

[72] Inventor **Joseph M. Cartelli**
c/o Infolite Corp., 2337 Lemoine Ave., Fort
Lee, N.J. 07024

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[54] **MATRIX SWITCH**
7 Claims, 8 Drawing Figs.

[52] U.S. Cl. **339/18 C,**
317/101, 317/112, 339/17 R, 339/19

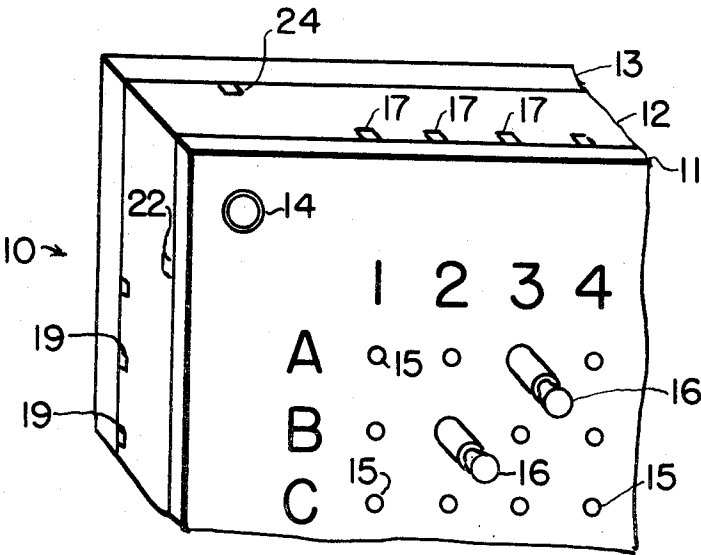
[51] Int. Cl. **H01r 25/00,**
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[50] Field of Search 317/101,
112; 200/5; 174/68.5, 113; 339/18 R, 18 C, 18 P,
19, 20, 21, 17 R, 17 E, 198 E, 198 R, 59, 61, 63,
64, 65, 176 R, 176 P

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Primary Examiner—Richard E. Moore
Assistant Examiner—Terrell P. Lewis
Attorney—Peter L. Tailer

ABSTRACT: A matrix switch contains an array of apertures intersected on two or more levels by aligned channels containing thin conducting strips backed by elastic strips, the insertion of a pin in an aperture contacting and flexing conducting strips on different levels and compressing elastic backing strips to maintain good electrical contact.



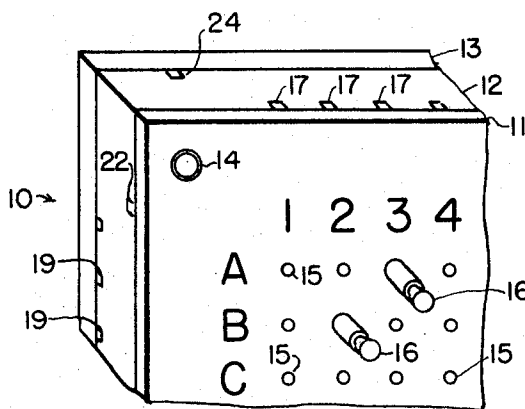


FIG. 1

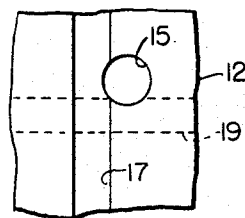


FIG. 4

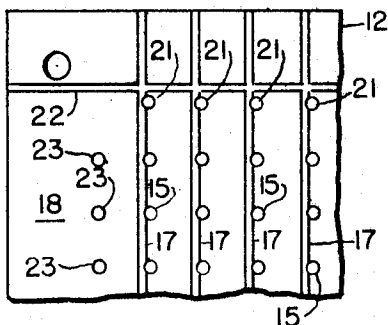


FIG. 2

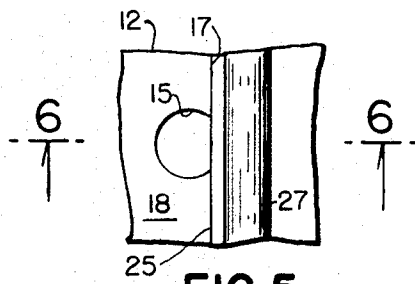


FIG. 5

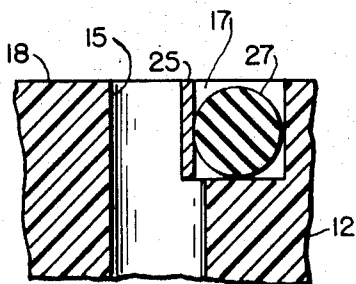


FIG. 6

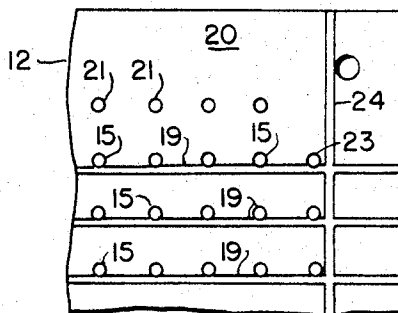


FIG. 3

INVENTOR:
JOSEPH M. CARTELLI
BY *Peter J. Tailor*
ATTORNEY

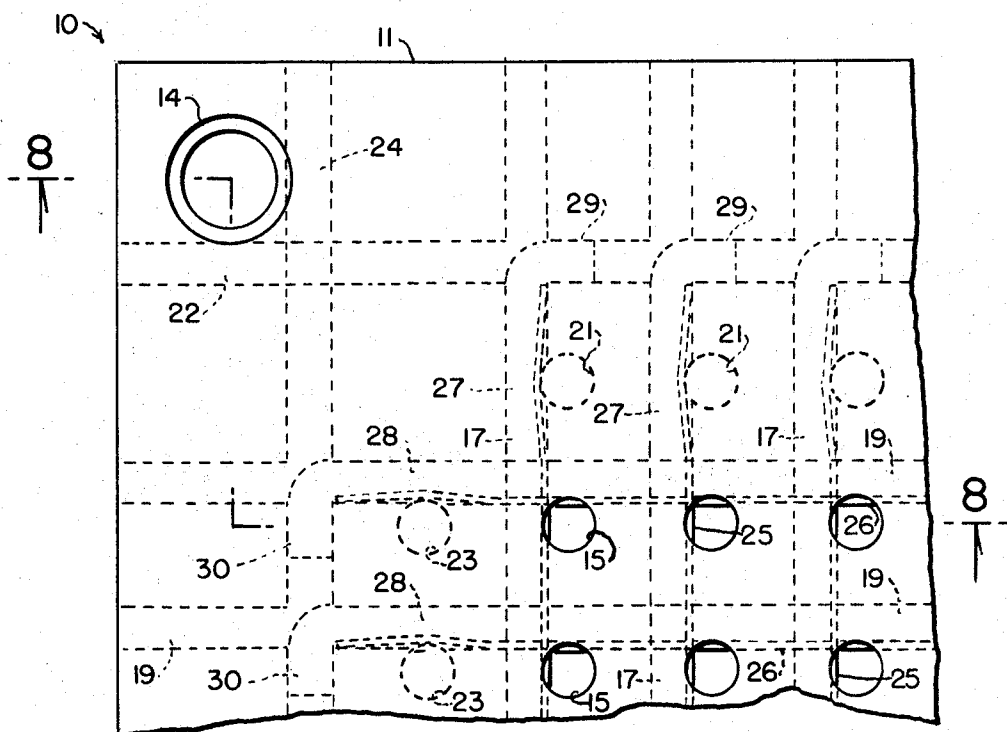


FIG. 7

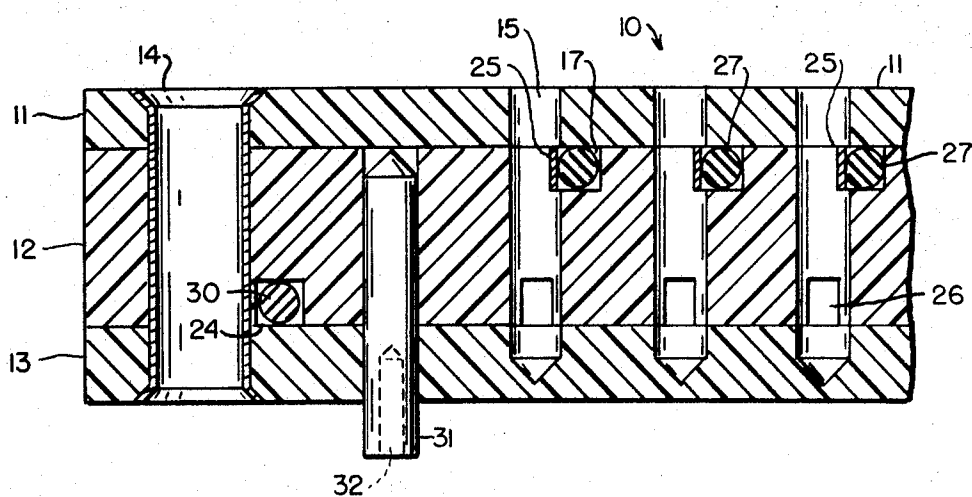


FIG. 8

INVENTOR:
JOSEPH M. CARTELLI
BY
Peter P. Tails
ATTORNEY

MATRIX SWITCH

BACKGROUND OF THE INVENTION

This invention is an improvement in matrix switch construction as shown in my U.S. Pat. No. 3,349,361, Prior matrix switch construction required that pin-receiving apertures be larger than inserted pins to allow contact strips spanning the apertures to be flexed by pin insertion for good contact. Conventional nonaligned apertures in matrix switches are more costly to fabricate and are more difficult to assemble.

SUMMARY OF THE INVENTION

A matrix switch contains an array of apertures intersected on two or more levels by aligned channels. The aligned channels contain thin conducting strips backed by elastic strips with the thin conducting strips projecting into the apertures. The insertion of a conducting pin, a diode pin, or the like into an aperture contacts and flexes thin conducting strips on two or more levels while compressing elastic backing strips to provide good electrical contact.

When a matrix switch has two or more levels, at least a front panel, a deck panel, and a rear cover are provided. Two levels of channels may be cut in the front and back of a single deck panel. The array of apertures may be aligned clearance holes extending at least through the front panel and any deck panels, the aligned receiving the shanks of inserted pins.

While the channels at different levels are usually at right angles to each other, they may be parallel or otherwise varied for specific applications. More than two levels may be provided and the array of apertures may be in a hex pattern.

The specific structure of this invention allows a greater deflection of the contact strips with a given distance between cross points. The contact strips cannot be deformed in use as their deflection is controlled and limited by the surrounding construction. The larger deflection of the contact strips allows greater tolerances to be employed in fabrication while still ensuring good electrical contacts. The matrix switch of this invention is also easier to manufacture as all apertures in different layers or panels are coaxial and may be of the same diameter.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a broken away corner of a matrix switch according to my invention;

FIG. 2 is a front view of a broken away corner of a deck panel;

FIG. 3 is a rear view of the broken away corner of a deck panel shown in FIG. 2;

FIG. 4 is an enlarged front view of a fragment of deck panel containing an aperture;

FIG. 5 is a top view of a fragment of a deck panel containing a contact strip and an elastic backing strip;

FIG. 6 is a section taken on line 6—6 of FIG. 5;

FIG. 7 is an enlarged front view of a broken away corner of a matrix switch, and

FIG. 8 is a horizontal section taken on lines 8—8 of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, a matrix switch, generally designated by the reference numeral 10, has a front panel 11, a center deck panel 12, and a rear cover 13 secured together and aligned by eyelets 14 or the like. As may further be seen in FIGS. 7 and 8, an array of apertures 15 are formed in front panel 11 to receive the shanks of diode pins 16 or the like. The apertures 15 extend at least through deck panel 12 and may extend into or through rear cover 13.

As shown in FIG. 2, vertical slots 17 in the front surface 18 of deck panel 12 intersect all the apertures 15 of the array. As may be seen in FIG. 3, horizontal slots 19 in the back surface 20 of deck panel 12 intersect all the apertures 15 of the array. As shown in FIGS. 2, 7 and 8, contact holes 21 are formed in deck panel 12 and rear cover 13 so that each hole 21 inter-

sects a vertical slot 17. Horizontal slots 22 are formed in front surface 18 of deck panel 12 above and below the apertures 15 and the contact holes 21. As shown in FIGS. 3, 7 and 8, contact holes 23 are formed in deck panel 12 and rear cover 13 so that each hole 23 intersects a horizontal slot 19. Vertical slots 24 are formed in the back surface 20 of deck panel 12 on each side of the array of apertures 15 and the contact holes 23.

As shown in FIGS. 5-8, thin metal contact strips 25 are placed in the vertical slots 17 to extend between upper and lower horizontal slots 22. Contact strips 26 are placed in the horizontal slots 19 to extend between the vertical slots 24. Resilient rubber backing strips 27 are placed behind the contact strips 25 with their ends 29 bent at right angles into slots 22 to longitudinally position strips 25. In a like manner, rubber strips 28 are placed behind contact strips 26 with their ends 30 bent into slots 24.

Permanently placed terminal pins 31 containing soldering apertures 32 are placed in the contact apertures 21 and 23 each to make contact with a strip 25 or 26. This the insertion of a pin 16 connects desired terminal pins 31 in a matrix switch 10.

Front panel 11, deck panel 12 and rear cover 13 are made from any suitable nonconducting material such as plastic. The conducting strips 25 and 26 are of brass or beryllium copper about 0.005 by 0.093 inch. The resilient strips 27 and 28 are of silicon or neoprene rubber preferably round in section for ease of insertion into the slots 17 and 19. Strips 25 and 26 should be about the same height as the depth of slots 17 and 19. Contact pins 31 may be fixed in place in any manner desired.

While this invention has been shown in the best form known, it will nevertheless be understood that modifications may be made without departing from the spirit of the invention.

What is claimed is:

1. A matrix switch having pins for insertion therein, said matrix switch comprising, in combination, at least one panel of nonconducting material containing an array of apertures for the insertion of pins and containing at least two levels of channels intersecting said apertures, contact strips of conducting material in said channels intersecting and extending into said apertures, and backing strips of elastic material in said channels behind said contact strips, insertion of a pin in one of said apertures flexing contact strips and compressing backing strips

2. The combination according to claim 1 wherein said contact strips are substantially the same height as the depth of said channels.

3. The combination according to claim 2 wherein said at least one panel comprises a least one deck panel having a front and back surface each containing a level of said channels, a front cover on said deck panel, and a back cover on said deck panel, said apertures extending at least through said front cover and said at least one deck panel.

4. The combination according to claim 3 wherein said back cover and said deck panel contain contact holes, each contact hole intersecting one of said channels, and with the addition of contact pins in said contact holes through said rear cover into said back panel, each of said contact pins contacting one of said contact strips.

5. The combination according to claim 4 wherein said apertures in said front cover and in said deck panel are coaxial and the same size.

6. The combination according to claim 5 wherein said at least one back panel contains intersecting channels, said channels in said level being intersected on each side of said apertures and contact holes by two bounding intersecting channels, said backing strips of elastic material each having ends bent past the ends of a contact strip to extend into an intersecting channel securing said contact strips longitudinally.

7. The combination according to claim 2 wherein said backing strips are substantially round in section.