United States Patent

[11] 3,544,738

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[21] Appl. No. **716,626**
[22] Filed **March 27, 1968**
[45] Patented **Dec. 1, 1970**
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[54] **MOMENTARY RETAINING TRANSLATION MEANS FOR MULTIPLE SWITCHES**
4 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** **200/5,** 200/18, 200/153; 340/322
[51] **Int. Cl.** **H01h 9/26**
[50] **Field of Search** 200/5, 18, 153.11, 153.12, 153.13; 340/322, 323; 192/40, 22; 74/1.5

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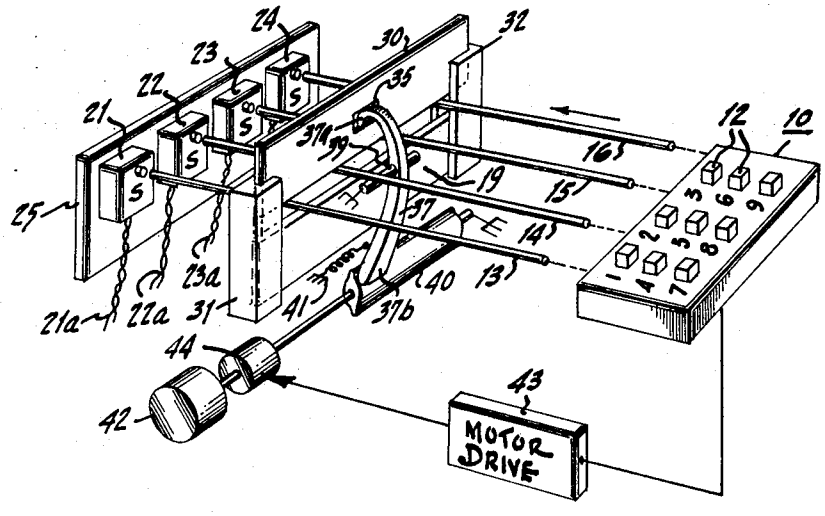
ABSTRACT: A keyboard having a system for translating key movements into coded electrical signals by selective operation of a plurality of electrical switches and incorporating a clamping apparatus for the switch actuating devices to momentarily retain a switch actuated state of the devices to insure an accurate switch readout.



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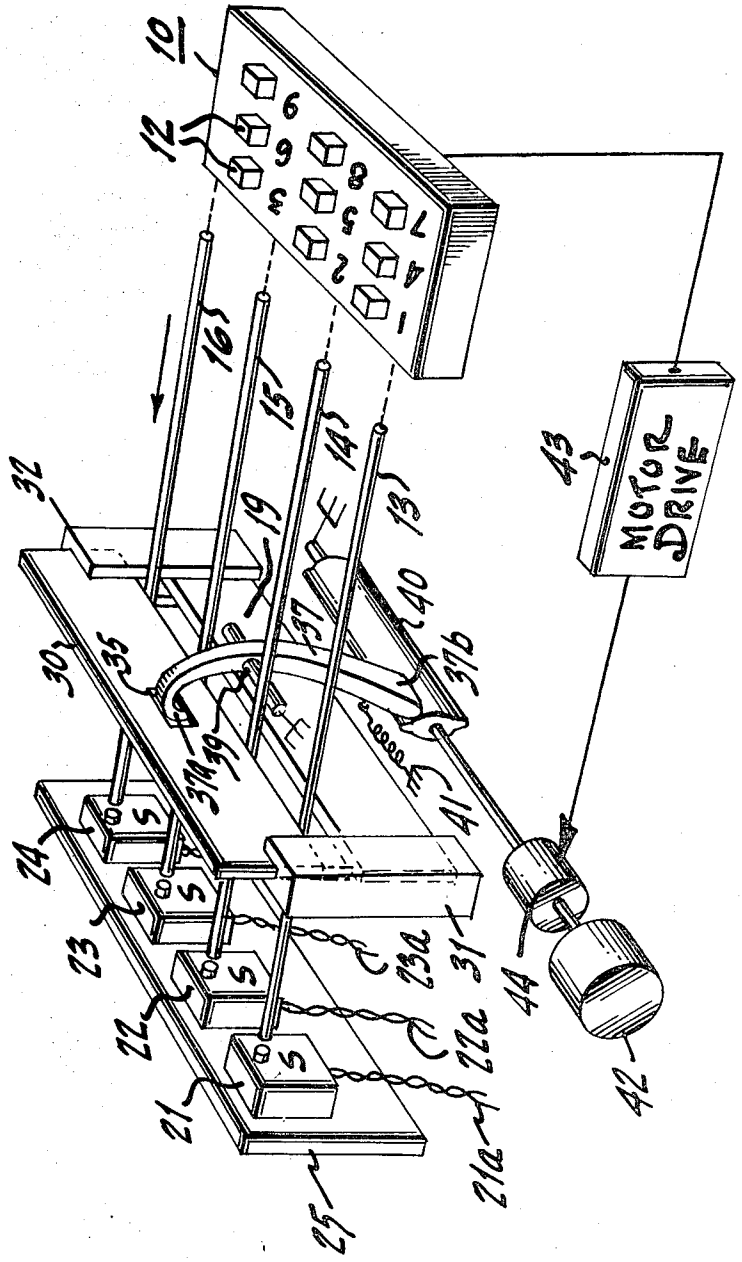

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MOMENTARY RETAINING TRANSLATION MEANS FOR MULTIPLE SWITCHES

BACKGROUND OF THE INVENTION

The use of keyboards as data entry devices for digital computer systems has created the problem of accurately translating the operator induced movements of the keys in the keyboard into coded electrical signals suitable for use in the computer system. One data entry keyboard for such use has a mechanical coding system wherein key movements are translated to corresponding coded actuation of a group of electrical switches. This type of apparatus has inherent readout problems caused by the fact that the switch closure times are not accurately synchronized and the switch closure interval is not controlled. Accordingly, it is desirable to have a keyboard data entry device wherein the translation of key movements to electrical signals is controlled by predetermined operational characteristics to produce an accurate readout of the translated data.

BRIEF SUMMARY OF THE INVENTION

Apparatus embodying the present invention includes a control apparatus for a keyboard device which converts a mechanical key movement into a corresponding coded actuation of a plurality of electrical switches by means of a plurality of selectively movable switch-actuating rods. The rods are all momentarily clamped after they have been actuated to a switch actuating position to insure an accurate readout of the actuated switches.

DESCRIPTION OF THE DRAWINGS

The single figure drawing is a pictorial illustration of an embodiment of the present invention used in a keyboard apparatus.

DETAILED DESCRIPTION

A keyboard **10** having a plurality of keys **12** is arranged to convert a mechanical key actuation by an operator into a corresponding selective movement of a plurality of rods, shown as rods **13**, **14**, **15** and **16**. For example, an actuation of one of the keys **12** would result in a movement of rods **13** and **14** while a movement of another one of the keys **12** would move rods **13**, **14** and **16**. Such keyboards are well known in the art, and the details of their internal construction and operation does not form a part of the present invention. The rods **13** to **16** are arranged to move in the direction shown by the arrow when actuated by the keys of the keyboard **10**.

A fixed support **19** is positioned under the rods **13** to **16** and is used to guide the rods **13** to **16**. This support may be advantageously made of a low friction material, e.g., nylon. The rods **13** to **16** extend past the support **19** to a group of switches **21**, **22**, **23** and **24** mounted on a common support **25**. Each of the rods **13** to **16** is operatively associated with a respective one of the switches **21** to **24**, e.g., rod **13** is associated with switch **21**. The ends of the rods **13** to **16** are spaced from the associated ones of the switches **21** to **24** by a distance which is equal to the keyboard induced movement of the rods **13** to **16** minus the distance required to actuate an associated one of the switches **21** to **24**. Thus, the movement of a rod by a key **12** is sufficient to actuate the corresponding one of the switches **21** to **24**. The switches **21** to **24** are connected by respective electrical lines **21***a*, **22***a*, **23***a* and **24***a* (not shown) to associated equipment, e.g., a digital computer.

A clamping bar **30** is slideably supported between a pair of slotted guide posts **31** and **32** with the bottom of the bar **30** being located above and normally spaced from the rods **13** to **16** while, also being parallel to the top edge of the plate **19** supporting the rods **13** to **16**. In order to assure the proper positioning of the bar **30** and the plate **19**, they may both be located in the slots of the guide posts **31** and **32**. A centrally located opening **35** is provided in the clamp bar **30**. A lever arm **37** is pivoted on a fixed pivot **39** located intermediate the

ends of the lever **37**. One end **37***a* of the lever arm **37** is fitted into the opening **35** in the clamp bar **30** while the other end **37***b* of the lever arm is urged against a cam member **40** by a spring **41**. The cam **40** is selectively rotated by a motor **42**. A motor drive circuit **43** is momentarily energized by the keyboard **10** upon an actuation of any of the keys **12**, e.g., a common switch is operatively connected to all of the keys **12**. The motor drive circuit **43** produces an energizing drive pulse for a clutch **44** which momentarily connects the continuously rotating motor **42** to the cam **40**. Such clutch mechanisms are well known in the art and may be of the type shown in U. S. Pat. Nos. 2,973,846 and 2,998,873, both by Albert Burstein. Alternatively, other devices could be used to produce the drive for the cam **40**, e.g., the motor **42** could be a stepping motor directly to the cam **40** and operated by a signal having a predetermined pulse width.

In operation, the illustrated embodiment of the present invention produces a coded actuation of the switches **21** to **24** by the movement of selected ones of the rods **13** to **16** in response to the operation of one of the keys **12** on the keyboard **10**. Concurrently, the motor drive **43** is energized to produce a drive signal for the clutch **44** to connect the cam **40** to the continuously running motor **42**. This drive signal is a pulse-type momentary signal which is effective to activate the clutch **44** to produce a **180°** rotation of the cam **40**.

The illustrated cam **40** is provided with a pair of opposite high cam surfaces connected by intermediate low cam surfaces. In the unactuated position, the cam **40** presents a low surface to the cam end **37***b* of the lever **37**. The normal position of the lever **37** on the pivot **39**, thus, is determined by one of the low surfaces of the cam **40**. This position of the lever **37** raises the clamp bar **30** by means of the end **37***a* of the lever **37** to a position clear of the rods **13** to **16**. On the other hand, when a high surface of the cam **37** is presented to the cam end **37***b*, the lever **37** is pivoted on the pivot **39** to drive the bar **30** against the rods **13** to **16**. Since the high and low surfaces of the cam **40** are alternately located on the cam **40**, a **180°** rotation of the cam **40** is effective to cycle the cam surface adjacent to the lever end **37***b* from a low surface to a high surface and, then, to a low surface. During this cycle, the lever **37** is pivoted on the pivot **39**, the clamp bar **30** is pressed against the rods **13** to **16**, and, subsequently, the clamp bar **30** is restored to a spaced position with respect to the rods **13** to **16**. Thus, following an actuation of one of the keys **12**, the rods **13** to **16** are selectively moved to produce a coded operation of the switches **21** to **24**.

After a short delay determined by the time constant of the motor drive **43** and the inertia of the motor **42** and cam **40**, the cam **40** is driven through **180°** successively clamp and unclamp the rods **13** to **16** while they are in a switch operating position. This delay is selected to ensure that all the rods are in a switch operating position, while the cam cycle is selected to have an elapsed time which does not interfere with the normal operation of the keyboard **10**. On the other hand, the rods **13** to **16** are momentarily retained in a switch actuated position for a predetermined time, whereby the coded switch pattern can be accurately determined and the possibility of variations in the operating time of the rods **13** to **16** affecting this switch readout is eliminated.

I claim:

1. A combination comprising a keyboard having keys, means for translating a movement of said keys in said keyboard to representative signals and means for momentarily retaining said last-mentioned means in a translating state following a key movement and for automatically releasing said means for translating before a succeeding key movement, said means for momentarily retaining including a clamp means for clamping said means for translating to retain said translating state and means responsive to the actuation of any of said keys for operating said clamp means, said means responsive to the actuation of any of said keys including a delay means for delaying an actuating signal for said clamp means to produce an energization of said clamp means when said means for translating is in a translating state.

2. A combination as set forth in claim 1 wherein said means for translating includes a plurality of rods selectively actuated by said keys in a coded pattern and a plurality of electrical switches operatively associated with respective ones of said rods to produce a coded electrical signal pattern corresponding to a said selective actuation of said rods, said clamp means being operative to clamp said rods to retain an actuated state.

3. A combination as set forth in Claim 2 wherein said clamp means includes a guide means supporting said rods, a clamp bar normally spaced from said rods and positioned from said guide means and a cam means operative to momentarily drive said clamp bar against said rods in response to a signal from said delay means.

4. A combination as set forth in Claim 3 wherein said cam means includes a cam, a motor, clutch means for selectively connecting said motor means to said cam in response to said actuating signal and a lever means actuated by said cam to drive said clamp bar.