United States Patent [19]

Koeppe

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[54] **KEYBOARDS**

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[52] **U.S. Cl.** ..... **197/98,** 178/17 C, 340/365 R

[51] **Int. Cl.** **B41j 5/08**

[58] **Field of Search** 197/98; 340/365; 235/145, 235/146; 178/17, 77–81; 335/177–180

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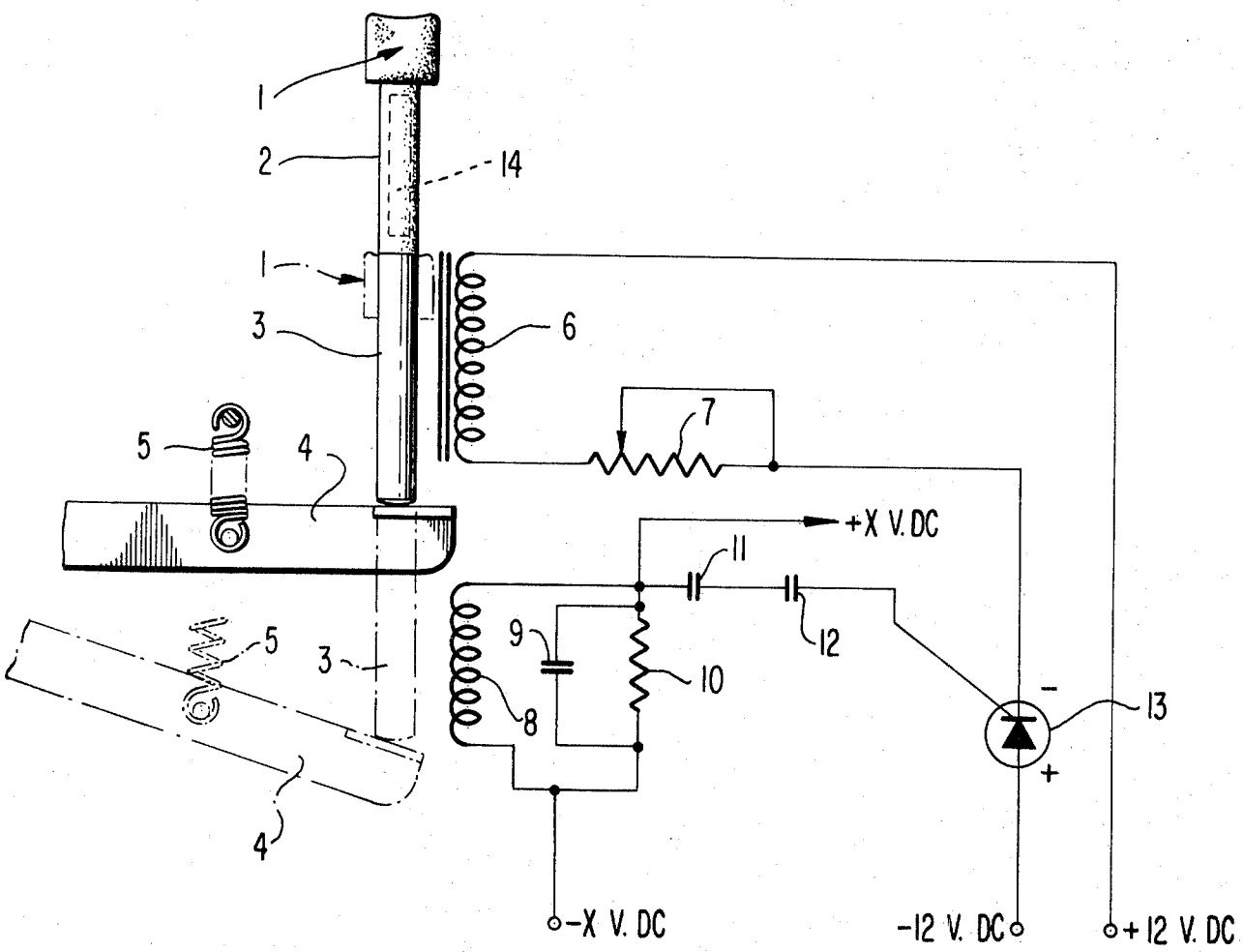
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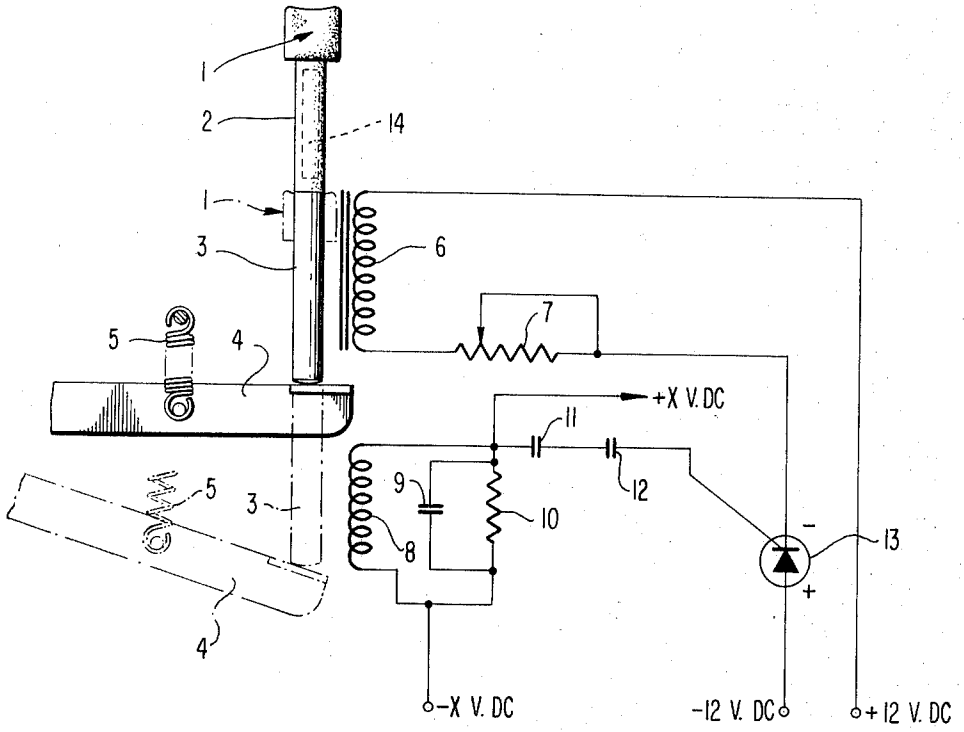
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[57] **ABSTRACT**

Keys of a typewriter or similar machine embodying a keyboard are returned to their elevated inactive positions by a force greater than the force utilized to support the keys in their elevated positions. The increased return force may be derived from the operation of electromagnetic means. The invention causes the fingers of the keyboard operator to "bounce" to an advantageous position above the keyboard where they are poised for a more rapid and efficient continuing keyboard operation.

5 Claims, 1 Drawing Figure




1
2
14
1
3
6
7
5
4
+X V. DC
11
5
3
9
10
12
8
13
4
-X V. DC
-12 V. DC
+12 V. DC

KEYBOARDS

BACKGROUND OF THE INVENTION

The keys of typewriter and other business machine keyboards are usually biased toward and supported in elevated inactive positions by a resilient means which may be adjustable to vary the "touch" of the keys. When the conventional keyboard is used by an operator, the above key biasing force must be overcome by the fingers with a sufficient force to properly operate the key mechanism. Following such operation, the same key biasing force or means is utilized to return the keys to their normal elevated positions after they are released by the fingers of the operator. While this traditional and conventional means long employed in the prior art is quite satisfactory in terms of economy and generally efficient operation, it has been discovered in connection with the present invention that the speed and efficiency of operation of a typewriter or similar machine keyboard can be significantly increased as a result of utilizing a return force on the keys to elevate them which is greater than the force used to hold the keys in their normal elevated positions. In accordance with the invention, therefore, a second and separate means is utilized to return the keys of a keyboard to their elevated inactive positions. This increased return force acting on the keys has for a result a boosting or "bouncing" action against the fingers of the keyboard operator, and the advantageous result of this finger boosting is the positioning of the operator's fingers without effort in a poised and slightly elevated location generally centrally of the keyboard so as to enhance the continuing operation of the keyboard. More particularly, the invention by means of its finger boosting effect will increase significantly the overall speed and efficiency of operation of the keyboard for a given operator.

The invention is characterized by extreme simplicity in that it may be embodied in a simple circuit forming a part of the overall operating circuit of an electric typewriter or the like. Preferably, an electromagnetic means in the circuitry is employed to return the key to its elevated position with the force required to produce the results envisioned by the invention. However, other force producing means may be utilized in some instances and on some types of machines for the return of the keyboard keys with sufficient force to boost the fingers. It is believed that the invention can be incorporated in typewriters and other similar machines with a minimum of expense and with virtually no structural alterations of the machine other than relatively small circuitry modification.

Other features and advantages of the invention will become apparent during the course of the following description, with reference to the accompanying drawing showing an embodiment of the invention.

BRIEF DESCRIPTION OF DRAWING

The drawing FIGURE is a partly schematic view of one keyboard key and associated electrical circuitry embodying the invention, it being understood that each key of the keyboard is similarly equipped and operated.

DETAILED DESCRIPTION

Referring to the drawing in detail, wherein like numerals designate like parts throughout, the numeral 1 designates the upper extremity of a key shaped for convenient engagement by the operator's finger and being formed of non-ferrous material of any preferred type. The numeral 2 designates the lower portion or plunger attached to the bottom of the element 1 and likewise being formed of non-ferrous material. Suitably secured to the lower end of the non-ferrous plunger portion 2 and rigid therewith is a paramagnetic, ferrous metal plunger extension 3 which at least in part embodies a permanent magnet, preferably at the lower tip of the plunger. The lower end of the key plunger portion 3 is shown in engagement with a conventional key lever 4 biased by a suitable return spring 5 to the position shown in full lines in the drawing whereby the key will be normally held in its raised idle or inactive position. The key including its non-ferrous and ferrous plunger sections is shown with the key lever 4 in a fully depressed use position in phantom lines in the drawing.

The numeral 6 designates a conventional DC solenoid whose coil is adjacent to and preferably surrounds the ferrous metal plunger portion 3 when the latter is fully elevated. It should be understood that an alternating current device or means could also be utilized without changing the basis of the invention. A variable resistor 7 is utilized in the circuit with the solenoid coil 6, as shown. A proximity switch 8 operating on a small voltage, and of a type well known in the art, is positioned below the solenoid 6 and at the elevation of the plunger portion 3 when the latter is fully depressed by the keyboard operator. A capacitor 9 and resistor 10 necessary for the proximity switch circuit are provided as shown. Additional capacitors 11 and 12 necessary to operate a silicon-controlled rectifier (SCR) are coupled between the proximity switch 8 and SCR 13, as indicated in the drawing.

It should be mentioned that the spring means 5 for holding key 1 elevated is only one of numerous forms of spring devices which might be employed for this purpose, and it is intended not to limit the invention to the form of spring means shown in the drawings. The spring 5 is designed to offer little resistance to the downward force exerted on the key by the operator's finger and the force of this spring need only be sufficient to support the key in a stable manner while in the raised inactive position.

As indicated in the drawing, a small voltage, X volts (DC or AC) is maintained through the proximity switch 8, thus producing a magnetic field into the vicinity of the coil 8. When the key 1 is in the elevated position shown in full lines, no current flows through the circuit containing the variable resistor 7 and solenoid 6. However, when the key is fully depressed to the broken line position in the drawing, the ferrous metal plunger portion 3 will enter the magnetic field of the proximity switch coil 8. This, in turn, causes a change in the voltage in the circuit containing the coil 8, capacitors 9, 11 and 12 and resistor 10, which causes SCR 13 to pass current through the circuit containing variable resistor 7 and solenoid 6. Once the higher voltage passes through the coil of solenoid 6, a magnetic field is produced which is strong enough to attract the ferrous metal plunger portion 3 of the particular key back to its normal elevated position. Once the plunger portion 3 has thus been removed from the vicinity of the proximity switch coil 8, the SCR 13 acts as a switch and closes the circuit containing variable resistor 7 and so-

lenoid 6, and the key is then held in the normal raised position prior to its next use by the conventional spring means 5. Instead of the magnetic attraction of the plunger portion 3 by the coil 6 to elevate the key plunger, magnetic repulsion forces may also be utilized to elevate the key plunger and such forces will occur between like poles of a permanent magnet 14 embodied in the plunger portion 3 and in the magnetic field created by energizing the coil 6 in an alternate arrangement. The location of these magnetic poles may be established as desired depending upon the direction of winding of the coil 6 and the placement of the permanent magnet in the plunger portion 3.

As previously noted, the essential feature or concept embodied in the above-described structure and mode of operation lies in the utilization of the greater than usual upward return force exerted on the key in returning it to the raised idle position. This force and the resulting abrupt upward movement of the key will boost or "bounce" the operator's finger to a poised position above the keyboard, reducing manual effort and positioning the finger more advantageously to strike the next key with greater speed and efficiency. It is believed that, after becoming accustomed to the use of the keyboard embodying the invention with its unique finger boosting action that the typist or other machine operator, will be able to work faster and with greater accuracy and with less manual effort and fatique compared to that encountered with conventional keyboards. The utility and advantages of the invention will be apparent to those skilled in the art without the necessity for any further description herein.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. In a keyboard, an operator depressable key element having a non-ferrous upper part and a ferrous metal lower part, key lever means engaged with said lower part of the key element to be moved thereby to a working position, resilient means connected with said key lever means and returning the key lever means to a normal non-working position and supporting the key element through the key lever means in a non-working position, and induction means including first and second inductors activated by movement of the key element to a working position and exerting an elevating force on the key element substantially in excess of the elevating force which the resilient means is capable of exerting.

2. The structure of claim 1, and said first inductor comprising a solenoid coil and the second inductor comprising a proximity switch coil, said solenoid coil disposed adjacent the non-working position of said ferrous metal lower part and the proximity switch coil disposed adjacent the ferrous metal part when the latter is in the working position, and additional circuit means including a controller rectifier coupled with said solenoid coil and said proximity switch coil.

3. In a keyboard, an operator depressable key element, a key lever means operatively engaged with the depressable key element, a resilient return means for the key lever means also serving to hold the depressable key element in a raised position, and another means activated by depression of the key element to a working position and exerting a return elevating force on the key element in excess of the force which said resilient return means is capable of exerting on the key element.

4. The structure of claim 3, and said another means activated by depression of the key element comprising an electromagnetic control circuit having first and second inductor elements in spaced relation along the path of movement of the key element, the key element being formed at least in part of ferrous metal and said ferrous metal part being shiftable with the key element between first and second positions adjacent to said first and second inductor elements.

5. The structure of claim 3, and said another means activated by depression of the key element comprising a means utilizing magnetism to exert the return elevating force on said key element.

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