The pill 122 is dispensed from the blister cavity 120, when the tab 236 is passed through the punch out 240. It should be noted that the width of the contacting surface 272a and/or the width of the contact surface 268a, 268b and the speed at which the pill 122 is pushed out, would control the time the momentary switch 290 is remained in closed position.

Figures 11 is a perspective view of a package assembly 300 used generally for pharmaceutical articles in accordance with the second preferred embodiment of the present invention. The pharmaceutical articles used in the package assembly 300 are, for example, capsules, tablets, and/or pills for controlled indication of dispensing of the pharmaceutical articles from the package assembly 300. Although the package assembly 300 is used for storing capsules, tablets, and/or pills, but one of ordinary skill in art would appreciate that the package assembly 300 may be used for variety of other consumer products such as battery, electronic devices and the like.

The package assembly 300 includes a first portion 302 and a second portion 304 which are integrally attached to one another by a ridge 306. The first portion 302 includes a front side 308 and a back side 310. Similarly, the second portion 304 includes a front side 312 and a back side 314. The first portion 302 and a second portion 304 are best understood by reference to Figs. 13 and 17A-17C, the function and use of which will be described in greater detail hereinafter. The ridge 306 is defined by two substantially parallel non-continuous score lines 316 and 318. The width (W) of the ridge 306 is

generally corresponds to the thickness of the first and second portions 302, 304 and will be described in greater detail below. Each of the respective first and second portions 302,304 includes a blister pack 250 (not entirely visible in Fig. 11) having a 2D matrix of blister cavities 320. At least one blister pack 250 is sandwiched between front and back sides 308, 310 in the first portion 302 and at least one blister pack 250 is sandwiched between front and back sides 312, 314 in the second portion 304. Each of the blister cavities 320 is protruded from the respective first side of the first portion 302 and the second portion 304. Each blister cavity receives a pill 322 therein. Opening 324 in the first portion 302 is provided to receive a microprocessor 262 (shown in Fig. 15A & 15B). The microprocessor 262 in corporation with a momentary switch 490, as described hereinafter, permits the accessing of the pills 322 in each blister cavity 320 to be monitored. Holes 326a, 326b are also provided to place Light Emitting Diodes (LEDs) 266 that are part of the circuitry unit 260 in the package assembly 300. The holes 326a, 326b are located on the back side 310 and are exposed through the opening 324 of the front side 324. The first portion 302 and the second portion 304 may also be attached together by any suitable means including, but not limited to, by adhesives or mechanical means. It should be noted that the first portion 302 and the second portion 304 can be separated and used individually without compromising the integrity and the function of the package assembly 300. When the first portion 302 and the second portion 304 are separated, each portion can contain a circuitry unit. Generally, the size of the package assembly 300 depends on the number of pills 322 stored in the package assembly 300. The first portion 302 and the second portion 304 are preferably made of paper, paperboard, or cardboard, but other suitable materials may be used as well. The package

assembly 300 is portable, easy to use, inexpensive, and effectively assist a patient in following a prescribed regimen for taking medication.

Fig. 12 illustrates the package assembly 300 of Fig. 11 which is folded in half. When folded in half, the package assembly 300 resembles a book. As noted above, the width (W) of the ridge 306 is provided to compensate for the thickness of the blister pack 250 and the circuitry unit 460 disposed therein. When the package assembly 300 is in the folded position, the ridge 306 permits the first and second portions 302 and 304 to fold onto one another with ease and prevents possible tearing of non-continuous score lines 316 and 318 in the folded area. As will be appreciated from viewing Figs. 11 and 12, the back side 310 of the first portion 302 includes a 2D matrix of tear away doors 328 that are each defined by non-continuous score lines 330. The 2D matrix of tear away doors 328 are aligned with the corresponding blister cavities 320 shown in Fig. 11. The function and use of the tear away doors 328 are best understood by reference to Figs. 17A-17C and will be described in greater detail hereinafter.

Figs. 13A is a plan view of a blank 400 used to form the package assembly 300 of Fig. 11 in accordance with the second preferred embodiment of the present invention. The blank 400 is constructed from any suitable foldable material, such as paperboard that is die-cut to form a generally rectangular configuration when the blank 400 is in the unfolded position. It is well within the scope of this invention to use any suitable material well known or later developed in the art such as, for example, paper, plastic, and the like. The blank 400 is divided into section I and section II by two longitudinal non-continuous score lines 316 and 318 extended along the length of the blank 400. It will be appreciated that the practice of this invention permits the section I and section II be separated from

the one another so that each section I or section II can be folded to form a package assembly that would use and function exactly the same manner as the package assembly 300.

In the exemplary embodiment of Fig. 12, when the blank 400 is folded, respective sections I and II are defined by respective first and second portions 402 and 404. The longitudinal non-continuous score lines 402 and 404 are extended from left edge 406 of the blank 400 to the central portion of the blank 400. The non-continuous score lines 316 and 318 are substantially parallel and form the ridge 306, as discussed above. A cut out 410 is formed from the central portion of the blank 400 to the right edge 412 of the blank 400. Transverse non-continuous score lines 414, 416, and 418 extend along the width of the blank 400 and cooperate with the longitudinal non-continuous score lines 416 and 418 to define eight panels, namely, two contact panels 420a, 420b, two circuit panels 422a, 422b, two exterior panels 424a, 424b, and two blister panels 426a, 426b. The central portion of the blank 400 is defined by intersection of non-continuous score lines 316 and 318 with the transverse non-continuous score line 416. It should be noted that the number of panels illustrated in Fig. 13A is strictly exemplary in nature and is in no way intended to limit the number of panels in the package assembly 300.

The contact panel 420b includes a rectangular cut out 428 which extend from one end of the panel 420b toward the center thereof. In the exemplary embodiment of Fig. 13A, the contact panel 420a may have similar cut out 428 in which the two panels 420a, 420b would be identical. The blister panel 426b includes the opening 424 which cooperates with the cut out 428 to permit the microprocessor 260 to be exposed when the blank 400 is folded to form the package assembly 300 as depicted in Fig. 11. It should be

noted that the cut out 428 and the opening 424 are not critical to the practice of the invention. In the absent of the cut out 428 and the opening 424, the circuitry unit 460 is concealed between the panels 420a, 420b, 422a, 422b, 424a, 424b, and 426a, 426b when the blank 400 is in the folded position.

Each of the contact panels 420a, 420b includes an 2D matrix of individual swing door 430 that are each defined by non-continuous score lines 432. Fig. 13A illustrates a total of fifteen swing doors 430 that are substantially oblong in shape and are positioned approximately in the center of contact panels 420a, 420b. It should be noted that the number of swing doors 430 shown in Fig. 13A is strictly exemplary in nature and is in no way intended to limit the number of swing doors 430 that can be included in the package assembly 400. Furthermore, each swing door 430 preferably stands alone and is not connected with another swing door 430.

For illustrative purposes only, Figs. 13B, 13C shows only a portion of the contact panel 420a which illustrates the manner in which one of the swing doors 430 pivots with respect to the panel 420a. The swing door 430 is defined by the non-continuous score line 432 and includes a frusto-oval portion 434. The non-continuous score line 432 is interrupted by a pair of nicks 438 so as to hold the swing door 430 to the contact panel 420a and permits the swing door 430 to pivot in and out of the plane of panel 420a as best depicted in Fig.13C. One of ordinary skills in the art would appreciate that the pair of nicks 438 functions similarly to that of a typical door hinges which permit the swing door 430 to pivot along an axis aligned with a second long side of the generally frusto-oval portion 434.

For illustrative purposes only, Figs.13D and13E show only a portion of the circuit panel 422a which illustrates the manner in which one of the swing doors 440a, 440b pivots with respect to the panel 422a. The pair of swing doors 440a, 440b is aligned with the corresponding swing door 430 to be used forming an electronic momentary switch 490 (Fig. 16A) when the blank 400 is in the folded position and the circuitry unit 460 is attached thereto. The function and use of the momentary switch are best understood by reference to Figs. 17A-17C and will be described in greater detail later.

The swing doors 440a and 440b are defined by a cut line 442. Each of the swing door 440a, 440b is defined by a generally rectangular body portion 446a and 446b. The non-continuous score line 448 is interrupted by a pair of nicks 450 so as to hold the swing door 448 to the contact panel 422a and permits the swing door 440a to pivot in and out of the plane of panel 422a as best depicted in Fig 13E. Likewise, the non-continuous score line 452 is interrupted by a pair of nicks 454 so as to hold the swing door 440b to the contact panel 422a and permits the swing door 44ob to pivot in and out of the plane of panel 422a. One of ordinary skills in the art would appreciate that the pair of nicks 450 and 454 functions similarly to typical door hinges which permit the swing doors 440a, 440b to pivot along an axis aligned with a second long side of the generally rectangular body portion 446a and 446b.The swing doors 440a, 440b are positioned approximately in the center of circuit panels 422a, 422b. It should be noted that the number of swing doors 440a, 440b shown in Fig.13A are strictly exemplary in nature and is in no way intended to limit the number of swing doors 440a, 440b that can be included in the package assembly 400. Furthermore, each swing door 440a, 440b preferably stands alone and is not connected with another swing door 440a, 440b. Although the swing door 440a, 440b

are illustrated as being rectangular, it should be noted that it is within the scope of this invention to provide swing door 440a, 440b of any known shape, such as, for example, but not limited to, square, circular, triangular, trapezoidal, oval , and the like.

Each of the respective exterior panels 424a, 424b includes a respective 2D matrix of tear away doors 328 that are each defined by non-continuous score lines 458. The exemplary embodiment of FIG. 13A illustrates a total of fifteen tear away doors 328 that are substantially rectangular in shape and disposed approximately in the center of the exterior panels 424a. The shape of each tear away door 328 being rectangular is merely exemplary and it is within the scope of this invention to use any known shape to define the tear away doors 328, such as, but not limited to, circular, oval, square, trapezoidal, and the like. The tear away doors 328 are aligned with the respective swing doors 430, 440a, and 440b in the respective contact panel 420, 420b, circuit panels 422a, 422b when the blank 400 is in the folded position. It should be noted the number of tear away doors 458 illustrated is strictly exemplary in nature and is in no way intended to limit the number of tear away doors 328 that can be included in the assembly package 300. Furthermore, each tear away door 328 stands alone and is not connected with another tear away door 128. The exterior panels 424a, 424b form the back surface 310 of the package assembly 400 when the contact panels 420a, 420b, circuit panels 422a, 422b, and the blister panels 426a, 426b are folded onto one another. The back side of the package assembly 400 may also be used to print, for example, a doctor's instruction, pharmacists' instructions, graphics, comments and the like.

Each of the blister panels 426a, 426b includes an 2D matrix of punch outs 446 that correspond to the number of the respective tear away doors 328 in the exterior panels

424a, 424b, respective swing doors 430, 440a, and 440b in the respective contact panels 420, 420b and circuit panels 422a, 422b when the blank 400 is in the folded position. The blister panels 426a, 426b form the front surface 308 of the package assembly 300 (shown in Figs. 11 and 12) when the contact panels 420a, 420b, circuit panels 422a, 422b, and the exterior panels 424a, 424b are folded onto one another. The 2D matrix of punch outs 446, in the blister panels 426a, 426b, receives a corresponding 2D matrix of the blister cavity 320 as best depicted in Figs. 11 and 5. The punch outs 426a, 426b are positioned approximately in the center of blister panels 426a, 426b. It should be noted that the number of punch outs 446 shown in Fig. 13A is strictly exemplary in nature and is in no way intended to limit the number of punch outs 446 that can be included in the package assembly 300. Furthermore, each punch outs 446 preferably stands alone and is not connected with another punch out 446. Although the punch outs 446 are illustrated as being oval, it should be noted that it is within the scope of this invention to provide punch outs 446 of any known shape, such as, for example, but not limited to, rectangular, circular, triangular, trapezoidal, square, and the like.

Fig. 14A illustrates the manner in which the blank 400 of Fig. 13A is folded. Since the number of panels defined by the blank 400 in Fig. 13A is the same as the number of panels defined by the blank 200 in Fig. 3A, then the manner in which the blank 400 is folded to form the assembly package 300, is identical to the blank 200 as described hereinabove with reference to Figs. 8-10. As such, a detail description of folding of the blank 400 will be omitted to avoid redundancy. In addition, the manner in which the blister pack 250 is disposed in the blister panels 426a, 426b is identical to that of the blister panel 226a, 226b described in the first embodiment of the present invention.

As such, a detail description of the folding of blank 400 will be omitted to avoid redundancy as well.

Fig. 15A is a plan view of the blank 400 having a circuitry unit 460 disposed therein and is used to form the package assembly 300 in accordance with the second embodiment of the present invention. The circuitry unit 460 is configured on circuit panels 420a, 420b of the blank 400. As noted above, the circuitry unit 460 in corporation with a momentary switch 490, as described hereinafter, permits the accessing of the patient's pills 122 in each blister cavity 120 to be monitored. As best illustrated in Fig. 15B, the circuitry unit 460 includes the same microprocessor 262 that is used in the preferred embodiment of the present invention with reference to Figs 7A and 7B. As such, a detail description of the microprocessor 262 will be omitted to avoid redundancy. The microprocessor 262 may adhesively attached to the circuit panels 422a, 422b. The microprocessor 262 communicates with the package assembly 300 via conductive circuits 464a, 464b. Alternatively, one skilled in the art would appreciate that microprocessor 262 may be in optical communication with the package assembly 100 as described hereinafter. The respective conductive circuits 464a, 464b preferably consists of respective electrically conductive pathways 466a, 466b and 466c, 466d that are printed, for example, graphically in the form of printing ink or applied by another method, for example, in the form of foil, onto the circuit panels 422a and 422b as best depicted in the Fig. 15A.

Each of the conductive pathways 266a, 266b and 266c, 266d is configured to form a generally U-pattern conductive pathway. In the exemplary embodiment, the respective U-shaped conductive pathways 466a, 466b and 466c, 466d generally are

intertwined to minimize the space needed to print the conductive pathways 466a, 466b and 466c, 466d on their respective circuit panel 422a and 422b. The conductive circuits 464a, 464b functions similarly to that of the conductive circuits used, for example, in parallel switches. It will be appreciated that the parallel pattern configuration of conductive pathways 466a, 466b and 466c, 466d are only exemplary and by no means limited to parallel pattern. It is well within the scope of this invention that the conductive pathways 466a, 466b and 466c, 466d form other geometrical patterns with one another. Each of the conductive pathways 466a, 466b includes a plurality of conductive contact surfaces 468a and 468b. Similarly, each of the conductive pathways 466c, 466d includes a plurality of conductive contact surfaces 468c and 468d. In the exemplary embodiment of Fig 15A, the parallel pattern of the conductive circuits 464a, 464b correspond to the 2D matrix of the swing door 440a in the circuit panels 422a, 422b. For example, in the circuit panel 422a, each swing door 440a includes a pair of contact surface 468a, 468b that are printed on the opposite long side of the rectangular body portion 446a with the score line 448. Alternatively, the pair of contact surface 468a, 468b may be printed on one of the short sides of the swing door 440a, provided that the respective conductive contacting surface 472a, 472b are re-configured such that the pair of contact surface 468a, 468b are symmetric with respect to the contacting surfaces 472a, 472b. For example, if the contact surface 468a, 468b are printed on one of the short sides of the swing door 440a, then the respective conductive contacting surfaces 472a, 472b are also printed on the short side of the respective swing doors 430. The conductive contact surfaces 468a, 468b are spaced apart from one another as best shown in Fig. 15B. It should be noted that all of the contact surfaces 468a, are branched out from the

conductive pathway 466a and the entire contact surface 468b, are branched out from the conductive pathway 466b. Similarly, in the circuit panel 422b, each swing door 440a includes a pair of contact surface 468c, 468d that are printed on the opposite long side of the rectangular body portion 446a with score line 448. The contact surfaces 468c, 468d are spaced apart from one another as best shown in Fig. 15B. It should be noted that all the contact surface 468c are branched out from the conductive pathway 466c and the entire conductive contact surface 468d are branched out from the conductive pathway 466d. It should be noted that the parallel configuration of conductive pathways 466a, 466b and 466c, 466d substantially reduces the number of the electrical contacts needed to communicate with the microprocessor 262.

The conductive paths 466a, 466b are connected to the microprocessor 262 via the flexible circuit 270. As noted above, the microprocessor 262 including the flexible circuit 270 is the same for both of the embodiments of the present invention. The flexible circuit 270 is connected to the conducting pathways 466a, 466b and 466c, 466d by the Z directional electrically conductive tape 280. The Z directional electrically conductive tape 280 is similar to a two sided tape that conducts electricity only up and down through its thickness "z-direction" as well known in the art. The Z directional conductive tape 280 does not conduct across the surface of the circuit panels 222a, 222b. Advantageously, the Z directional conductive tape 280 could be applied over two conductive traces that are next to each other without connecting them to each other or "shorting them out". One ordinary skilled in the art would appreciate that a Z directional conductive adhesive may be used for the practice of the present invention. The Z directional conductive tape 280 is also known as anisotropic electrically conductive tape. Alternatively, It should be noted

that a standard conductive adhesive may be applied over two conductive traces that are next to each other, however, one of ordinary skilled in the art would know that the standard conductive adhesive have to be applied in a manner that a small amount is applied to each conductive trace so it would not spread out and touch the other contact surfaces 468a, 468b and 468c, 468d.

The microprocessor 262 is programmed to keep track of the time to take the pill and alert the patient if the pill was not taken at the appropriate time. The microprocessor 262 may be programmed to establish a desired pill schedule and to store in the memory the actual dispensing times of the pills. The audible piezo-alarm 264 sounds to indicate to the patient that it is time to take the pill according to the programmed pill schedule. The microprocessor 262 may be programmed to alert the patient to administer a pill every fixed time interval. The microprocessor 262 may also be programmed to keep track of the untaken pills by the patient. The light emitting diode (LED) 266 is a semiconductor that emits light when eclectically energized. The light emitting diode (LED) 266 acts as tiny light bulb and used as a small indicator light to alert a patient.

The swing doors 430 on the respective contact panels 420a, 420b receive respective conductive contacting surface 472a, 472b. As described above, each swing door 430 is defined by the non-continuous score line 432 and includes a frusto-oval portion 434. The conductive contacting surface 472a is applied at the tip of the frusto-oval portion 434 opposite from the score line 432. Similarly, the conductive contacting surface 472b is applied at the tip of the frusto-oval portion 434 opposite from the score line 432.

The respective conductive contacting surfaces 472a, 472b are in electrical communication with the respective conductive contact surfaces 468a, 468b and 468c, 468d, when the tip of the frusto-oval portion 434 slide over the conductive contact surfaces 468a, 468b and 468c, 468d.

Fig. 15C illustrates the manner in which the blank 400 of Fig. 15A is folded. The blank 400 in Fig. 15A is folded exactly in the same manner as the exemplary embodiment described above with regards to Fig. 14A. With the exception of the circuitry unit 460 in circuit panels 422a, 422b and the conductive contacting surfaces 472a, 472b in the contact panels 420a, 420b which are added to the blank 400 of Fig. 15A, the two exterior panels 424a, 424b, and two blister panels 426a, 426b in Fig. 15A are identical to that of Fig. 13A. As such, a detailed discussion of these panels will be omitted to avoid redundancy. It should be noted that in the Fig. 15A, when the contact panels 420a, 420b overlay the circuit panels 422a, 422b; each of the respective swing doors 430 in cooperation with each of the swing doors 440a forms a momentary switch 490 that is in an open position. The function and use of the momentary switch 490 are best understood by reference to Figure A-C and will be described in greater detail later.

Fig. 15D illustrates an exploded view of the blank 400 including the circuitry unit 460 and a pair of blister pack 250. With the exception of the circuitry unit 460 which are added to the blank 400, Fig. 15D is exactly the same as Fig. 14B. Therefore, a detailed discussion of incorporating the blister panels 250 onto the blank 400 will be omitted to avoid redundancy.

To construct the blank 400 illustrated in Fig. 15A to form the package assembly 300, the circuit panels 422a, 422b are folded onto the exterior panels 424a, and 424b

along the Non-continuous score line 216. Next, the contact panels 420a, 420b are folded onto the circuit panels 422a, 422b along the Non-continuous score line 414. To enhance the integrity of package assembly 300, adhesive may be applied in certain area of the circuit panels 422a, 422b which would secure the contact panels 420a, 420b to the circuit panel and facilitate holding the circuit unit 460 to the circuit panels 422a, 422b. To ensure that the swing doors 430 are free to pivot, abhesive (anti-stick compound) may be applied on the back side of the contact panels 420a, 420b so that to prevent the swing doors 430 from sticking to the foil 254 of the blister pack 250. Similarly, abhesive may be applied on the back side of the tear away doors 428 so that to prevent the tear away doors 428 from sticking to the back side of the circuit panels 422a, 422b. It is preferred that respective circuit panels 422a, 422b and respective exterior panels 424a and 424b are heat sealed with one another. Next, the pair of blister pack 250 is fitted into the blister panels 426a, 426b so that the blister cavities are protruded from the punch out 446, and then the blister panels 426a, 426b are folded onto the contact panels 420a, 420b along the Non-continuous score line 418. Then, all the panels 420a, 420b, 422a, 422b, 424a, 424b, 426a and 426b having heat sealable surfaces are overlaid onto each other to be heat sealed to form the package assembly 300. As noted above, depends on the number of panels to be folded, every permutation of possible folding sequences regarding the panels 420a, 420b, 422a, 422b, 424a, 424b, 426a and 426b along non-continuous score lines 414, 416, and 418 is considered to be within the scope of this invention.

Fig. 16A is an exploded perspective view of one blister pill having a momentary switch 490 attached thereto in accordance to a preferred embodiment of the present invention. Fig. 16A illustrates the assembly procedure of one of the blister pills in spaced

relation to the momentary switch 490. In the momentary switch 490, swing door 430 having the contacting surface 472a thereon is positioned in space relation to the swing doors 446a, 446b. It should be noted that the contacting surface 472a is protected by the swing door 440b when the swing door 430 is in contact with the swing doors 446a. The swing door 440b prevents accidental electrical shorting between the contacting surface 472a and the contact surfaces 468a, 468b. One of ordinary skilled in the art would appreciate that the package assembly 300 is constructed in the same manner as illustrated in Fig. 11. As noted above, the package assembly 300 is constructed from the blank 400, the blister pack 250, and the circuit unit 460 all incorporated with one another. The package assembly 300 includes fifteen blister cavities 120, each blister cavity having a pill 122 housed therein and, of which, one blister incorporated the momentary switch 290 thereto is best depicted in Fig. 16B. The detail operation of the momentary switch 490 is now described. For illustrative purposes, only one blister cavity 120 having a pill 122 therein with a momentary switch 290 attached to the blister cavity 120 is discussed.

Figs. 17A-17C are cross sectional views taken along line 17-17 of Fig. 16B, illustrating the operation of momentary switch 490 in accordance with the second embodiment of the invention. Figs. 17A-17C shows only one blister pill having a momentary switch 490 attached thereto, but one skill in the art appreciates that in the package assembly 300, each blister pill has one momentary switch 490 attached thereto. As noted above, the momentary switch 490 is used to monitor the dispensing of pill 122 from the package assembly 300. Fig. 17A shows the momentary switch 290 in an opened position in which the conductive contact surface 472a is spaced apart from the contacting surfaces 468a, 468b. It should be noted that the respective contact surfaces 468a, 468b

are symmetric with respect to the contacting surface 472a and the contact surfaces 468a, 468b are in the same plane, thus in the sectional views of 17A-17C, the contact surfaces 468a, 468b are present. A portion of the blister panel 426a with the blister cavity 120 having the pill 122 therein is protruded from the punch out 446. Fig. 17A clearly shows that the contact panel 420a and the circuit panel 422a are laid onto one anther. The contact panel 420 and the circuit panel 422a are sandwiched between the blister panel 426a and the exterior panel 424a. The tear away door 328 protects the circuit panel 422a from possible damage. Since the tear away doors 328 are only used for protection purposes, then the tear away doors 328 are not necessary component of the package assembly 300. With particular reference to Fig. 17A, each of the respective swing doors 430, 440a, 440b pivots with respect to three respective hinges 431, 441, and 447. The basic mechanism of the momentary switch 490 relies on the principle that if two doors are placed together in parallel manner with their hinge points at different locations, the point at which one door contact the other door, will change as one door is pushed against the other door to be opened. Alternately, the momentary switch 490 may have four doors instead of two doors that just described.

With reference to Figs.17A-17C, when a user presses on the blister cavity 120, the pill 122 is push out and breaks through the foil 252, which in turn, push down on the swing door 430. The swing door 430 in turn, pivots with respect to the hinge point 431 downwardly out of plane of panel 420a as best illustrated in Fig. 17B. It should be noted that the swing door 430 also push out on the swing door 440b, which in turn, pivots with respect to hinge point 447. As the pill 122 continue to push out of the blister cavity the swing door 430 also push out the swing door 440a, which in turn pivots with respect to

hinge point 441. As the pill 122 continue to push out of the blister cavity 120, the tip of the swing door 430 having conductive contacting surface 472a would come in contact in a sliding manner with the conductive contact surfaces 468a, 468b and put the momentary switch 490 in closed position. The tear away door 328 is now separated from the exterior panel 424a. It is also possible to remove the tear away door prior to attempting to push the pill 122 out of the package. As noted above, the respective contact surfaces 468a, 468b are symmetric with respect to the contacting surface 472a and the contacting surfaces 268a, 268b are in the same plane, thus in the sectional views of 17A-17C, the contacting surfaces 468a, 468b are present. During the sliding motion of the tip of the swing door 430 over the contact surfaces 468a, 468b the momentary switch 490 remained in closed positioned. When the momentary switch 490 is in the closed position, the tip swing door 430 may or may not be completely positioned behind the swing door 422a as best shown in Fig. 17C. As the pill 122 continue to move out downwardly from the blister cavity 120 and is dispensed, swing doors 430 and 440a move back towards their original positions and the contacting surface 472a is disengaged from the contact surfaces 468a, 468b, which put momentary switch 490 back in the opened position. It should be noted that the width of the contacting surface 472a and/or the width of the contact surface 468a, 468b and the speed at which the pill 122 is pushed out, would control the time the momentary switch 290 is remained in closed position.

Fig. 18 is a flow chart illustrating the operation of a logic control used in the microprocessor 262 in accordance with the preferred embodiment of the invention. The flow chart is organized into three sections: Setup- Section A, Interval time- Section B and Alarm Section- C.

The Setup Section A (steps 500 – 510), as described below, encompasses the initiating and programming of the central processing unit (CPU) when the package assembly 100 or 300 is assembled. In step 502, the central processing unit (CPU) is initially setup when power is applied in the step 500. After initial setup, a factory test routine can be run, if desired, (steps 504 and 506) to check proper function of the microprocessor 262. In step 508, the parameters that will control the operation of the patient reminder program such as: Dose Interval, Pre-Alarm Interval, Alarms Post-Alarm Intervals are read and initialized into the program. This may be done by interrogation of a set of jumper connections on the circuit unit 260. These jumper connections can be selectively score during assembly of the package and correspond to a predetermined program code stored in the memory of circuit unit 260. After the above four steps, step 510 is run to setup the microprocessor 262 to be ready to sense a pill 122 being expelled from the package assembly 100 or 300. The program is now ready to enter the Interval Section B.

The Interval Section B (steps 512-522) encompass the start of the Dose Interval timing cycle and the sensing of the expulsion of a pill 122 prior to a reminder alarm being sounded. When the first pill 122 is expelled, the circuit receives a signal from the closing of one of the switches (290 or 490) associated with one of the pills 122 and this process is directed to the start of the timing cycle and the manner in which the reminder alarm operates and preempted or silenced by the dispensing of pill 122.

After the first pill is expelled in step 512, the microprocessor 262 receives a signal or sensed by the momentary switch associated with a pill 122 and the Dose Interval timer (step 514) is started. This begins the cycle of alarm times that will continue through all

the pills 122 that are scheduled to be taken. At the end of the Dose Interval in step 514, a window of time, referred to as the Pre-Alarm Interval, will be opened in the step 516. During this window of time, in the steps 518, 520, the microprocessor 262 will check to see if a pill 122 has been dispensed by looking for a closure of a momentary switch associated with a pill 122. If the circuit senses a pill dispensed, then in step 522, a Pre-Alarm Flag is set. This flag will be used later as an indication that the pill was taken before the alarm was sounded so the alarm will be preempted. (The Dose Interval time combined with the Pre-Alarm Interval time is equal to the total time between doses.) When the Pre-alarm Interval is completed after step 518, the Dose Interval (step 512) and the program will also proceed to the Alarm Section C.

The Alarm Section C controls-when and if-the alarm will sound and how often it will be repeated if a pill is not expelled after each alarm. The first portion step 524 will check to see if the Pre-Alarm Flag from step 522 has been set.

If the flag has been set (meaning a pill was expelled during the Pre-Alarm Interval) the steps will bypassed the Alarm steps 526, 528, 534. The flag will be cleared in the step 530 and the dose count will be reduced by one in the step 532. It should be noted that the dose count corresponds to the number of pills remaining in the package assembly. If the dose count has reached zero in the step 538, then the whole circuit will be shut down in the step 540. If the count is not zero in the step 538, then a signal will be sent to turn off the Alarm in the step 536. Since the Alarm was never turned on to begin with, this will have no effect.

If step 524 detects that the Pre-Alarm Flag has not been set, the Alarm will be triggered and the Post-Alarm Interval will begin in the step 526. The Alarm will continue

until a pill is expelled, as detected in step 528 or the Post-Alarm Interval is up in step 534. Again as before, after a pill is dispensed in the step 528, the Dose count will be reduced by one in the step 532 and if the does count has reached zero as checked in step 538, the whole circuit will be shut down in the step 540. Also as before, if the count is not zero, then a signal will be sent to turn off the Alarm in the step 536. If during the Post Alarm Interval a pill 122 has not been dispensed and the Post-Alarm Interval is completed in step 534, then the Alarm will be turned off.

Alternatively, if desired, the Post-Alarm Interval and the Alarm in the steps 526, 528 and 534 may be repeated a set number times after a predetermined Repeat Delay Interval (This repeat cycle is not depicted on the flow chart). If the pill is dispensed during this time or if the all the repeat alarm cycles have been completed and no pill being expelled, the Alarm would be turned off.

Figs.19A-19D illustrates a container 500 having the momentary switch therein in accordance to the present invention. The momentary switch described hereinabove can be used in the container 500 for shipping and/or storing articles (not shown). Fig. 23A shows the container 500 in an opened position. The container 500 comprises a bottom wall 502 having four orthogonal sidewalls 504, 506, 508, 510 extending upwardly from the bottom wall 502 to define an interior space 512, and four flaps 514a, 514b, 516a, 516b integrally attached and extended from the respective four orthogonal sidewalls 504, 506, 508, 510. The momentary switched 290 or 490 can be used in the container 500. In the exemplary embodiment of Fig. 23A, the flap 514a includes a tab 518 extending outwardly from thereof. The tab 518 includes a contacting surface 520 printed thereon. The flap 514b includes two contacts surfaces 522a, 522b spaced apart and printed thereon. When the

container 500 is in the closed position as shown in Fig. 23B, the momentary switch 290 or 490 is an opened position and the tab 520 is supported by the flap 516a and concealed by the flap 514b. The tap 520 is sandwiched between the flap 514b and 516a. When a user attempts to open the container 500, the tap 520 slides between the flaps 514b and 516a and would come in contact with the two contact surfaces 522a, 5522b which put the momentary switch 290 or 490 in a closed position. Alternatively, as shown in Figs. 23C and 23D, tab 518 is extending outwardly from the flap 516a and the two contact surfaces 522a, 522b are printed on the flap 516b opposite from the flap 515a.

The package assembly 100 could be equipped to communicate with a physician, pharmacist and/or caregiver to keep them abreast of the compliance of the patient to the prescribed regimen. This could be done via a transmitter device embedded in the package assembly 100 which could send a message via pager, text message, email, phone and the like. This could be done immediately when the patient misses a pill with critical medications, eg. anti-psychotics. The notification could also be done periodically such as once a day. In this case, the circuit unit 260 in the assembly package 100 would need to keep a log of the medication taken and/or missed pills so it could be transmitted later.

For the periodic transmission of the date, the package assembly 100 would not need to have a transmitter in itself that would connect directly with the external communication systems but could be enabled to download its data via a reader that is attached to a computer with a phone and/or internet connection. It also could be connected to an external cell phone on personal data assistance (PDA) too. In this embodiment, the package assembly 100 would be placed on the reader and transmit its information via a capacitive couple or via any other RF transmission methods such as

used with the various RFID circuits. The host machine such as, but not limited to, computer, cell phone, PDA and would then make the transmission of the data to the appropriate party.

Since many people are now carrying cell phones PDA's or combination devices, the package assembly 100 or 300 would not need to have any electronics in it at all. The package assembly 100 or 300 can provide a reminder to the patient via phone, cell phone, text message, pager and the like. The web address, phone number could be printed on the package assembly so the patient could contact them to set up the reminder scheme. A product or reminder code could also be printed on the package assembly or include with the pharmacy labels that could be entered to set the particular reminder scheme. The patient may have the ability to choose special variations in the start times and such, within limits of the specifics of the medication.

As a variation of this, an outside service could upload the reminder scheme to a cell phone of PDA's calendar/appointment program so the device does not need to be within range of the cell phone or wireless internet system all the time. The actual reminder data and program would be resident on their device. We could partner with a software and/or cell phone manufacturer for this.

In a further variation, a specific medication reminder application could be developed and be resident or downloaded to the device. It could have a better, more tailored interface with the patient and even have the possibility of customized voice or other auditory reminders. A code on the package assembly could be used to bring up a specific reminder scheme which may or may not be customized by the patient. The code could also include the quantity of the medication initially in the package and then

calculate when it would be finished and when the individual should reorder the prescription. It could then remind them or even enable them to place the order itself automatically. This feature could also be employed with an outside service.

RFID tagging of pharmaceuticals looks to be a certainty in the near future. As this becomes the mainstream, it would be possible to modify cell phones and PDA's to be able to read these tags at close proximity. From this, the device could be enabled to know what the medication is and the dosing regimen(s). An application in the device could be brought up automatically upon reading the medication's RFID tag and then prompt the user for any other information that is needed to set up the specific reminder scheme. For some medications, the scheme may be setup automatically. As noted above, the device could also know how much medication is initially in the package and reminder to reorder or place the order itself.

As noted above, the package assembly may alternatively use optical sensing for pill removal. It might be possible to print a high refractive index polymer (probably UV cured) or some multiple layers of optical quality material to create a light pipe(s) on the surface of the paperboard. The circuit board would then have an LED transmitter and an optical receiver such as are used in fiber optics communications. The traces could be printed across a pill door in the similar manner as used with a "break-the-trace" type of circuitry. In this case when a pill is pulled out, the trace would be broken and the light signal would be interrupted between the light source and the receiver.

If one can print optical traces as mentioned above, then there may be other possible circuit configurations too, such as sensing exposure to light when the pill is expelled or using the plastic in the blister as one of the optical conductors.

One or more advantages of the present invention are that the momentary switch includes a more reliable sensing feature than those known in the art. For example, the momentary switch is normally open and the momentary switch is closed when the pill is dispensing, therefore, if there is some intermittent continuity in the circuitry, such intermittent continuity in the circuitry has no material adverse effect.

Another advantage of the present invention is that the momentary switch is essentially foolproof with respect to "false" indications of pill removal since the momentary switching of the open circuit can occur only upon the dispensing of the pill from the blister pack.

A further advantage of the present invention is that the circuitry of the momentary switch is similar to that of known keypad type circuitry since the momentary switch is a normally open momentary switch.

Still another advantage of the present invention is that conductive pathways within the circuitry unit can be printed with carbon based inks. Therefore, the present invention does not require expensive silver inks for conductive pathways as it is customary used in conventional printed electronics.

Yet another advantage of the present invention is that the momentary switch may be used in other packaging such as corrugated containers. The momentary switch may be inserted into an accompanying sleeve for protection during handling, storage, shipment and even end user activities. In addition, the present invention may include a child proof feature of the type known in the art in which the child proof feature is associated with the structure of the package.

While the invention has been described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from its scope. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed, but that the invention will include all embodiments falling within the scope of the appended claims.

What is claimed is:

1. A switch for use with an article formed from paperboard, the article having a first panel and a second panel, the first panel and the second panel each having a sliding surface facing one another wherein the first and the second panels are in sliding relation to one another between a first position and a second position, the switch comprising:

a conductive pathway disposed on the sliding surface of the first panel;

a first contact surface disposed on the sliding surface of the second panel and a second contact surface disposed on the sliding surface of the second panel, the second contact surface being in spaced relation to the first contact surface so as to prevent electrical communication between the first and second contact surfaces and wherein the conductive pathway of the first panel is in spaced relation to at least one of the first and second contact surfaces of the second panel when the first and second panels are in the first position, and wherein the conductive pathway bridges the first and second contact surfaces when the first and second panels are in the second position, thereby permitting electrical communication between said first and second contact surfaces.

2. The switch of claim 1 wherein the first panel is defined by at least one swing door formed by a non-continuous cut line in a contact panel of the article.

3. The switch of claim 2 wherein the contact panel includes a plurality of swing doors formed therein and wherein each of the swing doors is interrupted by at least one nick adapted to hold the swing door to the contact panel.

4. The switch of claim 2 wherein the swing door has a generally oval body portion adapted to pivot with respect to the contact panel.

5. The switch of claim 2 wherein the swing door includes a tab projecting therefrom.

6. The switch of claim 5 wherein the conductive pathway is provided at least partways across a contacting surface of the tab.

7. The switch of claim 1 wherein the second panel is defined by at least one punch out formed in a circuit panel of the article.

8. The switch of claim 7 wherein the circuit panel includes a plurality of punch outs formed therein.

9. The switch of claim 7 wherein the first and second contact surfaces are provided at least partways across the punch out.

10. The switch of claim 7 wherein a microprocessor is disposed on said circuit panel and wherein the microprocessor is in closed electrical communication with the first and second contact surfaces when the conductive pathway bridges the first and second contact surface.

11. The switch of claim 1 wherein the swing door has a generally frusto-oval portion adapted to pivot with respect to the contact panel.

12. The switch of claim 2 wherein a portion of the swing door is defined by the contacting surface having the conductive pathway printed thereon.

13. The switch of claim 1 wherein the second panel is defined by a first swing door and a second swing door that are formed by non-continuous score lines in the circuit panel.

14. The switch of claim 13 wherein the first swing door and the second swing door are formed on opposed sides of the punch out.

15. The switch of claim 13 wherein the respective first and second swing doors is interrupted by a pair of nicks so as to hold the first and the second swing doors to the circuit panel.

16. The switch of claim 13 wherein the respective first and second swing doors pivots with respect to the circuit panel.

17. The switch of claim 13 wherein the respective first and second swing doors are generally rectangular in shape and wherein the first swing door is substantially larger in size than the second swing door.

18. The switch of claim 13 wherein the second swing door is formed to protect the contacting surface when the switch is in the first position.

19. The switch of claim 13 wherein the first swing door includes the first and second contact surfaces printed on a periphery of the first swing door.

20. The switch of claim 13 wherein the circuit panel includes a two dimensional matrix of the first and second swing doors formed thereon.

21. The switch of claim 13 wherein the plurality of swing doors on the contact panel corresponds to the two dimensional matrix of the punch out on the circuit panel.

22. The switch of claim 1 wherein the plurality of swing doors on the contact panel corresponds to the 2D matrix of the first and second swing doors on the circuit panel.

23. The switch of claim 1 wherein each of the swing doors on the contact panel aligned with each of the first and second swing doors on the circuit panel such that the second swing door covers the conductive pathway when the switch is in the first position.

24. The switch of claim 1 wherein the switch is in the second position when the swing door conducting pathway is sliding over the first and second contact surfaces of the circuit panel.

25. The switch of claim 1 wherein combined widths of the swing door conducting pathway and first and second contact surfaces causes the switch to remain in the second position.

26. A package comprising:

at least one contact panel having a conductive pathway;

at least one circuit panel having a first conductive contact surface and a second conductive contact surface spaced apart from one another so as to prevent electrical communication between the first conductive contact surface and the second conductive contact surface;

at least one blister cavity capable of having an article therein being positioned relative to the contact panel such that dispensing the article from the blister cavity causes the conductive pathway to bridge the first and second conductive surfaces and to thereby permit electrical communication between the contact panel and the circuit panel.

27. The package of claim 26 wherein the contact panel and the circuit panel are integrally attached with one another.

28. The package of claim 26 wherein the contact panel and the circuit panel are constructed from paperboard.

29. The package of claim 26 wherein the contact panel is defined by a plurality of swing doors formed by a non-continuous score lines.

30. The package of claim 26 wherein each of the swing doors pivots in and out of plane of the contact panel.

31. The package of claim 26 wherein each of the swing doors configured to have a contacting surface having the conductive pathway printed thereon.

32. The package of claim 26 wherein the circuit panel is defined by a two dimensional matrix of punch outs formed therein.

33. The package of claim 32 wherein each of the punch out is defined by a first swing door and a second swing door that are formed by non-continuous score lines.

34. The package of claim 33 wherein the first swing door and the second swing door are formed on opposed sides of the punch out.

35. The package of claim 26 wherein the article in the blister cavity is a pill.

36. The package of claim 26 wherein the at least one blister cavity includes a plurality of blister cavities having a pill disposed therein and wherein the blister cavity is sealed with a foil layer.

37. The package of claim 26 further comprising an exterior panel having a plurality of tear away doors formed by non-continuous score lines and wherein the exterior door is integrally attached to the circuit panel.

38. The package of claim 26 further comprising a blister panel having a plurality of punch out formed therein and wherein the blister panel is integrally attached to the circuit panel.

39. The package of claim 26 wherein the plurality of the blister cavities corresponds to the plurality of punch out in the blister panel.

40. The package of claim 26 wherein the contact panel and circuit panel cooperate with one another to form a switch wherein the switch is an open position when the conductive pathway of the contact panel is in spaced relation to at least one of the conductive contact surfaces and wherein the switch is a closed position when the conductive pathway bridges between the first and second conductive surfaces and to thereby permit electrical communication between the contact panel and the circuit panel.

41. The package of claim 26 wherein the dispensing of pill causes the swing door to pivot downwardly so that the swing door slides over the contact surfaces to bridge electrical communication.

42. A blank used to form a package comprising:

first, second, and third score lines divide the blank into at least one contact panel, at least one circuit panel, at least one blister panel, and at least exterior panel wherein the contact panel and the circuit panel are formed by the first score line, the blister panel and exterior panel are formed by the second score line and third score line delimit the circuit panel and exterior panel from one another and wherein the contact panel having at least one swing door configured to pivot with respect to the contact panel, the circuit panel having at least one punch out hole therein, the exterior panel having at least one tear away door therein, and the blister panel having at least one punch out hole configured to receive a blister pack protruded therefrom and wherein the at least one contact panel, the at least one circuit panel, the at least one blister panel, and the at least exterior panel cooperate with one another to construct the package.

Fig. 1

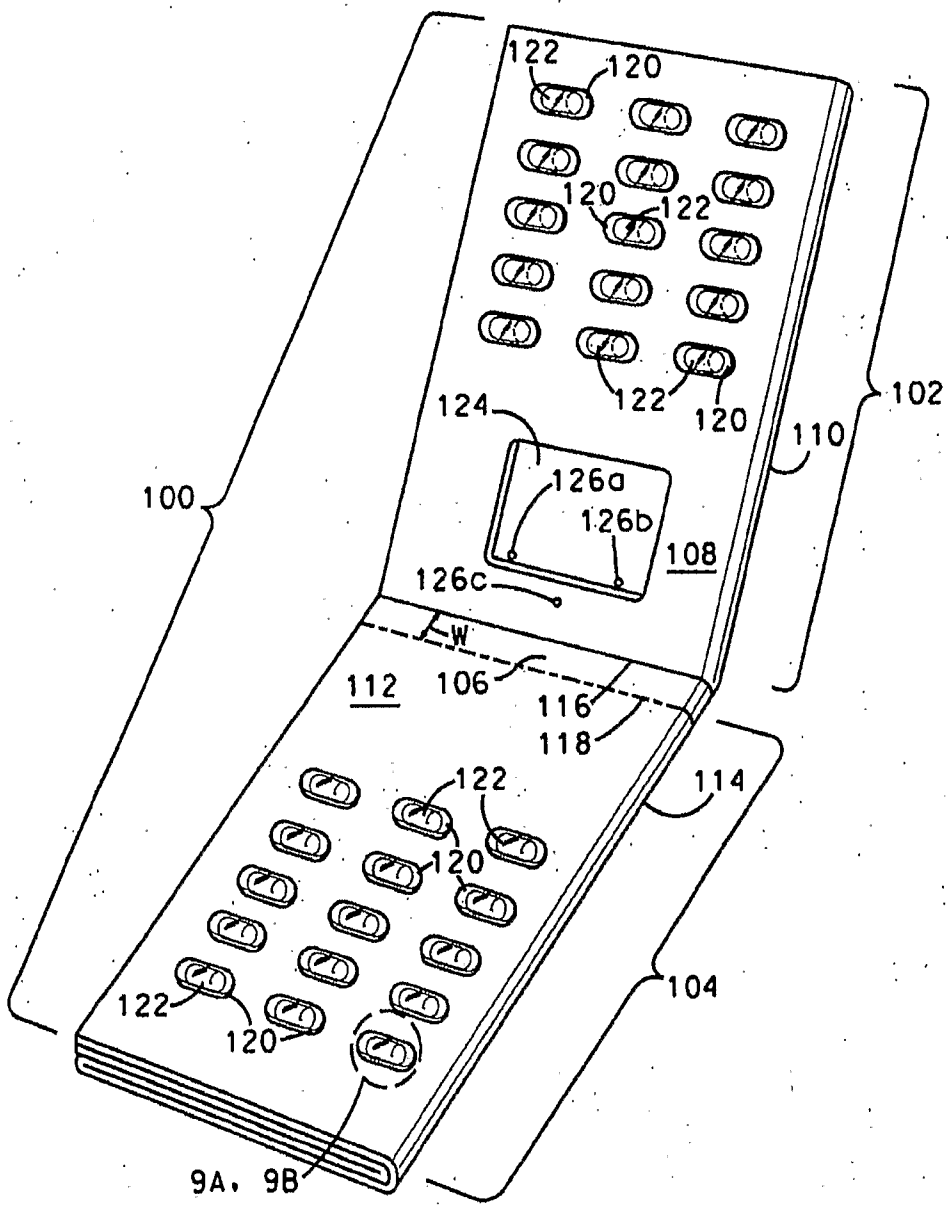

122
120
120
122
122
120
124
126a
126b
108
126c
102
110
100
W
112
106
116
118
114
122
120
122
120
104
9A, 9B

Fig. 2

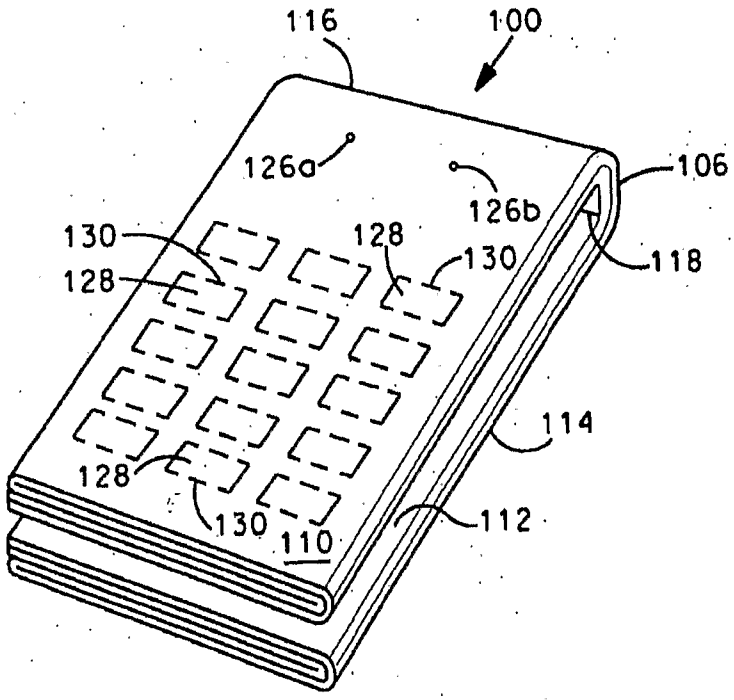
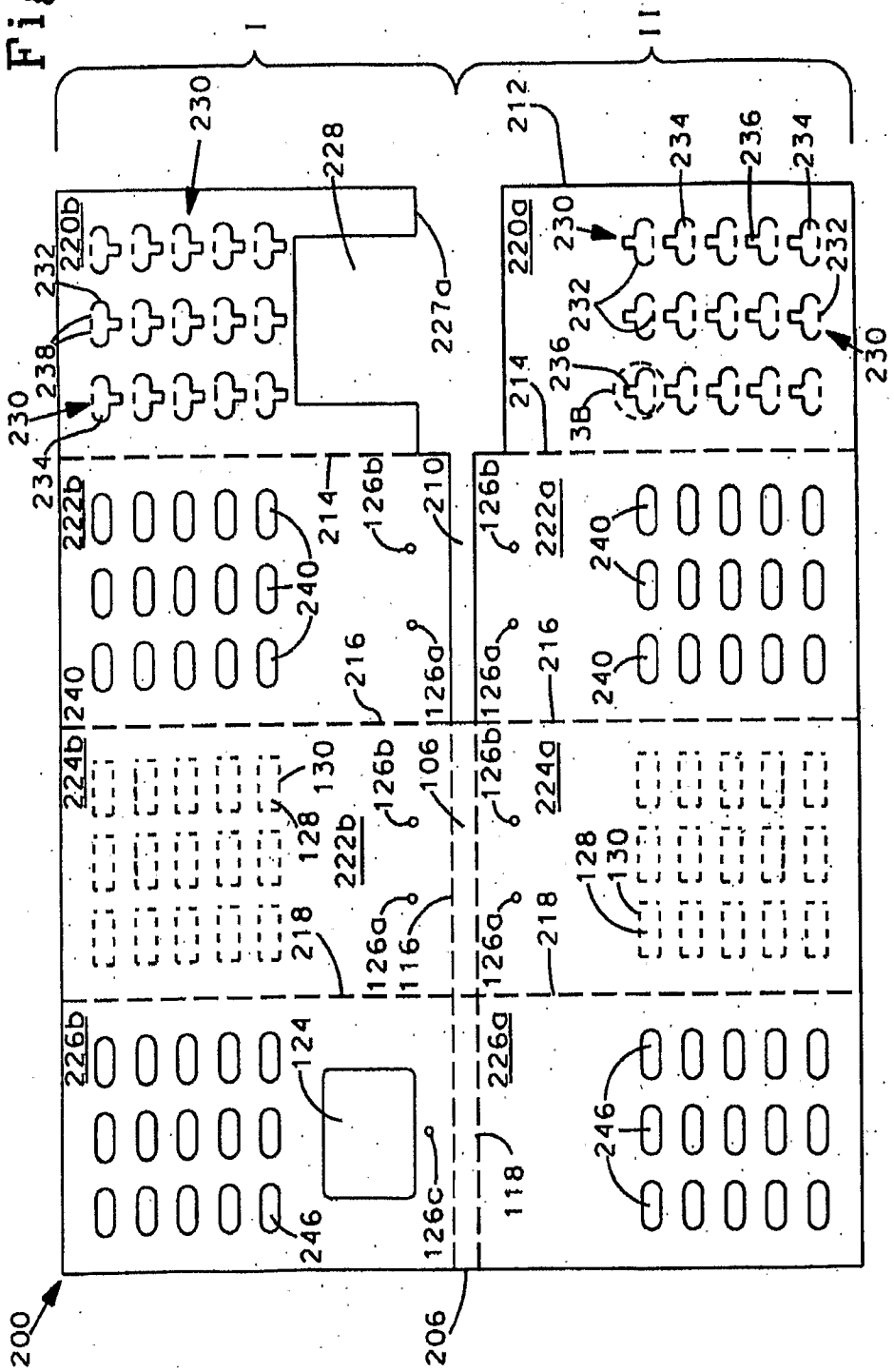


Fig. 3A


I
II
230
228
212
234
236
234
220b
232
227a
220a
230
232
232
238
230
214
236
230
234
3B
222b
126b
210
126b
222a
214
240
240
216
126a
126a
216
240
224b
126b
106
126b
224a
130
128
222b
128
130
126a
116
126a
218
218
226b
124
226a
246
118
126c
246
200
206

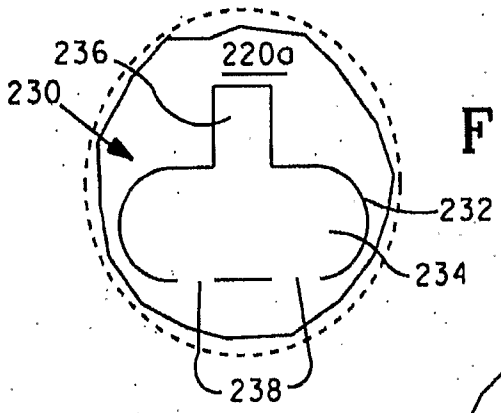


Fig. 3B

Fig. 3C

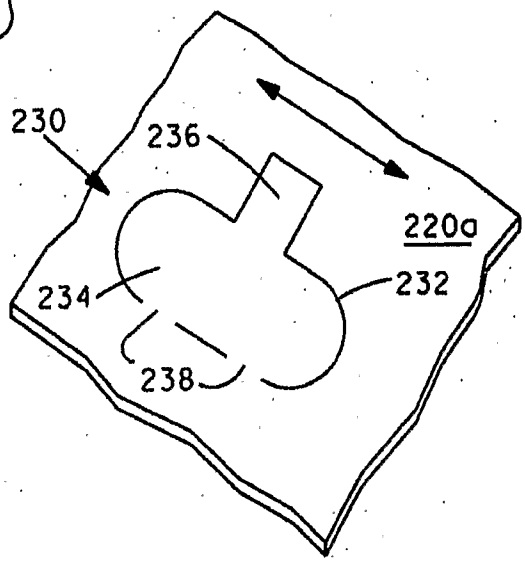


Fig. 3D

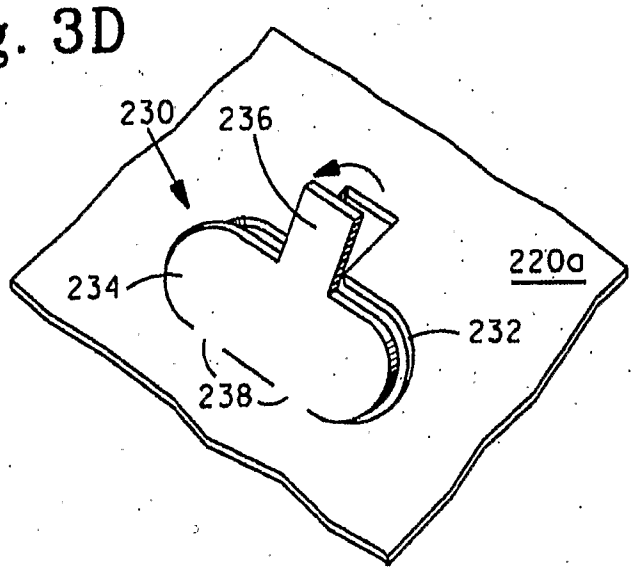


Fig. 4A

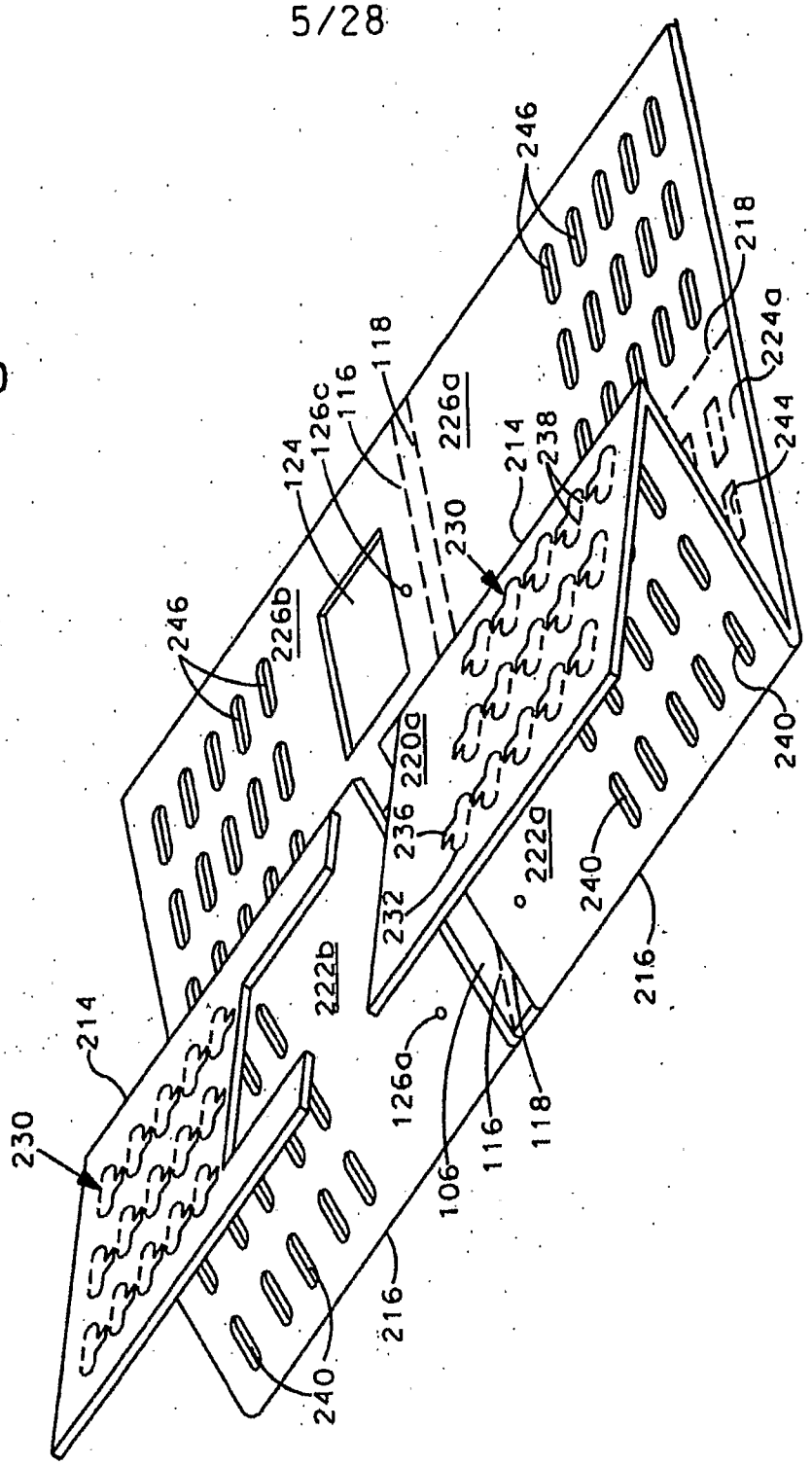
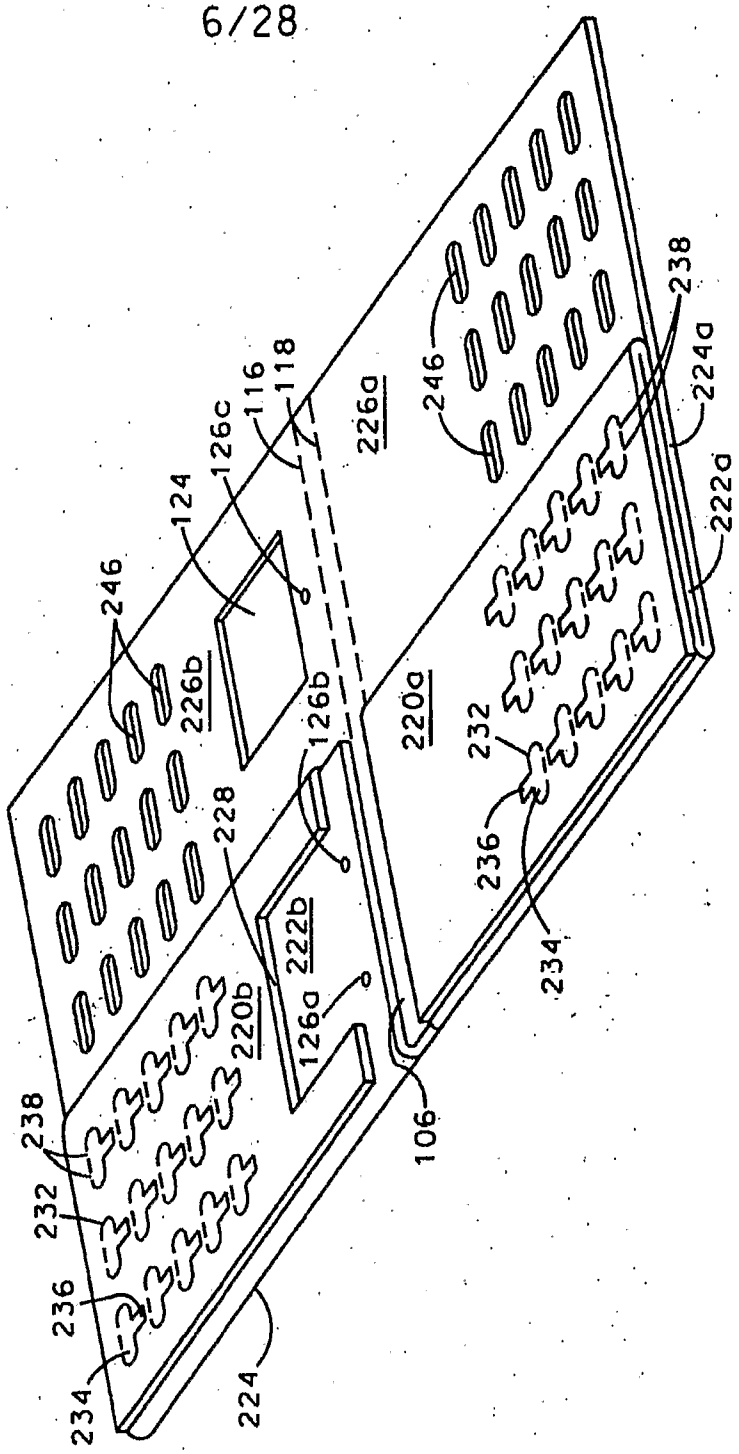

246
218
224a
118
116
126c
124
226a
214
238
244
230
246
226b
240
220a
236
222a
232
240
216
214
222b
230
126a
106
116
118
216
240

Fig. 4B


246
124
126c
116
118
226a
246
238
224a
222a
226b
126b
220a
232
228
222b
126a
220b
236
234
238
232
236
234
224
106

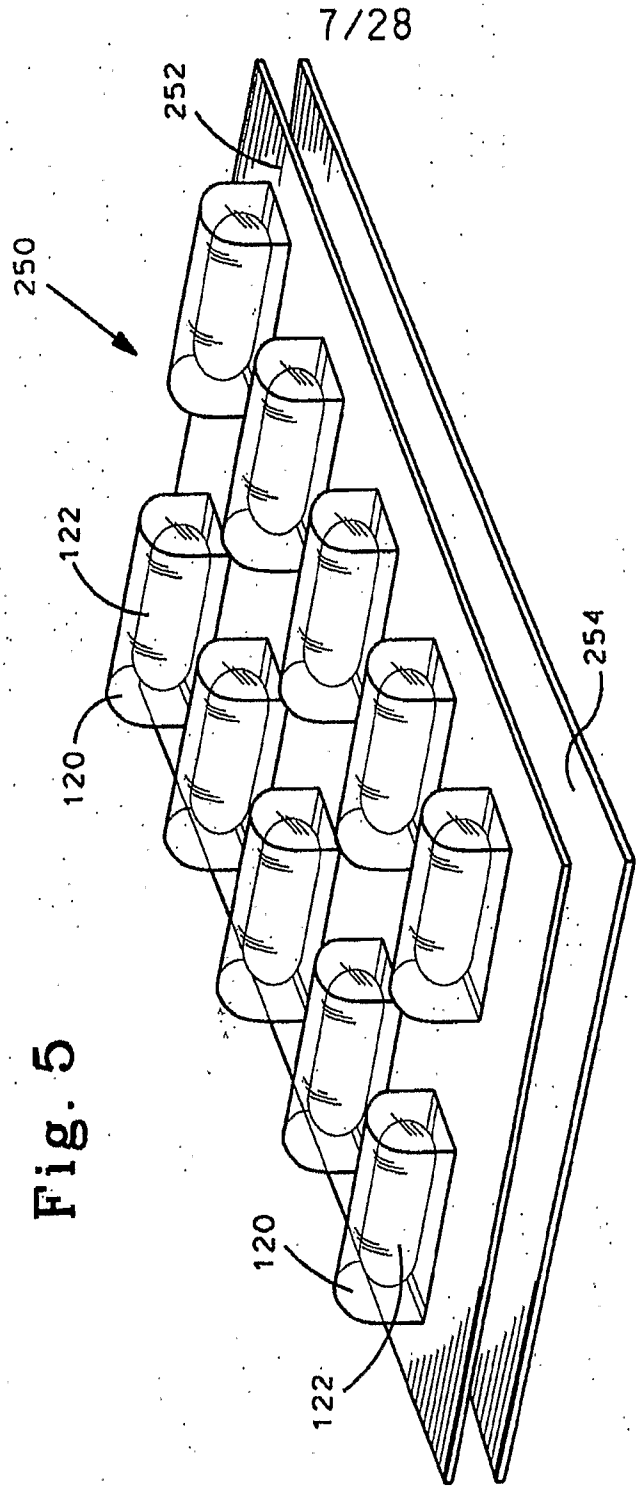


Fig. 5

Fig. 6A

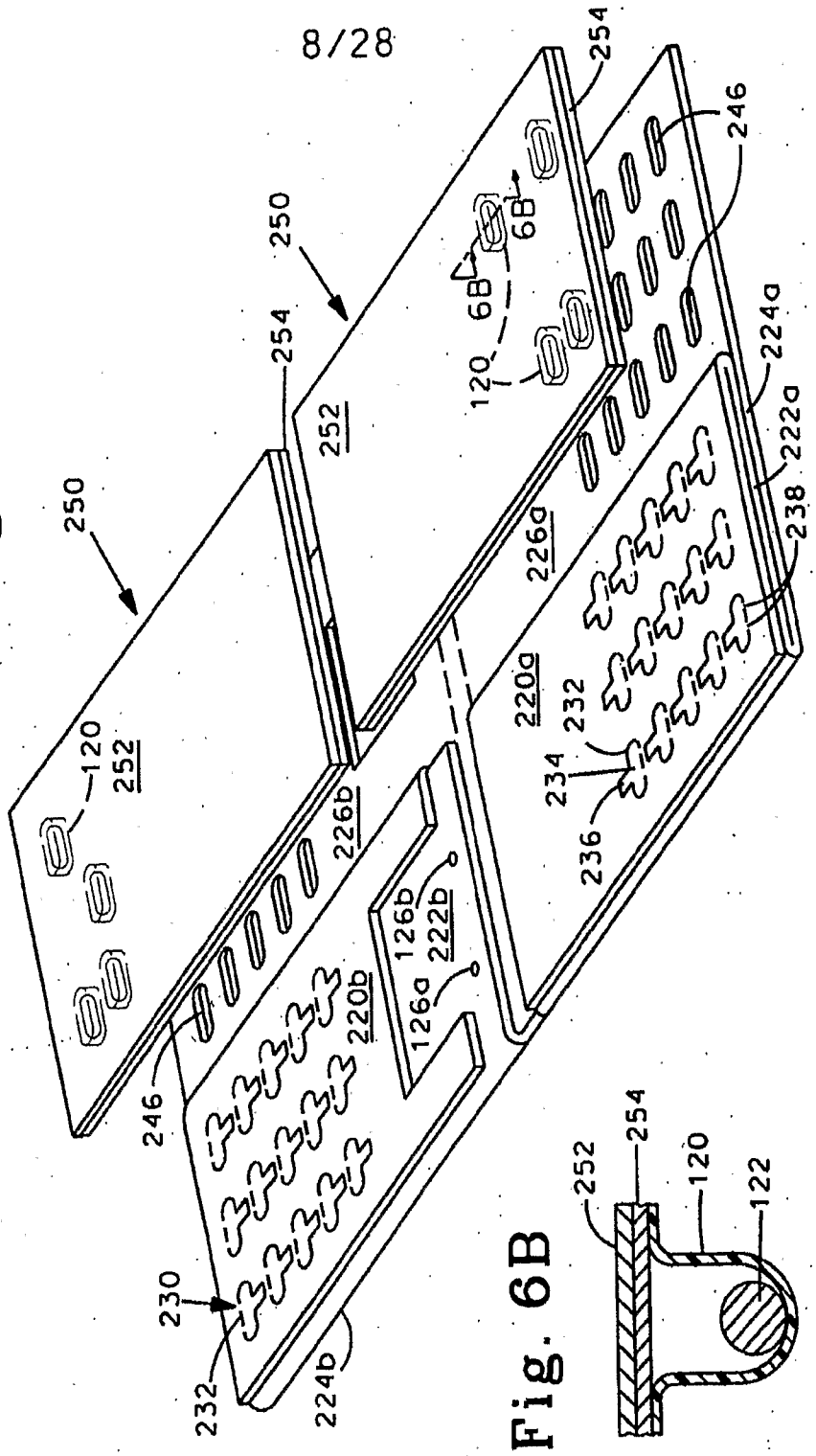

250
120
252
254
250
254
252
6B
6B
120
246
224a
222a
238
226a
220a
232
234
236
226b
126b
222b
126a
220b
246
230
232
224b

Fig. 6B

252
254
120
122

Fig. 7A

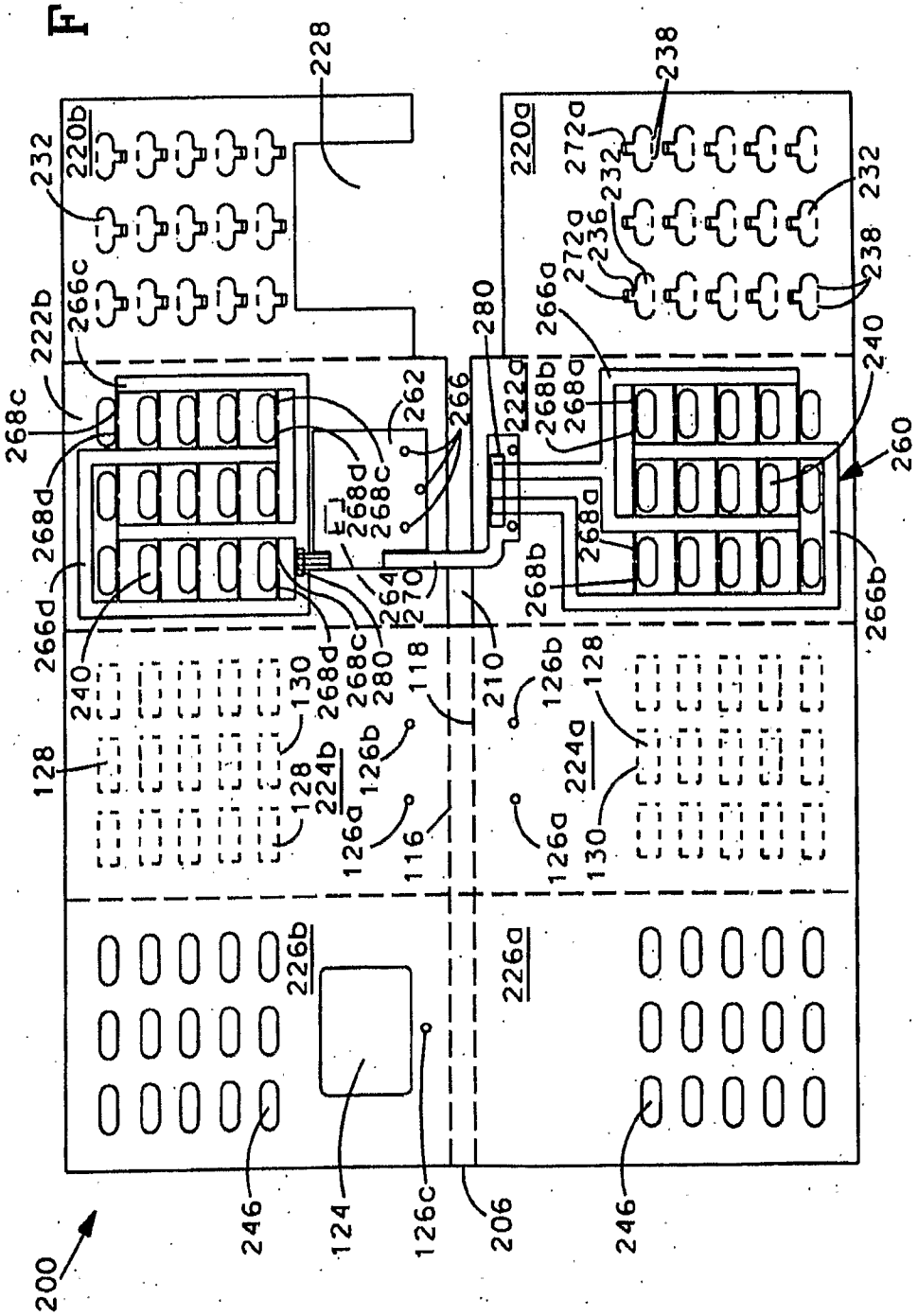

228
238
220b
220a
272a
232
236
266c
222b
280
266a
240
268c
262
266
222a
268b
260
268d
264
270
266d
210
126b
128
130
224b
126a
116
118
224a
226b
226a
246
124
126c
206
200

Fig. 7B

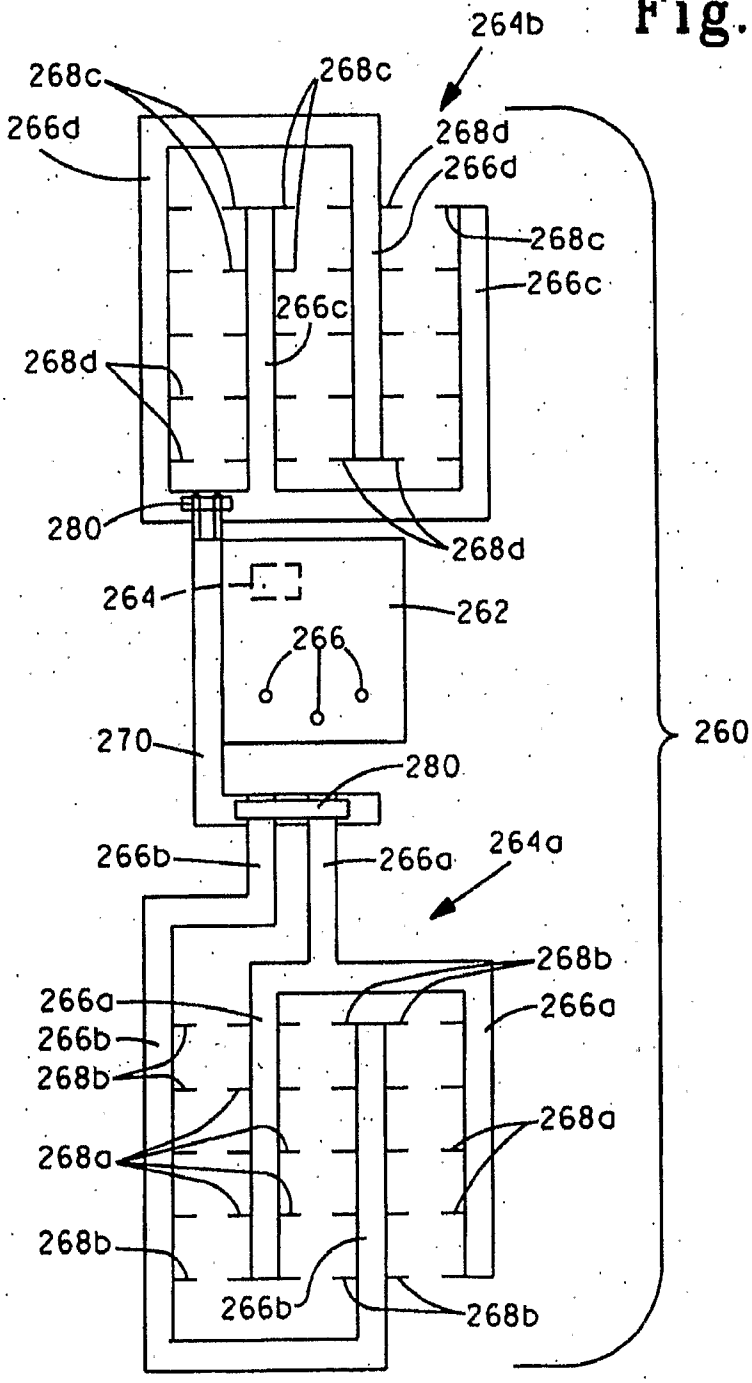

264b
268c
268c
266d
268d
266d
268c
266c
266c
268d
280
268d
264
262
266
270
260
280
266b
266a
264a
268b
266a
266a
266b
268b
268a
268a
268b
266b
268b

Fig. 7C

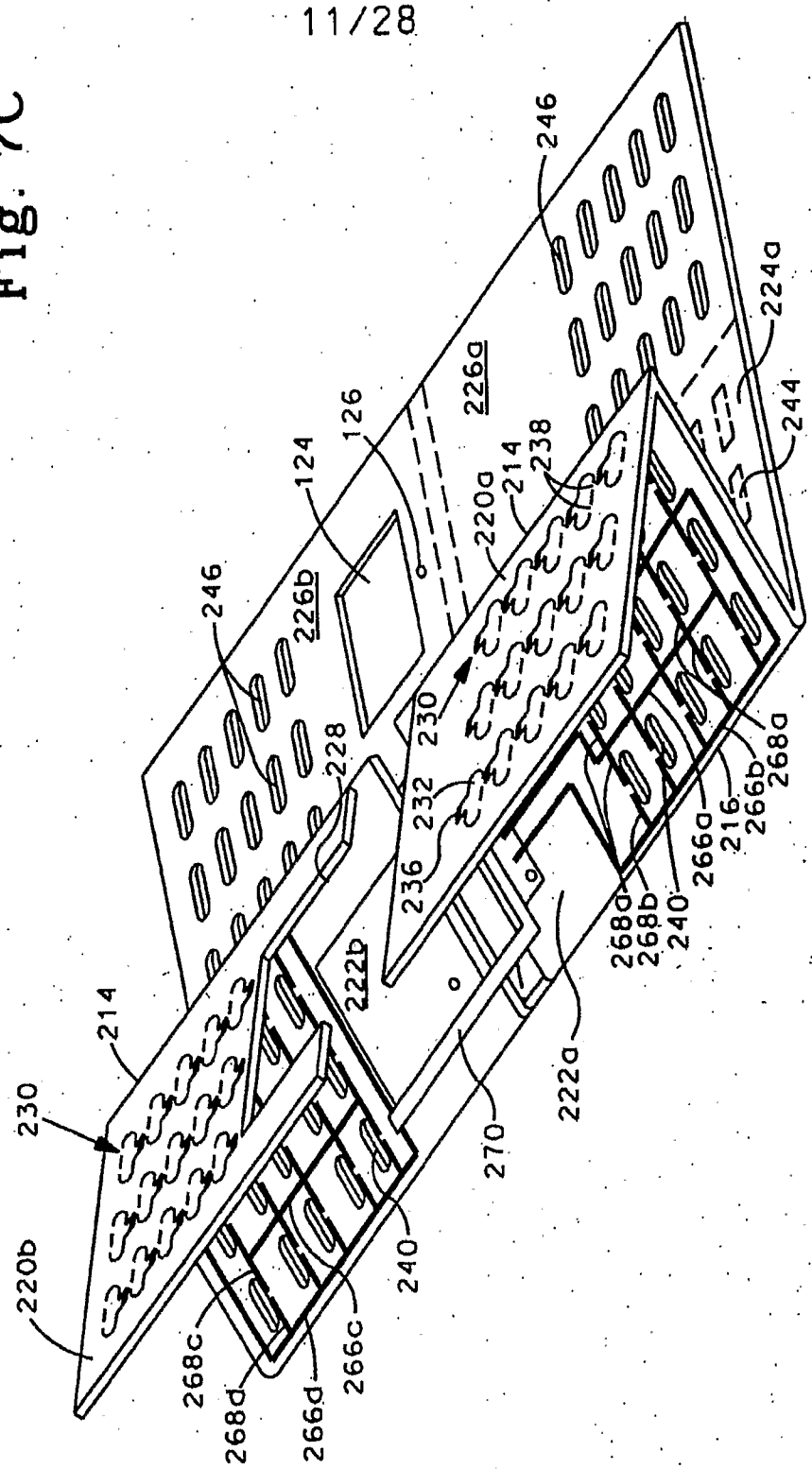

246
224a
244
226a
126
124
214
238
220a
246
226b
230
228
232
236
222b
214
230
220b
268c
268d
266d
266c
240
270
222a
268d
268b
240
266a
216
266b
268a

Fig. 7D

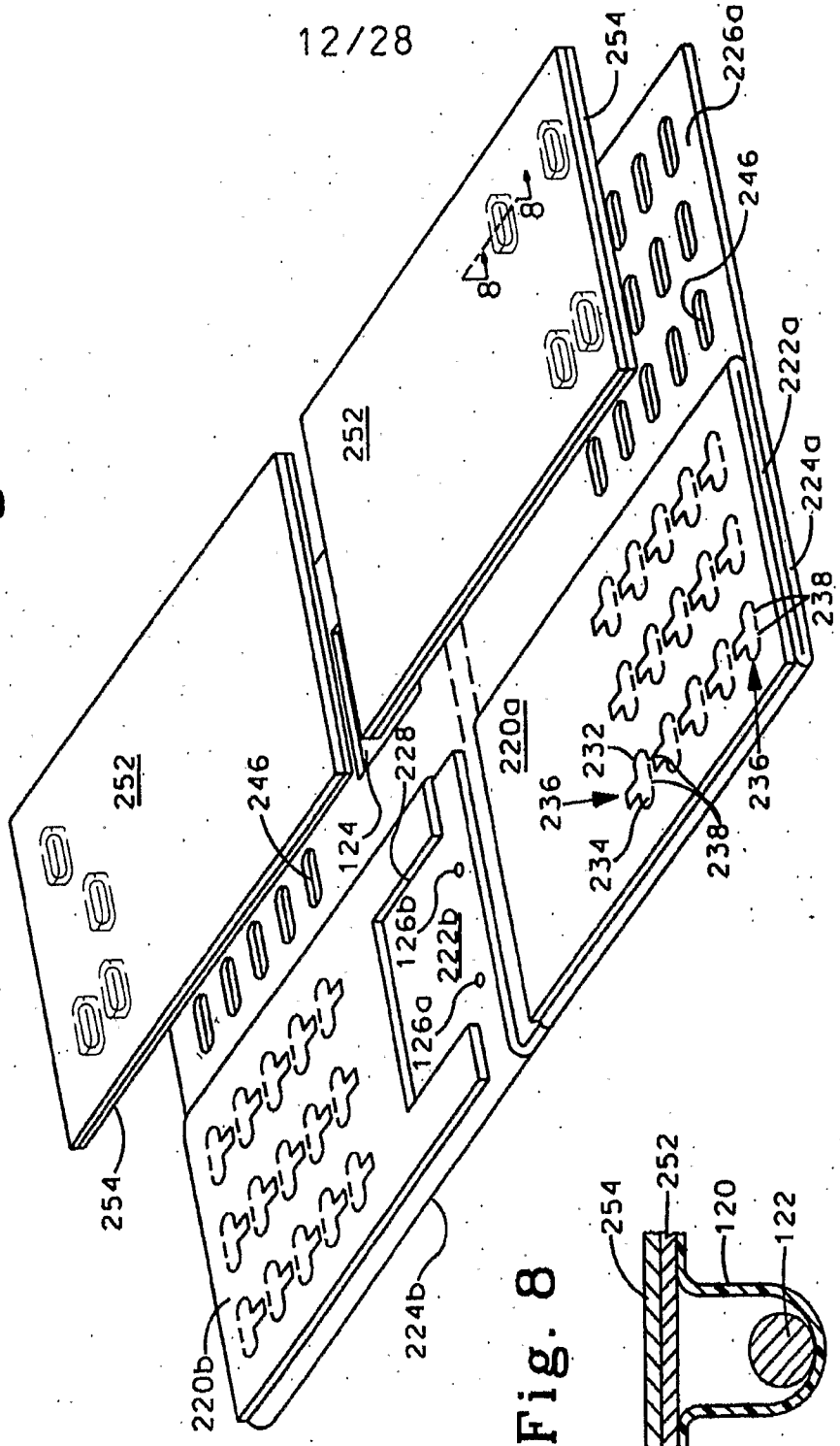

254
226a
246
252
222a
224a
238
220a
232
236
228
124
126b
222b
126a
234
220b
224b

Fig. 8

254
252
120
122

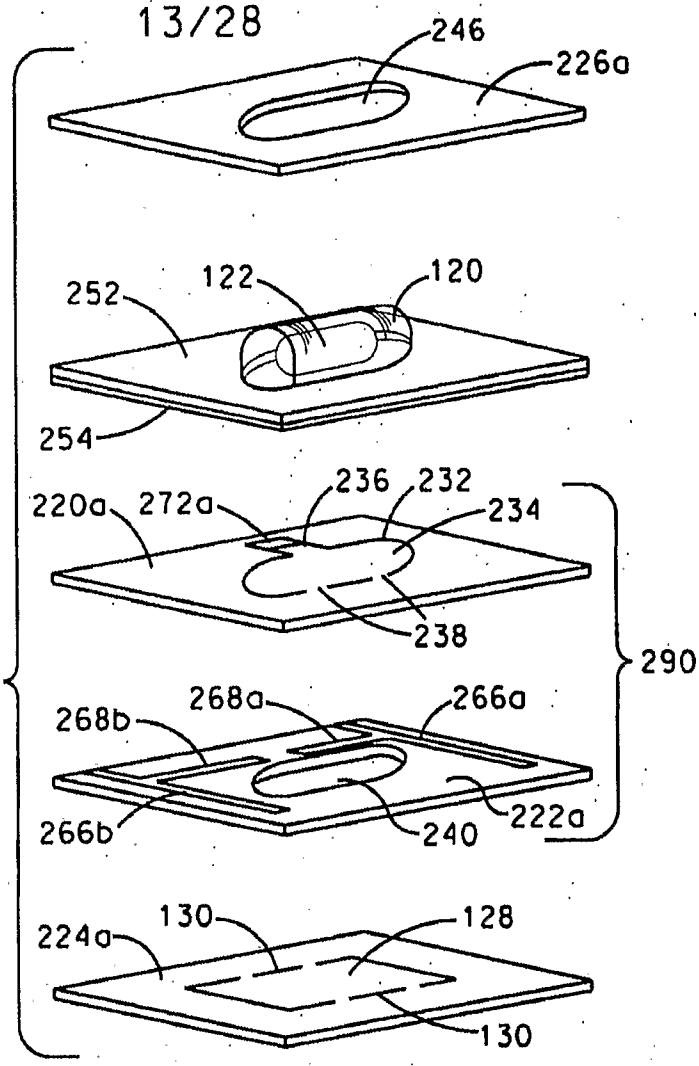

246
226a
252
122
120
254
220a
272a
236
232
234
238
290
268b
268a
266a
266b
240
222a
224a
130
128
130

Fig. 9A

Fig. 9B

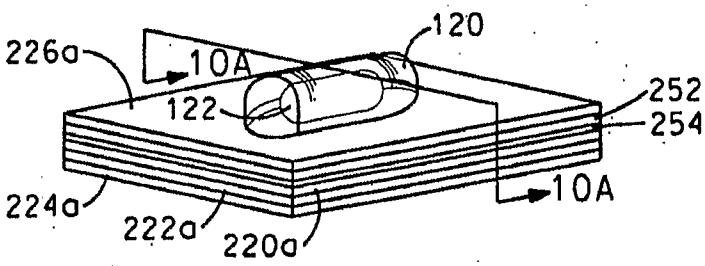

226a
10A
120
122
252
254
10A
224a
222a
220a

Fig. 10A

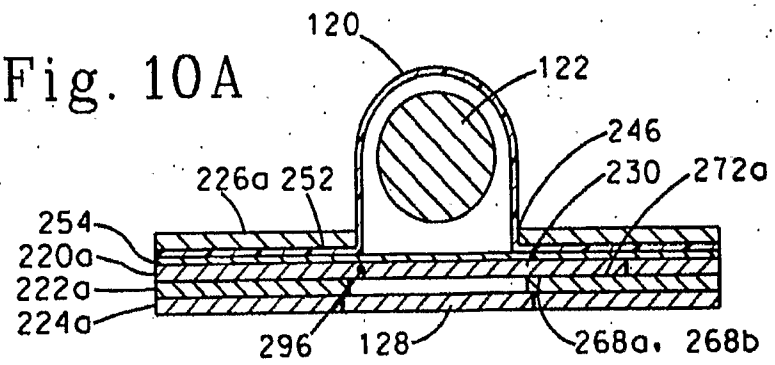


Fig. 10B

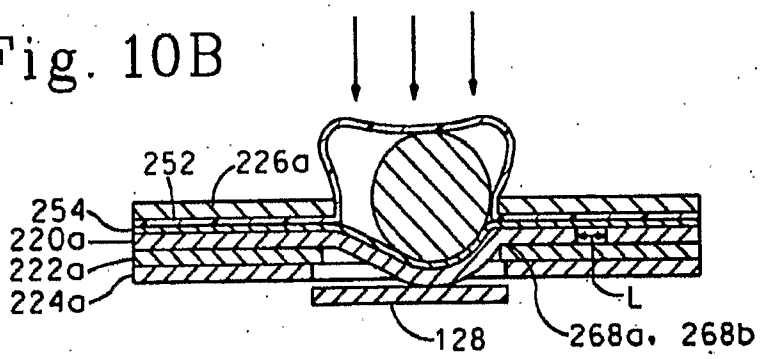


Fig. 10C

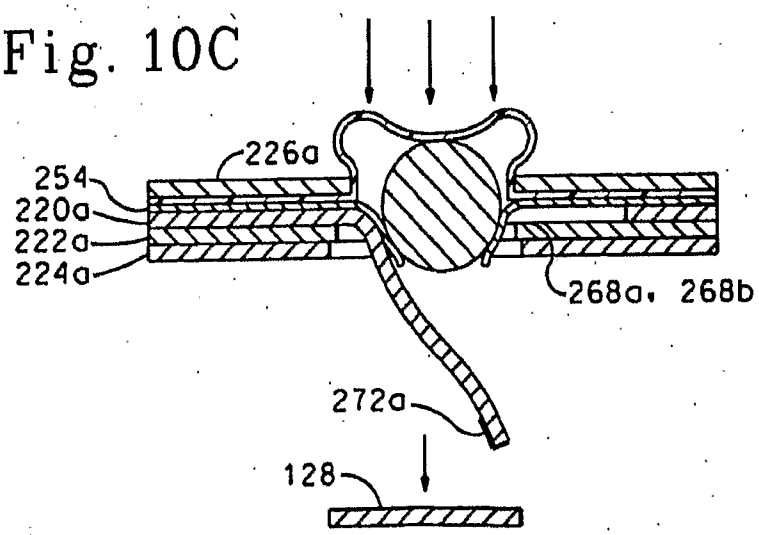


Fig. 11

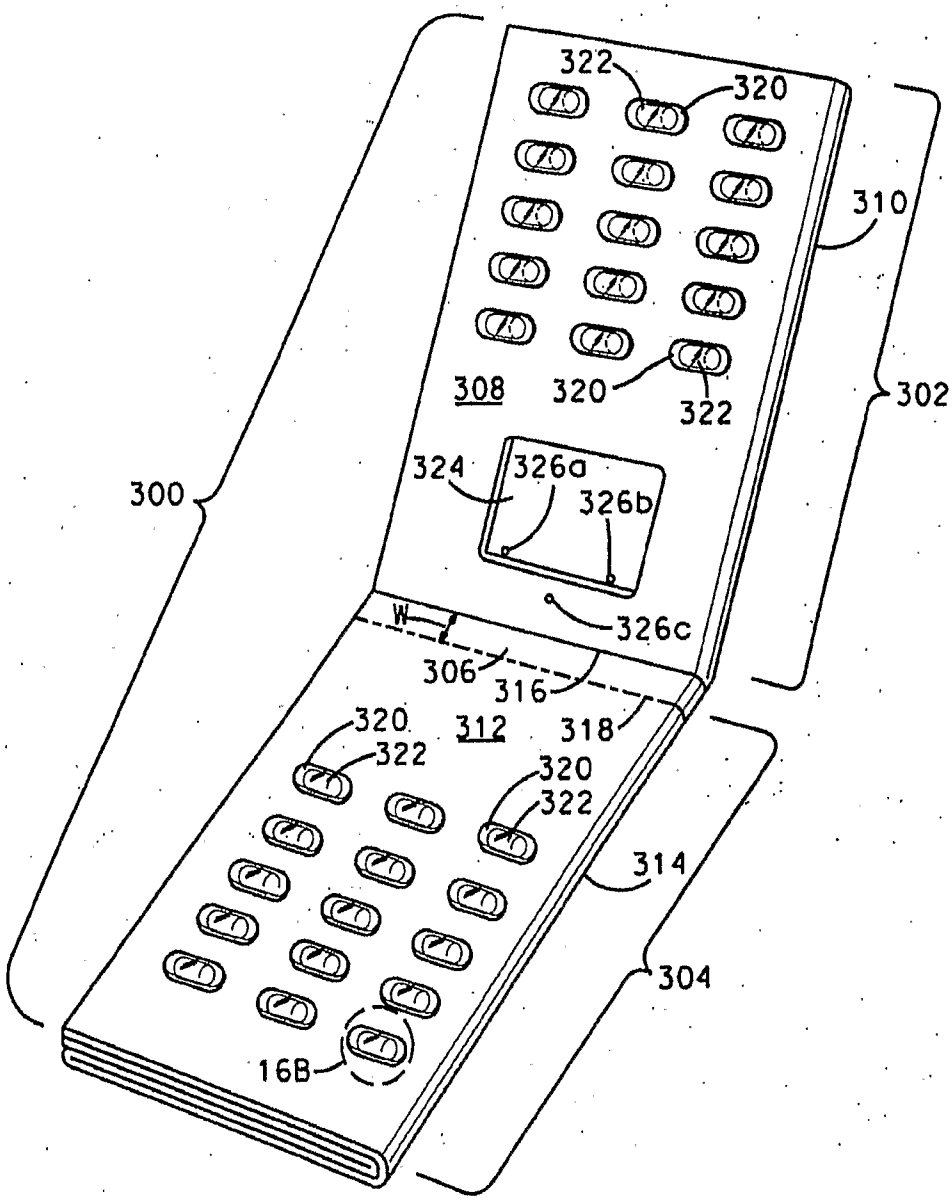

322
320
310
308
320
322
302
324
326a
326b
300
326c
W
306
316
320
312
318
322
320
322
314
304
16B

Fig. 12

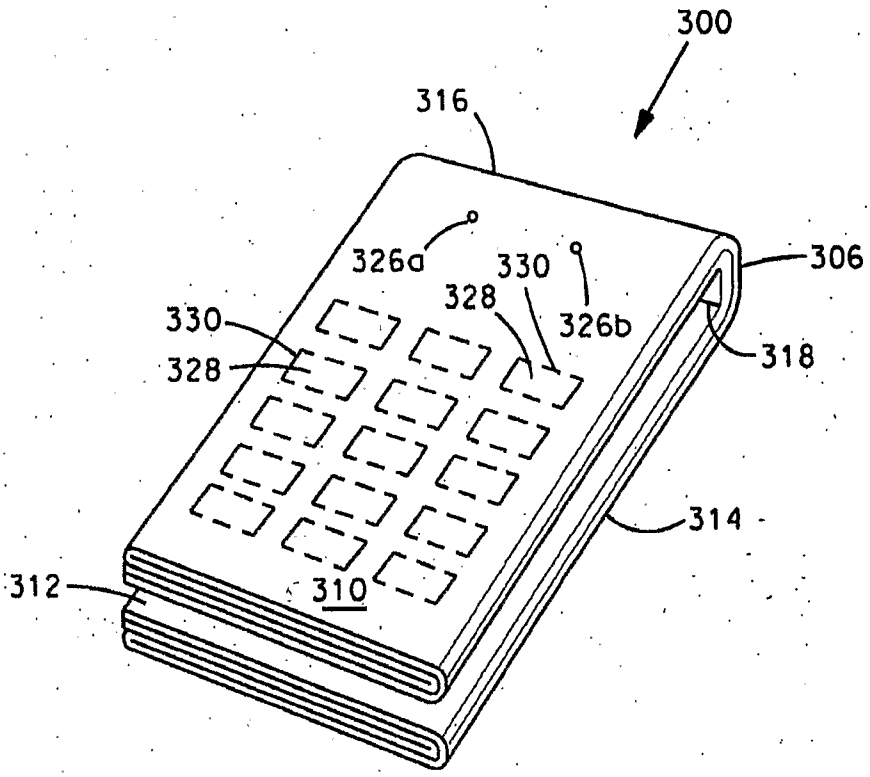


Fig. 13A

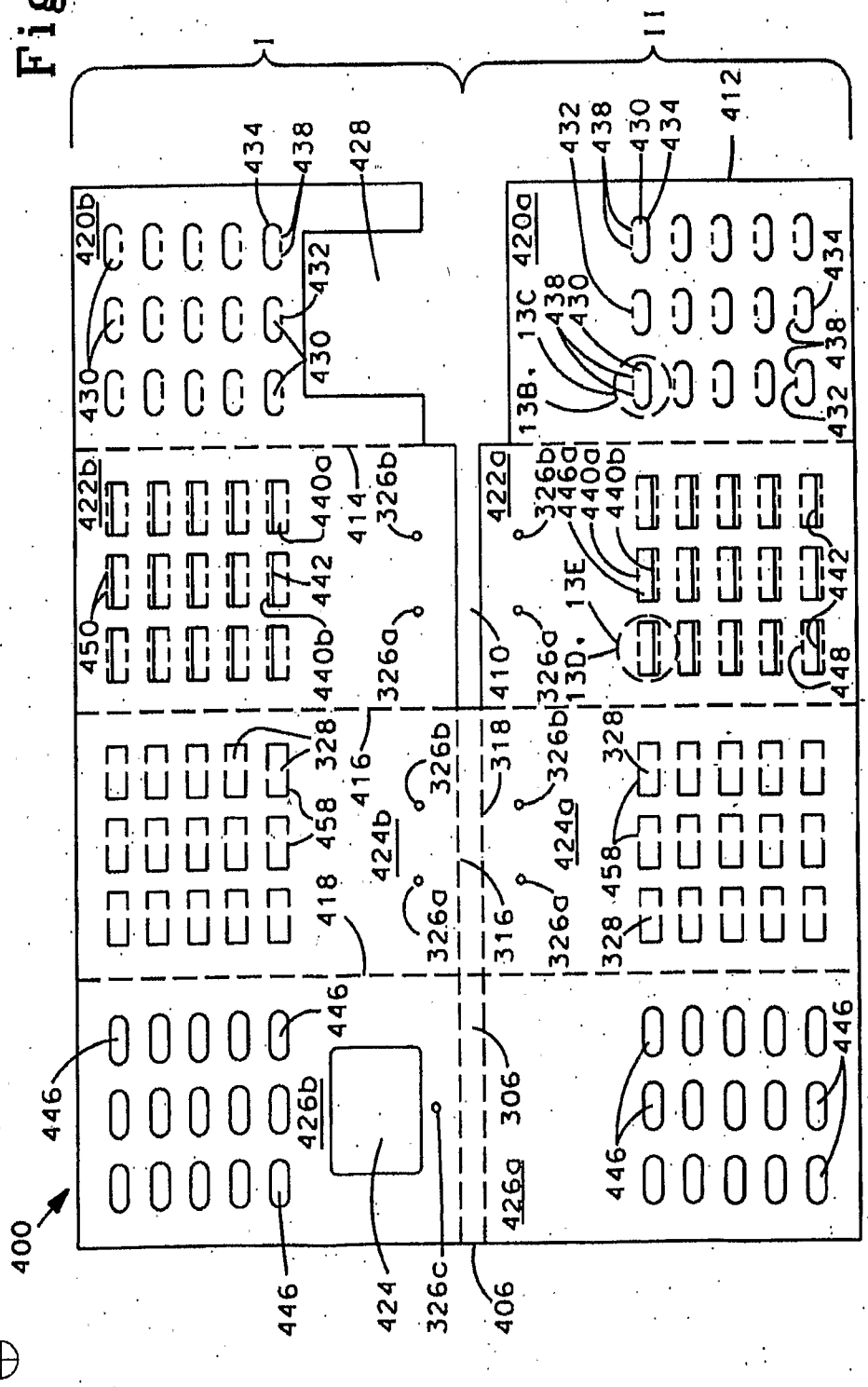

I
II
400
406
412
420a
420b
422a
422b
424
424a
424b
426a
426b
426c
428
430
432
434
438
440a
440b
442
446
448
450
458
306
316
318
326a
326b
326c
328
410
414
416
418
13B
13C
13D
13E

Fig. 13B

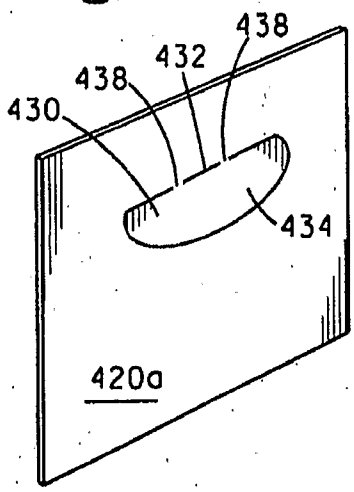


Fig. 13C

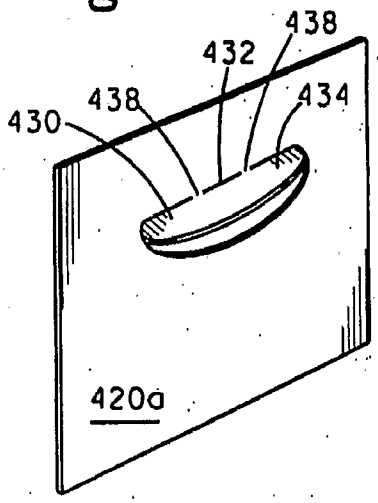


Fig. 13D

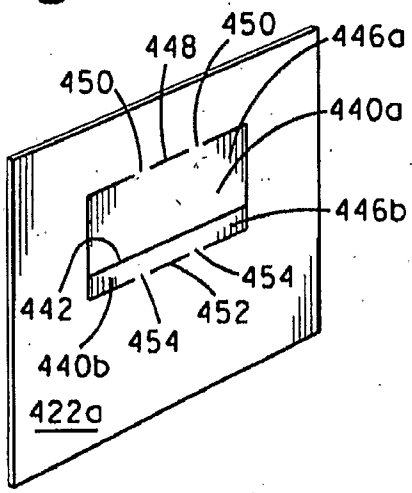


Fig. 13E

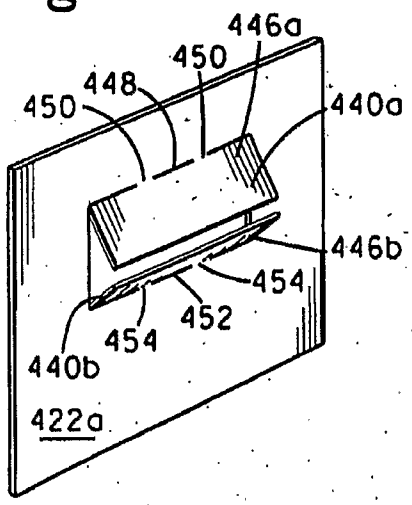


Fig. 14A

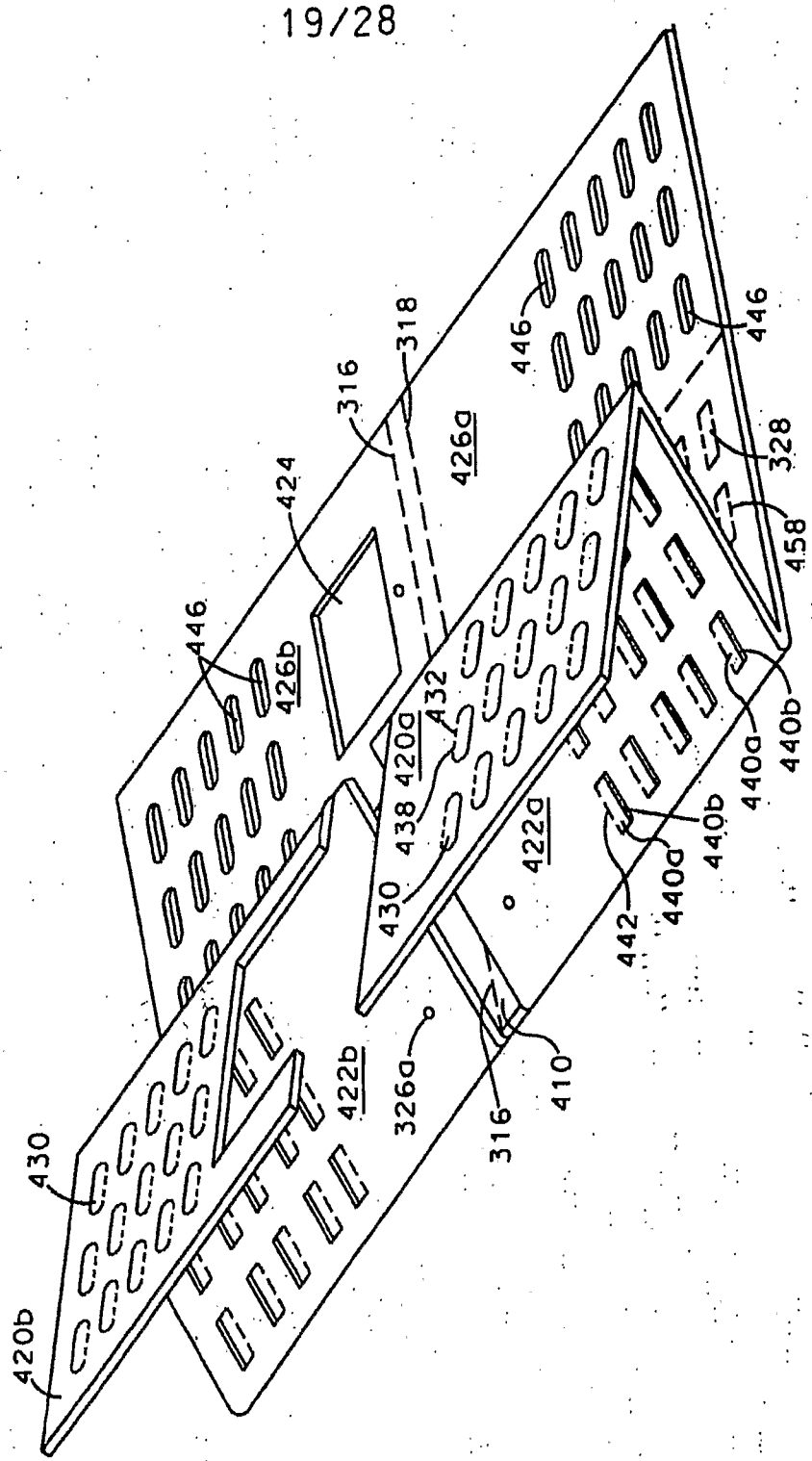

316
318
446
446
424
426a
328
458
446
426b
432
420a
438
430
422a
440a
440b
440a
440b
442
422b
326a
316
410
430
420b

Fig.14B

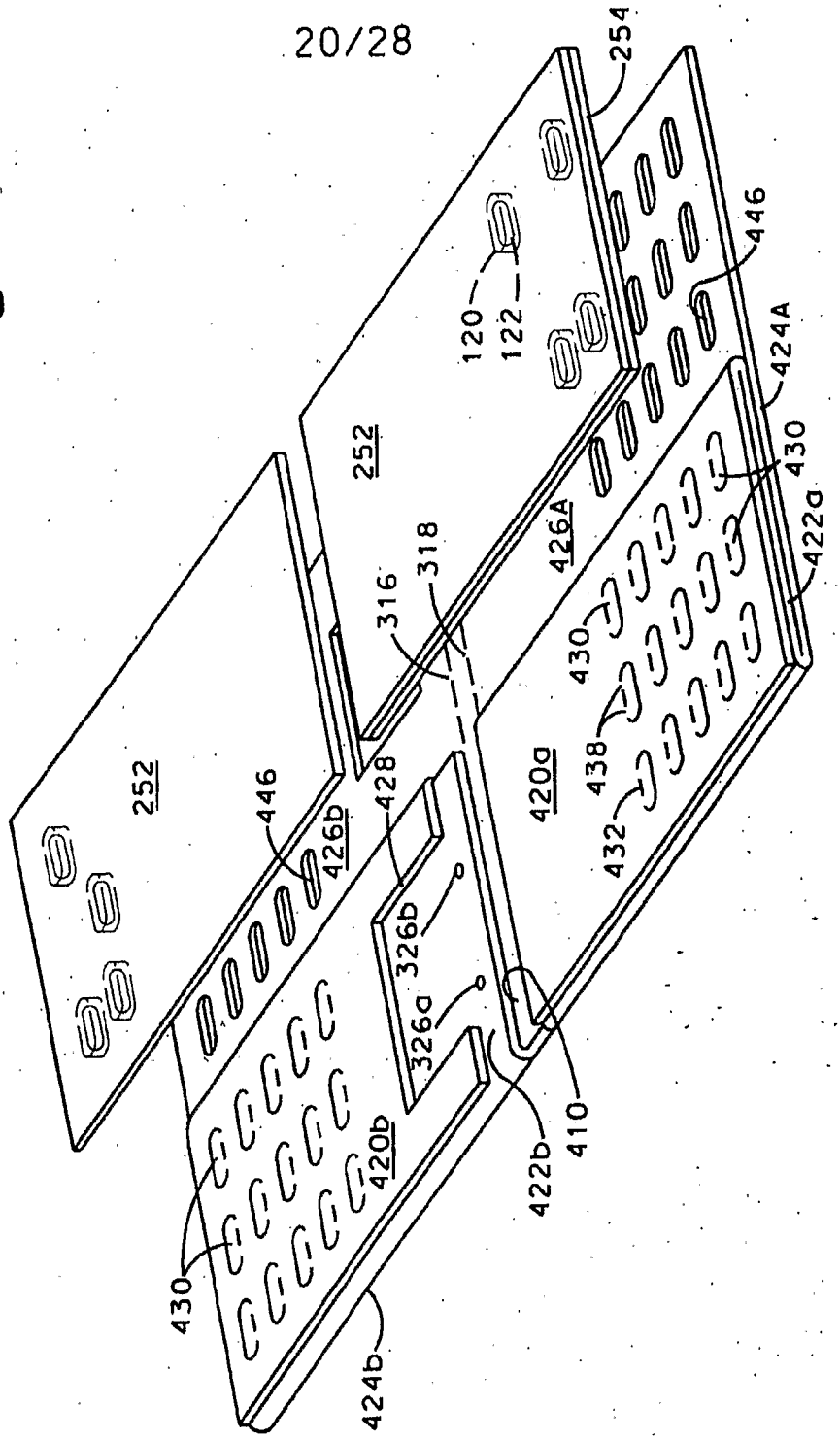

254
120
122
446
424A
252
430
422a
316
318
426A
430
438
432
420g
252
446
428
426b
326b
326a
420b
422b
410
430
424b

Fig. 15A

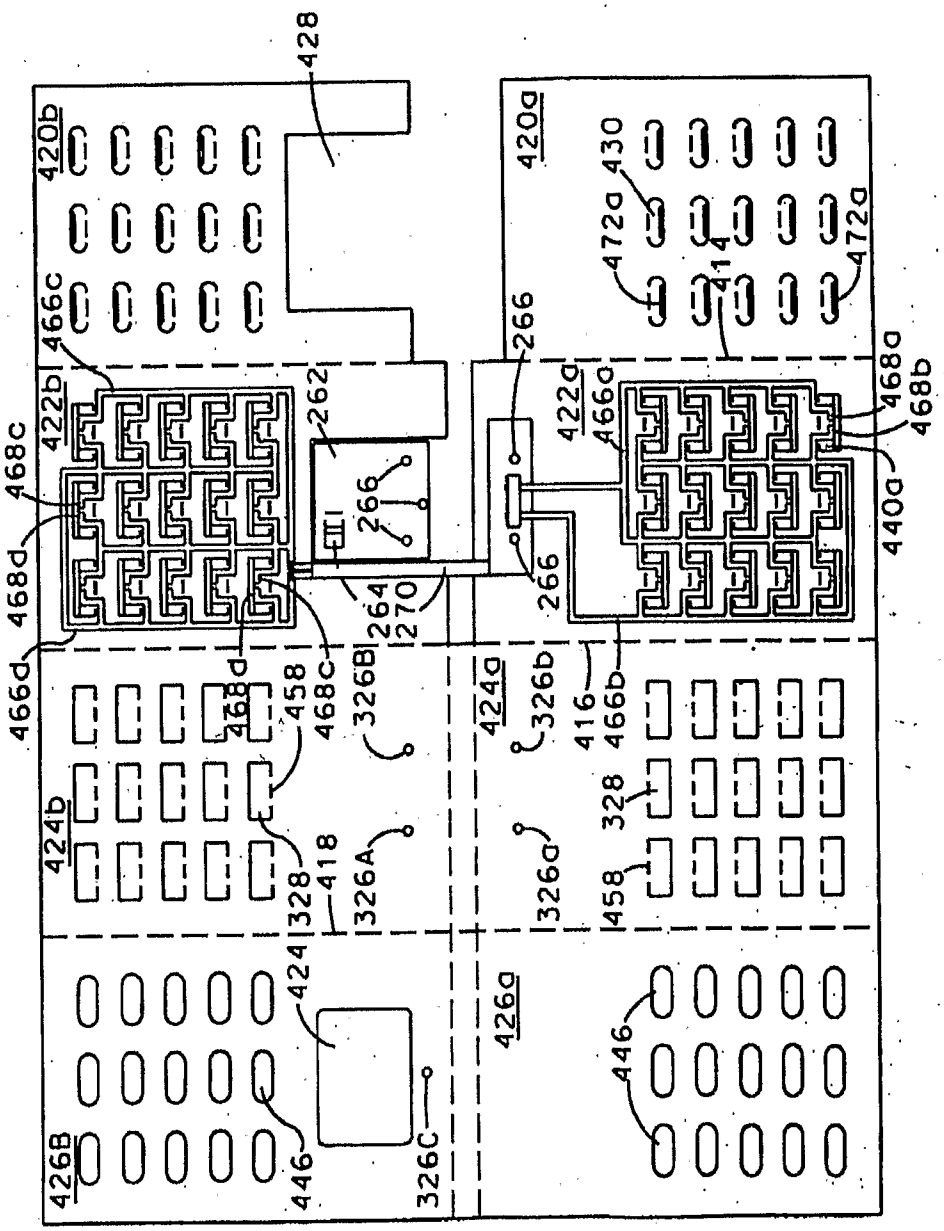

428
420b
420a
430
472a
472a
414
466c
422b
262
266
422a
466a
468a
468b
468c
468d
266
440a
264
270
266
466d
468d
458
468c
326B
424a
326b
416
466b
424b
328
418
326A
326a
458
328
424
426a
446
446
426B
326C

Fig. 15B

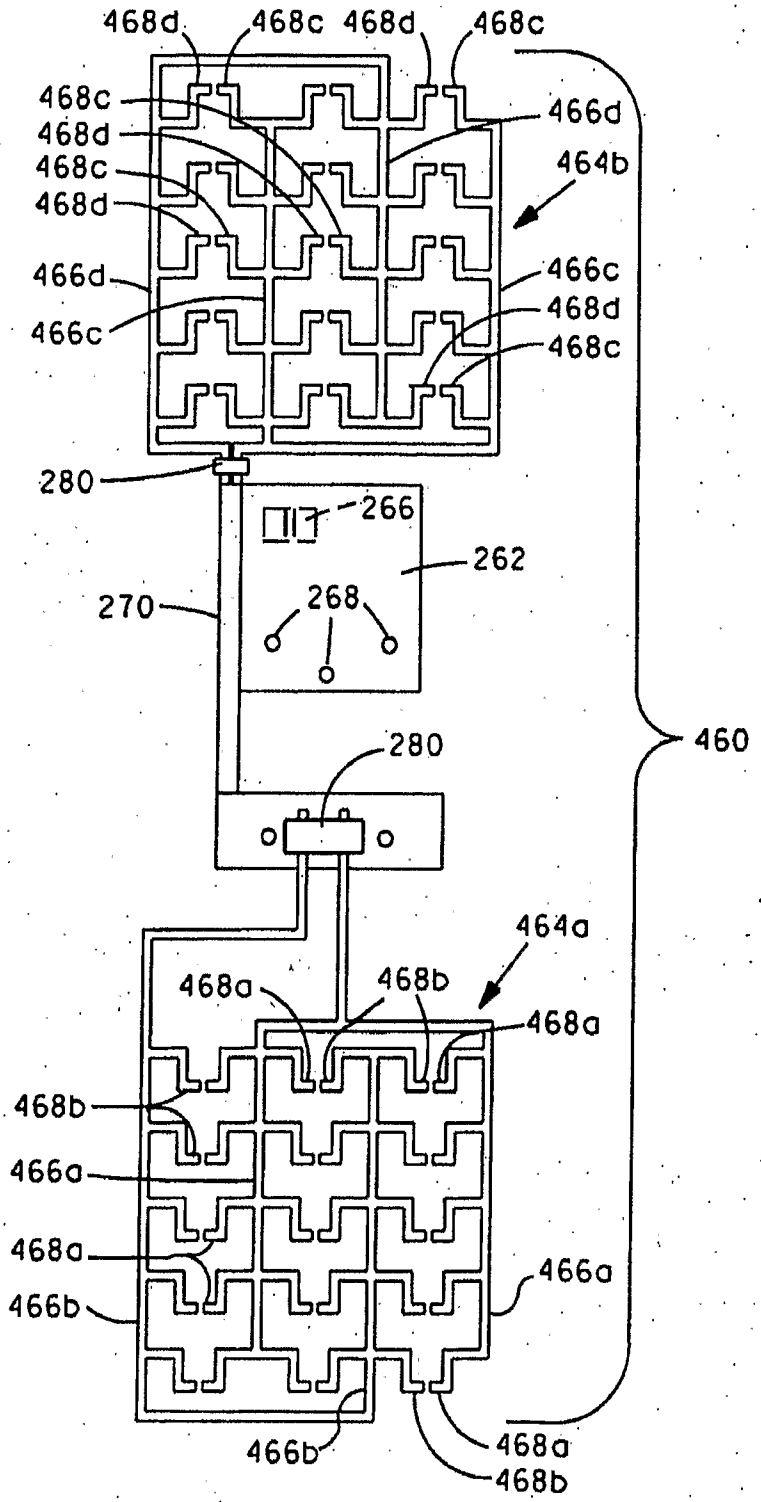

468d
468c
468d
468c
468c
468d
468c
468d
466d
466c
466d
464b
466c
468d
468c
280
266
262
270
268
280
460
464a
468a
468b
468a
468b
466a
468a
466b
466a
466b
468a
468b

Fig. 15C

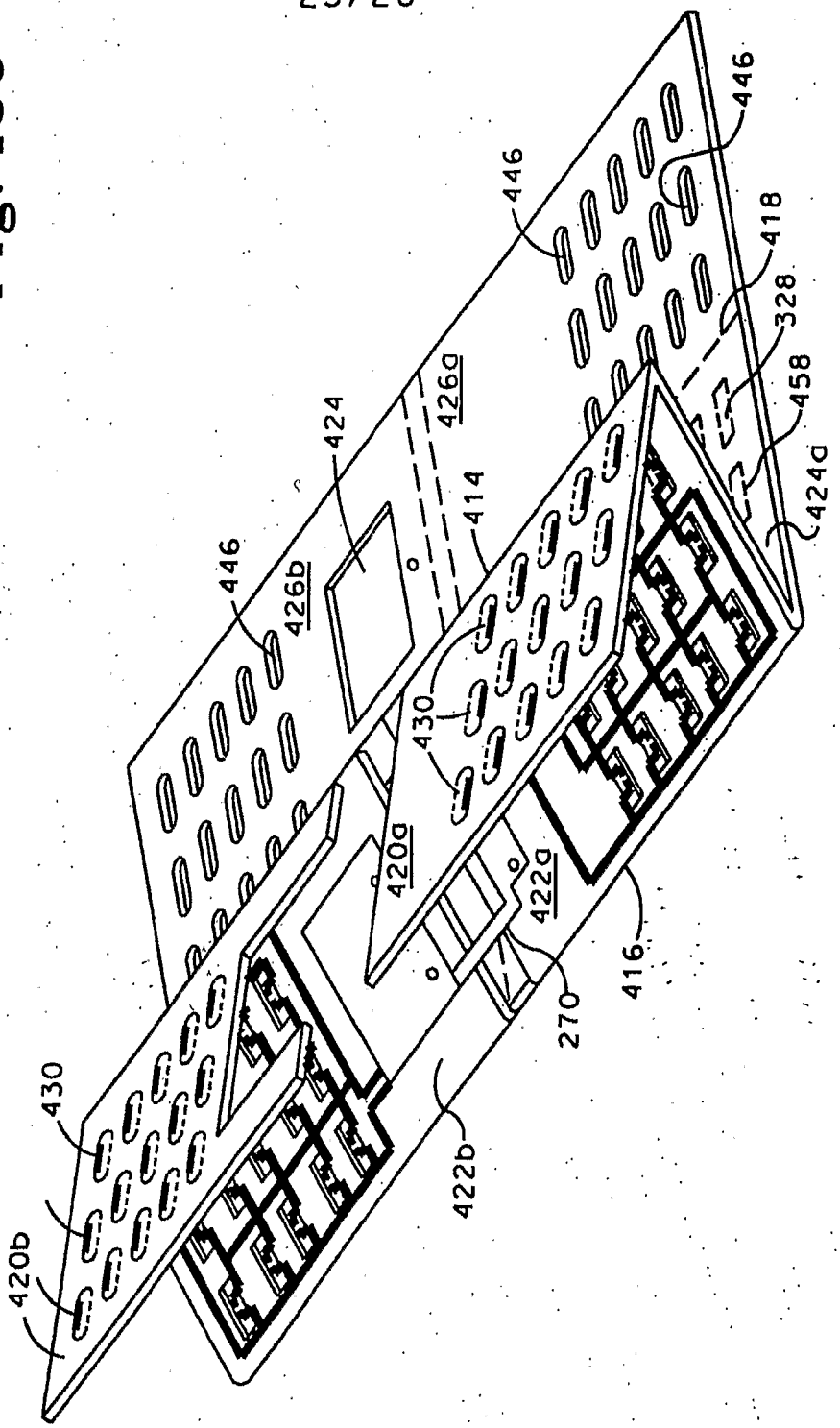

446
446
418
328
458
424a
424
426a
414
426b
446
430
420a
422a
416
270
430
420b
422b

Fig. 15D

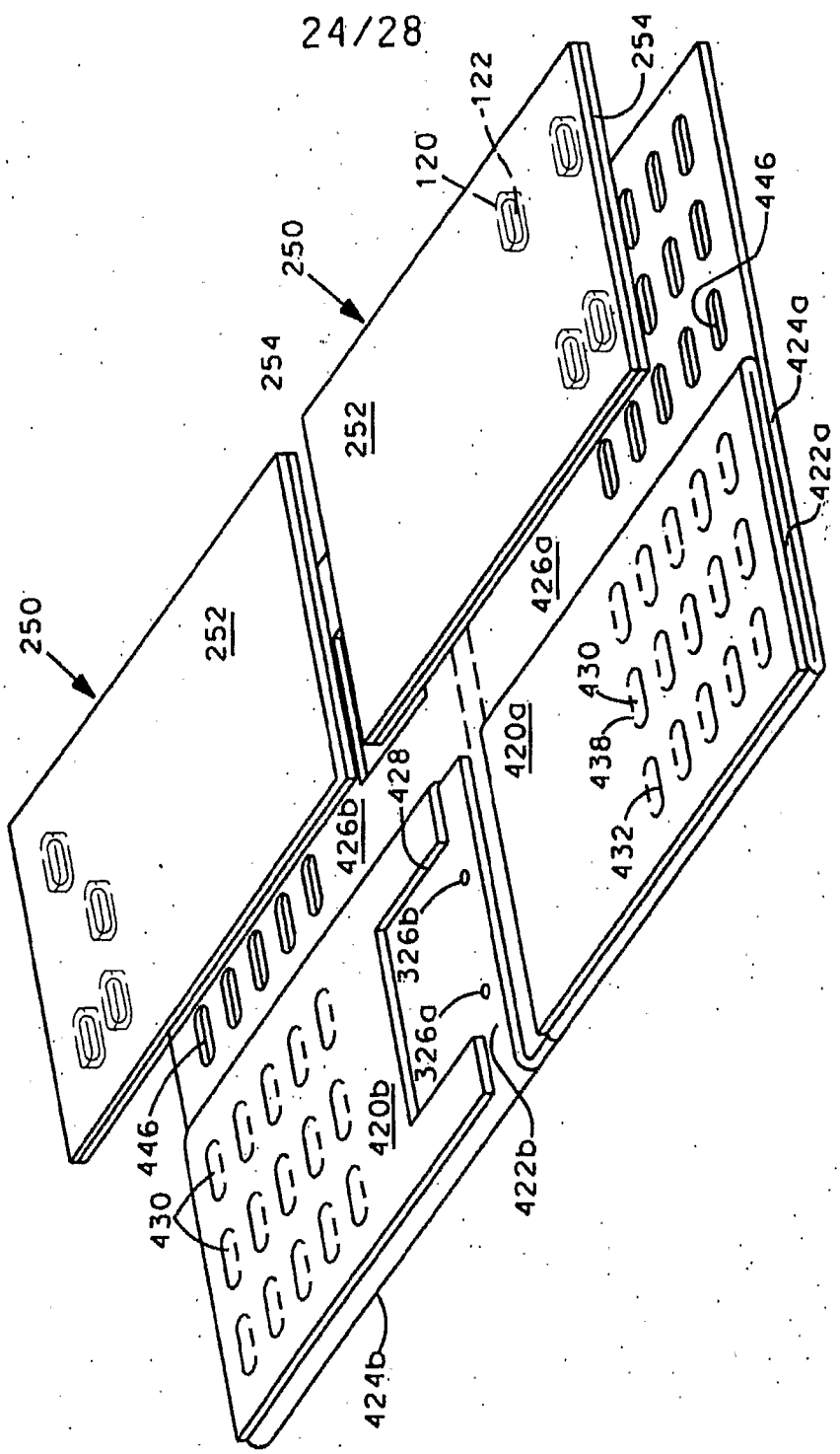

250
252
254
120
122
254
446
424a
422a
426a
420a
430
438
432
428
426b
326b
326a
420b
446
430
422b
424b

Fig. 16A

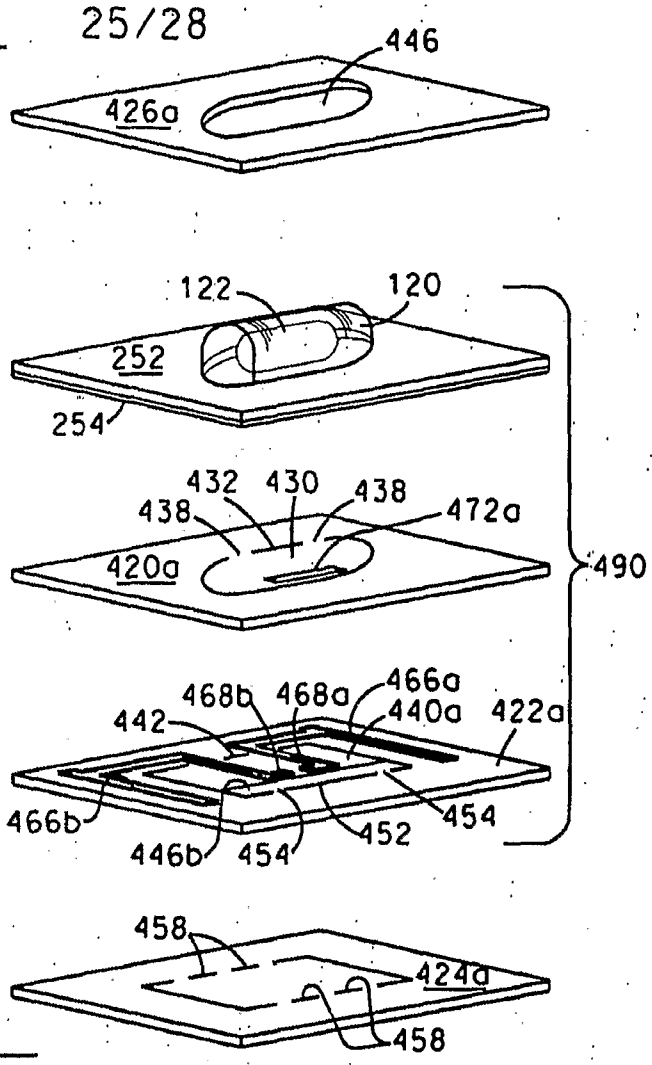


Fig. 16B

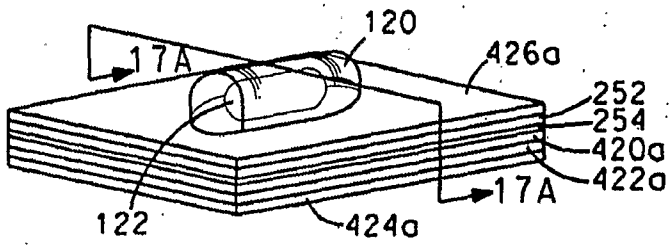


Fig. 17A

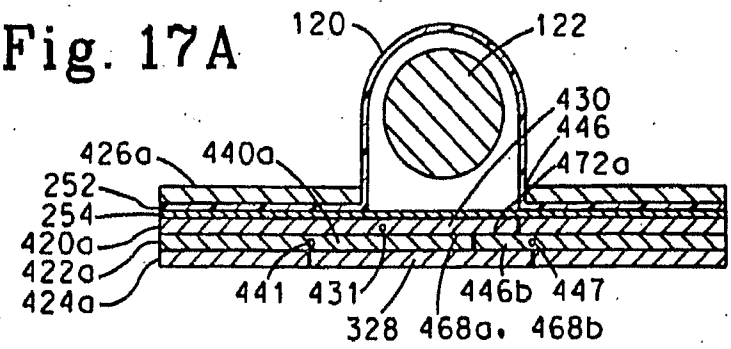


Fig. 17B

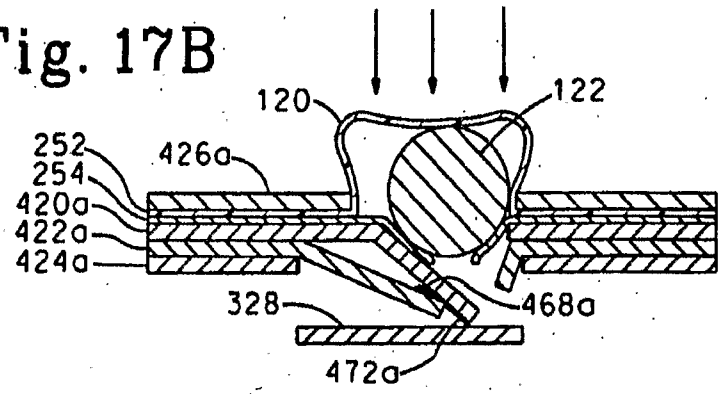


Fig. 17C

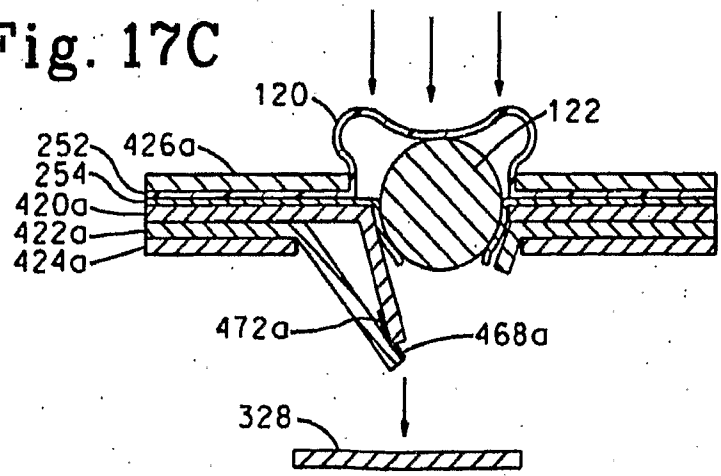


Fig. 18

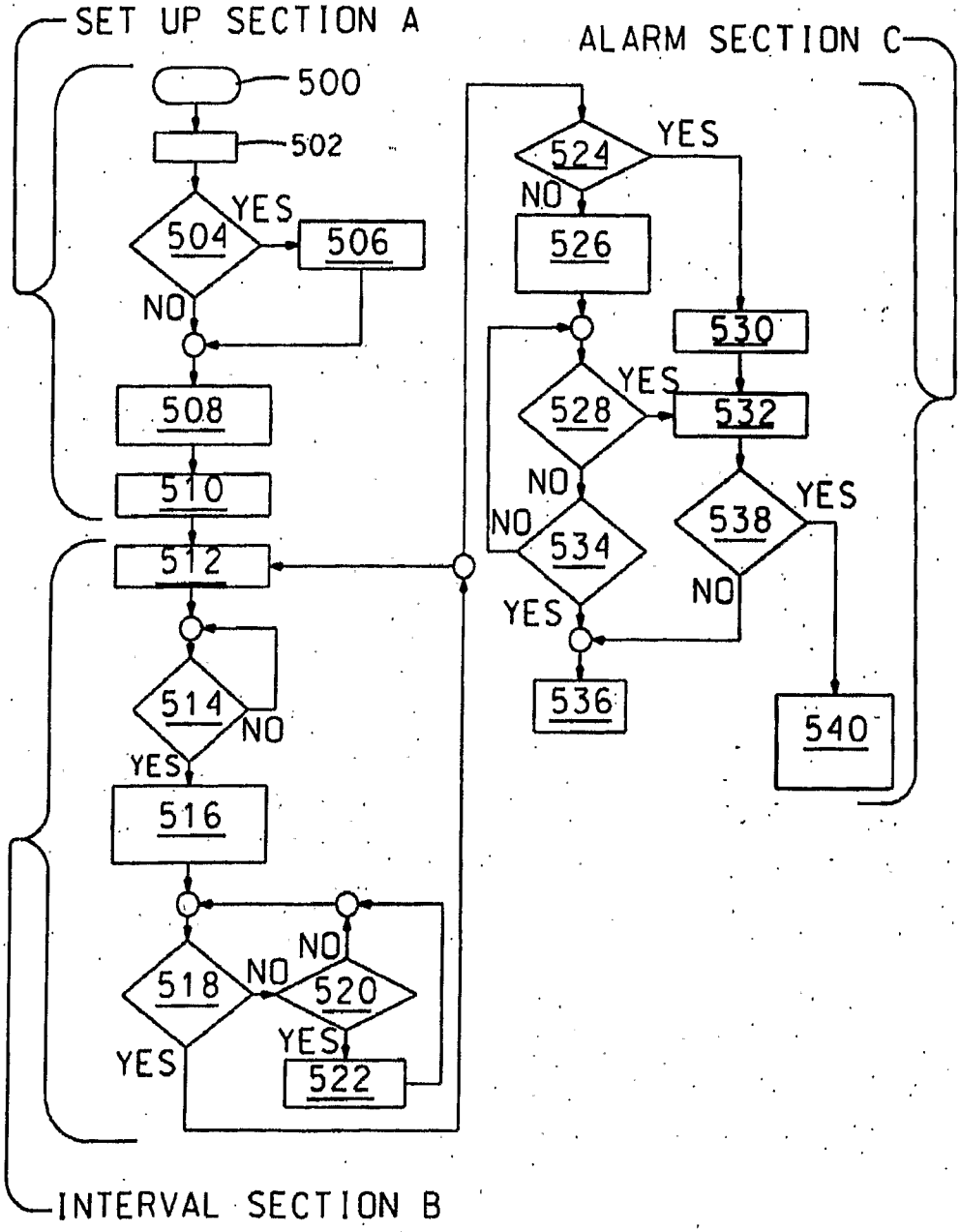

SET UP SECTION A
ALARM SECTION C
500
502
504
YES
506
NO
508
510
512
514
NO
YES
516
518
NO
NO
520
YES
YES
522
524
YES
NO
526
530
528
YES
532
NO
NO
534
538
YES
YES
NO
536
540
INTERVAL SECTION B

Fig. 19A

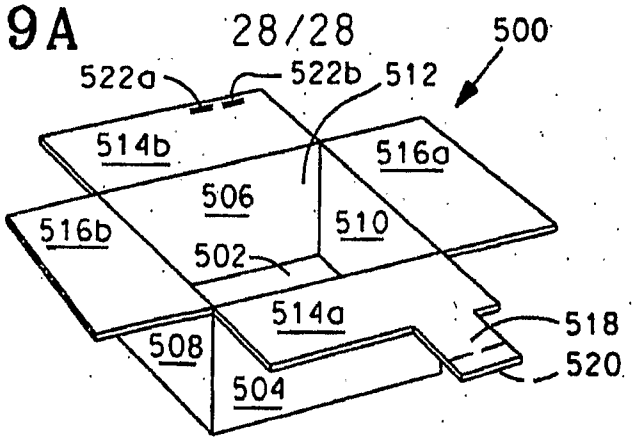


Fig. 19B

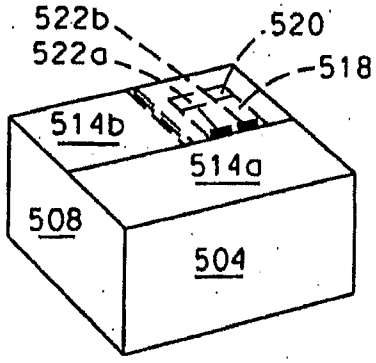


Fig. 19C

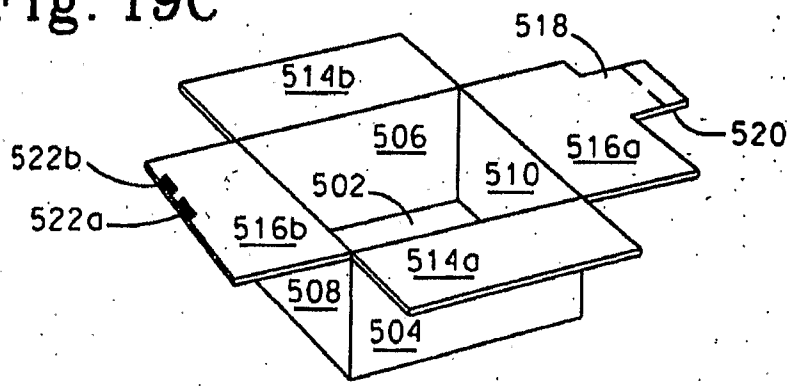


Fig. 19D

