Feb. 28, 1961 R. HENATSCH 2,973,079

TYPEWRITERS

Filed March 12, 1958 2 Sheets-Sheet 1

FIG. 1

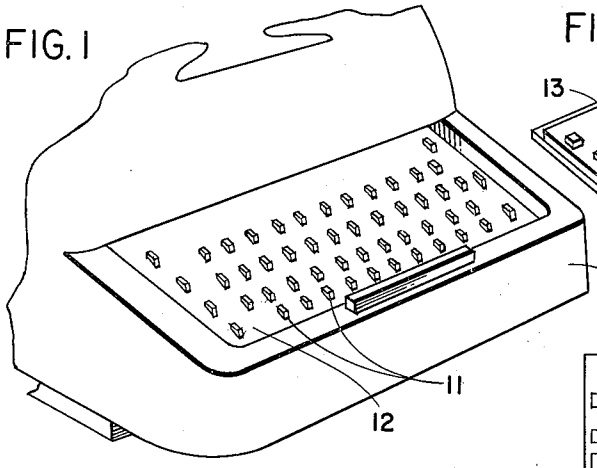



FIG. 2

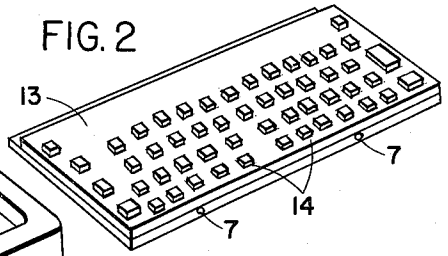
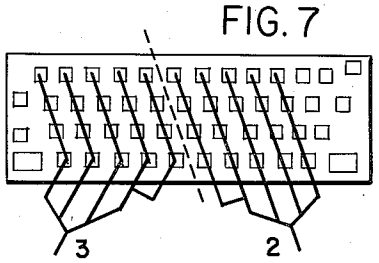



FIG. 7



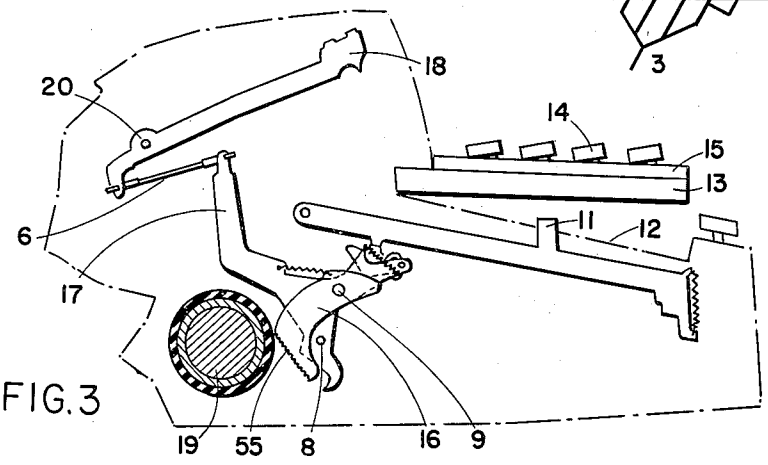




FIG. 3

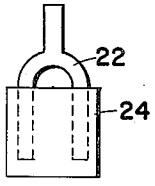



FIG. 6

FIG. 5

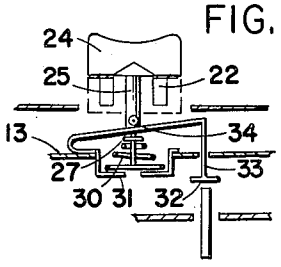
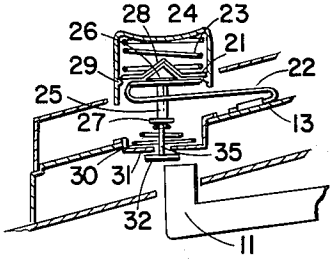



FIG. 4




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FIG. 8

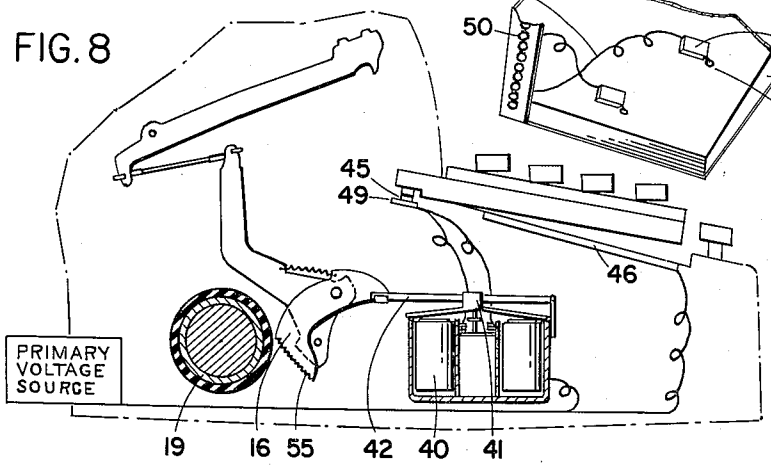



FIG. 9




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United States Patent Office 2,973,079
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2,973,079

# TYPEWRITERS

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Filed Mar. 12, 1958, Ser. No. 720,852
5 Claims. (Cl. 197—19)

This invention relates to improvement in typewriters and particularly to improvement in keyboards of electric typewriters, since in these some of the limitations necessitated by mechanical operation are now removed.

The forerunner of the present-day typewriter is generally conceded to be a machine patented by C. L. Sholes in 1868. The keyboard which was deemed adequate by Mr. Sholes at that time was one which best suited the mechanical requirements of the machine. The idea of using all of the fingers and having certain keys allotted to certain fingers and those alone did not occur to Mr. Sholes at the beginning and his concern was chiefly with mechanical difficulties, such as jamming and sticking of type-bars.

When schools began teaching what is commonly known as the "touch system" some ten or fifteen years later, it necessitated adjustment of the human anatomy to the mechanism which already existed. In more than eighty years since the machine was invented there has been little or no improvement in the keyboard to make it more suitable for the structure of the human hand and the entire trend has been toward standardization.

After having used a typewriter for more than forty years under these unfavorable conditions, it is my firm belief that standardization is wrong since the human beings who are required to use the machines are far from being standardized. For instance, a man, whose hands are one-half again as large as the average woman's is obliged to cramp them up on the same keyboard which is designed primarily for use by women users. Since even the fingers of the same hand are not of the same length and strength, it is illogical to have all of the keys aligned in horizontal rows and at the same level. Furthermore, when the two hands are identical, except in reverse, why should the keys for the left hand be in a different arrangement from those for the right hand when mechanical features which necessitated such an arrangement no longer exist?

I believe a method of manufacture in which the keyboard is provided as a separate detachable unit is a practical means of overcoming a stalemate which has existed since the typewriter was invented. By supplying multiple such units made according to different specifications and which are interchangeable on the same basic typewriter, individual operators would be benefitted and at the same time the manufacturers would not be taking chances with reformed typewriters which might not sell. By mutual agreement among manufacturers to adopt a certain standard in the basic machine, such separate keyboards could even be made to be interchangeable among various brands of typewriters. Each typist could maintain her own keyboard, just as she prefers to have it, which could be taken from job to job and attached to any basic typewriter constructed to receive it. Another typical advantage might be cited in a family typewriter in which a separate keyboard is provided to suit the mother, another to suit the father who has larger hands, and a third to suit a growing son or daughter being taught a reformed system in which the characters are more scientifically allotted to the keys, all three keyboards being interchangeable in the matter of seconds.



My main object is to provide operators with a choice of keyboards, so that they may select one best suited for their own personal requirements and preferences instead of forcing them to use one standard keyboard which is commonly referred to as the "universal keyboard," and to disclose a method by which a stalemate of approximately eighty years standing can be broken by teaching manufacturers how improved keyboards can be made available to those who want them, without seriously disrupting the typewriter manufacturing industry and with no inconvenience to operators.

More specifically, my objects are:

To enable operators to maintain personalized keyboards, constructed according to their preference, which can be easily and quickly transferred from typewriter to typewriter as occasion demands.

To provide separately constructed keyboards giving each operator a choice of the kind of key construction he or she prefers. This would give preference as to individual key characteristics, such as shape of key-head, stiffness of spring action and variation in the height of various keys to suit the various fingers of the same hand.

To provide separately constructed keyboards to give the operator a choice of the one best suited for the size of his or her hands.

To provide separately constructed keyboards giving a choice of the one preferred as to position of keys on the keyboard, since such position need no longer be limited by front-to-back arrangement of the key-levers, as heretofore. This would offer the operator a choice of a keyboard in which the keys are positioned more scientifically according to the anatomy of the hand. If desired, a keyboard could be selected in which the keys allotted to the left hand are as suitably positioned as those for the right hand. If preferred, the operator might select a keyboard in which the keys are positioned according to the length of the various fingers of the same hand, instead of being forced to use a keyboard in which the keys are positioned in straight horizontal rows.

To provide separately constructed keyboards giving a choice of arrangement of letters and characters on the key-heads.

To teach a method of construction in which separate keyboards provided with key-action independent of that of key-levers, would make possible an arrangement of type-bars not dependent on the key arrangement as well as an arrangement of keys not dependent on arrangement of the type-bars.

To provide for practice purposes, separate keyboards having the same action as is found on an electric typewriter, thereby greatly reducing the cost of supplying typing instruction in schools.

To enable operators to have a keyboard at a slant which best suits their needs and preference.

In the drawings:

Figure 1 is a partial perspective view of the front of an electric typewriter showing the headless ends of the key-levers protruding upward through a sunken panel. This is what is referred to as the basic typewriter.

Figure 2 is a perspective view of a typical separate panel capable of being attached to the basic typewriter and showing a full complement of key-heads arranged in a manner different from the universal keyboard.

Figure 3 is a partial sideview, partly in cross-section, near the front of an electric typewriter, showing a key-lever type of construction and with a keyboard panel partly detached.

Figure 4 is a cross-sectional sideview of a typical key

of the separate panel shown in Figure 3, through its approximate center, showing one means of transmitting a blow on the key to the end of the protruding key-lever.

Figure 5 is a cross-sectional frontview through the approximate center of a similar key which has been adapted with a device for deflecting the pressure to the right side of the key-head.

Figure 6 is a plan view of these keys showing the forked nature of the main supporting spring which retains the key in alignment.

Figure 7 is a diagrammatical plan of the universal keyboard showing how the keys are allotted to each hand.

Figure 8 is a partial sideview, partly in cross-section, showing a typical type-bar linkage in association with a power roller, an installation of electro-magnets to replace the customary key-levers and a keyboard panel which is partly detached.

Figure 9 is a bottomside perspective view of a detached keyboard panel showing two typical individual key mechanisms wired to contact points along one edge.

Since my disclosure is an attempt to destandardize a practice which has been standard for a long period and its purpose is to make choices available to operators rather than limit them to a set practice, it will be seen that its merit lies in its general conception rather than in the novelty or patentability of some specific device, arrangement of keys or allotment of letters and characters to the keys. To give a clearer understanding of the conception, a more detailed description of the objects is given.

Perhaps the greatest objection to the keyboard which was adopted in early typewriters for mechanical reasons is the fact that keys allotted to the left hand fall into quite a different arrangement from those allotted to the right hand, as may be seen by referring to Figure 7. Diagonal rows of keys are assigned quite naturally to the right hand **2**, two rows being alotted to the index finger. Although the left hand **3** extends from the elbow in the opposite direction from the right, the diagonal rows continue at the same angle as for the right hand and do not fall naturally beneath the fingers.

Being required to perform at practically the same time a different set of motions for each hand is in itself a cause for nervous fatigue. The diagonal rows of keys controlled by fingers of the right hand fall quite naturally under the fingers as they have their greatest flexibility of movement, giving the right hand a natural feeling of orientation when the little finger is lightly poised on its guide-key. The naturally weaker left-hand, however, is assigned to keys which do not fall naturally within the scope of the greatest flexibility of its fingers.

For example, in my hand the finger next to the little finger is 1" longer and the middle finger is 1½" longer than the little finger, yet I am expected to strike the same blow with each finger while the hand is poised over three keys which are side by side in a horizontal row. In order to retain the little finger on its guide key I have to curve the center fingers so much I strike on the nail instead of on the fleshy tip of the finger. Since the index finger, too, is shorter than the center fingers and is obliged to control two diagonal rows of keys, it is retained in a more or less stretched out position and uses a different type of muscular action from that required of the center fingers.

This cramped unnatural position is one of the greatest factors causing fatigue in typewriting. In addition to physical fatigue, mental fatigue results from having to constantly check the position of the hand due to the fact that the keys do not lie in a natural position. Even a minor change, such as slightly lowering from the straight horizontal row the position of the guide-keys, would eliminate the need for keeping the rest of the fingers of each hand in a cramped position to retain them over the straight horizontal row. When control of keys remains allotted to the same fingers, a slightly different position for a key could be easily mastered, especially if it brought welcome relief from strain.

A recently publicized keyboard reform, Patent 2,040,248, in which letters are more scientifically allotted to keys according to their frequency of use, etc., has not been generally adopted. It is my belief that this has resulted from two factors which I have tried to overcome in my disclosure. The first is the general opposition to a reform which would inconvenience operators accustomed to the universal keyboard through long usage and the second is the fact that the novelty lay only in the arrangement of the letters and not in repositioning of the keys to avoid fatigue. I have purposely conceived a method by which a gradual transition could be achieved, during which period no operators need be inconvenienced.

At first only a limited number of keyboards need be offered to those who want them, designed according to more scientific specifications and veteran typists need notice no change except when their attention had been called to the fact that their keyboard had been made detachable. After a campaign offering personalized keyboards and educating the public to their advantages, the number of reformed keyboards could be increased until only an ever decreasing number of veterans need be supplied with the outmoded universal keyboard.

In a separate application I am disclosing how the use of key-levers can be eliminated and keyboards made to be easily detachable from the typewriter. In Figures 8 and 9 of the present application I illustrate how easily multiple detachable keyboards of varying specifications and designs could be made to be interchangeable on the same basic typewriter when key-levers are eliminated as I disclose in my other application. It is necessary only to wire the individual key mechanisms on the separate panel to the contact element on the edge which will coincide with the corresponding contact element on the basic typewriter. This disclosure permits a far greater flexibility in both the position of the keys and allocation of character symbols to the keys than is practical when use of key-levers is retained.

Referring to Figures 1 and 2, it will be seen how the keys **14** can be mounted on the separate panel **13** which lifts right off of the basic typewriter **10**. The ends of the key-levers **11** are shown protruding upward through a perforated plate **12** although it is not absolutely necessary and any simple means such as friction catches **7** can be used to retain the panel in position on the typewriter.

To illustrate how my concept is made practical by the small amount of pressure required on the key-levers and the small amount of depression necessary when striking a key, a sideview of a typical type-bar linkage in relation to a power-roller is shown in Figure 3, as it appears in a comparatively recent model of an IBM electric typewriter. When the key-lever **11** is depressed slightly, cam **16** having a serrated edge **55** as shown, is revolved about its axis **9** in a clockwise direction. This brings the serrated edge into contact with the constantly moving power-roller **19** which is driven by a motor not shown. Since the roller is moving in a counter-clockwise direction and axis **9** is attached to sub-lever **17**, the cam, in being forced in a clockwise direction by the roller, carries axis **9** with it, which causes sub-lever **17** to revolve in a clockwise direction around its axis **8** which is a stationary rod extending across the typewriter, to which all similar type-bar linkages are attached.

Because of the flexible nature of link **6** and the off-center location of axis **20**, the type-bar **18** is forced into free-flight which causes it to strike a blow of the necessary force to do the printing.

By referring to Figure 4, it will be seen how a key-mechanism with sufficient rebounding action can be self-contained within the separate panel. The base of the key-head **21**, having a cone-shaped indentation **28** in its center, is securely attached to attaching-spring **22** which hooks onto panel **13**. The plan-view shown in Figure 6

shows the forked nature of spring 22 designed to retain the key-head normally in horizontal position but permitting some sidewise resilience. A hollow key-head shell 24 containing a resilient member such as a resilient pad or a coiled spring 23 as shown, is clamped over the base 21 and the spring 23 forces the shell upward as far as stops 29 inside the shell permit.

The separate key-stem 25, constructed with a cone-shaped top 26, a collar 27 in its central portion and a base 32 of relatively wider area, is retained in upright position 30 which rests on a horizontal base 31 with an opening 35 in its central portion through which the base 32 and the lower portion of the key-stem 25 protrude to make contact with key-lever 11 on the basic typewriter. Since the keyboard panel 13 is normally at a slant for the convenience of operators, base 31 is designed to retain the key-stem 25 in upright position. It will be observed that the detached key-stem and hollow key-head are designed to give the key what might be termed a "floating" action. This is desirable since one complaint about electric typewriters has been the fact that the keyboard has a "dead" feel which results from the slight depression and small amount of pressure required. In my disclosure, in addition to being spring-attached to the panel, spring action is provided in the stem and when that is exhausted, still further resilience is left in the key-head since the shell's relation to the base 21 is not fixed.

While the key is normally kept in horizontal position, it will be seen that the pivotal nature of the key-stem, in relation to the key-head, cushions a glancing blow which is struck on the side of a key in rapid typing, allowing the key-head to "give" slightly while still transmitting enough force to provide the slight pressure needed. It will also be seen that after the necessary contact with the key-lever has been made, there is still plenty of resilience in the key-head to give a finger the necessary rebound which aids it to recover after a blow to induce rhythmical typing which reduces fatigue.

It is to be understood that this conception does not change any of the basic typewriter, except omitting the key-heads and providing means for attachment of the separate panels to the frame. Since the usual rebounding action is still provided in the key-levers, less action would have to be built into the separate panels. That would be a matter in which the operator could be given a choice. Many would welcome a supplemental action which would "cushion" the blow, however it may be struck, and yet afford a firm "bottom" to the stroke to assist the finger in its recovery from the blow.

No problem would be involved in providing certain keys at different heights and Figure 4 illustrates how the slight pressure can be transmitted even though the key-head is not directly above the key-lever. Figure 5 illustrates how the force of the blow can be diverted when the key-head is moved to the left of the normal position of the key-lever. In this case a small wheel 34, designed to reduce friction, is mounted on the side of the key-stem 25 and the base 32 is attached on the end of a suitably shaped lever 33 which is springably attached to panel 13.

To illustrate how still greater flexibility is achieved by substituting electro-magnets for the key-levers in the basic typewriter, two drawings are included from another application I am making to claim such a combination in an electric typewriter. While the slight change which makes multiple panels interchangeable appears in Figure 9, I have included Figure 8 to give a brief description of the mechanism which makes the change possible. Although the type-bar linkage in connection with the power-roller remains practically the same, a series of electro-magnets 40, one for each type-bar or other operation, is installed in a convenient location in relation to the type-bar linkages. When an electro-magnet 40 is energized by being brought into the electric circuit, armature arm 41 is attracted to the magnet. This pulls down operation-rod 42 which is in loose contact with cam 16, causing the serrated edge 55 of the cam to be brought into contact with the power-roller 19 which takes over the operation from there, to produce the striking blow of the type-bar in the usual manner. Each electro-magnet is wired to a contact element 45 which is situated on a strip located in the front of the machine for easy access to the panel. A contacting plate 46 is situated directly beneath the location of the panel and this is wired to the circuit.

Referring now to Figure 9, key mechanism housings 47 are seen attached to the underside of the panel. When a key is depressed, its contactor 73 touches plate 46 thereby completing a circuit which energizes the electro-magnet for that key. In Figure 9 it will be seen how almost unlimited flexibility may be had by use of flexible wiring in connecting the key-mechanisms on the panel to the proper contacting element 50 on the edge of the panel. The extent of this flexibility is made still more evident when consideration is given to the fact that in Mr. Sholes' original model the location of the keys was further restricted by the use of wooden slats which were used as key-levers. Besides permitting freedom in location of the keys on the panel, this disclosure permits use of different typewriting methods, such as the Dvorak, which allocates the characters to different fingers than the universal, and yet multiple panels all differing in construction could be operated on the same basic typewriter.

The chief concern of this invention is not to show how a typewriter can be built so that various parts work together with a greater precision, which achievement lies within the range of a skilled mechanic's ability, but rather to teach how it may be built so that there may be a greater degree of smooth co-operation between the machine and the operator in order to produce work with greater speed, ease, accuracy and efficiency. By combining the component elements of the typewriter as I do, a result is achieved which is far greater than the actual mechanical co-operatioin of such elements. I disclose a practical way to eliminate the inflexibility of the universal keyboard after it has a factor deterring progress for many years.

From this very nature of my invention which teaches de-standardization where standardization has become firmly entrenched and which offers a choice to operators, it will be seen that adequate protection is not afforded by a patent merely covering the apparatus which is disclosed. In order to substantiate my claim for a method covering such a procedure in the manufacture of typewriters, I am disclosing two distinctly different ways in which multiple keyboards can be offered to the public—one which solves the problem by mechanical means and the other by electrical means.

Because it shows how the concept of multiple keyboards can be put into practice with very little change in the electric typewriter as it is being built today, I have used the mechanical means as my first disclosure. However, because it makes possible a far greater degree of flexibility in the keyboard, the electric method shown in Figures 8 and 9 may be considered as the best mode contemplated. The appended claims are intended to cover all modifications as fall within the true spirit and scope of this teaching.

What I claim is:

1. The combination with an electric typewriter having type-bars and other functional instrumentalities linked with mechanisms which activate and control them when placed in contact with a motor-driven roller by manual force applied on keys associated with the mechanisms; of separate, detachable, interchangeable panels of varying specifications and designs, in which keys are springably mounted with an action which is self-contained within the panel instead of being mounted on key-levers attached to the typewriter as is the well-known practice in the art and one panel varying from another panel in

order to offer to operators a choice of the one best suited for their requirements; means for quickly and easily attaching said panels to the typewriter alternately; and means for transmitting manual force applied on a key to the mechanism on the typewriter with which that key is associated, regardless of the location of the key on the panel.

2. The same as claim 1, each key, which is disposed adjacent to an opening in a panel, comprising a key-head, a stem having an upper extremity and a lower extremity and an attaching-spring, the key-head being resiliently supported on the attaching-spring and the key-stem having its lower extremity springably supported by the panel and retained in alignment with an opening while having its upper extremity held in upright alignment by the attaching-spring.

3. The same as claim 1, each key, which is constructed to be maintained in proper position on a panel which tilts slightly upward from the operator in the customary manner, comprising, in combination; an attaching-spring to which is secured a flat member conforming to the shape of the key desired and having a cone-shaped indentation in its central portion, a hollow shell in the shape of the key-head desired and having stops placed in its interior adjacent to its lower edge, fitting over said flat member but bearing no fixed relation thereto; a resilient member such as a coiled spring within the shell which urges it upward until said stops placed within the shell come in contact with the flat member to stop further progress; a supporting base in which an opening is centrally located and which is constructed and arranged to retain the key in upright position on the tilted panel; a key-stem which passes through the opening in the base and has a cone-shaped upper extremity, a lower extremity which broadens into a relatively greater area after it passes through the opening in the base and a collar in its central portion, and a resilient member interposed between the collar on the stem and said supporting base in a manner which holds the stem in central alignment with the cone-shaped indentation in the flat member secured to the attaching-spring, whereby a cushioned key-action is provided to the operator.

4. The combination with an electric typewriter having type-bars and other functional instrumentalities linked with mechanisms which activate and control them when placed in contact with a motor-driven roller by manual force applied on key-levers, having no key-heads, which are associated with the mechanisms, of separate, detachable, interchangeable panels of varying specifications and designs, in which key-heads are springably mounted for action instead of being mounted on key-levers attached to the typewriter, as is the well-known practice in the art; means for quickly and easily attaching the panels to the typewriter alternately; and means for transmitting manual force applied on a key-head to the mechanism on the typewriter with which that key-head is associated, regardless of the location of the key-head on the panel in relation to the mechanism which it controls, said means for transmission comprising a mechanism which is constructed and arranged to establish physical contact between the key which is located on the panel and the headless key-lever which is embodied in the typewriter in order to depress the key-lever the small amount necessary to activate the type-bar or other function with which it is associated.

5. The combination with an electric typewriter having type-bars and other functional instrumentalities linked with mechanisms which activate and control them when placed in contact with a motor-driven roller by electromagnetic devices which are controlled by means of keys located on a keyboard panel, of separate, detachable, interchangeable panels on varying specifications and designs, in which key-heads are springably mounted for action instead of being mounted on the key-levers attached to the typewriter, which is the well-known practice in the art; means for quickly and easily attaching the panels to the typewriter alternately and means for transmitting manual force applied on a key-head to the mechanism on the typewriter with which that key-head is associated, said means for transmission being capable of establishing electrical connection between the keys and the electro-magnetic devices which they control and constructed in two sections and arranged so as to permit detachment of the keyboard panels from the typewriter in a simple operation which simultaneously parts the sections of all the connections.

**References Cited** in the file of this patent

UNITED STATES PATENTS

2,105,731 Graves et al. ---------- Jan. 18, 1938