

[54] **ELECTROMECHANICAL KEYBOARD
INDEPENDENTLY OPERATED SWITCH
MECHANISM WITH IMPROVED
CONDUCTIVE RESILIENT ACTUATING
MEANS**

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[22] Filed: **Oct. 5, 1970**
[21] Appl. No.: **77,900**

[52] U.S. Cl. **200/5 A, 179/90 K, 200/159 R**
[51] Int. Cl. **H01h**
[58] Field of Search **179/90 K; 200/5 R, 5 A, 5 E,
200/16 A, 159 R, 159 A, 169 PB, 166 PC**

[56] **References Cited**
UNITED STATES PATENTS
3,210,484 10/1965 Dorsey 200/5 R
3,190,975 6/1965 King, Jr. 200/5 R X
3,536,877 10/1970 Von Fange et al. 200/166 PC

3,005,055 10/1961 Mattke 179/90 K
3,214,527 10/1965 Dauphinee 200/5 E
3,399,287 8/1968 Euler 200/159 R
3,506,795 4/1970 Schmidt 200/5 R
3,035,211 5/1962 Mitchell 179/90 K X
3,080,457 5/1963 Jansson et al. 179/90 K X

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[57] **ABSTRACT**
This invention relates to a multicontact switch in its form of a keyboard for converting digital information into a code, suitable for a particular data processing method. Information to be usable in such equipment, must first be converted into a code, suitable for use with the particular processing method. There are various codes in common use, such as numeric code, alphanumeric, binary, decimal-binary which is coded with or without auxiliary functions, duodecimal, hexadecimal binary code, etc. Although an apparatus having keys is used for this purpose, the actual coding is generally done by complex electronic devices resembling a code generator.

4 Claims, 7 Drawing Figures

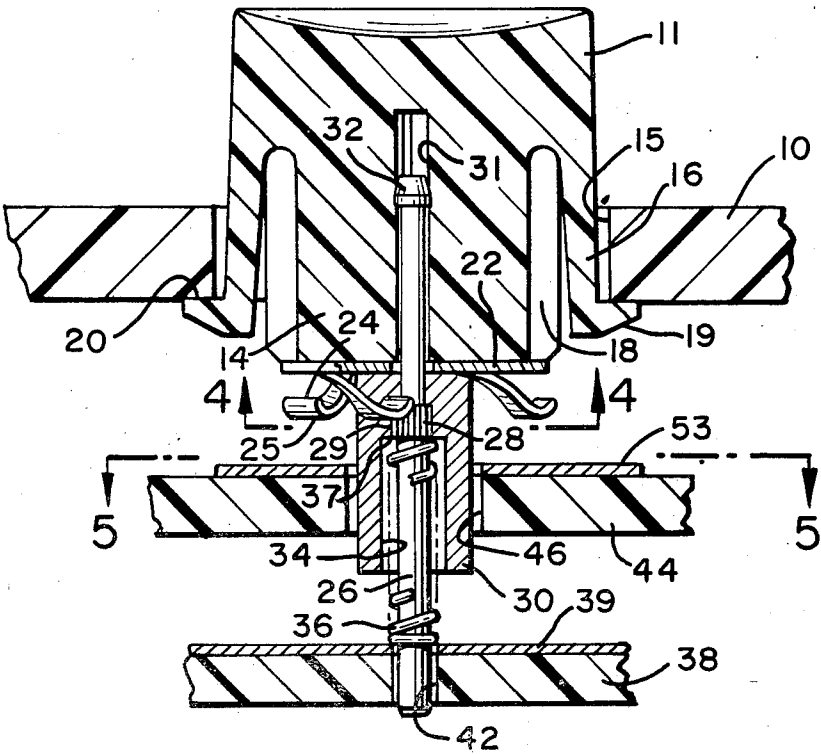


FIG. 1

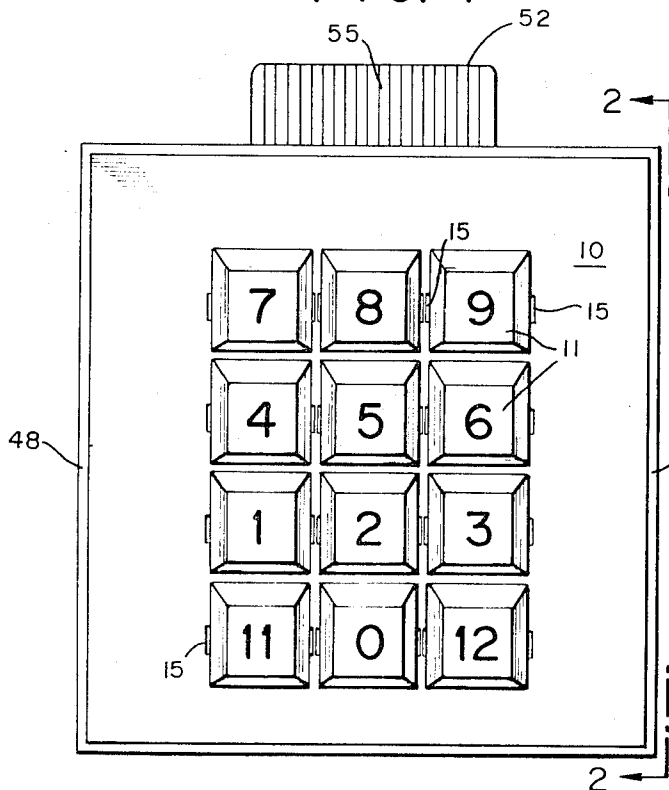


FIG. 2

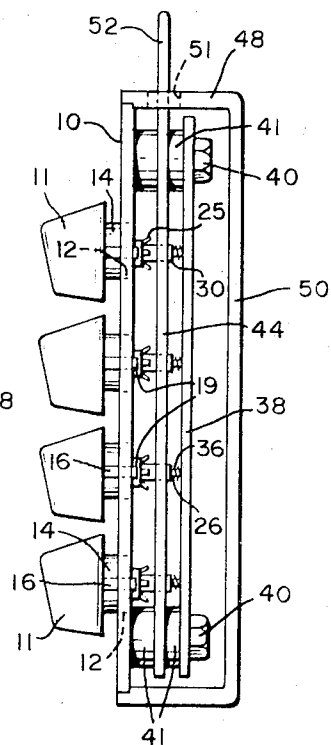


FIG. 3

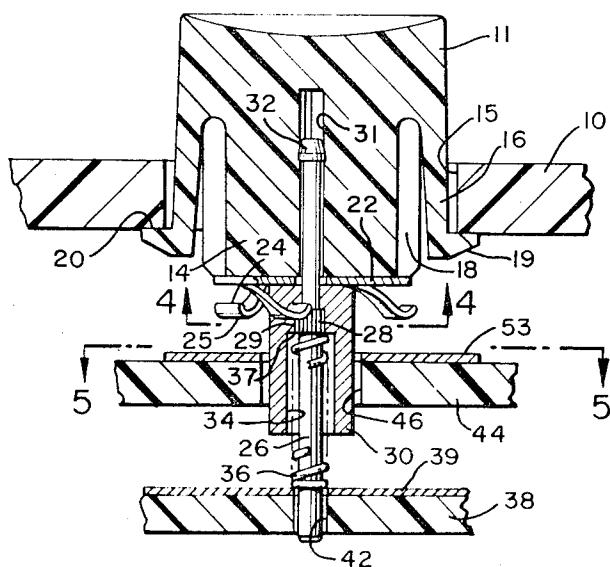
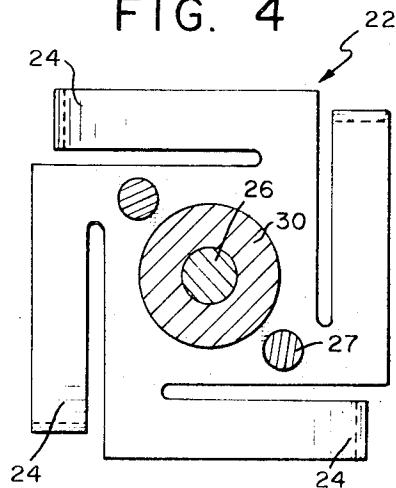


FIG. 4



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FIG. 5

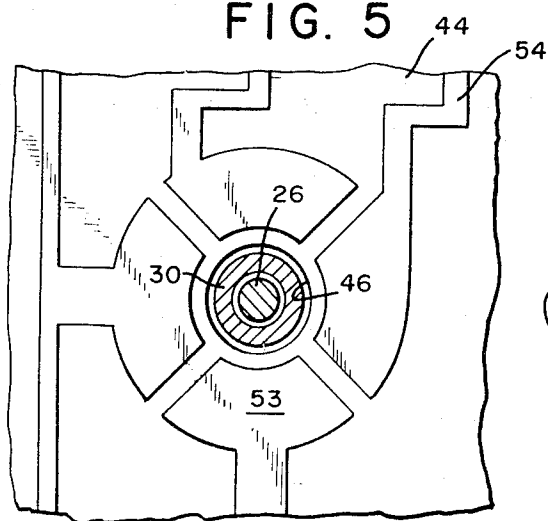


FIG. 7

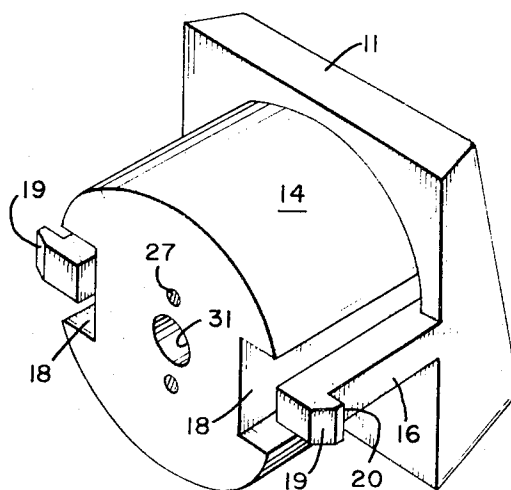
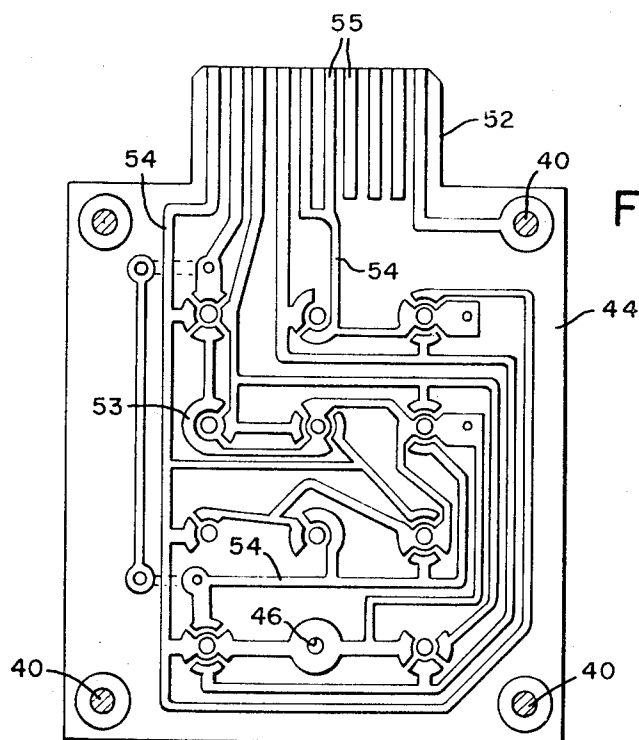


FIG. 6



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ELECTROMECHANICAL KEYBOARD INDEPENDENTLY OPERATED SWITCH MECHANISM WITH IMPROVED CONDUCTIVE RESILIENT ACTUATING MEANS

BACKGROUND OF THE INVENTION

This invention relates to a multicontract switch in its form of a keyboard for converting digital information into a code, suitable for a particular data processing method. Information to be usable in such equipment, must first be converted into a code, suitable for use with the particular processing method. There are various codes in common use, such as a numeric code, alphanumeric, binary, decimal-binary, hexadecimal binary code, etc. Although an apparatus having keys is used for this purpose, the actual coding is generally done by complex electronic devices resembling a code generator.

An important object of the present invention is to provide a multicontract switch, with keys resembling a keyboard, which does the coding directly by electromechanical means. For this purpose, no electronic code generators or logic circuits are required. The coding in accordance with the present invention is accomplished by depressing a key which moves a multifinger contact against a particular printed circuit board configuration, the design of which depends upon the code desired. The arrangement is such as to reduce the cost and complexity in a device of this character.

Another feature of the invention is a multicontract keyboard which has a considerable measure of versatility to accommodate various codes. This is accomplished by providing means for receiving various printed circuit boards, which may have different circuits on both sides of the board. Trackways provide for ready insertion and removal of the board. Each board has conductive areas for contact with one or more of the key contact fingers. Terminal contacts for connection to an external circuit are provided on a board extension. As a result, electromechanical coding of many varieties can be achieved.

In the drawing:

FIG. 1 is a plan view of the assembled keyboard;

FIG. 2 is a side elevation thereof taken on the line 2—2 of FIG. 1;

FIG. 3 is a vertical section showing an assembly of an individual key in a coding arrangement;

FIG. 4 shows a bottom plan view of the four-finger contact taken on the line 4—4 of FIG. 3;

FIG. 5 is a side elevation thereof taken on the line 5—5 of FIG. 3;

FIG. 6 is a plan view of a printed circuit board with coded circuit layout;

FIG. 7 is a perspective view of the lower side of a portion of the key.

In FIGS. 1, 2 and 3, there is shown the board 10 with 12 keys 11, each with a digit imprinted on its bevelled upper face, the digits in this case running from 1 to 12 with 0 in place of 10. Each key is mounted in a top plate which has a plurality of circular holes 12, one for each key. The key is generally square in plan view and has a circular shank 14 slidably received in the hole 12, the latter having opposed square notches 15, which receive resilient retaining hooks 16. These hooks extend downwardly adjacent to the lower face of the key. These retaining hooks are located in sidewall recesses 18 in the shank and have bevelled terminals 19 at the ends of the hook portion 20 to cause the resilient members to retract as they are pushed into the hole where the hook portions underlie the lower face of the top plate and prevent removal of the key.

A plate 22 of resilient sheet metal has four fingers 24 forming electrical contacts. The plate is secured to the lower face of key shank 14 by means of a pin 26 having a knurled section 28 which is secured within an axial opening 29 in a bushing 30. The pin extends through the top of the bushing and into an axial bore 31 in the key shank 14. An enlarged tapered head 32 is received in force fit relation near the upper end of the bore 31, thus securing the key rigidly at the upper end of the

pin with the contact plate 22 interposed therebetween. The contact fingers 24 are bent downwardly at their ends to a generally C-shaped configuration shown at 25. In order to prevent rotation of plate 22 relative to the key and bushing, pins 27 (FIG. 4) carried by the key pass through the plate.

The lower end of the bushing 30 has a counterbore 29, the pin 26 and the bushing forming a plunger assembly which with the key is returned upwardly by a coiled compression spring 36 engaging a shoulder 37 at the upper end of the counterbore. At its lower end, the spring engages a circuit board 38 mounted in spaced relation to the top plate 10 by means of machine screws 40 and spacer bushings 41. This board has a conductive surface 39 engaged by the spring 36 so that in addition to providing resilient means for returning the key, the spring provides an electrical connection with the conductive surface which is a common ground. The board also has an opening 42 to receive the lower end of the pin 26.

A printed circuit board 44 is mounted in spaced relation between the top plate 10 and board 38 by means of the screws 40 and bushings 41 and the printed circuit board has an opening 46 to receive the bushing conductive free sliding relation. The top plate is mounted in secured relation in a continuous sidewall 48 of a housing with a lower wall 50. The sidewall has an opening 51 for a side extension 52 of the printed circuit board 44.

The board is copper clad on its upper face which is suitably etched to form a desired pattern of contacts 53 to be engaged by the spring fingers 24 when a key is depressed and conductive paths 54 established. The conductive paths terminate in the conductive strips 55 to which wires may be attached. The side extension 52 may also be used as an electrical plug and inserted into an appropriate socket (not shown) containing matching connecting strips.

The code is contained in the arrangement of conductive segments 53 grouped about the hole 46 on the circuit board. There are four contact ends 25 which are lowered each time the key 11 is depressed and these ends connect the segments 53 to the common conductor 39. A suitable source of potential and a series of utilization loads connected between the strips 55 and the potential source provide the desired coded transfer.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A manually operated code switch for converting digital information into a desired pulse code comprising:

- a housing;
- a plurality of keys on one face of the housing, each having a digital designation;
- a conductive shaft secured to each key and extending into the housing;
- at least one conductive spring contact secured to each key, said contacts on each key connecting to its adjoining shaft;
- a flat conductive board mounted within said housing and parallel to the face thereof;
- a conductive resilient means coupled between each spring contact and said conductive board for connecting all of the spring contacts to a common terminal and for returning all the keys to their unactuated position after being manually depressed;
- an insulator circuit board positioned under all the keys and having conductors secured to one face for electrical connection to said spring contacts; and
- a plurality of conductive segments on the circuit board arranged in a coded pattern around each shaft, each of said segments connected to a conductive strip on the board which is available for use by a utilization circuit.

2. A code switch as claimed in claim 1 wherein said insulator circuit board and said flat conductive board are partly constructed of synthetic plastic such as phenol formaldehyde.

3. A code switch as claimed in claim 1 wherein there are at least 10 keys and each is provided with a helical conductive spring surrounding the shaft for connecting the spring contacts with the flat conductive board.

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4. A code switch as claimed in claim 1 wherein all the spring contacts are respectively secured to the bottom of each key by conductive bushings, said bushings each forming a contact terminal for one end of said conductive springs.

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