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TYPEWRITER KEY LEVER AND MOUNT THEREFOR

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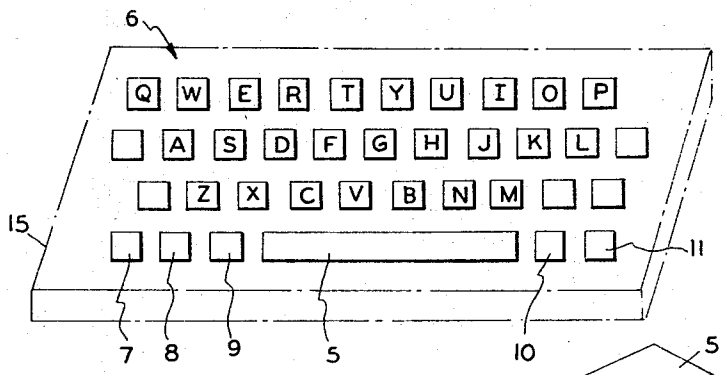


FIG.1

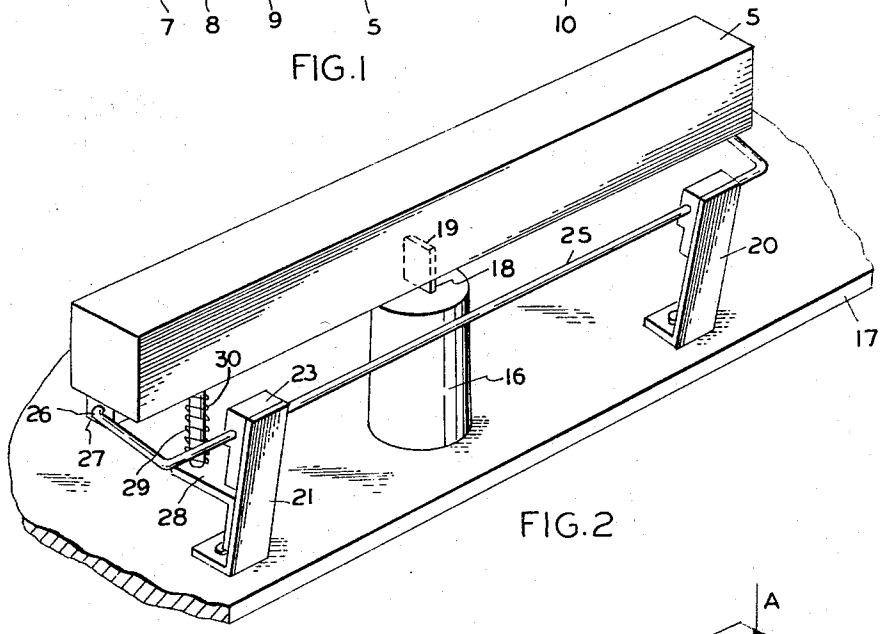


FIG.2

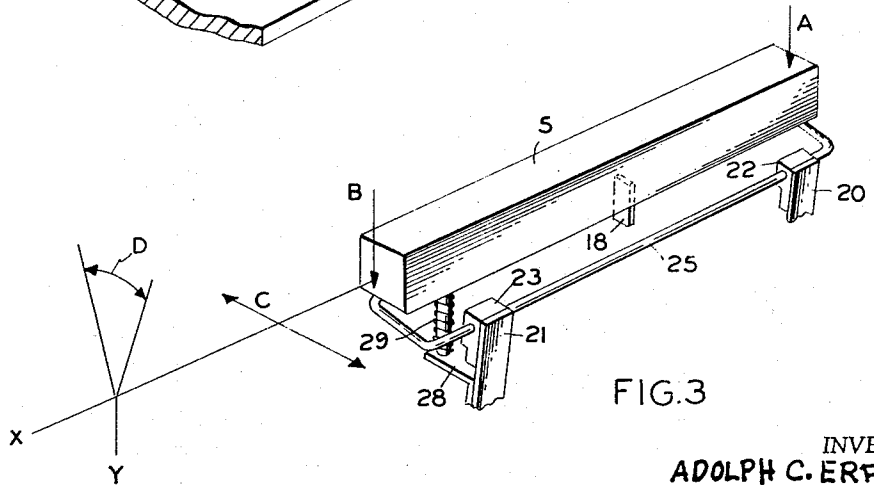


FIG.3

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TYPEWRITER KEY LEVER AND MOUNT THEREFOR

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This invention relates to typewriter keyboard assemblies and, more particularly, it relates to an operational lever assembly for a typewriter key.

In typewriter keyboards the space-bar conventionally is pivoted on long shafts mounted with pivot points far away from the space-bar resulting in a massive assembly with a different feel from the other typewriter keys, and requiring a large amount of mounting space. It has been found that this type of mounting assembly significantly limits typing speeds since the response time of the space-bar is thereby slower than top typing speeds attainable when using the other keys.

Furthermore, when using conventional space-bar mounts, the keyboard must be laid out with appropriate clearances for the space-bar mounting assembly and thereby there is little flexibility in keyboard layout variations when used with auxiliary key actuated controls such as desirable with electronic keyboards used to process data in electronic data processing systems.

In typewriters using electronic switches operable by the keys, the keyboard assembly preferably permits room for mounting the switches with normal key spacing in a compact keyboard assembly. However, if a single such switch is used with long space-bars, it must be in an assembly which does not tilt, bind, or stick when depressed at any position along the space-bar.

It is, therefore, one object of this invention to provide a very simple mounting assembly for long space-bars which is confined to the area taken up by the space-bar itself, and which is useful with key-operated electronic switches.

It is another object of this invention to provide a very simple key bar mounting assembly which distributes the finger-tip pressure on the key tops evenly over the length of the bar, so that it does not matter where the bar is depressed, nor will it allow the bar to bind or stick because it is depressed on one end or the other.

It is still another object of this invention to provide a key-bar mounting assembly which prevents the top surface of the bar from tilting to the horizontal while it is being depressed through its downward stroke.

It is still another object of this invention to provide a key-bar mounting assembly which keeps the entire length of the bar longitudinally stable throughout the length of the bar, so that it cannot change its angle in relation to a tight-fitting slot in the panel through which the key-bar emerges.

It is yet another object of this invention to provide a key-bar mounting assembly which is so light in structure that it has a "feel" and response comparable to the individual small keys, and can also be adjusted to have almost the identical pressure setting of the individual small keys.

All of these basic requirements of (1) an assembly which is confined to the area of the space-bar itself, (2) an assembly which is light enough to have very fast response and light touch, (3) an assembly which will stabilize the finger pressure through its longitudinal or lengthwise axis, (4) an assembly which prevents the bar from tilting from the horizontal during its downward stroke and (5) an assembly which can be moved readily to accommodate any special position on a crowded keyboard, with individual key switches—are met by a key assembly

afforded by this invention. This key assembly comprises a key lever holding the ends of the space-bar and pivoted in supports mounted adjacent the space-bar for transmitting force occurring at any point on the space-bar into smooth reciprocating action on a keyswitch actuator shaft mounted intermediate the space-bar without binding and with similar feel to that presented by a regular key directly connected to the keyswitch actuator shaft.

Further features of the invention will be described in detail in the following specification with reference to the accompanying drawing, in which:

FIGURE 1 shows a general plan view of a typical electronic keyboard with individual switches which has the long space-bar confined between other functioning keys;

FIGURE 2 is a perspective fragmental view of the individual space bar mounting assembly; and

FIGURE 3 is a fragmentary sketch of the mechanism with related vectors showing distribution of force throughout the mechanism.

As shown in FIGURE 1, the space-bar **5** is assembled in a typical keyboard array **6** with special operating keys **7**, **8**, **9**, **10**, and **11** aligned on either end of the space-bar **5**. This is a typical array for an electronic typewriter keyboard which operates a data processing system, for example, where special keys **7**, **8**, **9**, **10**, and **11** might indicate instructions such as "automatic," "delete," "stop," "start," etc.

Each of the keys **5**, **7**, etc. extends through a closely fitting aperture in sloping housing panel **15** to operate keyswitches mounted therebelow. Thus, as shown in FIGURE 2, an electrical keyswitch assembly **16** is provided under the panel **15**, which might be for example, the type shown in the copending application of Adolph Erpel for Keyboard Switch, Serial No. 369,446, filed May 22, 1964, now U.S. Patent No. 3,244,847. This electric keyswitch **16**, which is spring biased in its upward position, is mounted on a panel **17** generally parallel to the top of the housing panel **15**, and has an extending actuating shaft **18** vertically disposed for operating the switch when the space-bar **5** is depressed. Thus, the keyswitch shaft **18** is affixed to the space-bar **5** at an intermediate position such as by friction fit of the shaft **18** into a corresponding mating recessed portion **19** of the space-bar **5**.

It is seen by the dimensions of the keyboard **6** of FIGURE 1 that the keys are mounted closely together and thus the under-panel space available for each key must be confined to the vicinity of that key. The mounting assembly of FIGURE 2 accordingly affords a complete space-bar assembly which does not extend significantly beyond the dimensions of the space-bar **5**. In this respect, support members **20**, **21** are fixedly mounted to the panel **17** adjacent the space-bar **5**, such as by riveting, to extend vertically alongside the space-bar **5** on either side of the keyswitch **16**. Each support member **20**, **21** has a bearing member **22**, **23** near each end of the space-bar **5**, in which is pivoted a generally U-shaped key-lever rod **25**. This lever rod **25** permits the space-bar **5** to move vertically through an arcuate path at the ends **26** of the rod which may be bent for insertion into apertured plates **27** extending downwardly from near each end of the space-bar **5**, thereby holding the space-bar for restricted arcuate motion.

Vertical guide means are provided by the apertured guide plate **28** extending from support member **21** with which the guide pin **29** affixed underneath space-bar **5** is registered. This shaft is encircled by a spring **30** which biases the space bar **5** in its upward position along with the spring within switch **16**.

Operation of this assembly is illustrated by vectors associated with FIGURE 3. Axes X and Y may be drawn in the plane of reciprocation of the space-bar, which ex-

tends downwardly through pin **29** and the associated aperture in guide plate **28**, and in which the shaft **18** of keyswitch **16** is mounted for vertical actuation. Thus, the supports **20** and **21** are mounted generally in a plane substantially parallel with the plane of reciprocation of the space-bar **5** and keyswitch shaft **18**.

Now if a downward force by a typist as illustrated with vector A is positioned at one end (or at any other point) of space-bar **5**, the pivoted lever rod **25** serves to transmit this force also as vector B at the other end of space-bar **5** and thus equalize force evenly across the horizontal length of the bar to transmit pure vertical motion to the intermediate key-switch shaft **18** without binding or twisting the shaft **18**. Thus, no change in feel of actuation may occur as a function of horizontal location of pressure along the space-bar **5**. Furthermore, any longitudinal tilt of space-bar **5** is restricted by the bearing assemblies **22, 23**. These same bearing assemblies also restrict motion along the direction of vector C toward or away from the support members **20, 21** outside the arcuate pivot path of the lever rod **25**.

Any tendency for space-bar **5** to tilt or twist about arc D away from the vertical axis Y is restricted by the guide pin **29** registering in guide plate **28** which retains the space-bar **5** in vertical attitude.

Accordingly, it is seen that very simple mounting structure confined to the immediate vicinity of the space-bar **5** serves to permit operation of the space-bar keyswitch assembly **16** without heavy shafts, levers, or large masses that would significantly reduce typing speed compared with direct keyswitch shaft operation by other keys **7, 8, 9**, etc. Also, the direct motion with equalized force is attained without complex or expensive linkages or mechanisms. In such manner not only is the operating mechanism improved but also operator typing performance, so that the present invention has advanced the state of the art and accordingly those novel features believed illustrative of the nature and scope of the invention are defined with particularity in the appended claim.

What is claimed is:

In a typewriter keyboard, a space-bar mounting arrangement comprising in combination, an elongated key bar, an electronic switch assembly restrained for movement along

the shaft axis positioned along the key bar with a single reciprocating actuation shaft by said key bar and the switch assembly for direct linear vertical movement thereby, a pair of support members fixedly mounted alongside said key bar on either side of said switch near the ends of the key bar in a plane substantially parallel with the plane of reciprocation of said key bar, a lever member pivotably supported in each of said support members and pivotably engaging said key bar near each end to move through an arc about its pivotal supports in said support members as vertical force on said key bar reciprocates it with said actuation shaft, a single guide plate affixed to only one of said support members and extending into the plane of reciprocation of said key bar to define an aperture underneath said key bar, and a guide pin in said key bar spaced from said vertically movable actuation shaft and registering in said aperture for free vertical reciprocating movement of the key bar while restricting tilting of said key bar relative to the plane of reciprocation, whereby the downward component of force at any position on said key bar is transmitted substantially completely as reciprocating force to said actuation shaft.

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