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(54) **Interchangeable coded key pad assemblies alternately attachable to a user definable keyboard to enable programmable keyboard functions**

Auswechselbares kodierte Tastenfeld, welches alternierend befestbar ist an eine vom Benutzer konfigurierbare Tastatur zur Realisierung programmierbarer Tastaturfunktionen

Sous-ensemble à touches codé interchangeable, pouvant être fixé alternativement à un clavier configurable par l'utilisateur, pour effectuer des fonctions de clavier programmables

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DE-A- 2 723 736	DE-U- 8 336 889
US-A- 4 020 328	US-A- 4 626 830

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Description

This invention relates to keyboards and, more particularly, to interchangeable key pad assemblies for providing at least a portion of a user keyboard. Specifically, one embodiment of the invention provides interchangeable key pad assemblies that are coded so that when they are alternately installed on a keyboard, one of a variety of programmable sets of keyboard functions is enabled for selection by user actuation of the keys.

One exemplary use of the invention is in association with molded rubber keyboards. Molded rubber keyboards have been used in combination with underlying printed circuit boards to provide a keyboard structure much less expensive than those where each key requires a separate push button member separately mounted in a frame. The term "rubber," as used in this specification and in the claims, refers not only to synthetic and natural rubbers, but also to other elastomeric materials.

Molded rubber keyboards usually comprise a rubber sheet integral with upwardly projecting rubber keys. Each rubber key is located above a recess in the sheet and its lower end includes such means as conductive rubber members for closing the switch contacts on the printed circuit board located directly below it. The recesses form a diaphragm which acts to space the conductive rubber members above the printed circuit board, except when a particular key is pressed.

Church, U.S. Patent No. 4,764,770, for example, discloses a keyboard assembly which has a printed circuit board providing a series of switch contacts and a molded rubber keyboard providing a rubber base sheet overlying the printed circuit board and having a series of rubber keys integral with the base sheet. Each key has contacts on its bottom surface for closing each of the switch contacts when its key is depressed. Stabilizing membranes prevent the keys from wobbling or binding. Although undesirable wobbling or binding is substantially eliminated, the keyboard is either a dedicated keyboard or one whose key functions are determined by the system to which the keyboard is mounted.

US-A-4 020 328 discloses an auxiliary keyboard apparatus that comprises a removable keyboard which has no structure for automatic configuration of the system. That is, this auxiliary keyboard apparatus is not coded. Therefore, this auxiliary keyboard apparatus requires manual data entry to an associated processor in order to identify different keyboards.

US-A-4 626 830 discloses a membrane keyboard in which there does exist a structure for keyboard coding. Specifically, the membrane keyboard comprises conductive traces between first and third pin positions and second and third pin positions, respectively, on the membrane. That is, the membrane keyboard disclosed in US-A-4 626 830 comprises a hard-wired coding structure integral with the membrane itself to effect direct electrical contact between the first and third pin positions

and/or the second and third positions for keyboard coding.

DE-A-27 23 736 discloses a keyboard having an array of switches and an exchangeable cover plate. The cover plate extends over a part of the switches to prevent an actuation of those switches which are not required for a specific keyboard function.

Previously, overlays have been used to provide the user with identification of key functions for programmable or customizable key sets. Overlays are commonly used on computer keyboards and calculators. The typical overlay construction is a thin plastic sheet with screen-printed information. This material is not very durable and can be easily damaged.

Furthermore, these overlays typically are not securely attached to the computer keyboards and calculators. Consequently, they are easily dislodged and slide from the keyboard, frustrating the user. Also, the functions of the keys are dedicated or determined by the computer or calculator since the overlay does not operatively interact with the system.

Thus, the invention is based on the object of providing a custom key panel which allows the key functions to be tailored to a desired mode of operation.

This object is achieved by a custom key panel in accordance with claim 1.

Summary of the Invention

One embodiment of the present invention provides interchangeable key pad assemblies that are coded so that when they are alternately installed on a keyboard, one of a variety of programmable sets of keyboard functions is enabled for selection by user actuation of the keys. Each key pad assembly has a durable construction and is securely attachable to the remainder of the keyboard. Each key pad assembly is installed on the remainder of the keyboard and interfaces with the system with which the keyboard interacts, preferably a programmable system, to provide a custom key panel for the user so that key functions can be tailored to a desired selection of operations available to the user upon actuation of the keys.

The custom key panel in accordance with the invention is less prone to damage than an overlay, is securely attached, and imparts flexibility to the mechanical configuration of keys. The flexibility in configuration provides the user only the necessary function keys for the particular application. This provides a less cluttered panel for an improved human interface.

Brief Description of the Drawings

The above and other features of the invention and the concomitant advantages will be better understood and appreciated by persons skilled in the field to which the invention pertains in view of the following description given in conjunction with the accompanying drawings. In

the drawings:

Fig. 1 is an exploded view of one embodiment of a custom key panel in accordance with the invention; Fig. 2 is an electrical schematic drawing of the custom key panel shown in Fig. 1; Fig. 3 is a detailed drawing of a rubber keypad associated with the custom key panel shown in Fig. 1; Fig. 4 is a detailed drawing of a front panel of an interchangeable key pad assembly associated with the custom key panel shown in Fig. 1; Fig. 5 is a detailed drawing of a subpanel of an interchangeable key pad assembly associated with the custom key panel shown in Fig. 1; Fig. 6 is a detailed drawing of a spring retainer associated with the custom key panel shown in Fig. 1; Fig. 7 is a detailed drawing of a key adapter for allowing conventional keys to be incorporated into the custom key panel shown in Fig. 1; and Fig. 8 is a cross-sectional view of an interchangeable key pad assembly installed on the custom key panel shown in Fig. 1.

Detailed Description of the Preferred Embodiments

The custom key panel in accordance with the invention is an assembly of parts that preferably allows an interchangeable key pad assembly to be associated with system keyboard means to provide one of a variety of sets of key functions available to the user. The custom key panel provides direct execution of commands that typically are most frequently selected by the user.

In one embodiment, the custom key panel does not make an electrical connection when plugged in. It mechanically actuates switches for addressing a processor in the system with a unique identification code for each interchangeable assembly. This provides a very reliable system.

One embodiment of the custom key panel in accordance with the invention is generally indicated by the numeral 10, as shown in Fig. 1. The custom key panel 10 preferably comprises switch means 12 in the form of user selectable key means 14 and actuable key decoding means 16.

The custom key panel 10 also preferably comprises key means 18 selectively mountable in relation to the switch means 12 for actuating the switch means. The key means 18 preferably comprises mechanical switch actuating means comprising at least one key 20 which is selectively actuable by the user. The key means 18 also comprises key encoding means 22 which actuates the key decoding means 16 when the key means is mounted in relation to the switch means 12 for identifying the function selectable by the user when at least one key 20 is actuated by the user.

The switches 14 and 16 are preferably conductive rubber members 24 or pellets compression molded into a sheet 26 of non-conductive rubber, forming the keypad

or matrix of switches. The conductive members 24 are held above traces 28 on a printed circuit board 30 by the non-conductive rubber sheet 26. When a switch 14 or 16 is depressed, the conductive member 24 shorts the traces for that location and is acknowledged by the processor as a closed switch.

There are preferably six binary address switches, which allow 64 possible custom key panel key function options. The six address switches are arranged in the same matrix as hole locations on a subpanel 32 of the custom key panel assembly. The subpanel 32 can hold down an address switch 16 (ensuring closure) when there is no hole.

The configuration of each address switch 16 allows overtravel or compression of the rubber actuator without exerting excessive force on the assembly. This ensures switch closure under worst case tolerance stack-up and bowing of the subpanel 32 and the keyboard. The address switches 16 preferably have a small travel of 0.5 mm to closure, then a large overtravel of 3.0 mm. The travel of standard key switches is typically 1.7 mm with no overtravel.

The custom key panel 10 preferably allows an interchangeable key pad assembly 18 to be plugged into a front bezel 40 of an electronic instrument, such as the HP 70004A modular measurement system display/mainframe, to provide one of a variety of sets of key functions available to the user. The key pad assembly 18 is preferably retained in the bezel 40 by a mechanical spring 42. The spring 42 is installed from the backside of the bezel 40 and is retained by the key pad. The spring 42 latches over the edge of the subpanel 32 to retain the right side of the assembly. The left side is sandwiched around a shelf 44 in the bezel 40.

The key pad assembly 18 is installed by aligning the left side to the shelf 44 on the bezel 40, then rotating the assembly around the shelf like a hinge until the spring 42 latches. The operation is similar to closing a door.

To remove the key pad assembly 18, an opening 46 is provided in the front panel to insert a tool, such as a screwdriver blade. As the screwdriver is pushed into the opening 46, the spring 42 is forced away from the subpanel 32, which disengages the key pad assembly 18. The key pad assembly 18 is then forced away from the key pad by another portion of the spring, and any residual force from the depressed address switches 16. The key pad assembly 18 comes to rest at a sufficient distance away from the bezel 40 to provide finger clearance to grab the key pad assembly 18 for removal.

The key pad assembly 18 preferably utilizes conventional keycaps 50. The keycaps 50 are typically double shot injection molded keys with nomenclature integral to the keycap. Each keycap presses onto an adapter 52 allowing the keycap to function in the key pad assembly 18. Designers of custom key panels can modify these tools to create unique keycaps for each application.

This affords a great amount of flexibility to the design of future key panels. There can be, for example, fifteen

separate keys. These can be either half wide keycaps or quarter wide keycaps. Or there can be as many as three double wide keycaps used in the far left column (major user keys) with the remaining nine locations either half or quarter keys. The front panel can be screen-printed to provide any required identification of the key functions.

When the custom key panel is removed from the instrument, the keycaps are preferably captivated and can not fall out. This is accomplished by providing the subpanel 32 with apertures 60 into which the keycaps 50 connected to the adapters 52 are deposited. A front panel 62 having apertures 64 is then placed over the subpanel 32 and the keycaps 50 so that the apertures 64 align with the keycaps. The front panel 62 also includes welded studs 66 in which are fitted spacers 68. The studs 66 extend through holes 70 in the subpanel 32, and nuts 72 are threaded on the studs to hold the key pad assembly 18 together. The key pad assembly is rugged and durable enough to withstand damage during abusive handling outside of the instrument.

This invention has many advantages beyond what overlays can offer. Where flexibility, reliability, durability, and optimized human interface are desired, this invention is an ideal solution. There are numerous applications that can benefit from using a custom key panel in accordance with the present invention.

The foregoing description is offered primarily for purposes of illustration. One modification is to mold the entire key pad assembly 18 from a plastic material. In another contemplated embodiment, the address switches can be replaced by electrical address coding means, such as a diode matrix or read only memory.

Claims

1. A custom key panel (10) configured by one of a plurality of interchangeable key pad assemblies, comprising:

a printed circuit board (30) having a plurality of sets of conductive elements (28) applied to the surface of a dielectric material;

an elastomeric sheet (26) having a plurality of recesses positioned opposite the plurality of sets of conductive elements (28) of the printed circuit board (30);

a plurality of elastomeric keys (14, 16) located in line with the plurality of recesses in the sheet (26) and at a distance from the printed circuit board (30), each key having a conductive member (24) for closing the set of conductive elements (28) on the printed circuit board (30) in line with the key (14, 16);

each recess forming a diaphragm which acts to

space each associated conductive member (24) above each set of conductive elements (28) on the printed circuit board (30) in line with the recess, except when a particular elastomeric key (14, 16) is pressed;

the plurality of elastomeric keys (14, 16) forming a switch means (12) comprising a) user actuable means (20, 50, 52, 14) and b) actuable key decoding means (16), the key decoding means (16) being arranged for actuation by coupling of an interchangeable key pad assembly (18) to the plurality of elastomeric keys (14, 16); and

the interchangeable key pad assembly (18) associated with the custom key panel (10) comprising:

a front panel (62);

a subpanel (32);

at least one key (20) projecting through the front panel (62) and selectively actuable by the user for actuating the user actuable means (20, 50, 52, 14) after the interchangeable key pad assembly (18) is coupled to the switch means (12); and

key encoding means (22) independent of the at least one key (20) for actuating the key decoding means (16) when the interchangeable key pad assembly (18) is coupled to the plurality of elastomeric keys (14, 16);

whereby the interchangeable key pad assembly (18) when associated with the custom key panel (10) provides one of a variety of sets of key functions available to the user.

2. The custom key panel (10) according to claim 1 wherein the interchangeable key pad assembly (18) is configured to not make an electrical connection when plugged in the custom key panel (10) but rather mechanically actuates switches (16) for addressing the external processor with a unique identification code for the key pad assembly (18).
3. The custom key panel (10) according to claim 1, further comprising a spring retainer (42) associated with the custom key panel (10) for installing the interchangeable key pad assembly (18) on the custom key panel (10).
4. The custom key panel (10) according to claim 1 wherein the at least one key (20) comprises a key adapter (52) for allowing a conventional key to be incorporated into the interchangeable key pad

assembly (18).

5. The custom key panel (10) according to claim 1 wherein the switch means (12) further comprises:

bezel means (40);
the printed circuit board (30) being mounted to the bezel means (40);
the elastomeric sheet (26) being mounted to the bezel means (40) overlying the printed circuit board (30); and wherein the interchangeable key pad assembly (18) is plugged into the bezel means (40) to provide one of a variety of sets of key functions available to the user.

6. The custom key panel (10) according to claim 5 wherein the interchangeable key pad assembly (18) is retained in the bezel means (40) by a mechanical spring (42).

7. The custom key panel (10) according to claim 6 wherein the bezel means (40) has a shelf (44) and the interchangeable key pad assembly (18) comprises:

a first side, the first side of the interchangeable key pad assembly (18) being sandwiched around the shelf (44) of the bezel means (40); and
a second side, the mechanical spring (42) being latched over the second side of the interchangeable key pad assembly (18) to retain the interchangeable key pad assembly (18).

8. The custom key panel (10) according to claim 6 or claim 7 wherein the interchangeable key pad assembly (18) further comprises:

an opening (46) overlying the mechanical spring (42) when the interchangeable key pad assembly (18) is installed on the bezel means (40), the opening (46) being adapted for insertion of a tool to disengage the spring (42) from the interchangeable key pad assembly (18) to disengage the key pad assembly (18).

9. The custom key panel (10) according to claim 1 wherein there are six binary key encoding means (22) in the form of alternate unrelieved and relieved portions of the interchangeable key pad assembly (18).

10. The custom key panel (10) according to claim 1 wherein

the subpanel (32) has at least one aperture (60) into which the at least one key (20) is deposited; the front panel (62) has at least one aperture

(64), the front panel (62) being placed over the subpanel (32) and the at least one key (20) so that the at least one aperture (64) in the front panel (62) aligns with the at least one key (20) and the at least one aperture (60) in the subpanel (32);

and wherein the interchangeable key pad assembly (18) further comprises:

studs (66) mounted on the front panel (62); spacers (68) fitted on the studs (66), the studs (66) extending through holes in the subpanel (32); and

nuts (72) threaded on the studs (66) to hold the at least one key (20) sandwiched between the subpanel (32) and the front panel (62).

Patentansprüche

1. Ein kundenspezifisches Tastenbedienfeld (10), das durch eine aus einer Mehrzahl von austauschbaren Tastenfeldanordnungen konfiguriert ist, mit folgenden Merkmalen:

einer gedruckten Schaltungsplatine (30) mit einer Mehrzahl von Sätzen von leitfähigen Elementen (28), die auf der Oberfläche eines dielektrischen Materials angebracht sind;

einer elastomeren Schicht (26) mit einer Mehrzahl von Aussparungen, die gegenüber der Mehrzahl von Sätzen von leitfähigen Elementen (28) der gedruckten Schaltungsplatine (30) positioniert sind;

einer Mehrzahl von elastomeren Tasten (14, 16), die ausgerichtet zu der Mehrzahl von Aussparungen in der Schicht (26) und in einem Abstand von der gedruckten Schaltungsplatine (30) positioniert sind, wobei jede Taste ein leitfähiges Bauglied (24) zum Schließen des Satzes der leitfähigen Elemente (28) auf der gedruckten Schaltungsplatine (30) ausgerichtet mit der Taste (14, 16) aufweist;

wobei jede Aussparung eine Membran bildet, die wirkt, um jedes zugeordnete leitfähige Bauglied (24) über jedem Satz von leitfähigen Elementen (28) auf der gedruckten Schaltungsplatine (30) ausgerichtet mit der Aussparung zu beabstanden, es sei denn, daß eine spezielle elastomere Taste (14, 16) gedrückt wird;

wobei die Mehrzahl von elastomeren Tasten (14, 16) eine Schalteinrichtung (12) bilden, die a) eine Benutzer-betätigbare Einrichtung (20, 50, 52, 14) und b) eine betätigbare Tastendecodiereinrichtung (16) aufweist, wobei

- die betätigbare Tastendecodiereinrichtung (16) zur Betätigung durch Koppeln einer austauschbaren Tastenfeldanordnung (18) mit der Mehrzahl von elastomerischen Tasten (14, 16) angeordnet ist; und
- wobei die austauschbare Tastenfeldanordnung (18), die dem kundenspezifischen Tastenbedienfeld (10) zugeordnet ist, folgende Merkmale aufweist:
- eine Frontplatte (62);
- eine Unterplatte (32);
- wobei mindestens eine Taste (20) durch die Frontplatte (62) vorsteht und selektiv durch den Benutzer betätigbar ist, um die Benutzer-betätigbare Einrichtung (20, 50, 52, 14) zu betätigen, nachdem die austauschbare Tastenfeldanordnung (18) mit der Schalteinrichtung (12) gekoppelt ist; und
- eine Tastencodiereinrichtung (22), die von der mindestens einen Taste (20) unabhängig ist, zum Betätigen der Tastendecodiereinrichtung (16), wenn die austauschbare Tastenfeldanordnung (18) mit der Mehrzahl von elastomerischen Tasten (14, 16) gekoppelt ist;
- wodurch die austauschbare Tastenfeldanordnung (18), wenn dieselbe dem kundenspezifischen Tastenbedienfeld (10) zugeordnet ist, einen Satz aus einer Mehrzahl von Sätzen von Tastenfunktionen schafft, die für den Benutzer verfügbar sind.
2. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 1, wobei die austauschbare Tastenfeldanordnung (18) konfiguriert ist, um keine elektrische Verbindung herzustellen, wenn dieselbe in das kundenspezifische Tastenbedienfeld (10) eingesteckt ist, sondern Schalter (16) mechanisch betätigt, um den externen Prozessor mit einem einzigartigen Identifikationscode für die Tastenfeldanordnung (18) zu adressieren.
3. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 1, das ferner einen Federhalter (42) aufweist, der dem kundenspezifischen Tastenbedienfeld (10) zugeordnet ist, um die austauschbare Tastenfeldanordnung (18) in dem kundenspezifischen Tastenbedienfeld (10) einzubauen.
4. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 1, bei dem die mindestens eine Taste (20) einen Tastenadapter (52) aufweist, um zu ermöglichen, daß eine herkömmliche Taste in die austauschbare Tastenbedienfeldanordnung (18) aufgenommen werden kann.
5. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 1, bei dem die Schalteinrichtung (12) ferner folgende Merkmale aufweist:
- eine Frontrahmeneinrichtung (40);
- die gedruckte Schaltungsplatine (30), die auf der Frontrahmeneinrichtung (40) befestigt ist;
- die elastomerische Schicht (26), die an der Frontrahmeneinrichtung (40) befestigt ist, die über der gedruckten Schaltungsplatine (30) liegt; und wobei die austauschbare Tastenfeldanordnung (18) in die Frontrahmeneinrichtung (40) eingesteckt wird, um einen Satz aus einer Mehrzahl von Sätzen von Tastenfunktionen zu schaffen, die für den Benutzer verfügbar sind.
6. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 5, bei dem die austauschbare Tastenfeldanordnung (18) durch eine mechanische Feder (42) in der Frontrahmeneinrichtung (40) gehalten wird.
7. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 6, bei dem die Frontrahmeneinrichtung (40) ein Gestell (44) aufweist und die austauschbare Tastenfeldanordnung (18) folgende Merkmale aufweist:
- eine erste Seite, wobei die erste Seite der austauschbaren Tastenfeldanordnung (18) Sandwich-artig um das Gestell (44) der Frontrahmeneinrichtung (40) angeordnet ist; und
- eine zweite Seite, wobei die mechanische Feder (42) über die zweite Seite der austauschbaren Tastenfeldanordnung (18) verriegelt ist, um die austauschbare Tastenfeldanordnung (18) zu halten.
8. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 6 oder 7, bei dem die austauschbare Tastenfeldanordnung (18) ferner folgendes Merkmal aufweist:
- eine Öffnung (46), die über der mechanischen Feder (42) liegt, wenn die austauschbare Tastenfeldanordnung in der Frontrahmeneinrichtung (40) eingebaut ist, wobei die Öffnung (46) zum Einsetzen eines Werkzeugs angepaßt ist, um die Feder (42) aus dem Eingriff mit der austauschbaren Tastenfeldanordnung (18) zu nehmen, um die Tastenfeldanordnung (18) aus dem Eingriff zu nehmen.

9. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 1, bei dem sechs binäre Tastencodiereinrichtungen (22) in der Form von abwechselnd nicht entspannten und entspannten Abschnitten der austauschbaren Tastenfeldanordnung (18) existieren. 5
10. Das kundenspezifische Tastenbedienfeld (10) gemäß Anspruch 1, bei dem 10
- die Unterplatte (32) mindestens eine Öffnung (60) aufweist, in welche die mindestens eine Taste (20) abgelegt ist;
- die Frontplatte (62) mindestens eine Öffnung (64) aufweist, wobei die Frontplatte (62) über der Unterplatte (32) und der mindestens einen Taste (20) derart plaziert ist, daß die mindestens eine Öffnung (64) in der Frontplatte (62) mit der mindestens einen Taste (20) und der mindestens einen Öffnung (60) in der Unterplatte (32) ausgerichtet ist; 15 20
- und wobei die austauschbare Tastenfeldanordnung (18) ferner folgende Merkmale aufweist: 25
- Stifte (66), die auf der Frontplatte (62) befestigt sind;
- Abstandshalter (68), die auf den Stifte (66) befestigt sind, wobei sich die Stifte (66) durch Löcher in der Unterplatte (32) erstrecken; und 30
- Muttern (72), die gewindemäßig auf die Stifte (66) gedreht sind, um die mindestens eine Taste (20) zwischen der Unterplatte (32) und der Frontplatte (62) Sandwich-artig zu halten. 35

Revendications 40

1. Panneau à touches personnalisé (10) configuré par un parmi plusieurs ensembles de claviers interchangeables, comprenant:
- une carte de circuit imprimé (30) comportant plusieurs ensembles d'éléments conducteurs (28) appliqués à la surface d'un matériau diélectrique;
- une feuille d'élastomère (26) comportant plusieurs cavités placées à l'opposé des différents ensembles d'éléments conducteurs (28) de la carte de circuit imprimé (30);
- plusieurs touches en élastomère (14, 16) situées en ligne avec les différentes cavités situées dans la feuille (26), et à une certaine distance de la carte de circuit imprimé (30), chaque touche comportant un élément conducteur (24) 45

pour fermer l'ensemble d'éléments conducteurs (28) situés sur la carte de circuit imprimé (30) en ligne avec la touche (14, 16);

chaque cavité formant un diaphragme qui agit en espaçant chaque élément conducteur associé (24) situé au-dessus de chaque ensemble d'éléments conducteurs (28) situé sur la carte de circuit imprimé (30) en ligne avec la cavité, sauf lorsqu'une touche en élastomère particulière (14, 16) est actionnée;

les plusieurs touches en élastomère (14, 16) formant un moyen de commutation (12) comprenant a) un moyen pouvant être actionné par l'utilisateur (20, 50, 52, 14) et b) un moyen de décodage de touche pouvant être actionné (16), le moyen de décodage de touche (16) étant aménagé pour être actionné par couplage d'un ensemble de clavier interchangeable (13) vers les différentes touches en élastomère (14, 16); et

l'ensemble de clavier interchangeable (18) associé au panneau à touches personnalisé (10) comprenant:

un panneau avant (62);

un sous-panneau (32);

au moins une touche (20) se projetant à travers le panneau avant (62) et pouvant être actionné de façon sélective par l'utilisateur pour actionner le moyen pouvant être actionné par l'utilisateur (20, 50, 52, 14), après que l'ensemble de clavier interchangeable (18) ait été couplé au moyen de commutation (12); et

un moyen de codage de touche (22) indépendant de la au moins une touche (20), pour actionner le moyen de décodage de touche pouvant être actionné (16) lorsque l'ensemble de clavier interchangeable (18) est couplé aux différentes touches en élastomère (14, 16);

de façon que l'ensemble de clavier interchangeable (18), lorsqu'il est associé au panneau à touches personnalisé (10), fournisse l'un des différents ensembles de fonctions de touches disponibles pour l'utilisateur. 50

2. Panneau à touches personnalisé (10) selon la revendication 1, dans lequel l'ensemble de clavier interchangeable (18) est configuré de façon à ne pas effectuer une connexion électrique lorsqu'il est branché dans le panneau à touches personnalisé (10), mais actionne plutôt mécaniquement des commutateurs (16) pour adresser le processeur externe avec un code d'identification unique pour l'ensemble de clavier (18). 55
3. Panneau à touches personnalisé (10) selon la revendication 1, comprenant en outre un dispositif de maintien à ressort (42) associé au panneau à touches personnalisé (10), pour installer l'ensemble de

clavier interchangeable (18) sur le panneau à touches personnalisé (10).

4. Panneau à touches personnalisé (10) selon la revendication 1, dans lequel la au moins une touche (20) comprend un adaptateur de touches (52) pour permettre à une touche classique d'être incorporée dans l'ensemble de clavier interchangeable (18). 5
5. Panneau à touches personnalisé (10) selon la revendication 1, dans lequel le moyen de commutation (12) comprend en outre: 10
 - un moyen en biseau (40);
 - la carte de circuit imprimé (30) étant montée sur le moyen en biseau (40); 15
 - la feuille en élastomère (26) étant montée sur le moyen en biseau (40) recouvrant la carte de circuit imprimé (30); et dans lequel l'ensemble de clavier interchangeable (18) est branché dans le moyen en biseau (40) afin de fournir une diversité d'ensembles de fonctions de touches disponibles pour l'utilisateur. 20
6. Panneau à touches personnalisé (10) selon la revendication 5, dans lequel l'ensemble de clavier interchangeable (18) est retenu dans le moyen en biseau (40) par un ressort mécanique (42). 25
7. Panneau à touches personnalisé (10) selon la revendication 6, dans lequel le moyen en biseau (40) comporte un rebord (44), et l'ensemble de clavier interchangeable (18) comprend: 30
 - un premier côté, le premier côté de l'ensemble de clavier interchangeable (18) étant intercalé autour du rebord (44) du moyen en biseau (40); 35
 - et
 - un second côté, le ressort mécanique (42) étant verrouillé sur le second côté de l'ensemble de clavier interchangeable (18) pour retenir l'ensemble de clavier interchangeable (18). 40
8. Panneau à touches personnalisé (10) selon la revendication 6 ou la revendication 7, dans lequel l'ensemble de clavier interchangeable (18) comprend en outre: 45
 - une ouverture (46) recouvrant le ressort mécanique (42) lorsque l'ensemble de clavier interchangeable (18) est installé sur le moyen en biseau (40), l'ouverture (46) étant adaptée pour l'insertion d'un outil pour désengager le ressort (42) de l'ensemble de clavier interchangeable (18), afin de désengager l'ensemble de clavier interchangeable (18). 50
9. Panneau à touches personnalisé (10) selon la 55

revendication 1, dans lequel il existe six moyens de codage de touche binaire (22), sous la forme de parties alternativement réduites et non réduites de l'ensemble de clavier interchangeable (18).

10. Panneau à touches personnalisé (10) selon la revendication 1, dans lequel

le sous-panneau (32) a au moins une ouverture (60), dans laquelle la au moins une touche (20) est déposée;

le panneau avant (62) a au moins une ouverture (64), le panneau avant (62) étant placé au-dessus du sous-panneau (32), et la au moins une touche (20), de façon que la au moins une ouverture (64) située dans le panneau avant (62) soit alignée avec la au moins une touche (20) et la au moins une ouverture (60) située dans le sous-panneau (32);

et dans lequel l'ensemble de clavier interchangeable (18) comprend en outre:

des goujons (66) montés sur le panneau avant (62);

des entretoises (68) ajustées sur les goujons (66), les goujons (66) s'étendant à travers des trous situés dans le sous-panneau (32); et

des écrous (72) vissés sur les goujons (66) pour tenir la au moins une touche (20) intercalée entre le sous-panneau (32) et le panneau avant (62).

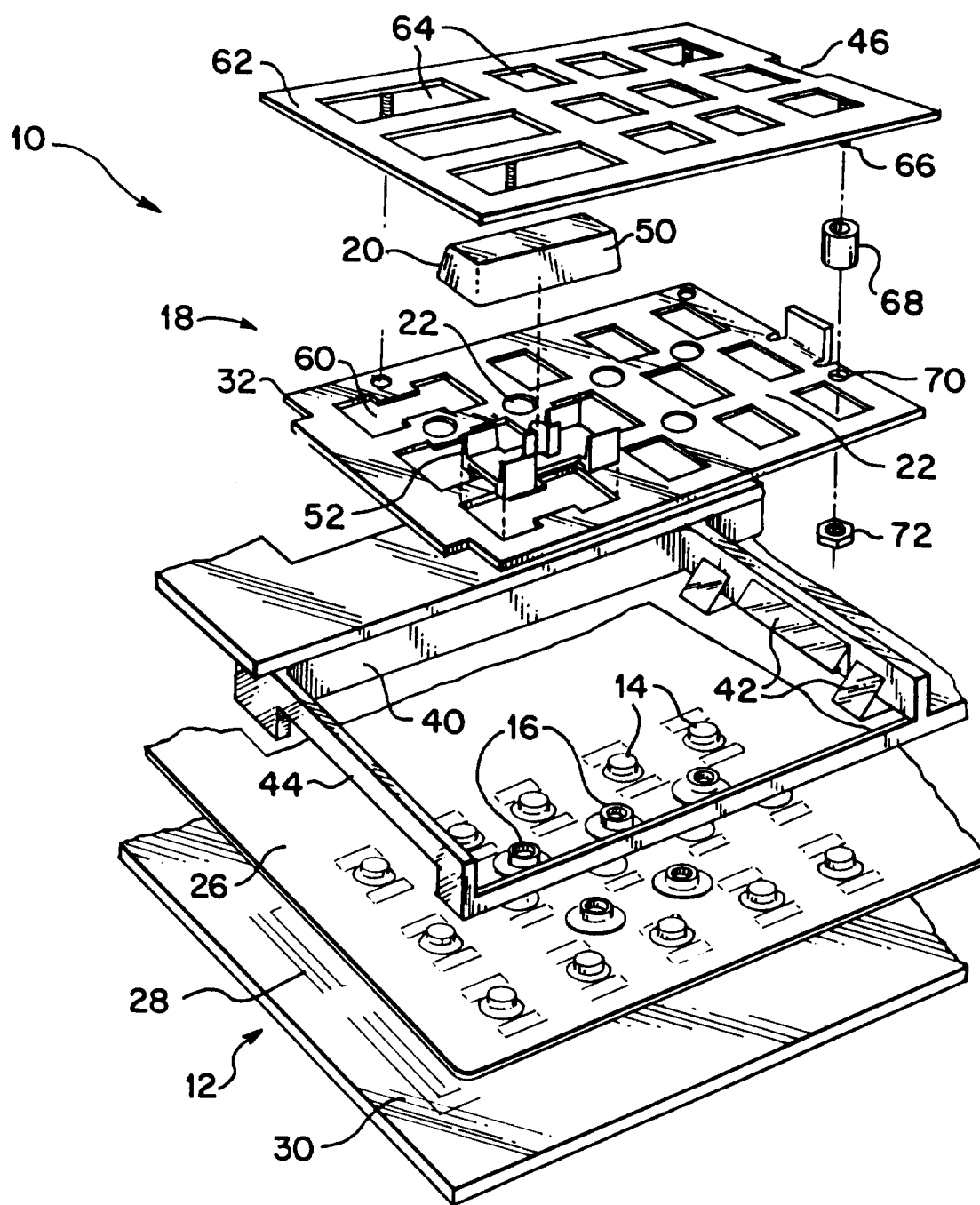


FIG 1

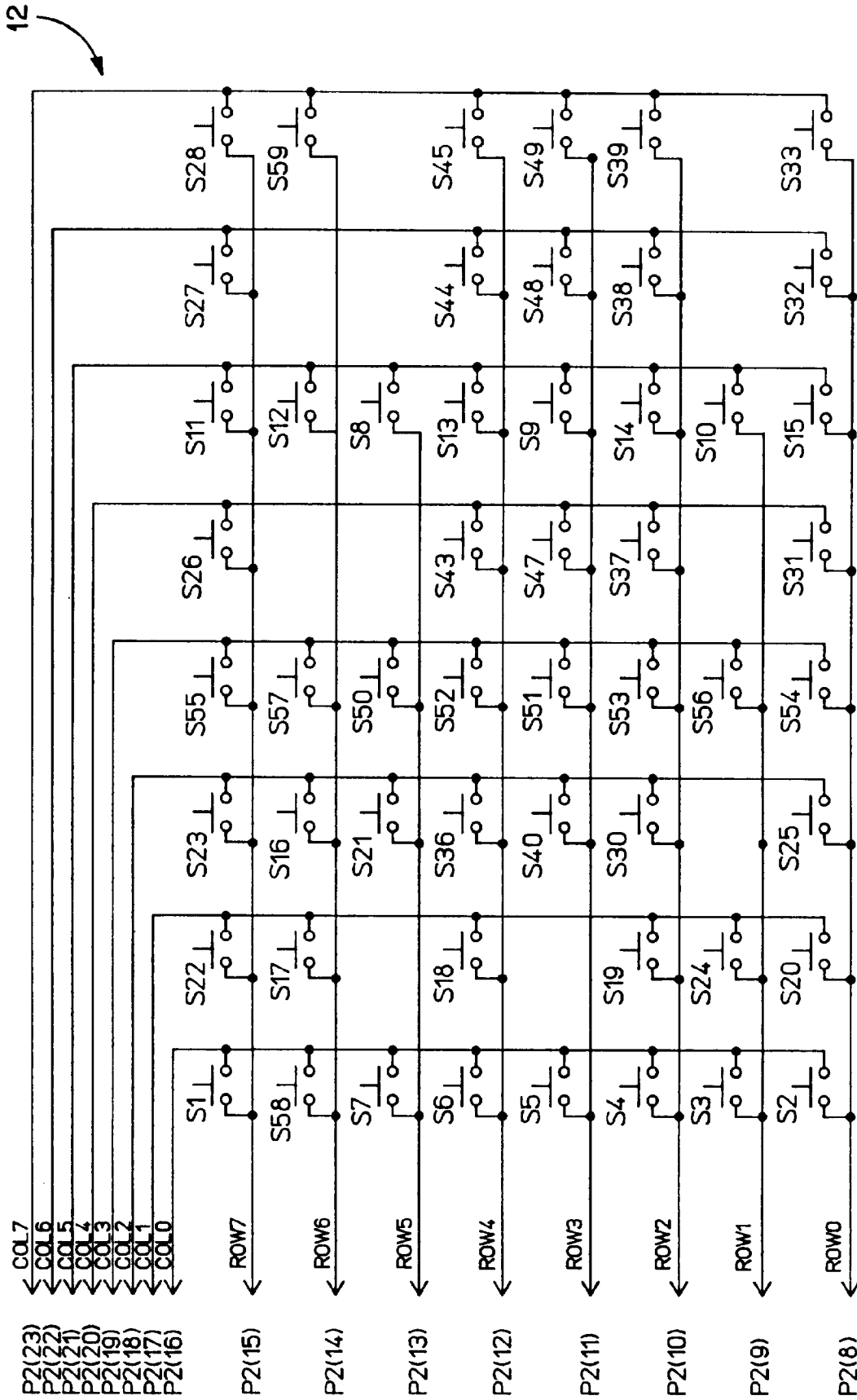


FIG 2A

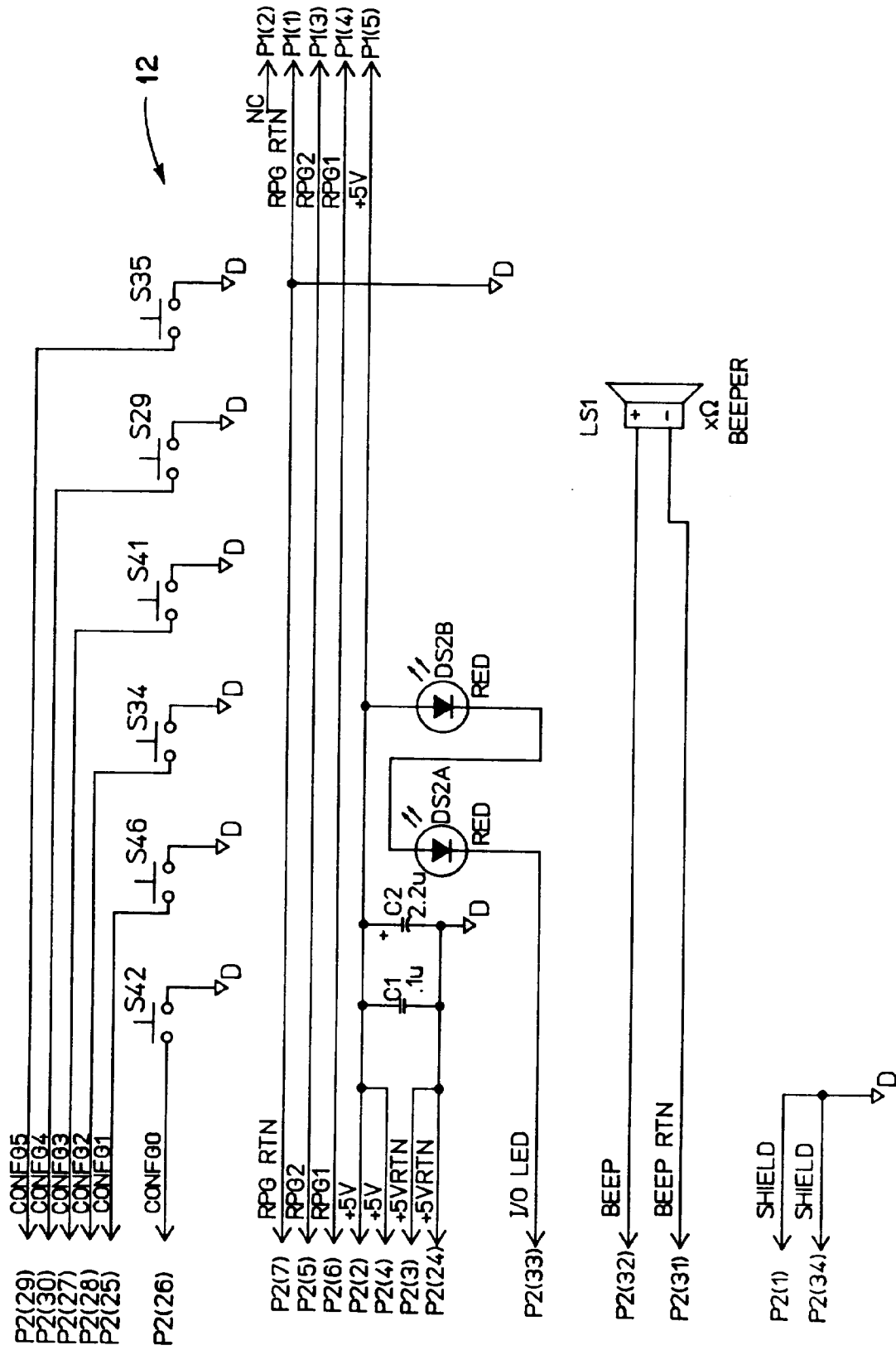
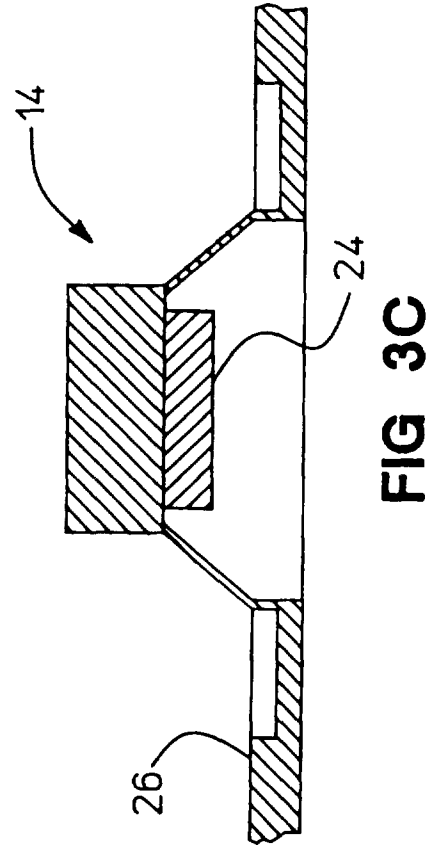
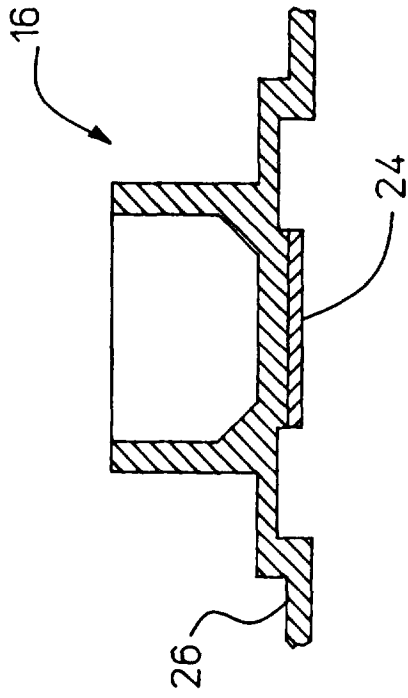
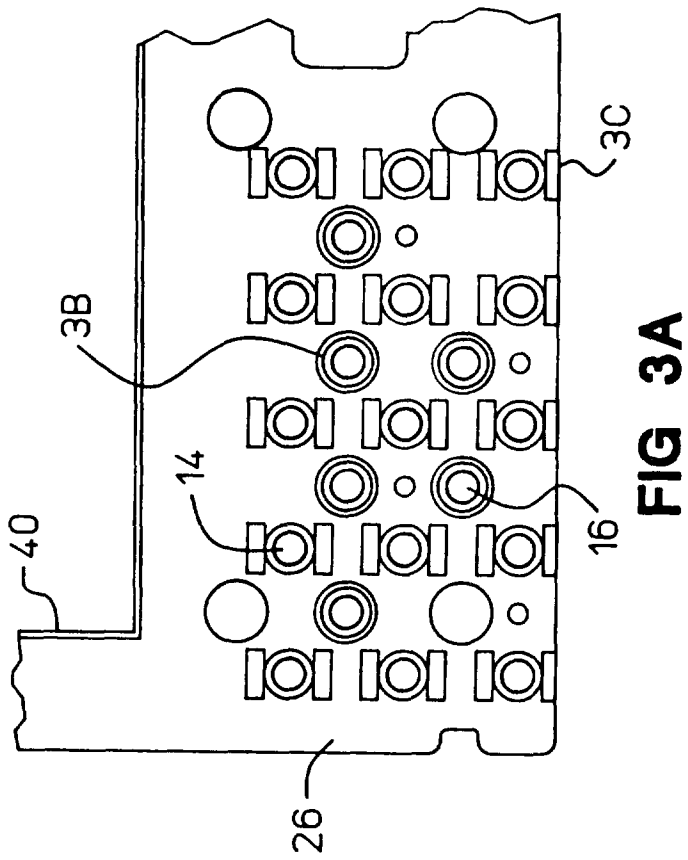


FIG 2B



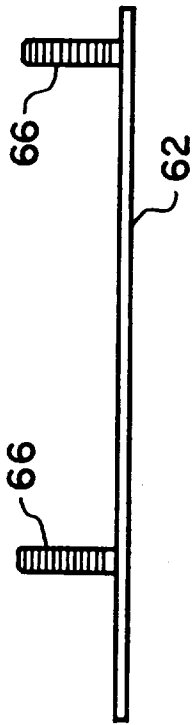


FIG 4C

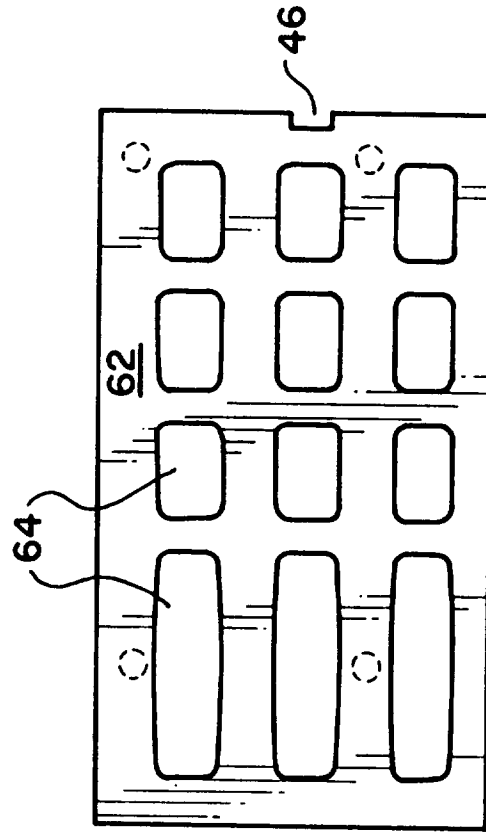


FIG 4A

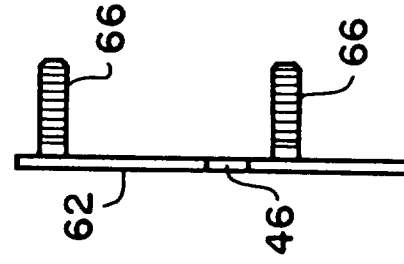


FIG 4B

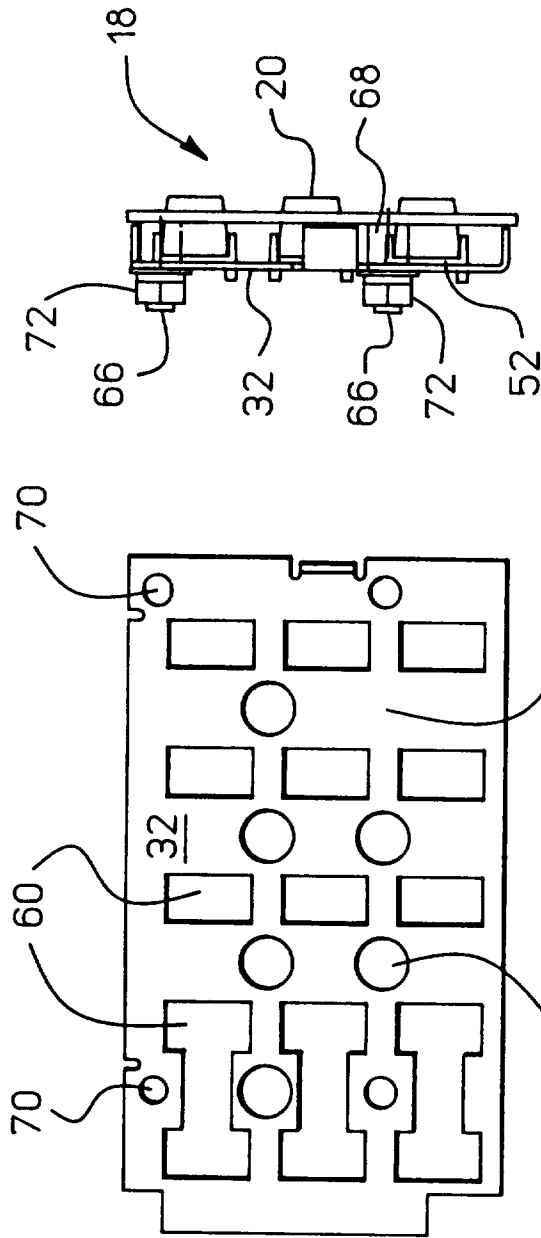


FIG 5A

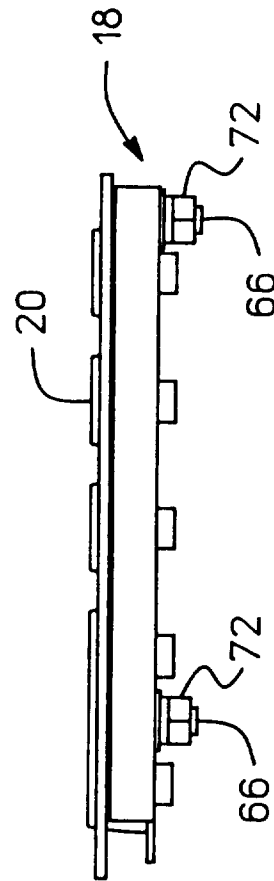


FIG 5B

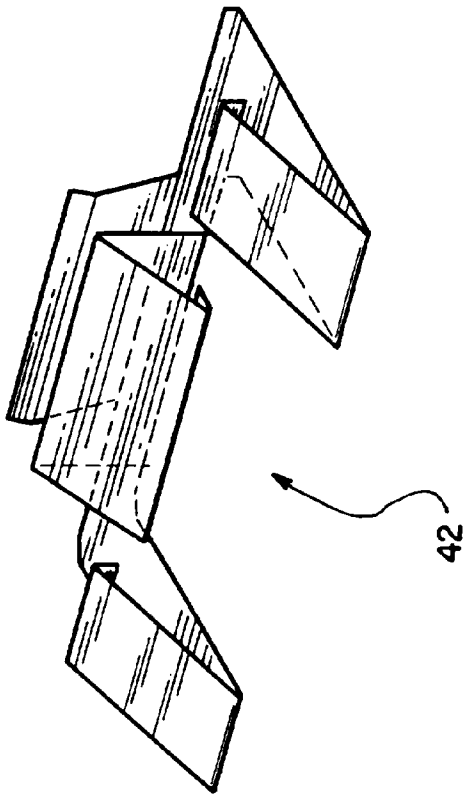


FIG 6

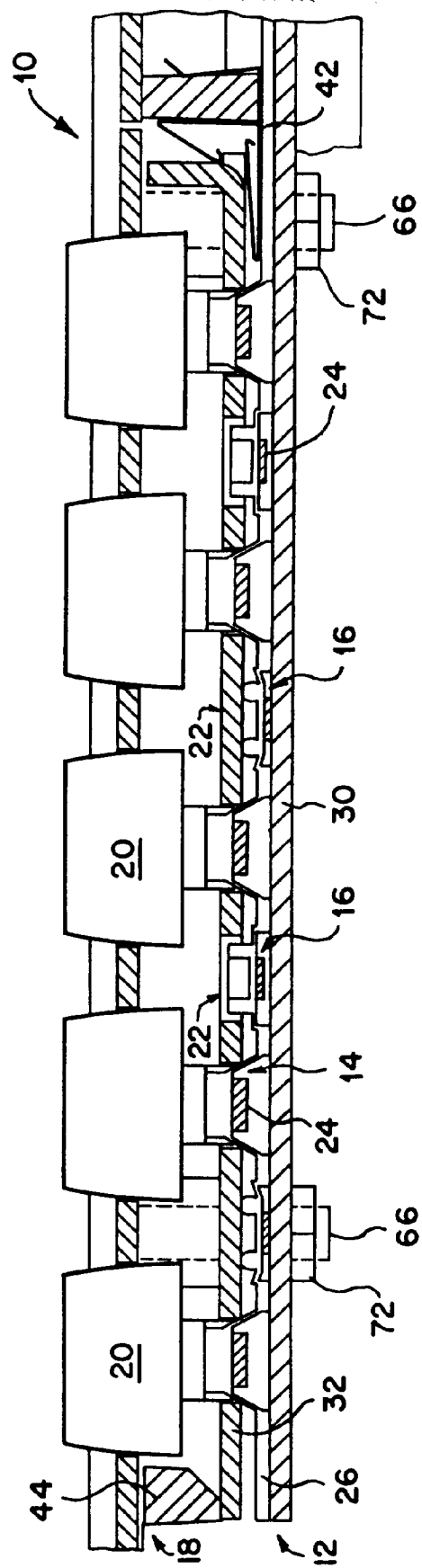


FIG 8

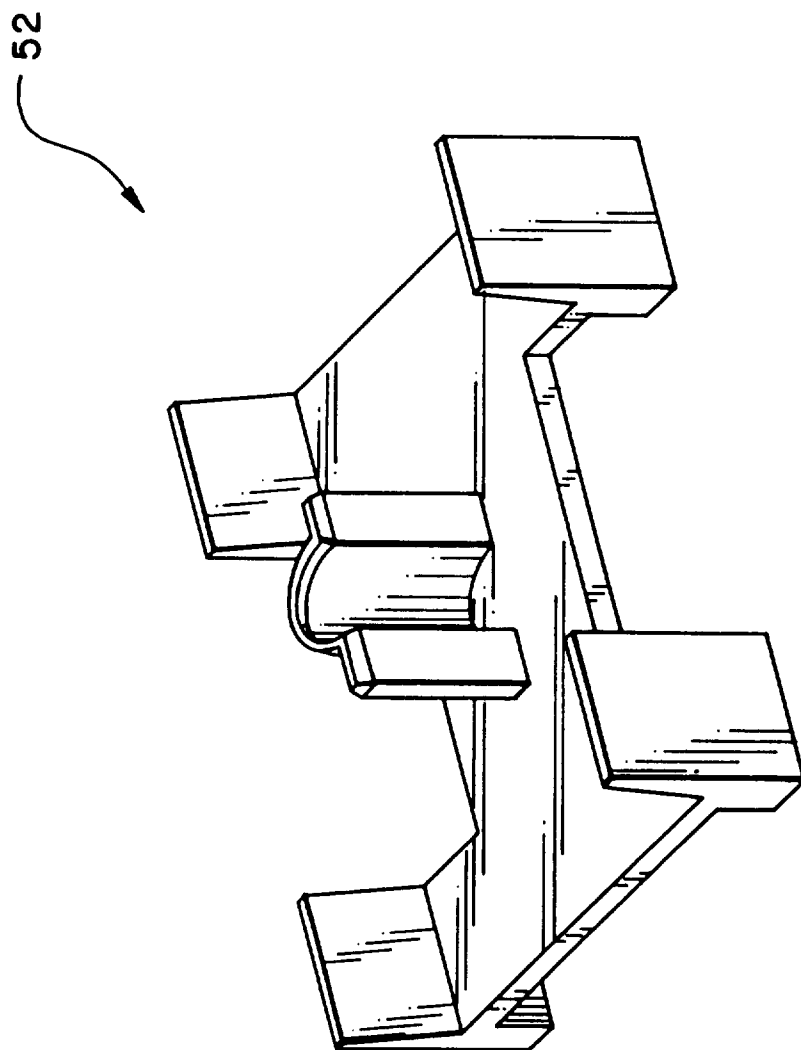


FIG 7