W. F. KEMBLE.

KEYBOARD FOR TYPE WRITING OR ANALOGOUS MACHINES.

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1,200,439. Patented Oct. 3, 1916.

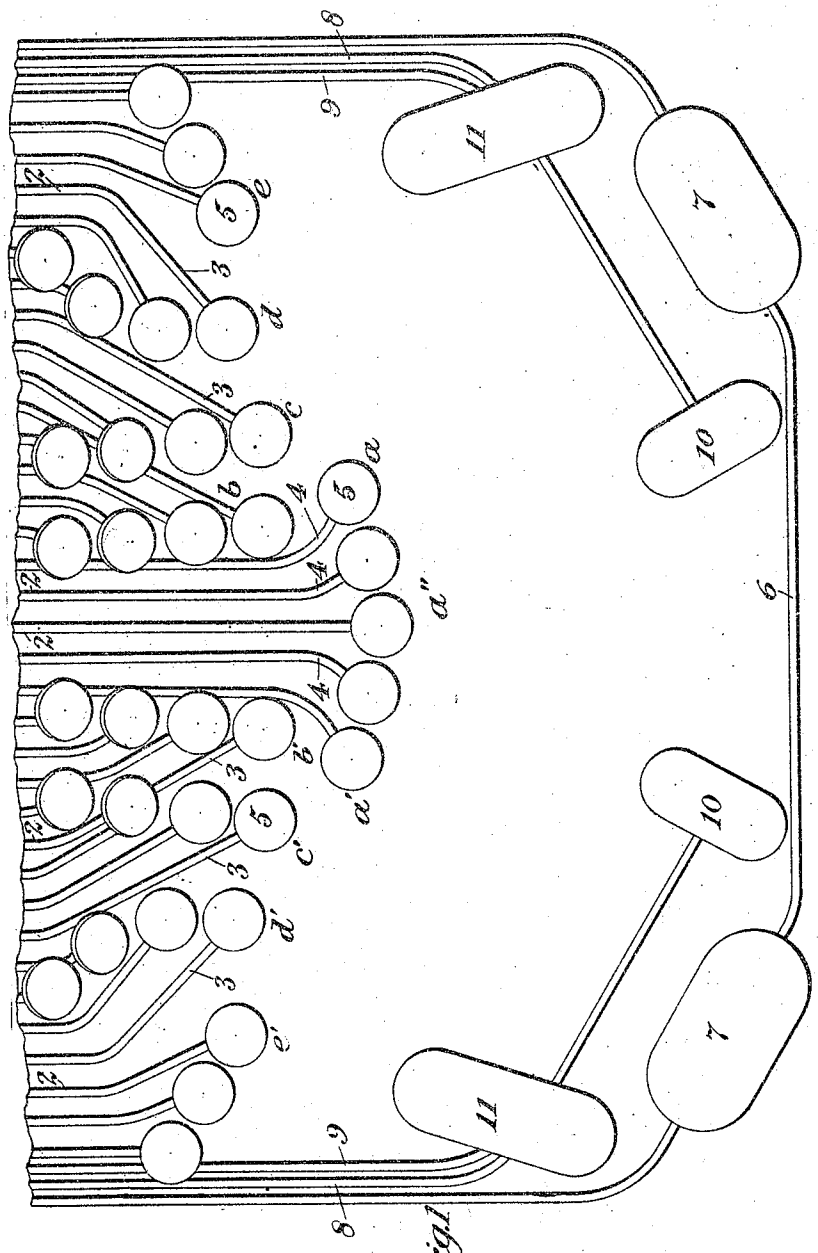


Fig. 1

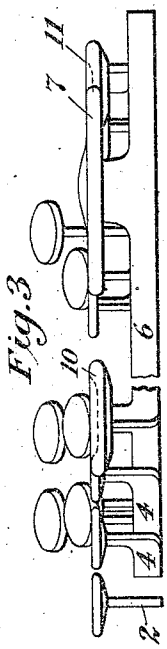


Fig. 3

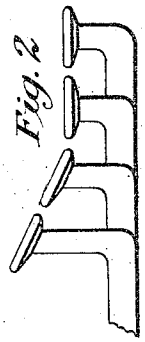


Fig. 2

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KEYBOARD FOR TYPE-WRITING OR ANALOGOUS MACHINES.

1,200,439. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed October 9, 1912. Serial No. 724,713.

To all whom it may concern:

Be it known that I, WILLIAM F. KEMBLE, a citizen of the United States, and a resident of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Keyboards for Type-Writing or Analogous Machines, of which the following is a specification.

This invention relates to a keyboard for typewriting or analogous machines, and the main object of the invention is to provide a key mechanism for machines of this general class in which all of the keys and other parts to be depressed by the fingers of the operator are located in such positions as to permit the depression of the same while the hand as a whole is maintained substantially in a fixed position with respect to the keyboard.

As is well known, the natural movements of the fingers of the hand follow certain definite paths or lines, not all of the fingers moving naturally in the same or similar directions. In order to obtain a keyboard of maximum efficiency—that is, one which will require the minimum of effort on the part of the operator in locating and depressing the keys, etc., to be depressed—these keys, etc., should be located in groups corresponding respectively to the individual fingers to be used in striking such keys. Where all of the fingers of each hand are brought into play and each has a definite portion of the keyboard under its individual control, and the keys so controlled are located in positions corresponding as closely as possible to the natural path of movement of the finger by which they are intended to be struck, the minimum of movement will be required at the keyboard to effect the selection and depression of individual keys.

The keyboard of the present invention is one in which the keys and all other manually controlled parts of the keyboard are so located relatively to one another and to the natural paths of movement followed by the fingers of the hand or hands held in a substantially stationary position with respect to the keyboard, as to eliminate all, or substantially all, unnecessary movement of fingers and hands in manipulating such keys, etc. The preferred construction is one in which a set of keys is divided into a plurality of linear groups running in different directions corresponding substantially to the natural directions of movement of fingers of the hand when the hand is held horizontally in a substantially stationary position, these linear groups corresponding usually to the number of fingers on the two hands and the paths in which the groups of each set operated by either hand are located preferably diverging from the front toward the rear of the keyboard—following the natural direction of movement of most of the fingers of the hand. Where all fingers are used, as is intended in the keyboard preferably employed, some of the groups are disposed in linear paths the general direction of which is lengthwise of the keyboard, while others are disposed in paths having a general direction crosswise of the keyboard, the general direction for the three intermediate fingers of each hand being lengthwise of said keyboard, while for the thumb and the little finger of each hand the general direction is crosswise, this being the natural direction of movement of the thumb and the little finger. The keyboard preferably used is one in which the keys are divided into two sets disposed symmetrically with reference to the longitudinal axis of the keyboard, one set being under the control of one hand and the other of the other hand. Each set also has the keys of some of the groups preferably disposed in different planes, some keys of each such linear group being substantially horizontal, as usual, while others have their surfaces at an angle to the horizontal plane, being inclined upwardly toward the rear of each such group, in order to bring the keys near the back of the keyboard nearer to the center of swing of the operator's finger than would be the case if all were disposed horizontally. In addition to the keys being arranged as just described, the manually operated elements, whether keys, bars, or other similar parts, intended to control the operation of spacing and shift levers, will also preferably be located in such positions as to be readily operated, substantially without change of position of either hand with respect to the keyboard as a whole, the preferred construction being one in which the spacing-lever is operated by one part of the palm of the hand and the shift-lever or levers by another or other parts of said palm.

Other features of the invention not here-

inbefore referred to will be hereinafter described and claimed and are illustrated in the accompanying drawings, in which—

Figure 1 is a plan of a keyboard illustrating so much of a typewriting or analogous machine embodying the present invention as is necessary to understand the same; Fig. 2 is a detail illustrating in side elevation a portion of said keyboard, and Fig. 3 is a detail illustrating in front elevation, with parts broken away, substantially half of said keyboard.

Similar characters designate like parts in all the figures of the drawings.

As the particular construction and mode of operation of the typewriting or other machine to which my improved keyboard is intended to be applied, is of no consequence, all unnecessary elements of such machine have been omitted from the drawings for the sake of clearness. It is to be understood, however, that said keyboard may be applied to any ordinary or suitable type of such machine.

2 designates generally operating levers of the general type ordinarily employed in typewriting machines. The main portions of these operating levers may run in parallel straight lines, as indicated in Fig. 1, and as is usual in standard machines, or they may converge or be grouped in any other desired manner. At their forward ends some of these operating bars will ordinarily be bent laterally, as indicated at 3 and 4, either toward or away from the longitudinal axis of the keyboard. Some of the operating levers may be straight from end to end thereof, as illustrated. Each of the operating levers terminates at its forward end, as is usual, in a key, 5, by means of which the corresponding lever is depressed. The key-levers so constituted may be those of a machine having any desired number of cases, but as illustrated here, the number of keys used corresponds to a three-case machine, each key representing both a capital and a small letter and also a miscellaneous character to be made, or such other combination of three characters as may be desired. It will be understood, of course, that the particular location of the letters, etc., to be struck, while a matter of choice, will preferably be such as will reduce to the minimum the effort required to find or locate keys representing characters most frequently used.

The keys of the keyboard shown are divided substantially into two sets, one for the right hand and one for the left, and each set has a linear group of keys the general direction of which corresponds as closely as possible to the direction of movement of the finger employed to operate the keys of that group; and the lateral spacing of the groups relative to one another is such as to have each group as nearly as possible immediately under the finger by which it is controlled, so that practically no movement of a finger crosswise of its natural path of movement will be required to find a key. In the keyboard illustrated there are five linear groups for each hand and two of these groups have a common element and merge into each other, these being the groups for the thumb, and being located at the center of the front of the keyboard. The other groups, with the exception of those controlled by the little finger, extend substantially lengthwise of the keyboard, the groups intended to be operated by the little fingers being located substantially crosswise of the keyboard and in positions corresponding quite closely to those of the keys intended to be operated by the thumbs. The five groups for the right hand are indicated by a, b, c, d and e, and those for the left hand by a', b', c', d' and e', the central key at the front of the machine, which is indicated by a'', being common to the groups a and a'. The group b is intended to be controlled only by the forefinger of the right hand, the group c only by the second finger, the group d only by the third finger, and the group e only by the little finger of said hand. The groups b', c', d' and e' are correspondingly controlled. The groups a and a' are intended to be controlled only by the right and left thumbs respectively, with the exception of the key a'' common to both groups, which may be controlled by either thumb.

In addition to the keys controlling the writing of letters, etc., the keyboard of such a machine as described ordinarily has spacing and shift-levers, as is well understood. A spacing-lever substantially of well-known type is illustrated at 6, and this carries a suitable manual element or elements, such as a bar or bars 7, intended to be struck by the operator. Two such manual elements or bars are preferably used, one under the control of the right hand and the other under that of the left. Similarly one or more shift-levers, which are or may be of the ordinary type, will be employed. Shift levers for both the second and third case positions are illustrated, the levers 8 representing one of these case positions and the levers 9 the other, and suitable manual elements—keys or bars—are connected to these levers for operating them. The manual elements shown are bars, 10 and 11, and two of each are employed, one under the control of each hand. The principal feature, however, of this part of the keyboard is that each of these manual elements is so located with respect to the keys 5 and with respect to the position the hand is intended to occupy in manipulating the keys, as to be at all times immediately under a portion of the palm of the hand intended to operate it. Here the

spacing lever is intended to be operated by the back part of the ball of the palm of the hand, while the bars 11 are under the control of the right-hand edge of the palm and the bars 10 under the control of the left-hand edge of the palm, these bars being actuated by merely tipping the hand to the right or to the left as required. Correspondingly the element 7 is operated by merely pressing down the back edge of the palm. The two sets, it will be noticed, are disposed symmetrically with the devices of each set converging toward the longitudinal axis of the keyboard, in order that all of them may coöperate properly with the keys 5 from a predetermined substantially fixed position of each hand with respect to the key-board under it.

In addition to the features just described each of the linear groups *b*, *c*, *d* and *b'*, *c'* and *d'*, controlled by the three intermediate fingers of the hands preferably has elements disposed in different planes, the keys in each of these groups located at or near the front edge of the keyboard being in the usual substantially horizontal position of keys of ordinary keyboards, while the keys farther back in each of these linear groups are inclined toward a horizontal plane, the angle of inclination being preferably such as to bring each inclined key face to a point where the finger controlling it will have the minimum distance to move in striking it. Where two or more keys of a single group are inclined for this purpose the general path in which the faces of the keys of the group lie will be one having an upward and rearward inclination from the front of the group, as will be evident by referring to Fig. 2, in which the last inclined key of the group is elevated above the next to the last, but is substantially in a path common to the key faces of all the keys of that group. The same is true of each of the other series or groups controlled by the three intermediate fingers of the hands. Thus by properly disposing the keys of the two main sets in lines following the general directions of the fingers when the fingers are in action, and by disposing the groups controlled by the intermediate fingers of the hands in paths corresponding approximately to the arcs in which the fingers swing, and by suitably relating the miscellaneous keys or bars controlling the spacing and shift-levers, etc., to the positions of the keys of the main sets, all of the manual operations required in typewriting, etc., may be performed with the minimum of movement by the operator, and particularly with the minimum of movement of the hands relative to the keyboard, and a corresponding increase in the efficiency of the operator secured through reduction of the amount of work required of him in accomplishing a given task, or increase in the amount of work turned out in a given time, or as a result of the expenditure of a given amount of energy.

What I claim is:

1. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of a set of keys secured respectively to said operating levers, the keys of said set being divided into a plurality of linear groups running in different directions corresponding substantially to the natural directions of movement of fingers of the hand when the hand is held horizontally in a substantially stationary position the general direction of the groups controlled by the thumb and the little finger being substantially crosswise, and of the groups controlled by the other fingers substantially lengthwise, of the key-board.

2. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of a set of keys secured respectively to said operating levers, the keys of said set being divided into a plurality of linear groups running in different directions corresponding substantially to the natural directions of movement of fingers of the hand when the hand is held horizontally in a substantially stationary position and the keys of the groups controlled by the three intermediate fingers of the hand having their faces in paths the general direction of which is upward toward the rear of the keyboard.

3. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of two sets of keys secured respectively to said operating levers and disposed symmetrically at opposite sides of the longitudinal axis of the keyboard, the keys of each set being divided into a plurality of linear groups running in different directions corresponding substantially to the natural directions of movement of fingers of both hands when the hands are held horizontally and in substantially stationary positions the general directions of the groups controlled by the thumbs and of those controlled by the little fingers being substantially crosswise, and of the groups controlled by the other fingers of each hand substantially lengthwise, of the keyboard.

4. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of two sets of keys secured respectively to said operating levers and disposed symmetrically at opposite sides of the longitudinal axis of the keyboard, the keys of each set being divided into a plurality of linear groups running in different directions corresponding substantially to the natural di-

rections of movement of fingers of both hands when the hands are held horizontally and in substantially stationary positions and the keys of those groups of each set which are controlled by the three intermediate fingers of the corresponding hands having their faces in paths the general direction of which is upward toward the rear of the keyboard.

5. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of a set of keys secured respectively to said operating levers, the keys of said set being divided into a plurality of linear groups running in different directions some diverging rapidly corresponding substantially to the natural directions of movement of fingers of the hand when the hand is held horizontally in a substantially stationary position, and a spacing-lever having a bar distant from the longitudinal center of the keyboard, and in position to be operated by the palm of the hand.

6. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of a set of keys secured respectively to said operating levers, the keys of said set being divided into a plurality of linear groups running in different directions corresponding substantially to the natural directions of movement of fingers of the hand when the hand is held horizontally in a substantially stationary position, and a spacing-lever and a shift-lever having bars in position to be operated respectively by different portions of the palm of the hand.

7. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of a set of keys secured respectively to said operating levers, the keys of said set being divided into a plurality of linear groups running in different directions corresponding substantially to the natural directions of movement of fingers of the hand when the hand is held horizontally in a substantially stationary position, and a spacing-lever and a pair of differential shift-levers having bars in position to be operated respectively by the back and both sides of the palm of the hand.

8. In a keyboard of the class described, the combination with a plurality of operating levers running in one general direction, of two sets of keys secured respectively to said operating levers and disposed symmetrically at opposite sides of the longitudinal axis of the keyboard, the keys of each set being divided into a plurality of linear groups running in different directions corresponding substantially to the natural directions of movement of fingers of both hands when the hands are held horizontally and in substantially stationary positions, a spacing-lever, differential shift-levers, and two sets of operating bars for said levers said sets being disposed symmetrically at opposite sides of the longitudinal axis of the keyboard and all of said bars being inclined toward said axis.

Signed at New York in the county of New York and State of New York this 4th day of October, A. D. 1912.

WILLIAM F. KEMBLE.

Witnesses:
ANNE C. BARNES,
C. S. CHAMPION.