United States Patent [19]

Pinkham

[11] **3,930,083**

[45] **Dec. 30, 1975**

[54] **KEYBOARD PANEL FOR AN ELECTRIC SWITCH CONTACT**

[75] Inventor: **Philip C. Pinkham,** Arleta, Calif.

[73] Assignee: **Litton Systems, Inc.,** Beverly Hills, Calif.

[22] Filed: **July 26, 1974**

[21] Appl. No.: **492,170**

[52] **U.S. Cl.** **428/67;** 428/138; 156/293; 156/303.1; 200/5; 200/159; 200/264

[51] **Int. Cl.²**.... **B32B 3/10;** B29D 3/00; H01H 1/06

[58] **Field of Search** ..... 161/109; 156/293, 303.1; 200/159 B, 264, 5 A, 288; 428/131, 137, 138, 67

[56] **References Cited**

UNITED STATES PATENTS

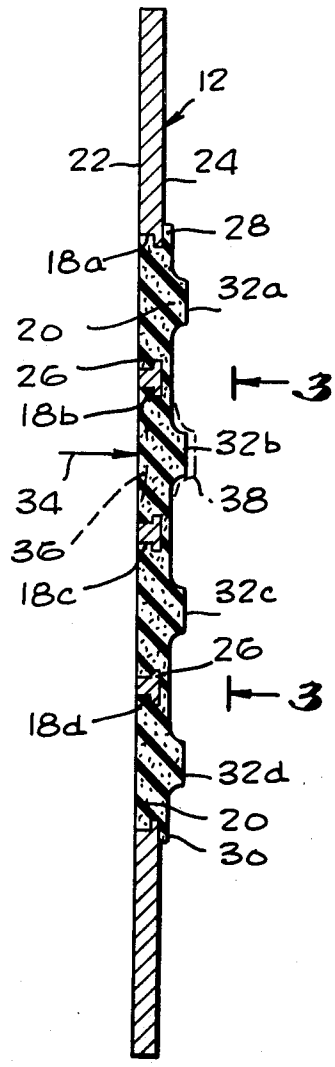
3,617,660	1/1970	Krakinowski	200/159 B X
3,699,294	10/1972	Sudduth	200/264 X
3,728,509	4/1973	Shimojo	200/264 X
3,760,137	9/1973	Shimojo et al.	200/159 B X
3,789,167	1/1974	Seeger, Jr. et al.	200/5 A

Primary Examiner—Philip Dier

[57] **ABSTRACT**

A keyboard panel having a rigid panel board with a plurality of apertures and a resilient material filling the apertures. The resilient material has a force transmitting and concentrating projection at each of the apertures so that the resilient material develops a tactile feel as it resists deformation.

9 Claims, 3 Drawing Figures



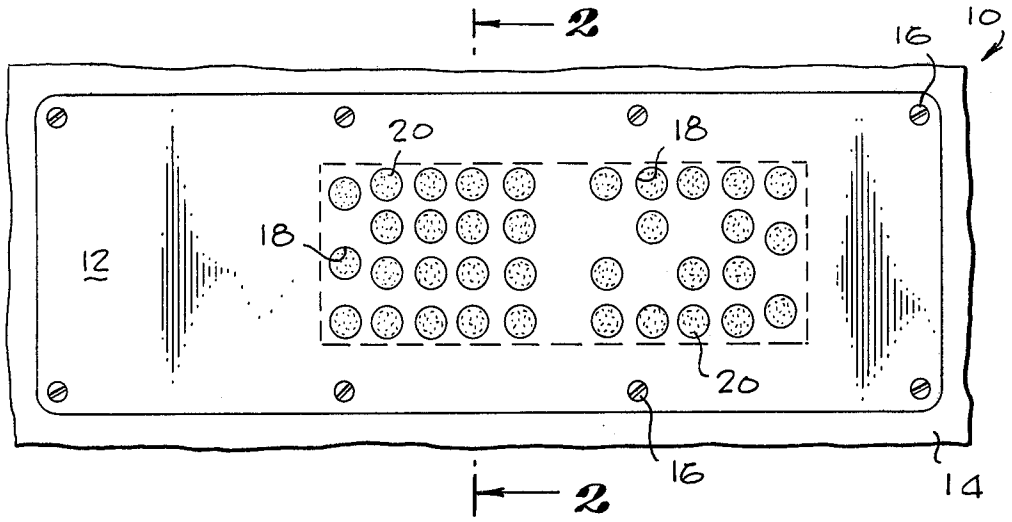


Fig. 1

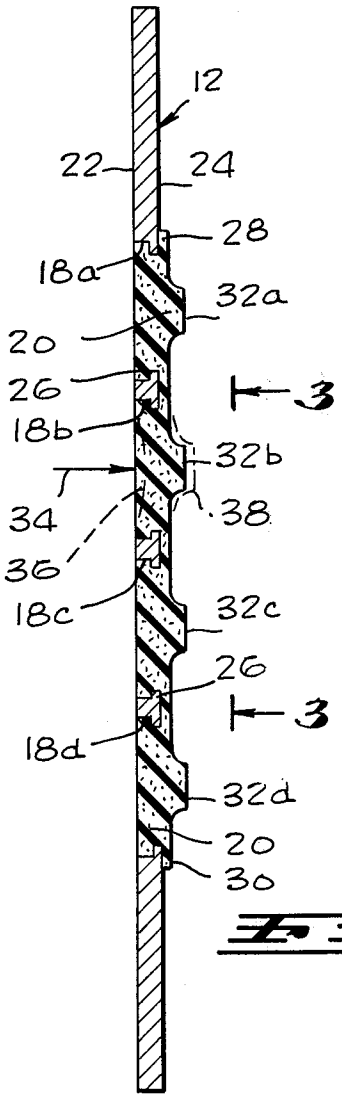
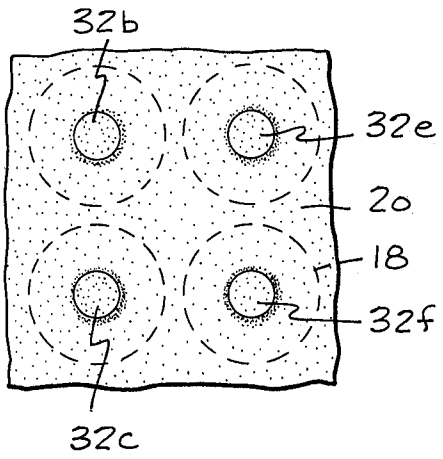


Fig. 2

Fig. 3



KEYBOARD PANEL FOR AN ELECTRIC SWITCH CONTACT

BACKGROUND OF THE INVENTION

Message entry devices for establishing a coded message for transmission to a central station ordinarily include an array of switches adapted to be actuated to operate on logic circuitry to formulate a predetermined message. Heretofore, such message entry devices have utilized ordinary switch devices having switch actuating means adapted to be operated by the operator. As an example of such switch actuators, the message entry devices utilized keys associated with each switch adapted to be depressed to close contacts associated with the switch for operation on the logic circuitry.

OBJECTS OF THE INVENTION

Accordingly, it is an object of the invention to provide a new and improved keyboard panel.

It is an object of the invention to provide a keyboard panel having ease of operation while developing an environmental seal of high integrity.

It is an object of the invention to provide a keyboard panel developing a relatively good tactile feel during operation.

It is an object of the invention to provide a keyboard panel that is inexpensive to manufacture.

It is an object of the invention to provide a keyboard panel that has an improved force transmitting and concentrating means.

SUMMARY OF THE INVENTION

Briefly, in accordance with the invention, a keyboard panel is provided having a rigid and apertured panel board with a resilient material carried by the board and filling its apertures. The resilient material has a force transmitting and concentrating projection at each of the apertures. When the resilient material is deformed at a selected aperture, the resilient material resists such deformation and thereby develops a relatively good tactile feel.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which may be regarded as the invention, the organization and method of operation, together with further objects, features, and the attending advantages thereof, may best be understood when the following description is read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a plan view, partly broken away, of the keyboard panel of the invention.

FIG. **2** is an enlarged sectional view along the line **2—2** of FIG. **1.**

FIG. **3** is a plan view, partly broken away, along the line **3—3** of FIG. **2.**

DESCRIPTION OF THE INVENTION

Referring to FIG. **1,** one keyboard panel **10** of the invention is illustrated as a planar panel; however, it is contemplated that the panel can be curvilinear, for example, or another selected geometry. A rigid panel **12** is mounted on a support surface and/or structure **14** by a plurality of similar fasteners, such as screws **16.** The panel **12** has a plurality of similar apertures **18** that are located in a predetermined pattern as illustrated. A

flexible, and preferably resilient, material **20** fills each or selected ones of the apertures **18** as described hereinafter.

In FIGS. **2** and **3,** the rigid panel **12** has a first or obverse surface **22** and a second or reverse surface **24** with apertures **18***a*, **18***b*, **18***c*, and **18***d* opened therethrough. Each of the apertures **18** has a similar radially inwardly extending lip flange **26** that extends into the aperture and is flush with the second surface **24.** The resilient material **20,** which can be an elastomer such as silicone rubber, fills each of the apertures **18** and is flush with the first surface **22** as illustrated. It is contemplated that the resilient material **20** can be raised from the first surface **22.** The resilient material **20** extends beyond the second surface **24** and is preferably bonded at its lateral portions **28** and **30** to the second surface of the panel **12.** The resilient material is suitably formed at each or selected ones of the apertures **18** to develop similar force transmitting and concentrating projections **32***a*, **32***b*, **32***c*, and **32***d* as illustrated by FIGS. **2** and **3;** the later figure also illustrating adjacent projections **32***e* and **32***f* which are not shown by FIG. **2.** The force transmitting and concentrating projections can be of any selected geometry but are preferably the mesa projections as illustrated by FIGS. **2** and **3.**

Operatively, the keyboard panel **10** of the invention covers and is spaced from one or more conventional keys (not shown) that are to be selectively actuated. If a key associated with aperture **18***b*, for example, is to be actuated, an actuating force is applied to the resilient material **20** which fills aperture **18***b* at its first surface as schematically represented by applied force arrow **34.** The applied force deforms the resilient material **20** within aperture **18***b* and displaces the first surface to the generally concave phantom surface **36.** Concomitantly, the force concentrating projection **32***b* is similarly displaced to the phantom key-actuating position **38** where the projection **32***b* impinges upon and actuates the conventional key (not shown) as desired. Because the resilient material is preferably selected to resist such deformation at a selected aperture, the hardness of the material amplifies the sensation of movement and thereby provides a tactile feel of key actuation. The lip flanges **26** and the lateral portions **28** and **30** provide additional locking of the resilient material to the panel **12** so that the applied force **34,** unless it is unnecessarily large, does not destroy the integrity of the resilient material bond to the second surface **24.** This is important where an environmental integrity of the keyboard panel **10** is critical and is desired.

As will be evidenced from the foregoing description, certain aspects of the invention are not limited to the particular details of construction as illustrated, and it is contemplated that other modifications and applications will occur to those skilled in the art. It is, therefore, intended that the appended claims shall cover such modifications and applications that do not depart from the true spirit and scope of the invention.

I Claim:

1. A keyboard panel comprising:

a. rigid means having a plurality of apertures and further having first and second spaced-apart surfaces,

b. a lip flange extending from said rigid means radially inwardly into each of said apertures,

c. flexible means carried by said rigid means filling each of said apertures substantially flush with said

first surface and covering a selected portion of said second surface, said aperture lip flange retaining said flexible means to said rigid means at each of said apertures, and

d. force transmitting and concentrating means extending from said flexible means at each of said apertures.

2. The keyboard panel of claim **1** in which said rigid means is an apertured panel board.

3. The keyboard panel of claim **1** in which said flexible means is a resilient material.

4. The keyboard panel of claim **3** in which said resilient material is an elastomer.

5. The keyboard panel of claim **1** in which said force transmitting and concentrating means is a projection of said flexible means at each of said apertures.

6. The keyboard panel of claim **5** in which said projection develops a mesa.

7. The keyboard panel of claim **1** in which said second surface is flush with said lip flanges.

8. The keyboard panel of claim **7** in which said flexible means has lateral portions suitably bonded to said second surface so that said flexible means provides an environmental seal.

9. The keyboard panel of claim **7** in which said flexible means is a resilient material bonded to said rigid means and further retained by said lip flange.

* * * * *