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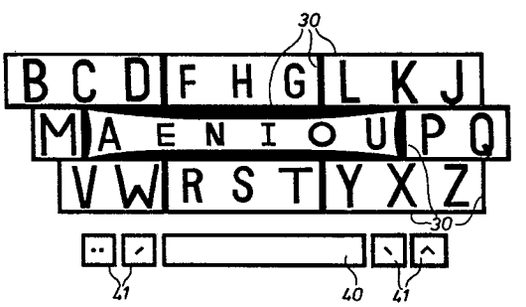
(54) Character keyboards.

(57) A keyboard suitable for a typewriter, word processor, computer terminal and the like consists of an array of keys corresponding to the characters of an alphabet arranged in distinct adjacent zones (11 to 19). The zones (11 to 19) may be delineated by boundaries (21, 22 or 30) or may be intrinsically defined by the nature of the characters they contain. The zones (11 to 19) are arranged in rows. The vowel characters of the alphabet are located in one or more adjacent zones (15) which are not in the top or bottom rows and which do not extend to either lateral extreme of the array.

Peripheral characters or keys are preferably larger than central characters or keys and the characters in each zone, in the top row and in the bottom row are preferably alphabetically related.

The keyboard is faster to use than a Qwerty layout for an untrained operator and results in fewer errors, and touch-typing is faster to learn on the keyboard.



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CHARACTER KEYBOARDS

This invention relates to keyboards, typically but not exclusively of the kind used in connection with typewriter and other word handling or processing machines, where keys correspond to the characters of an alphabet, for example the 26 letters of the alphabet used in the English language, and an operator touches, depresses or otherwise actuates a key to enter the corresponding character into the machine. The invention is specifically concerned with the layout of the characters in the keyboard.

The conventional typewriter keyboard, referred to herein as the Qwerty layout, is normally acceptable for trained touch-typists although it possesses characteristics which do not facilitate the activity of touch-typing. Furthermore the Qwerty layout is not well suited for use by people who are untrained in touch-typing, and who therefore have to search for the location of each character before they can actuate the key. Alternative layouts have from time to time been proposed which are claimed to be superior to Qwerty for touch-typing purposes but little effort has been made to design a keyboard which is well-suited to the untrained user.

The present invention aims to provide a keyboard which is designed equally for use by the touch-typist and by the untrained person. The keyboard described herein has been shown, for the untrained user, to produce a gain in speed of 20% over the Qwerty keyboard, and to produce a simultaneous reduction in error rate of 32% compared with Qwerty. When those errors of which the untrained user is unaware are separately counted, the keyboard described herein has been shown to produce a reduction in error rate of 65% compared with Qwerty. It has also been demonstrated that touch-typists previously trained on Qwerty can be re-trained to touch-type on the keyboard described herein to speeds in excess of 30 words per minute with an error tolerance of 1 error per 30 words after 15-18 hours of use, and to speeds in excess of 45 words per minute after 30 hours of use, with the same error tolerance of 1 error per 30 words. The keyboard of the invention is designed to provide top touch-typing speeds at least equal to those achieved with Qwerty.

The present invention also aims to provide a keyboard which has been designed in such a way that it can be fully key-centre to key-centre compatible with the Qwerty layout, such that it can be provided as a user-selectable option to Qwerty on any equipment containing a keyboard in which the signals corresponding to key actuation are transmitted to a computer, or on any equipment containing a keyboard in which key actuation controls a replaceable type unit such as a daisy-wheel or a golf ball.

The present invention provides a keyboard comprising an array of keys each identified by a corresponding character of an alphabet including vowels, wherein the array comprises a plurality of distinct adjacent zones each containing a group of characters, the zones are arranged in a plurality of rows, and the vowels in the alphabet are located in one or more adjacent zones which are in neither the top row nor the bottom row and which do not extend to either lateral extreme of the array.

References herein to the top row and to the bottom row are to be understood as relating to the keyboard layout as would be shown in a two-dimensional representation, such as a schematic drawing, seen from the point of view of the operator. Other directional terms are to be construed accordingly.

Each character in the array may be located on a physical key which can be operated by movement, pressure, touch or in any other way to signify the selection of that character. Alternatively, the characters in the array need not each be associated with a conventional physical key as such, but may merely identify a local region in which selection of that character can be signified by a suitable action on the part of the operator. The term "keyboard" as used herein is thus not intended to be limited to an array of traditional keys corresponding to the characters of the alphabet, but extends to any device which, on activation of successive selected ones of individual locations corresponding to the characters, can give rise to corresponding successive outputs denoting the characters selected.

Similarly the term "key" as used herein is not limited to a physical key but extends to such local regions or individual locations in which specific characters can be activated. Given a suitable keyboard technology, a key may accordingly be merely a surface or a region of space immediately above or in front of or otherwise directly associated with the corresponding character. The characters in the array serve to identify the locations of the corresponding keys.

The zones in the keyboard may be defined physically, and/or intrinsically by the groups of characters within the zones. Thus in the former case the zones may be delineated by visible or tangible boundaries which contrast with any boundaries between characters or between keys within each zone and which are readily apparent to a keyboard operator. In the latter case, the individual zones may be made up of letters which are related, for example, by occurring consecutively in the alphabet, as in the case of zones made up by the letters BCD, FHG or LKJ (it not being necessary that the letters occur in the zone in alphabetical order); or a zone may be made up exclusively of vowels or may be bounded by vowels.

Visible delineation of zones, for example by the use of distinct boundary lines or by differently colouring adjacent zones or the characters within adjacent zones, is preferred in the case of a keyboard to be used by an untrained operater, i.e. an operator who relies to some extent on visual searching to locate a character.

It is not necessary that each zone be the same height or size, or that the height or size of a row be constant. A zone may for example correspond to the height of two rows, especially at the extreme left or right hand end of the rows.

Some letters, such as Y in the English language may occasionally be used as vowels. Such letters may optionally be considered to be vowels and may be included in the zone or zones containing the vowel characters. Other characters which are wholly consonants may also be present in the vowel zone or zones.

The number of characters in each zone is preferably from 1 to 5 or 6, and preferably the majority of zones contain 3 to 5 characters.

The preferred number of rows of zones is from 3 to 5, and is most preferably 3 or 4. Each row preferably contains from 1 to 3 zones.

The location of the characters and keys in each zone need not be at the same horizontal level, but it is preferred that no two characters or their corresponding keys in the same zone should be vertically aligned.

In order that the keyboard should be suitable for use by both trained and untrained persons, the characters which are to be present within each zone and the overall arrangement of the zones must be determined on the basis of a favourable compromise between the following features.

It is advantageous that characters and keys with relatively high frequency of use should be located close to the centre of the keyboard.

It is advantageous that the characters and keys contained

within each zone should be made up of characters which occur together in the alphabet or of characters such as vowels which have familiarity as an alphabetic subset. The group(s) of characters made up by the vowels are likely to be those most frequently used, and so to be at the centre of the keyboard. It is also desirable that in at least some of the zones the characters of the group appear in the same order as they occur in the alphabet. Furthermore, it is advantageous if the array of characters constitutung the keyboard is as a whole related to the usual order of the alphabet being used, and it is accordingly preferred that all the character keys in the top row of zones correspond to characters in the first half of the alphabet, and all the character keys in the bottom row of zones correspond to the characters in the second half of the alphabet. It is likewise preferred that in each row of zones, in the case where the characters of each group are found together in the alphabet, the sequence of groups is itself in alphabetical order. The order or sequence of characters in a row is taken from left to right in the case of the characters of an alphabet that is used for writing and reading from left to right, and from right to left in the case of the characters of an alphabet that is used for writing and reading from right to left.

It is advantageous that pairs of characters or keys in frequent successive use (such as TH and HE from the word THE in the English language) should be located close to each other. Nevertheless, it is preferred that such pairs of characters should be located on keys which are not allocated to the same finger for touch-typing purposes.

It is preferred that visually confusable characters such as M and N, T and I, P and R, are not located on adjacent keys.

It is advantageous for the keys and/or the character identifications for the keys to be in a range of sizes that increase with distance from the central zone or zones. Similarly, keys and/or character identifications for keys within a zone may increase in size with distance from the centre of the array. It has been found that by increasing the size of the surrounding keys and/or character identifications, the untrained operator's visual search for characters on outlying keys can be facilitated.

It is advantageous that the keys allocated as "home keys" for touch-typing purposes should represent a substantial proportion of the total frequency of use (preferably not less than 40%). It is advantageous that the keys allocated to the index and adjacent finger of each hand for touch-typing purposes should represent an even greater proportion of the total frequency of use (preferably not less than 70%)

It is also advantageous that the keys allocated to the little finger of each hand together with the keys other than the home keys allocated to the finger adjacent to the little finger of each hand should represent a low proportion of the total frequency of use (preferably not more than 15%).

The construction of the keyboard itself is not

considered to be critical. Thus it may be of any kind capable of transmitting information which is distinctive of the character being selected to the remainder of the machine to be operated from the keyboard. Where the keyboard is part of a simple typewriter, the information may directly result in hard copy on paper; where it is part of electronic data processing apparatus such as a computer terminal, word processor, print composition machine, or the like, the information may be stored electronically in the machine, or may be presented on a visual display, or may be electronically communicated to another machine, or may result in hard copy. Other possibilities include the keyboard as part of a communicating machine for use by physically or mentally handicapped persons, in which case the information may result in a visual or auditory signal in addition to any of the other results described above.

Suitable keyboard constructions include those conventionally used for typewriters, and electronic data processing apparatus such as computer terminals, print-composition machines and the like, either with or without moving parts, where a character can be selected by pressure, touch, heat or electrical capacitance from the operator's fingers. Other possible constructions may be based on the projection of the array of characters on a screen, for example on a video display unit; selection of a character and actuation of the corresponding key, in the broad sense as used herein, may then be made by means of a light pen, or by touching a sensitized screen or screen overlay, or by breaking an infra-red or other cross-beam projected across the front of the screen. The keyboard may even be of the kind used by the

disabled by blowing through a straw, operating a lever, or otherwise accessing a suitably sensitized location of the selected character in the array.

The keys may be identified by representations of the corresponding characters either on or adjacent to each key. Alternatively, each key may be given the shape of the corresponding character, so that the sensitized region is defined by the combination of the shape and the extent of the representation of the character in the array.

The physical separation of adjacent zones may be by any means that is readily apparent to the operator, such as a printed line, a groove or slot, raised beading or increased spacing between characters or keys. It is preferred that any increased spacing be small, in order to avoid fragmentation of the array; it is desirable that all the characters of the alphabet should be contained in a single continuous array.

The invention is illustrated by way of example in the accompanying drawings, in which Figure 1 shows a keyboard made up of an array of 26 keys corresponding to the Roman alphabet used, e.g., in Western European languages such as English, and Figures 2 and 3 show corresponding arrays positioned such that the centre of each character can correspond substantially to the centres of the keys as typically found on the keyboard of a standard typewriter, computer terminal or the like. This ensures that the keyboard of the invention can be used as an optional alternative in any device possessing a standard keyboard arrangement.

In the keyboard shown in Figure 1, each key is formed in the shape of the letter to which it corresponds, and is touch

sensitive. Electrical circuitry of a known kind generates a signal when a key is touched by an operator and the signal, which is indicative of the key that has been actuated, is fed by means of output leads to, for example, a remote printer (not shown).

The letters shown on the keyboard, which are themselves the keys, are grouped into zones, in rows. The top row consists of a left hand zone 11, containing the group of keys B, C, and D; a central zone 12, containing the group of keys F, H, and G, and a right hand zone 13, containing the group of keys L, K and J.

The second row consists of a left hand zone 14, containing a group consisting of the single key M; a central zone 15 containing the five vowels A, E, I, O and U and also the key N between E and I; and a right hand zone 16 containing the group of keys P and Q.

The third and final row consists of a left hand zone 17 containing the group of keys V and W; a central zone 18 containing the group of keys R, S, and T; and a right hand zone 19 containing the group of keys Y, X and Z.

The letters and accordingly also the keys, are of various sizes. The smallest are N and I at the centre of the vowel zone 15, and the others are progressively larger with distance from the centre of the array.

The zones are separated by clearly marked lines. The central vowel zone 15 is entirely surrounded by line 21, which approximates to a rectangle and which separates the zone from the surrounding zones 11,12,13,14,16,17,18 and 19. These latter zones are in turn separated one from another by essentially

radial lines 22 extending outwardly from the vowel zone boundary line 21.

All zones except the vowel zone 15 contain exclusively letters which are related by their occurring consecutively in the alphabet. If the letter N were to be relocated with the letter M in the zone 14, all zones without exception would contain only related letters; such an arrangement would however have the disadvantage that M and N are among the pairs of letters which are somewhat similar in appearance and therefore tend to be confused at a quick glance, and consequently there would be an increased risk of operator error in this respect. Furthermore N is a frequently used letter in English and other European languages and must be centrally located to achieve the objectives described earlier. However, N is slightly emboldened to make it more salient at its central "out of alphabetical order" position. The letters of the other more readily confusable pairs of letters, such as P and R and T and I, are also each separated into different zones. The confusable letters V and W remain adjacent but the typeface of the W is amended to provide a low centre peak (Fig. 3) and thus to distinguish the character more clearly from the V.

By the use of keys corresponding to the outlines of the letters, there are no other lines separating the keys which might conflict visually with the lines 21, 22 delineating the zones and thereby interfering with the operator's concept of the zones.

The normal alphabetical arrangements of the letters in the groups F, H, G; L, K, J; Y, X, Z are altered so that the letters in each group most frequently used in normal English

(H, L and Y respectively) is closest to the centre of the array and thus more likely to be quickly located by an operator concentrating on the central vowel zone. The most central keys namely, A, E, N, I, O and U in the vowel zone 15, R, S and T in the central third row zone and H in the central top row zone, together account for 70% of all character usage in normal English, based on frequency of use.

The keyboard illustrated in Figure 1 is suitable for one or two handed operation by an operator relying on visual searching to locate desired characters and is intended to facilitate learning character locations. It is also suitable for progression towards touch-typing using the usual four fingers on each hand for alphabetical character key actuation.

The version of the keyboard shown in Figure 2 permits its production by conversion of an existing Qwerty keyboard, or by a similar manufacturing process. It also permits the offering of the keyboard of the invention as a standard option to Qwerty in any situation when the decoding of the key signals is under software control. The heavy lines 28 shown in Figure 2 are not present on the keyboard itself but merely serve in the drawing to denote the eight lateral divisions of the keyboard for the purpose of eight-finger touch-typing, each division defining the keys allocated to one particular finger. The alphabetic relations of the characters in the Figure 2 array are all as described in the keyboard of Figure 1.

Where the keyboard comprises separate movable keys for touch-typing purposes, it is preferred that the individual keys or areas between the keys should be appropriately marked

with lines and borders to produce the effect of zone demarcation and that peripheral character sizes should be increased. This makes the keyboard equally suitable for the untrained user. It is also preferred that the natural dividing lines between separate keys should not be prominent unless these correspond to the zone demarcation lines. This can best be achieved by the provision of dark-coloured keys on a dark background with light coloured lettering and zone demarcation. Where the spacing between key-centres is held constant, the extent to which peripheral characters can be increased in size is dependent upon the physical size of the top of the key. Relatively large key tops are, therefore, preferred.

In the Figure 2 keyboard the letters are marked on adjacent generally square keys 29, which are preferably contoured to assist positive and accurate finger placement, on an otherwise conventional typewriter keyboard. Twenty five of the twenty six Qwerty letter keys are retained as letter keys, although with changed significations; the P key in the top row of the Qwerty layout is however ommitted and is replaced by a new letter key for Z to the immediate right of the Qwerty M key on the bottom row. The keyboard may be thus simply converted or made on existing manufacturing machinery without the need for expensive retooling, since there is normally an existing non-letter key, such as a punctuation mark,where the Z key is to be introduced.

The four central touch-typing divisions defined by the lines 28 in Figure 2 correspond to the keys operated by the first two fingers of each hand, normally the strongest fingers.

Based on normal English character frequency, this keyboard allows approximately 80% of all character usage to be assigned to these four fingers.

The keyboard shown in Figure 3 is also a typewriter keyboard with the same layout of alphabetic character keys as that shown in Figure 2. The keys are similar to the keys 29 of Figure 2 in size and shape, although the divisions between the keys are omitted from Figure 3 for clarity.

The sole distinction from the Figure 2 keyboard is that the keys in the Figure 3 keyboard are marked with their corresponding characters in different sizes and the zones are visibly separated by boundaries 30 marked on the appropriate edges of the keys, the zone boundary markings being broader than the boundaries between keys within each zone.

The zone boundary markings 30 are broadest towards the centre of the keyboard array, reducing the unmarked areas of the keys at the centre relative to the unmarked areas of the keys further from the centre. The character markings vary in size correspondingly, thus creating the appearance of an increase in key size from the centre of the keyboard outwards on a typewriter keyboard on which the keys are in fact the same size. Thus the arrangement shown in Figure 3 is a preferred arrangement for any keyboard which is to be utilized by both untrained users and trained touch-typists. As already indicated above the arrangement preferably involves the reversal of the light and dark areas shown in the drawing so that the keys themselves are dark coloured and the character markings and zone boundary markings are light coloured. In this way the spaces between the keys are render-

ed less obvious and so detract as little as possible from the zone boundary markings.

For use of a keyboard according to the invention with electronic data processing apparatus, as in a word processor, electronic work-station, computer terminal, or print composition machine, the machine can include a program which enables the operator to select either a Qwerty (or other) keyboard layout or an alternative layout such as that shown in Figures 2 and 3. The keys on the keyboard may carry dual character identifications corresponding to the two layout options, or replaceable alternatively marked keys or supplementary key covers may be provided wherein one set corresponds to the Qwerty or other layout and one to the layout of a keyboard of this invention.

Similar alternative key markings may also be provided for use on typewriters with easily replaceable typing heads, such as those using so-called golf-ball or daisy-wheel typing heads. A typewriter with a Qwerty or other given keyboard may be simply converted to operate with a keyboard of this invention by the use of a set of key markings to be applied to the existing keys, and a corresponding typing head. Suitable key markings will include character markings and may include zone boundary markings. The set of markings may be in the forms of, for example, key caps or covers or printed self-adhesive film.

Where the key layout is displayed on a touch display of one of the various types mentioned earlier, it is only necessary to arrange that either the Qwerty layout or a layout of this invention can be optionally displayed depending

upon a user-selectable switch or equivalent instruction.

It has been found that for inexperienced users using one or two fingers only, the keyboards shown in the drawings significantly reduce time and simultaneously reduce error, especially undetected error, when compared with the Qwerty layout. The keyboards of the invention also facilitate a gradual progression by an inexperienced user into a manner of operation closely resembling touch-typing, and it is anticipated that touch-typists trained on these keyboards will learn faster and attain maximum speeds at least as fast as touch-typists trained on a Qwerty keyboard.

The keyboards of the present invention are applicable to all or most languages using a Roman type alphabet, e.g., to all or most Western European languages, since the frequency of use of the different letters of the alphabet tends to follow a similar pattern. This is illustrated in the following Table I wherein a comparison is made between the average frequency of use of the different letters of the alphabet per 1000 characters in the English and French languages, the letters being taken in the order in which they appear in the rows shown in the drawings beginning at the left-hand end of the top row.

TABLE I

Average Usage per 1000 Characters

Letter	English	French
B	16	6
C	32	37
D	37	34
F	23	22
H	51	5
G	16	13
L	40	62
K	5	1
J	0	2
M	23	28
A	81	82
E	123	163
N	72	77
I	72	75
O	80	59
U	31	66
P	23	38
Q	2	16
V	9	11
W	20	0
R	60	61
S	66	79
T	96	65
Y	19	4
X	2	2
Z	1	0

For languages such as French or German which make use of accents the keyboard of the present invention may include suitable accent keys. Such accent keys may be provided on additional keys at the ends of the rows shown in the drawings or in an additional row, e.g., in a fourth row above the top row shown in the drawings. However, according to a preferred embodiment of the invention as illustrated in Figure 3, the normal space bar 40 is made somewhat shorter than is usual and additional accent keys 41 are provided at either end thereof. Thus, in the illustrated embodiment, four accent keys 41 are provided, namely umlaut, acute, grave and circumflex, which like the space bar 40 are positioned so that

they can be actuated by the thumbs of the operator. This arrangement is thought to be preferable mainly because on a standard keyboard the thumbs are used only for the space bar and thus tend to be very much under-used as compared with the fingers. To enable the required accent to be associated with a required letter the accent keys 41 may be such that when actuated the selected accent will be printed or otherwise displayed or recorded but will not initiate indexing along to the next space. Thus when an accent key 41 is actuated and then a selected letter key, the accent and the selected letter will be properly associated and indexing along to the next space will only take place after actuation of the letter key. Alternatively, where the keyboard is logic controlled, e.g., is associated with a suitable computer, the arrangement may be such that a selected letter and a selected accent to be associated therewith can be keyed-in in predetermined or random order and the key signals combined to produce a single accented character.

A further advantage of the illustrated keyboard of the present invention, as compared with known keyboards such as Qwerty, which assists both the trained and the untrained user is that the bulk of the workload when touch-typing based on average character usage is on the "home" keys and the other keys which are actuated by the first two fingers on each hand (the "home" keys in the illustrated keyboard being the four keys at each end of the middle row, i.e., the keys for the letters M,A,E,N, for the left hand and O,U,P,Q, for the right hand) so that the workload on the weak fourth or "little" finger of each hand and at the "weaker positions",

i.e., the little finger on each hand and the third finger on each hand away from the home keys, is reduced to a minimum. This is clearly illustrated in Table 2 which shows the percentage workload, based on average character usage, on various keys and fingers for both the English and the French languages.

TABLE 2

	English	French
Workload on home keys	44%	53%
Workload on home keys plus other keys on first or index finger	84%	84%
Workload on first two fingers of each hand	81%	78%
Workload on fourth or "little" fingers	5%	6%
Workload at weaker positions	9%	10%

This concentration of the workload on the home keys and on the stronger fingers not only assists trained touch-typists but is also of assistance to those being trained as touch-typists since such trainees will only have to use their weaker third and fourth fingers a minimum amount. The concentration of the workload on the stronger fingers is also of great help to untrained users who tend to use only their first or their first and second fingers.

Claims:-

1. A keyboard comprising an array of keys each identified by a corresponding character of an alphabet including vowels, characterised in that the array comprises a plurality of distinct adjacent zones (11 to 19) each containing a group of characters, the zones (11 to 19) are arranged in a plurality of rows, and the vowels in the alphabet are located in one or more adjacent zones (15) which are in neither the top row nor the bottom row and which do not extend to either lateral extreme of the array.

2. A keyboard as claimed in claim 1, characterised in that the zones (11 to 19) are delineated by visible or tangible boundaries (21,22 or 30) which are distinct from any boundaries between characters or between keys within each zone.

3. A keyboard as claimed in claim 1 or 2, characterised in that the zones (11 to 19) are separated by visible boundaries (21,22 or 30) that are more prominent than any visible boundaries between keys within each zone.

4. A keyboard as claimed in claim 2 or 3, wherein adjacent zones are distinguished by colour.

5. A keyboard as claimed in any one of the preceding claims, characterised in that the keys and/or the character identifications for the keys are in a range of sizes that increase with distance from the central zone or zones (15).

6. A keyboard as claimed in any one of the preceding claims, characterised in that keys and/or character identifications for keys within a zone (11 to 19) increase in size with distance from the centre of the array.

7. A keyboard as claimed in any one of the preceding

claims, characterised in that the number of characters in each zone (11 to 19) is from 1 to 6.

8. A keyboard as claimed in any one of the preceding claims, characterised in that the majority of zones (11 to 19) contain 3 to 5 characters each.

9. A keyboard as claimed in any one of the preceding claims, characterised in that there are 3 or 4 rows of zones (11 to 19).

10. A keyboard as claimed in any one of the preceding claims, characterised in that each row contains from 1 to 3 zones (11 to 19).

11. A keyboard as claimed in any one of the preceding claims, characterised in that no two characters or their corresponding keys in the same zone (11 to 19) are vertically aligned.

12. A keyboard as claimed in any one of the preceding claims, characterised in that the characters contained within each zone (11 to 19) other than any zone (15) containing vowel characters are made up of characters which occur together in the alphabet.

13. A keyboard as claimed in claim 12, characterised in that in at least some of the zones (11 to 19) the characters appear in the same order as they occur in the alphabet.

14. A keyboard as claimed in claim 12 or 13, characterised in that in each row of zones (11 to 19) in which the characters of each zone occur together in the alphabet, the sequence of zones is in alphabetical order.

15. A keyboard as claimed in any one of the preceding

claims, characterised in that all the characters in the top row of zones (11,12,13) occur in the first half of the alphabet and all the characters in the bottom row of zones (17,18,19) occur in the second half of the alphabet.

16. A keyboard as claimed in any one of the preceding claims, characterised in that the characters are the 26 letters of the alphabet as used in the English language.

17. A keyboard as claimed in any one of the preceding claims, characterised in that the positions of the characters on the keyboard are related to the frequency of use of the different characters.

18. A keyboard according to claim 17, characterised in that at least the majority of the most frequently used characters are in a central region of the keyboard.

19. A keyboard as claimed in any one of the preceding claims, characterised in that each key is in the shape of the corresponding character.

20. A keyboard as claimed in any one of the preceding claims, characterised in that it includes at least one accent key (41).

21. A keyboard according to claim 20, characterised in that said at least one accent key (41) is arranged for activation by a thumb of the user.

22. A typewriter having a keyboard, characterised in comprising an array of keys each identified by a corresponding character of an alphabet including vowels, wherein the array comprises a plurality of distinct adjacent zones (11 to 19) each containing a group of characters, the zones (11 to 19) are arranged in a plurality of rows, and the vowels in the alphabet

are located in one or more adjacent zones (15) which are in neither the top nor the bottom row and which do not extend to either lateral extreme of the array.

23. Electronic data processing apparatus having a keyboard, characterised in comprising an array of keys each identified by a corresponding character of an alphabet, including vowels, wherein the array comprises a plurality of distinct adjacent zones (11 to 19) each containing a group of characters, the zones (11 to 19) are arranged in a plurality of rows, and the vowels in the alphabet are located in one or more adjacent zones (15) which are in neither the top row nor the bottom row and which do not extend to either lateral extreme of the array.

24. Apparatus according to claim 23 when programmed or arranged so that the keyboard can optionally be used as a Qwerty keyboard.

25. A conversion kit for converting a typewriter having a replaceable typing head and a given keyboard to the use of an alternative keyboard comprising an array of keys each identified by a corresponding character of an alphabet including vowels, characterised in that the array comprises a plurality of distinct adjacent zones (11 to 19) each containing a group of characters, the zones are arranged in a plurality of rows, and the vowels in the alphabet are located in one or more adjacent zones which are neither in the top row nor the bottom row and which do not extend to either lateral extreme of the array, the kit comprising a set of markings including character markings and optionally zone boundary markings adapted to be applied to the keys of a given keyboard to convert it to a said alternative keyboard, and

a typing head corresponding to the converted keyboard adapted to replace the typing head corresponding to the given keyboard.

26. A keyboard as claimed in any one of the preceding claims, characterised in that most pairs of characters in which one member of the pair must frequently be actuated following the other member of the pair are in close physical proximity.

27. A keyboard as claimed in any one of the preceding claims, characterised in that most pairs of characters in which one member of the pair must frequently be actuated, following the other member of the pair, are not located on keys allocated to the same finger for touch-typing purposes.

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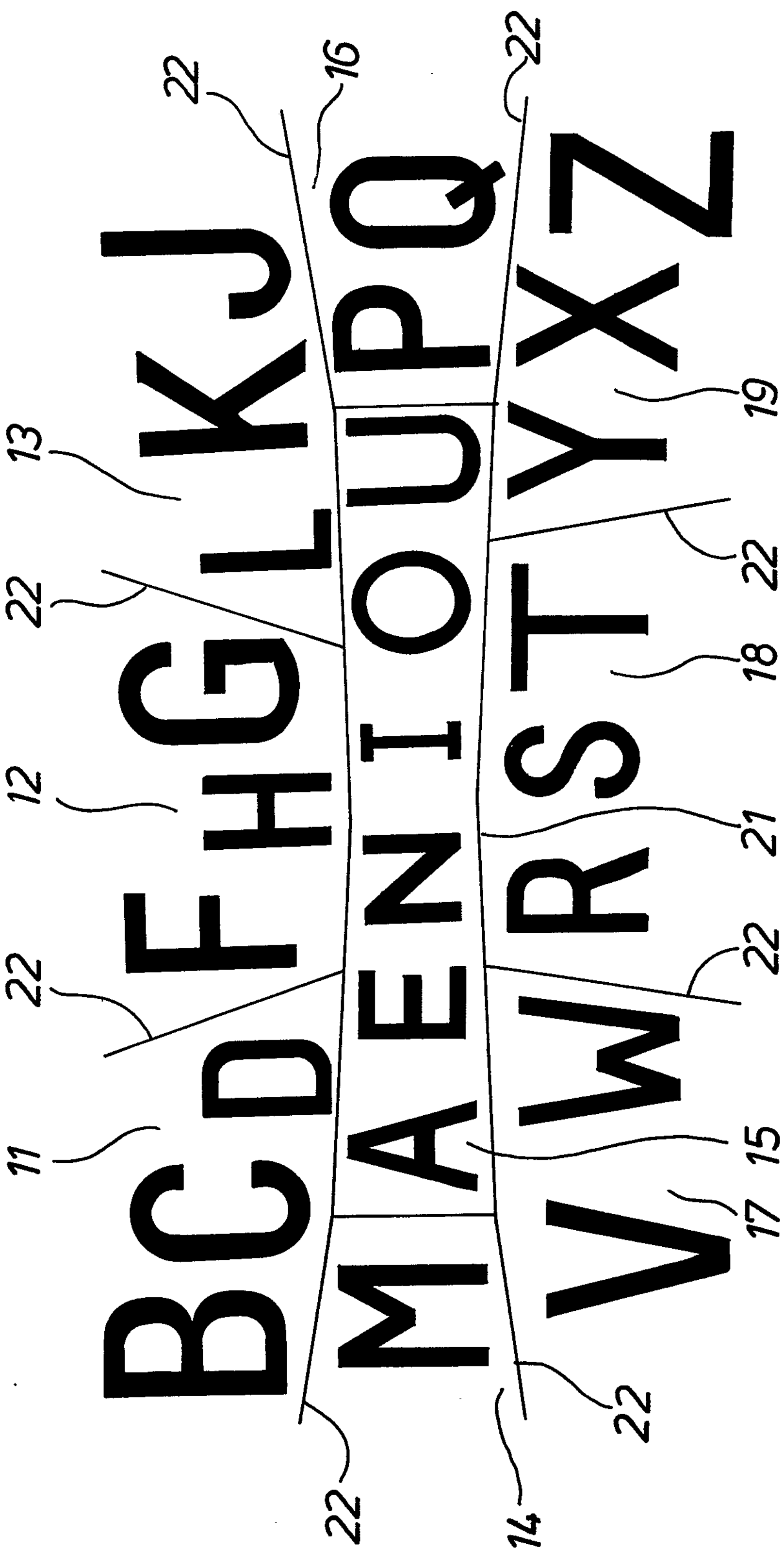

FIG. 1

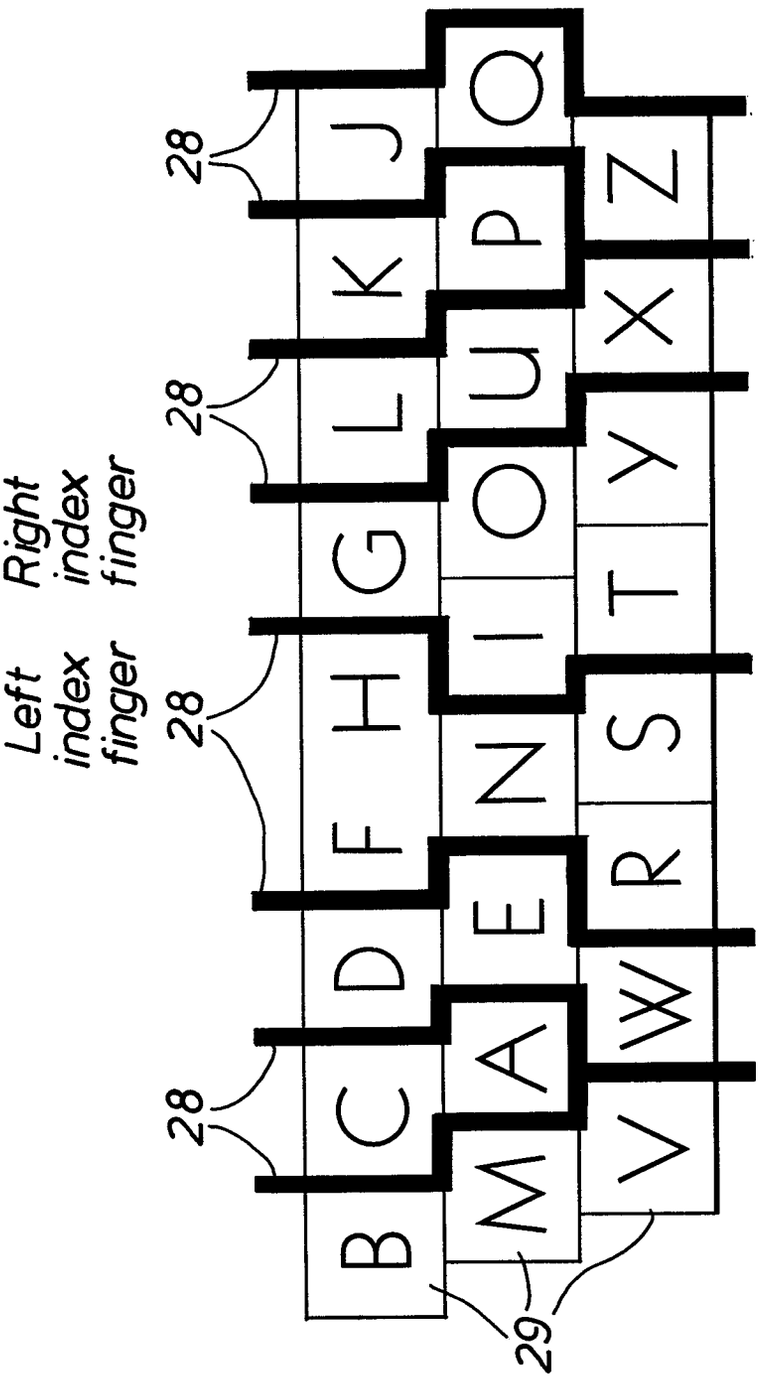
Left index finger
Right index finger
28
28
28
28
B C D F H G L K J Q
M A E N I O U P Y X Z
V W R S T Y
29

FIG.2

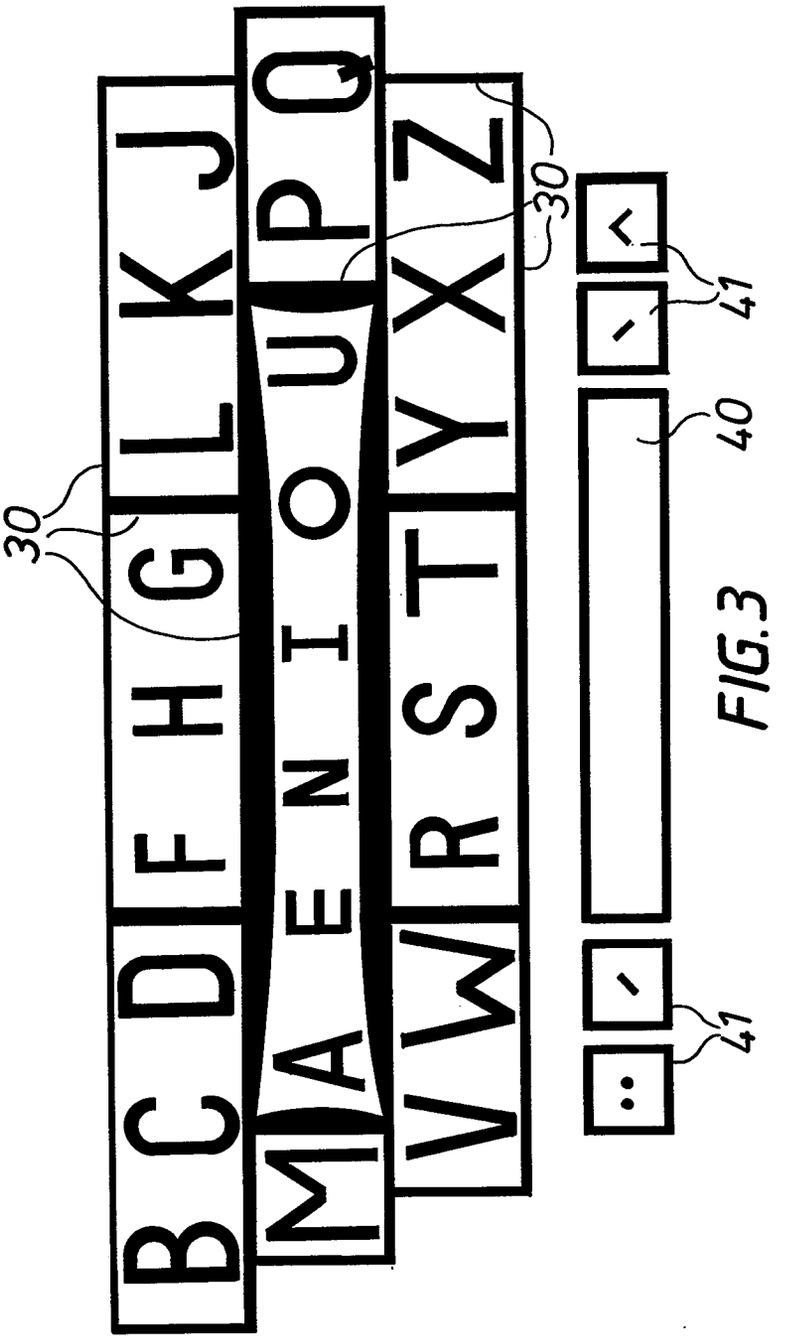

FIG.3