United States Patent [19]

McGunnigle

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[45] **Date of Patent: Dec. 29, 1987**

[54] **PROCESS FOR DETERMINING OPTIMUM KEYBOARD FORMATS FOR A GIVEN LANGUAGE**

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[73] Assignee: **FWM Enterprises, Inc.**, Somers, N.Y. ; a part interest

[21] Appl. No.: **833,811**

[22] Filed: **Apr. 9, 1986**

Related U.S. Application Data

[60] Division of Ser. No. 676,610, Dec. 3, 1984, Pat. No. 4,613,247, which is a continuation of Ser. No. 401,913, Jul. 26, 1982, abandoned.

[51] **Int. Cl.**[4] **B41J 5/10**

[52] **U.S. Cl.** **400/484**; 400/486

[58] **Field of Search** 400/486, 484, 489

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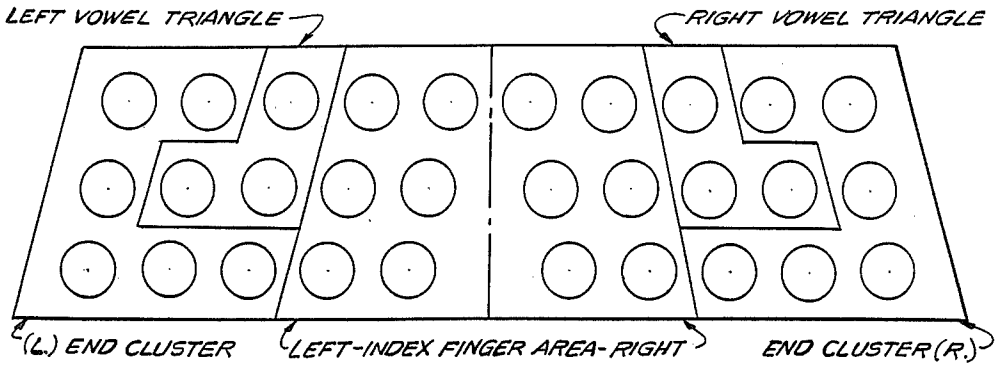
Primary Examiner—William Pieprz

Attorney, Agent, or Firm—Leo Zucker

[57] **ABSTRACT**

A keyboard arrangement suitable for use in typewriters, word processors, computer terminals and the like includes a number of manually actuable key members supported in a given array. Different letter formats can be selected for those key members corresponding to letter characters, wherein each of the letter chracter key members is made to correspond to a selected one of at least two different letters. Accordingly, a user can select, for example, either the conventional typewriter letter format or a new format wherein letters are assigned to the key members according to the frequency of use of the letters in a given language and the relative ease of accessibility of each key member to the fingers of the user's hands. In one embodiment, the key members in the left-hand portion of the keyboard array are arranged in columns which slope downwardly toward the left side of the array, and the key members in the right hand portion of the array form columns which slope downwardly toward the right side of the array.

16 Claims, 26 Drawing Figures



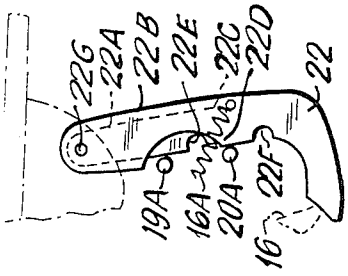

22G
22A
22B
22E
22C
22D
22
19A
16A
20A
22F
16

FIG. 2

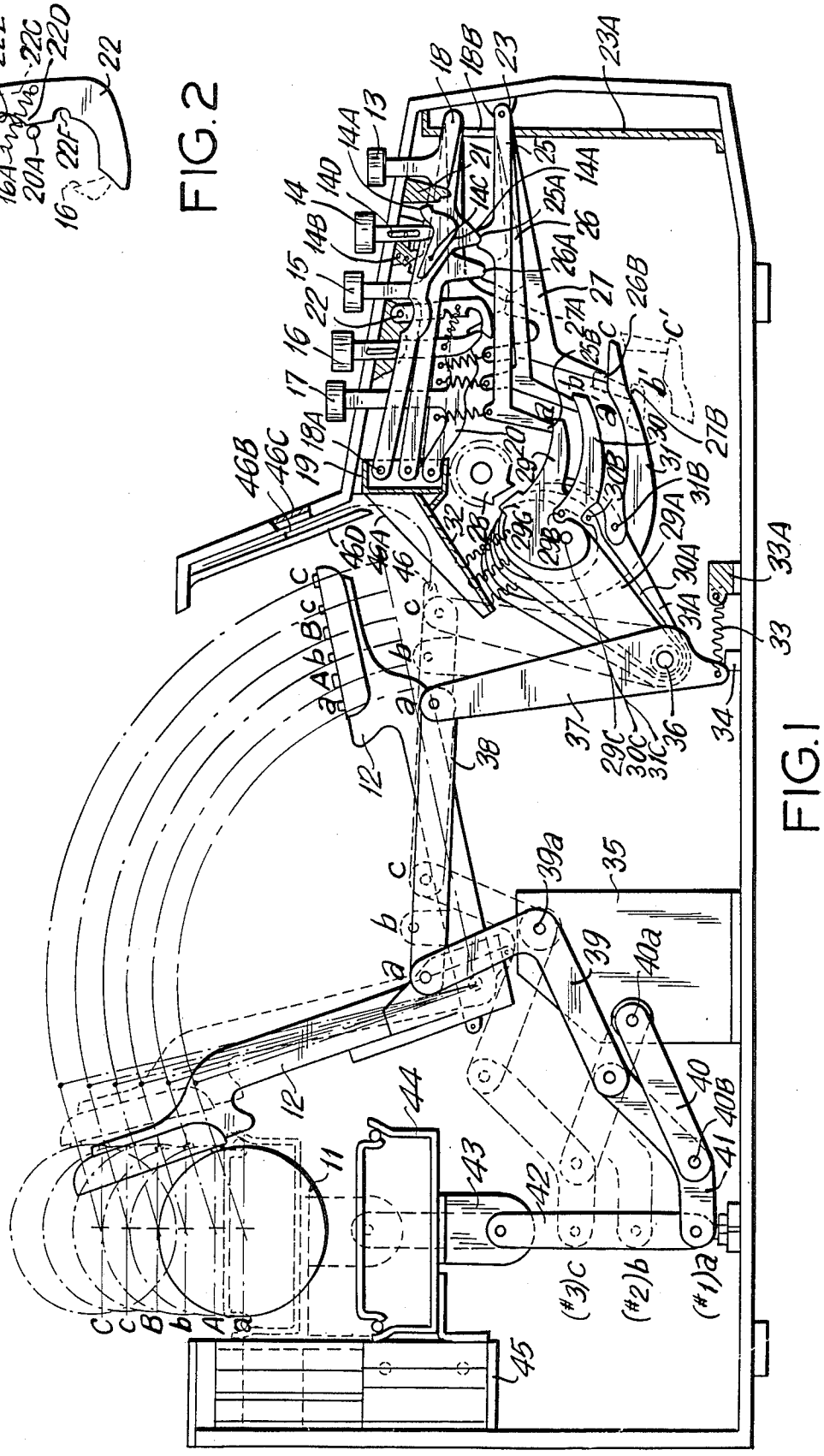

18
18B
23
23A
13
14A
14
14C
21
25
14B
15
25A
26
26A
22
27
26B
16
27A
17
18A
19
46B
46C
20
29
30
31
27B
46D
46A
46
32
29A
31B
29B
30B
29C
30A
31A
33A
33
34
37
30C
31C
36
38
12
39a
35
39
40a
40
40B
41
44
43
42
11
45
(#3)c
(#2)b
(#1)a

FIG. 1

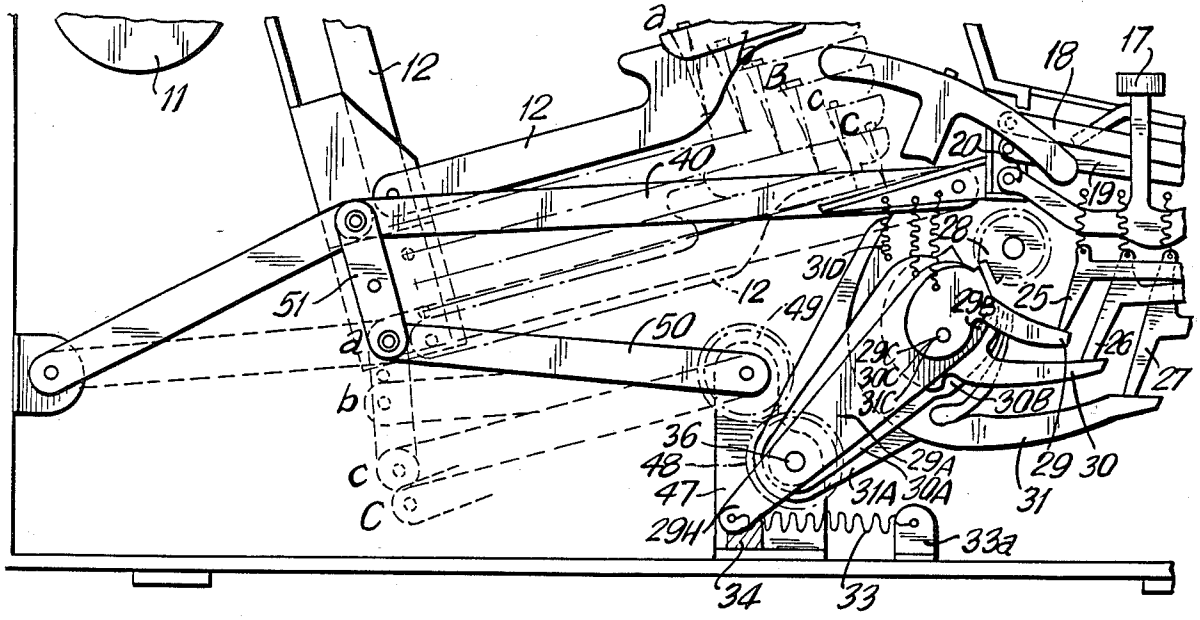

11
12
12
a
B
c
C
40
18
17
20
19
28
31D
25
49
12
51
50
29B
26
29C
30C
31C
27
30B
a
b
c
C
36
48
47
29H
29A
31A
30A
29
30
31
33a
34
33

FIG. 3

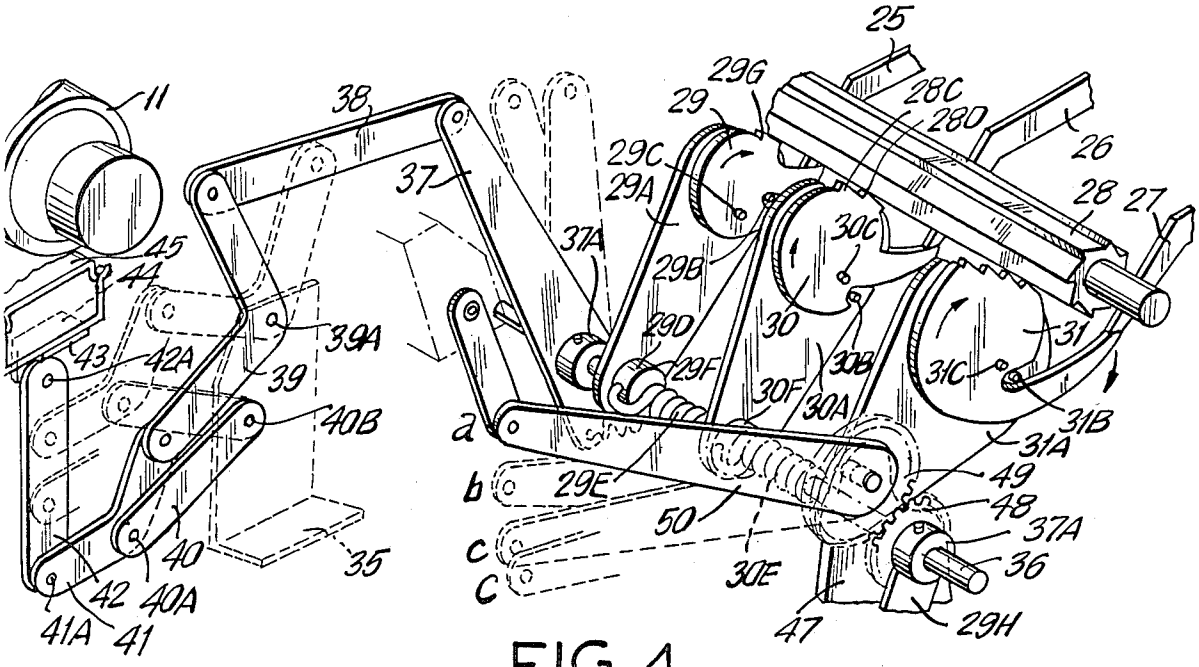

11
38
37
45
44
43
42A
39A
39
40B
40
42
40A
41A
41
35
25
29G
29
28C
28D
26
29C
29A
28
27
37A
30C
29B
30
31
29D
29F
30B
31C
30F
30A
31B
31A
a
b
29E
49
48
50
37A
c
C
30E
36
47
29H

FIG. 4

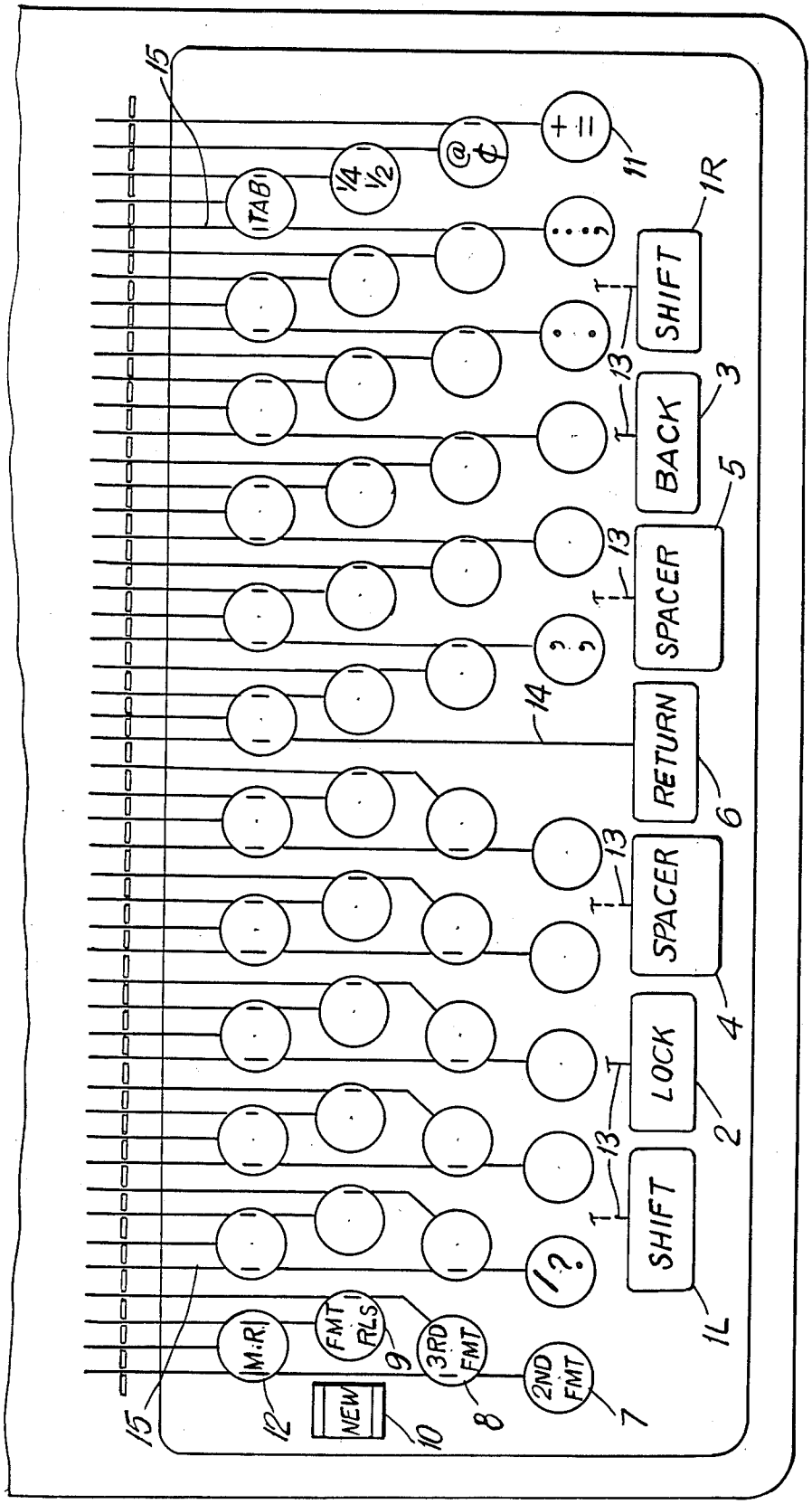

15
TAB
¼ ½
@ ¢
+ =
11
SHIFT
1R
BACK
3
SPACER
5
RETURN
6
SPACER
4
LOCK
2
SHIFT
1L
13
14
M·R
FMT RLS
9
13RD FMT
8
2ND FMT
7
NEW
10
12

FIG. 5

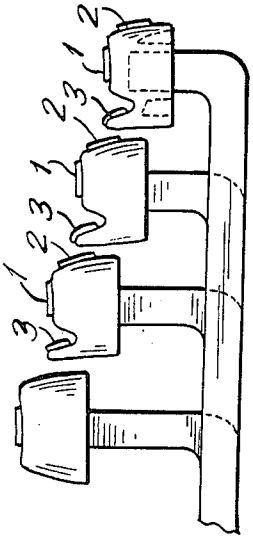


FIG.7

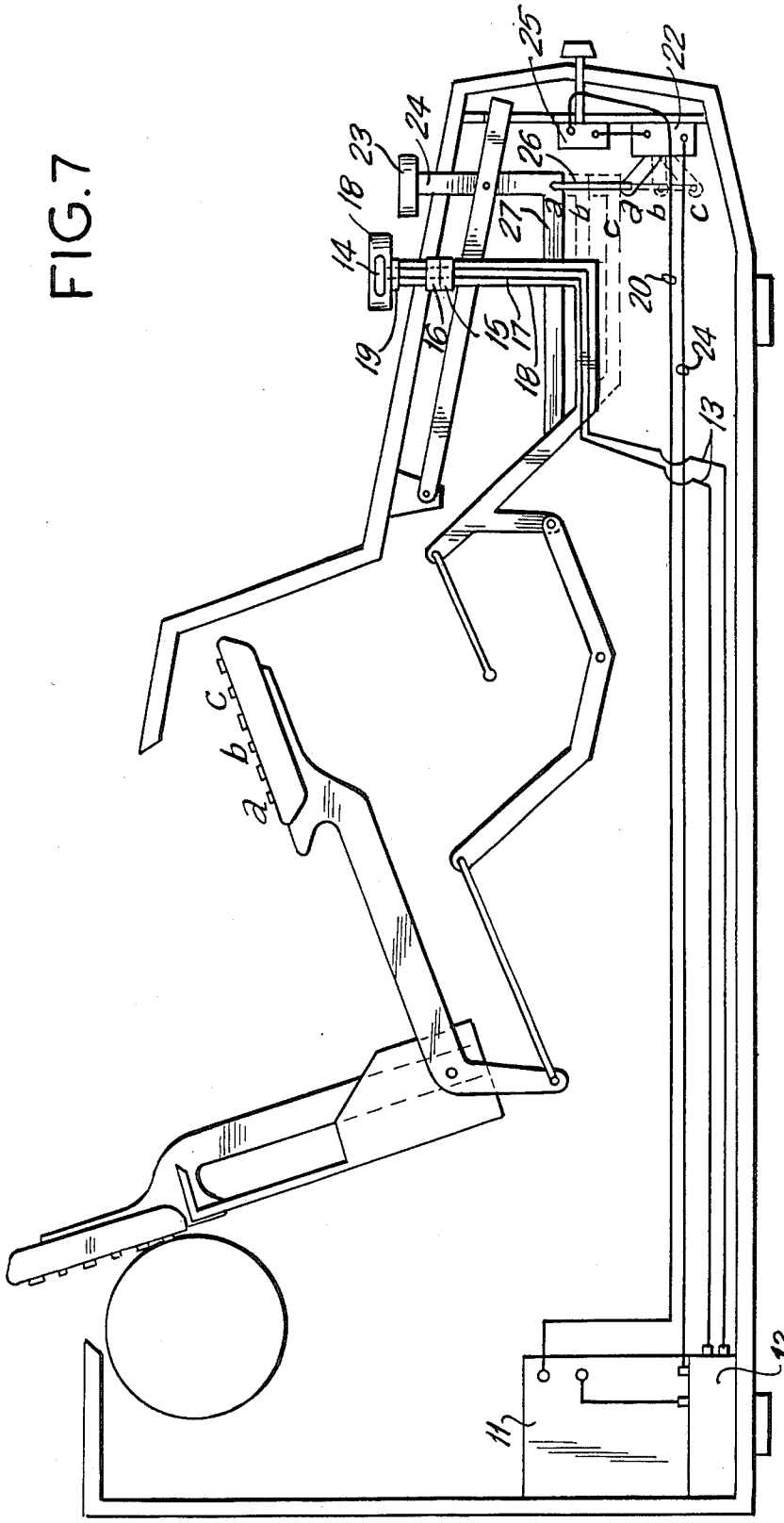
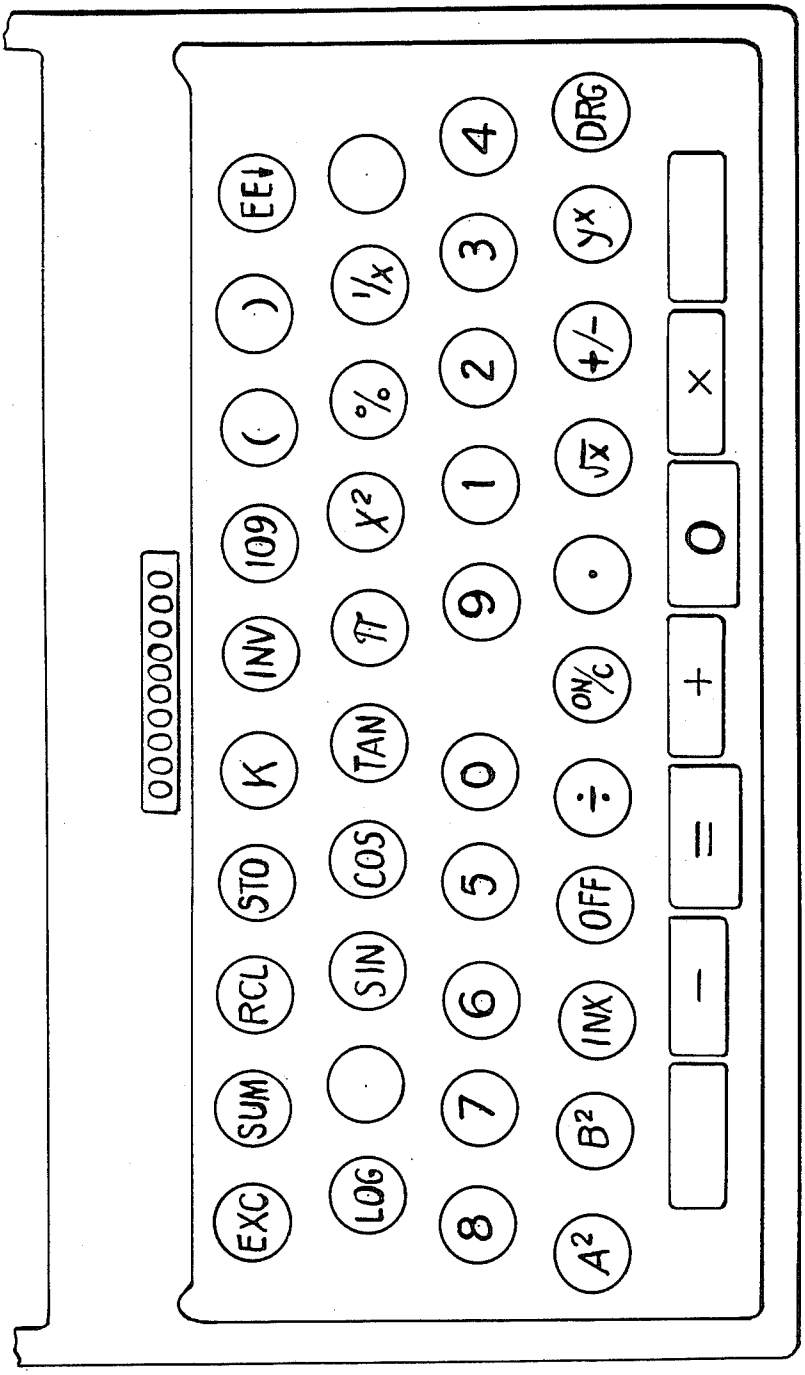


FIG.6



A TYPEWRITER CALCULATOR KEYBOARD, ONE OF A MULTI-FORMAT DISPLAY. (DERIVED FROM USE OF LIGHTED DISPLAY ELEMENTS LETTER AND NUMBER INDICATORS)

FIG.8

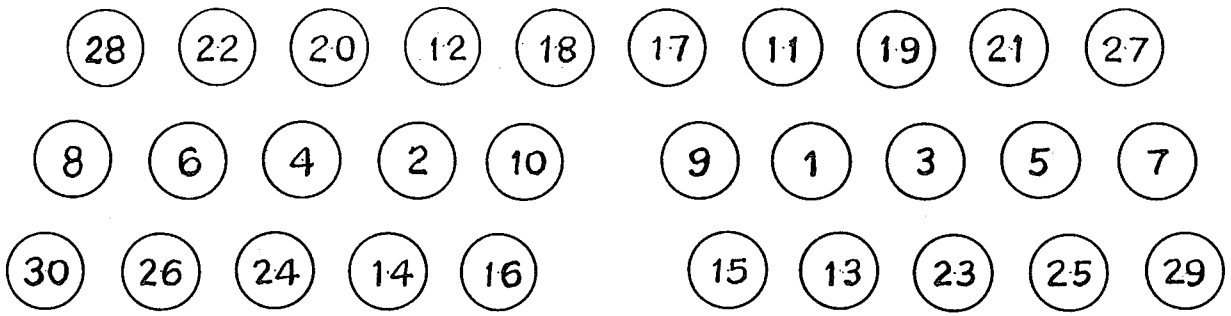


FIG.9

THE UNIVERSAL FINGER-PRIORITY NUMBERED FORMAT OF ALL LANGUAGES

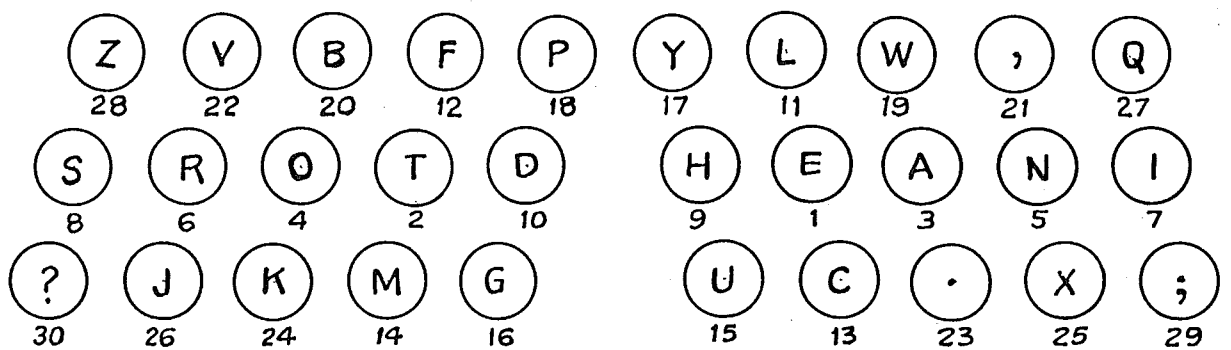


FIG.10

THE PRIMARY OF "PERFECT" FORMAT

E	T	A	O	N	R	I	S	H	D	L	F	C	M	U	G	Y	P	W	B	,	V	·	K	X	J	Q	Z	;	?
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

FIG.11

THE FREQUENCY ALPHABET OF THE ENGLISH LANGUAGE

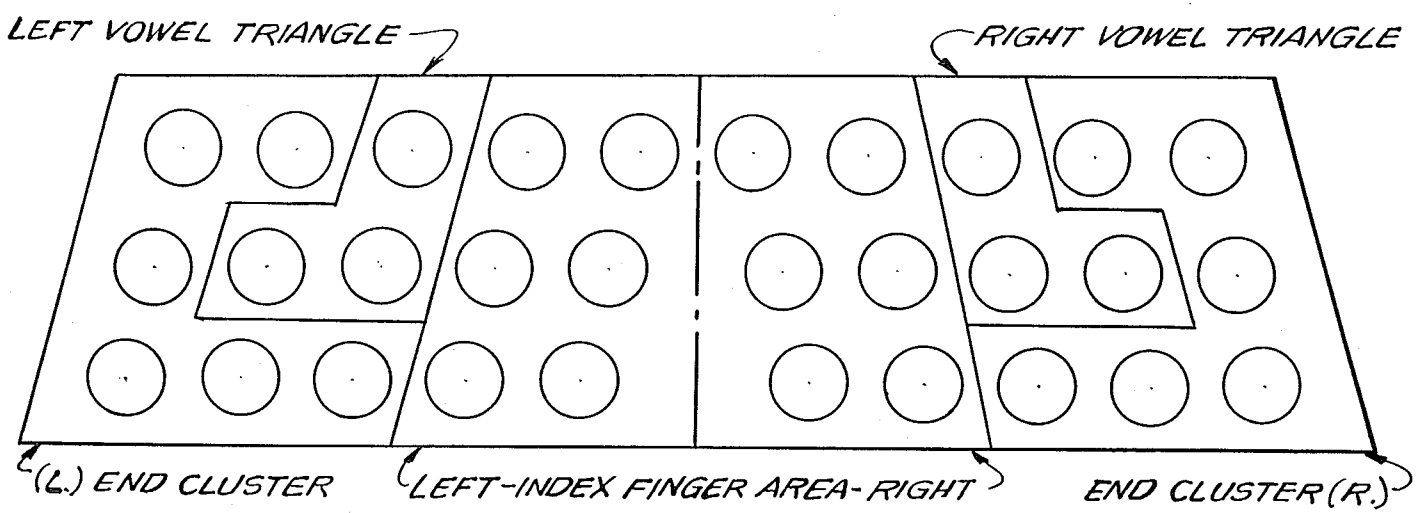


FIG.12

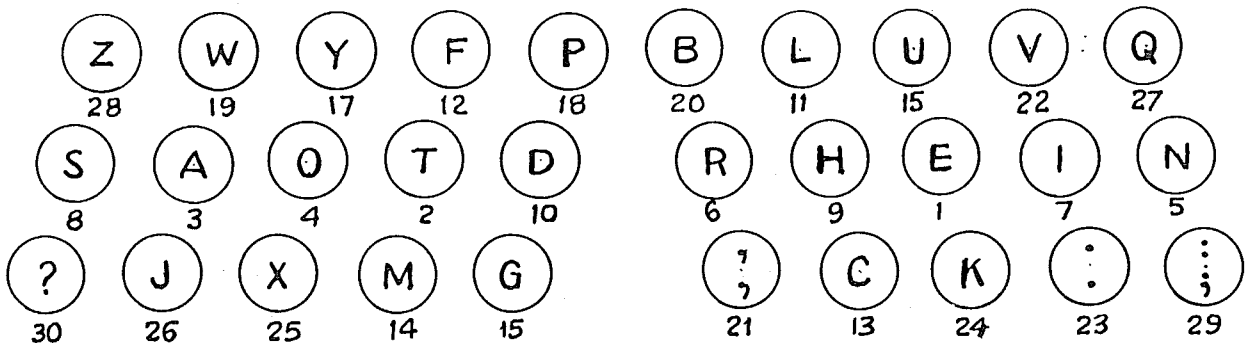


FIG.13

THE INTERMEDIATE FORMAT

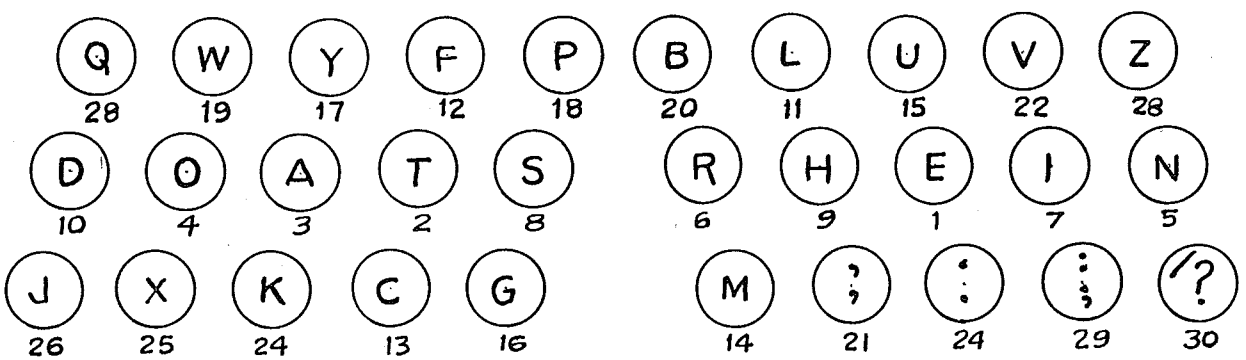


FIG.14

THE FINAL AND IDEAL KEYBOARD LETTER FORMAT OF THE ENGLISH LANGUAGE FOR THE TYPEWRITER, THE COMPUTER AND THE WORD PROCESSOR

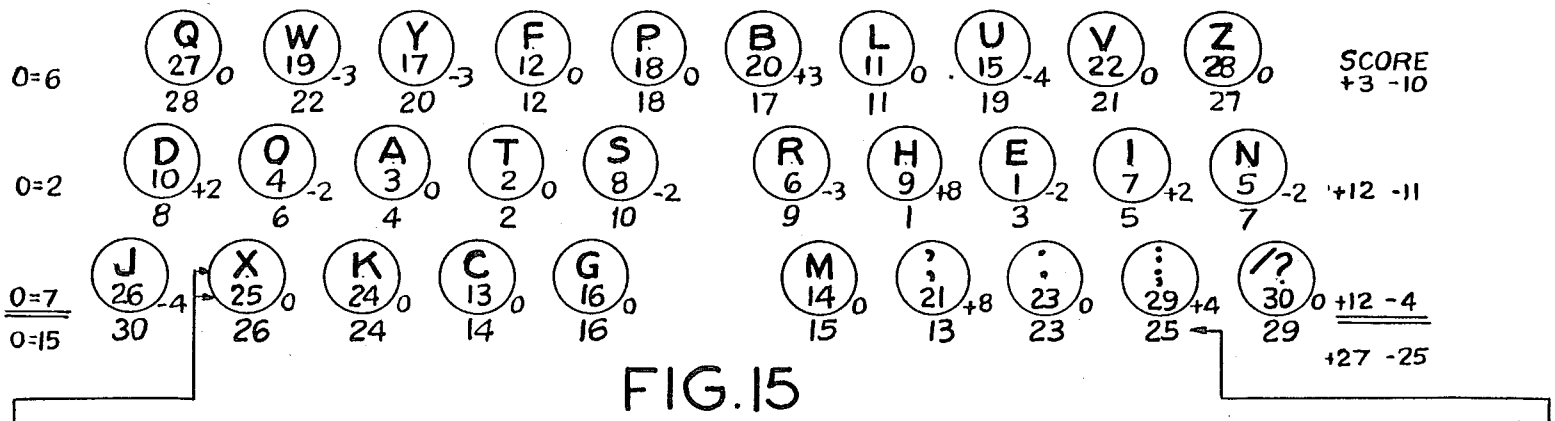


FIG.15

SCIENTIFIC FORMAT COMPARED TO THE NUMBERED LETTERS OF THE PRIMARY FORMAT

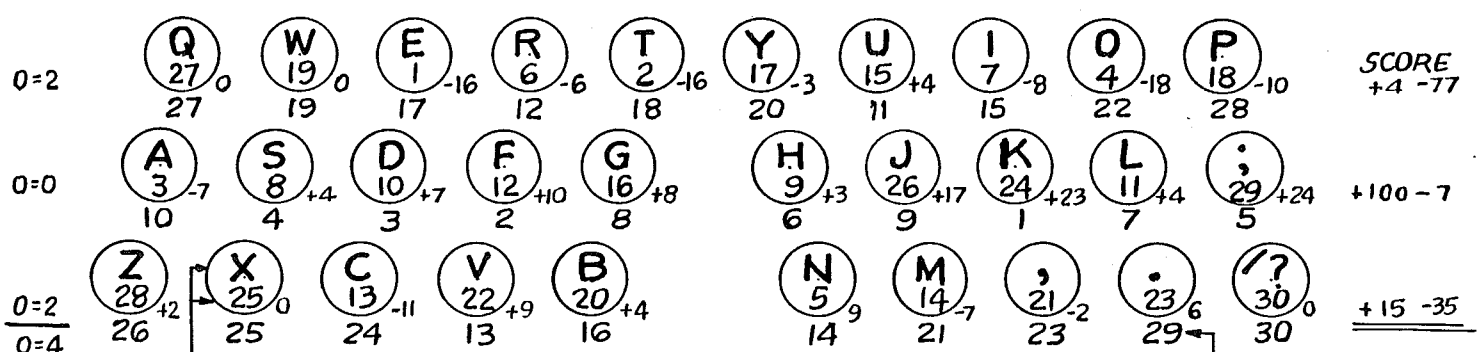


FIG.16

STANDARD FORMAT COMPARED TO THE NUMBERED LETTERS OF THE SCIENTIFIC FORMAT

% USE LEFT HAND											% USE RIGHT HAND	ROW TOTAL
32.0	Q 1.2	W 15.4	E 131.0	R 68.3	T 104.7	Y 19.8	U 24.6	I 63.4	O 80.0	P 19.8	20.8	52.8
22.9	A 81.5	S 61.0	D 37.8	F 29.2	G 19.9	H 52.6	J 1.3	K 4.2	L 33.9	; 0.5	9.2	32.2
5.4	Z 0.7	X 1.6	C 27.6	V 9.2	B 14.4	N 71.0	M 25.3	, 10.0	. 6.0	/ 0.3	11.2	16.6
60.4											41.2	101.6

FIG. 17

LETTER USE PER THOUSAND, WITH ROW PERCENTAGE USE, OF THE STANDARD FORMAT

9.0	Q 1.2	W 15.4	Y 19.8	F 33.9	P 19.8	B 14.4	L 29.2	U 24.6	V 9.2	Z 0.7	7.8	16.8
36.5	D 37.8	O 80.0	A 81.5	T 104.7	S 61.0	R 68.3	H 52.6	E 131.0	I 63.4	N 71.0	38.6	75.1
5.3	J 1.3	X 1.6	K 4.2	C 27.6	G 19.9	M 25.3	, 10.0	. 6.0	; 0.5	/ 0.3	4.3	9.7
50.8											50.7	101.6

FIG. 18

LETTER USE PER THOUSAND, WITH ROW PERCENTAGE USE, OF THE SCIENTIFIC FORMAT

E	N	A	R	S	I	T	U	O	L	D	C	P	M	V	F	B	G	Q	,	X	·	H	Y	Z	J	K	W	;	?
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

FIG.19

THE FREQUENCY ALPHABET OF THE FRENCH LANGUAGE

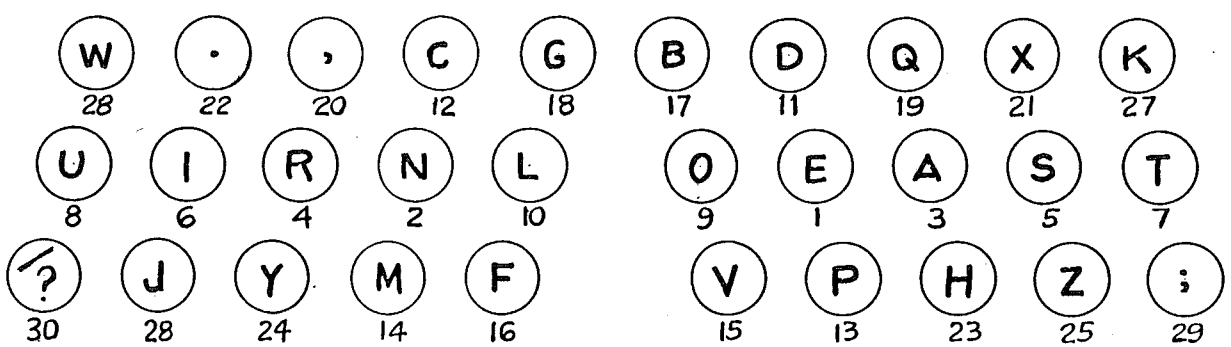


FIG.20

THE PRIMARY OR "PERFECT" FORMAT
OF THE FRENCH LANGUAGE

EFFICIENCY PERCENTAGES OF THE FRENCH FORMAT

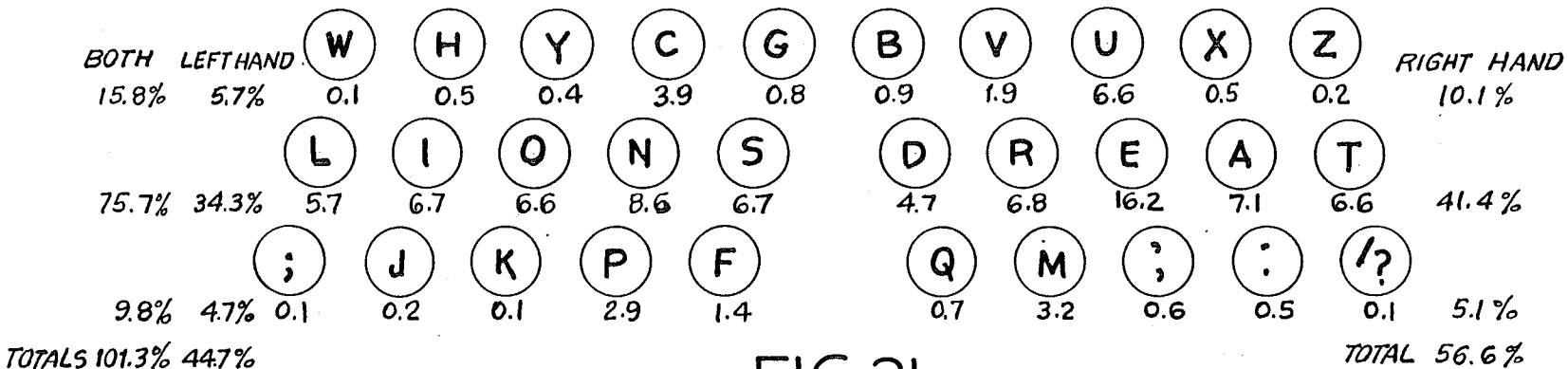


FIG.21

THE INTERMEDIATE FORMAT OF THE FRENCH LANGUAGE

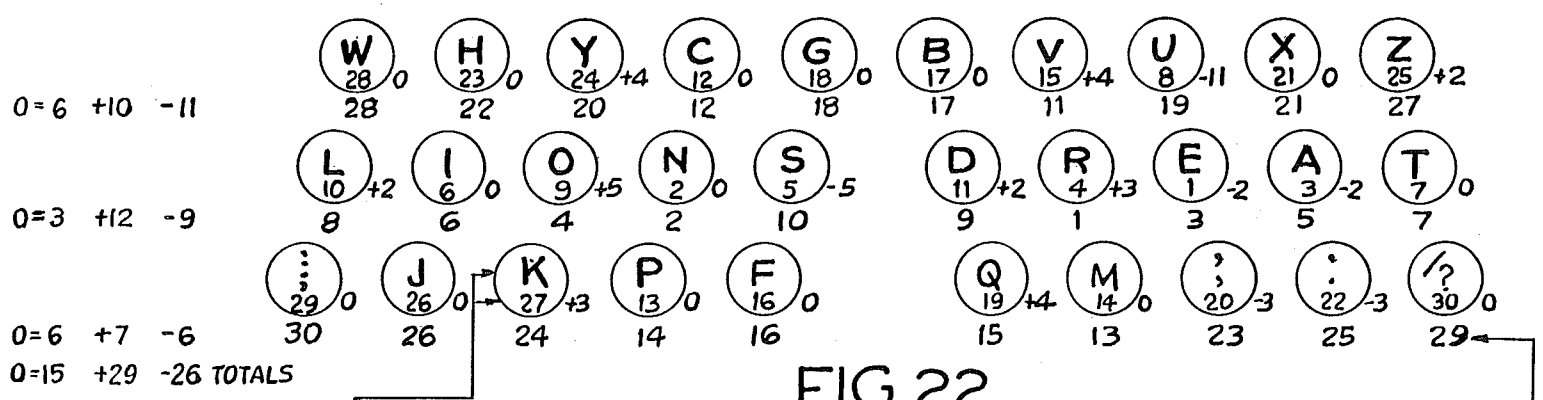


FIG.22

THE INTERMEDIATE FORMAT OF THE FRENCH LANGUAGE COMPARED TO THE UNIVERSAL FINGER PRIORITY-NUMBERED FORMAT

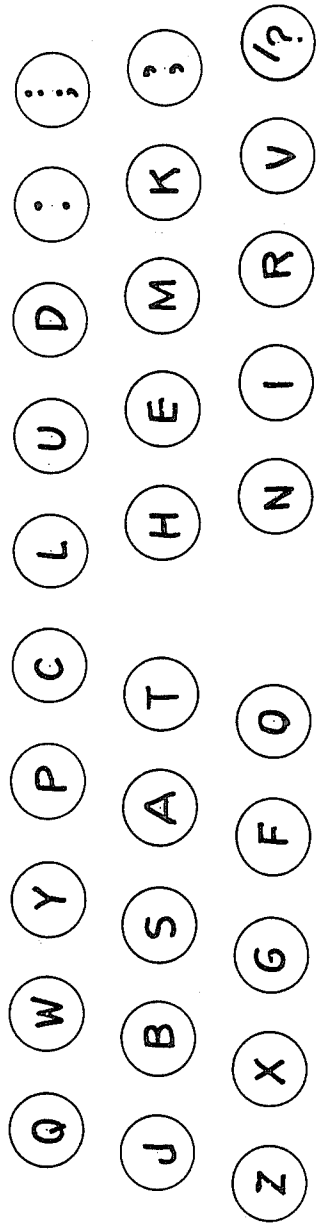


FIG.23

THE PEOPLE'S FORMAT

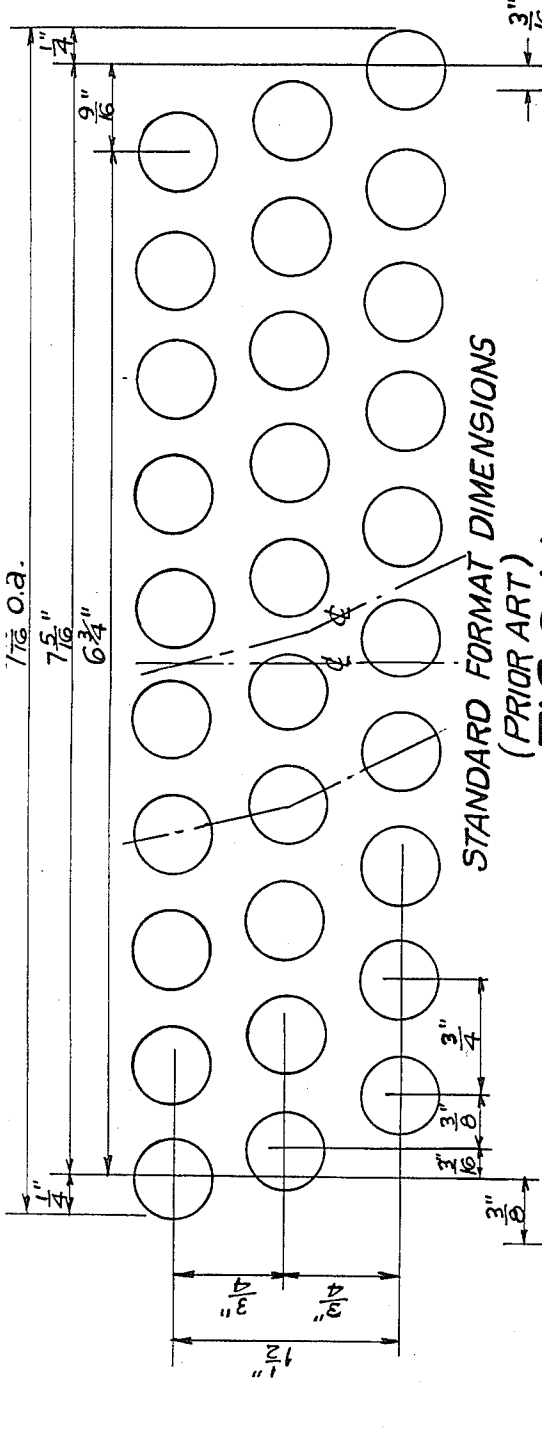


FIG.24A

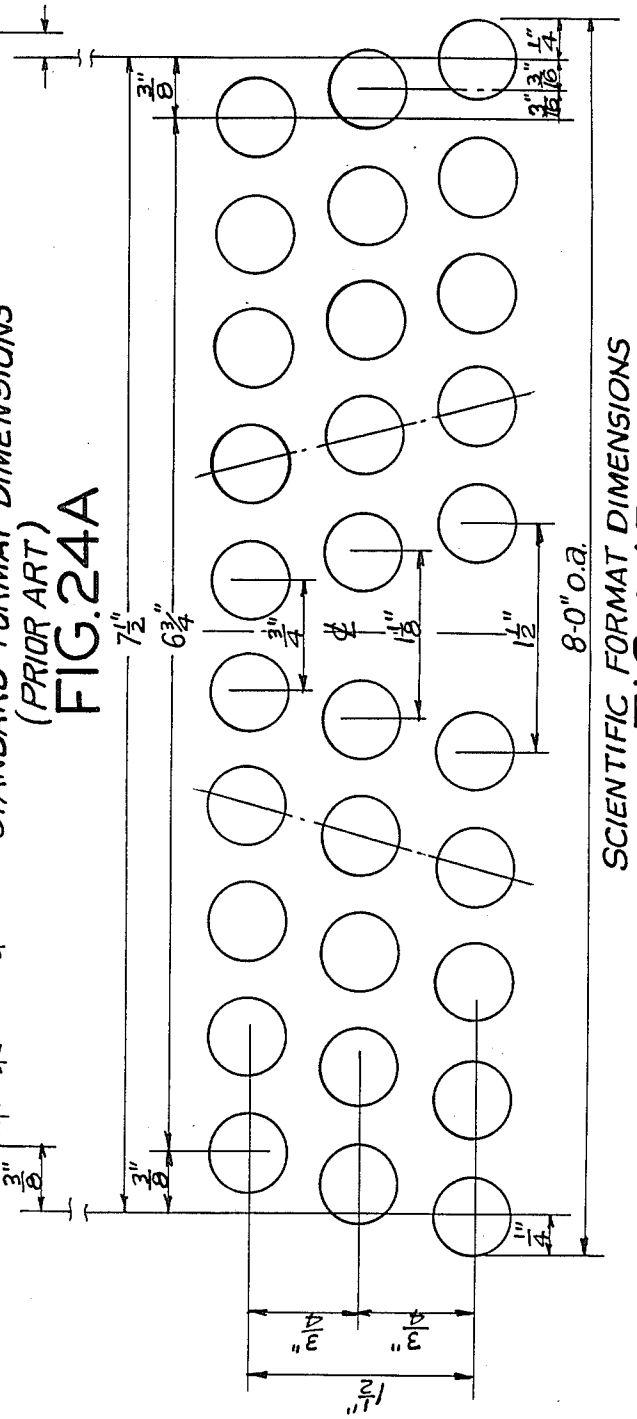


FIG.24B

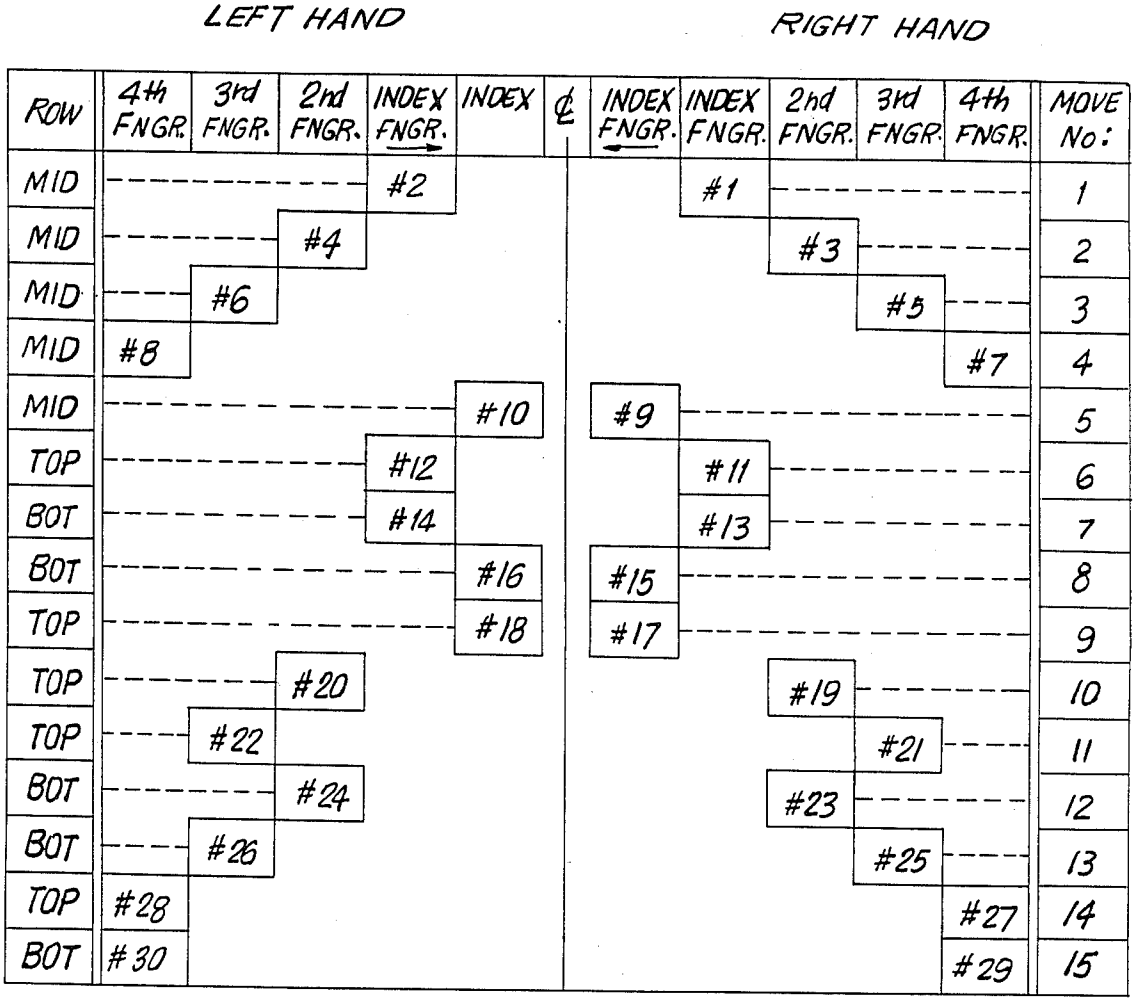

LEFT HAND
RIGHT HAND
ROW
4th FNGR.
3rd FNGR.
2nd FNGR.
INDEX FNGR.
INDEX
℄
INDEX FNGR.
INDEX FNGR.
2nd FNGR.
3rd FNGR.
4th FNGR.
MOVE No:
MID #2 #1 1
MID #4 #3 2
MID #6 #5 3
MID #8 #7 4
MID #10 #9 5
TOP #12 #11 6
BOT #14 #13 7
BOT #16 #15 8
TOP #18 #17 9
TOP #20 #19 10
TOP #22 #21 11
BOT #24 #23 12
BOT #26 #25 13
TOP #28 #27 14
BOT #30 #29 15

FIG. 25

PROCESS FOR DETERMINING OPTIMUM KEYBOARD FORMATS FOR A GIVEN LANGUAGE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a division of application Ser. No. 676,610 filed Dec. 3, 1984, and issued as U.S. Pat. No. 4,613,247 on Sept. 23, 1986. The '610 application is a continuation of application Ser. No. 401,913 filed July 26, 1982, and now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to keyboards and more particularly to a keyboard having selectable letter formats for minimizing operator fatigue and increasing speed. The invention also relates to a process for arriving at optimum keyboard letter formats for any given language for both professional and amateur typists.

2. Description of the Prior Art

The present-day typewriter has evolved from the nineteenth century into instruments which can be operated manually or electrically, or electronically as part of the modern computer terminal in the form of a keyboard. With the computer keyboards, information which is entered may be printed at once or at a later time. Operating any one of these instruments today with the standard QWERTY format for the characters on the keyboard, however, disregards the natural use of the operator's hands, particularly the left hand. Thus, only the trained professional typist, having become used to the conforming demands of the QWERTY format, can use any of these instruments with proficiency.

So it is that modern users of the QWERTY format are, for the most part, of two distinct classes. The professional typists, who may never purchase a keyboard instrument but can earn their living operating one, are the only ones recognized by most manufacturers who persist in providing only the QWERTY format. Entrepreneurs and others, who buy such instruments later in life and haven't enough time to learn the touch-type demands of QWERTY and who must "peck and hunt" at the keyboard, are generally unrecognized by those whoe manufacture it.

The need for a mass-produced keyboard instrument having formats other than QWERTY has been reflected, for example, in recent articles discussing the DVORAK simplified keyboard ("DSK") as one alternative. The DSK format is, however, directed only to the English language. As the world-wide sales of keyboard instruments with the QWERTY format continues, it is imperative that easier formats be made available for users in non-English speaking countries.

SUMMARY OF THE INVENTION

This invention proposes to redress the irrationalities in the modern typewriters instrument and its electronic take-off, the Computer, by bringing about solutions that will make these machines in the near future easier to learn; easier to operate and with less fatigue; increase the average speed and with less typing errors; principally, by adding new language-adapted formats to them that will overcome all the above disadvantages for both the professional and the amateur typist. The proposed process in this invention of evolving the formats is precise enough so that they can create a custom-tailored keyboard for every major language in the world, and eventually eliminate the standard QWERTY format that now blankets most languages, completely ignoring the idiomatic needs of each.

Further, with the physical keyboard properly aligned to the left hand and with several other thoughtful improvements offered in this invention, it may well be that the burgeoning Computer, the world's fastest machine, may well have optimum keyboards for enabling professional and lay persons to communicate with it efficiently well into the distant future.

1. The Rational Multiple Format Writing Machines.

A means to provide Multiple Formats. This Invention proposes a mechanism allowing typewriters to have a dual or multiple formats, that with the push of an added key will provide instant choice between the present standard QWERTY format and language-adapted or user oriented ones. It is significant that in this multiple form, one and the same machine can be used by both generations of users; those who use the standard format and choose not to change, and those people who in the future will learn only a format most efficient for them. With this mechanical change on the Typewriter, corresponding changes in the Computer and the Word Processor can be implemented electronically, as well. Only then it can be said that the world's fastest machines also have the most efficient of keyboards to enable persons to communicate with them expeditiously.

Over the 115 years since the first commercial typewriter appeared in 1872, many attempts have been made to overcome the inefficiencies of the Standard Keyboard with a better designed one. None of them has ever been able to replace it, however, since there has always been resistance by many in accepting any other format.

Estimates abound that the number of computers will increase in the United States in the next ten years to perhaps nearly thirty million. Since the Computer and the Word Processor have adopted the typewriter QWERTY keyboard as their own, this vast proliferation of machines saddled with an awkward format will be an unnecessary burden unless a way is found and accepted to adopt more efficient, user-oriented formats in the next few short years.

A clear outline of the mechanical changes required for the present day typewriter machine to be converted to a multiple format arrangement will be found in the Mechanical Review, below.

Two format indicators are shown, for example, for an electric typewriter in FIGS. **1** and **3**. A format mechanism, in each instance, coordinates the movement of the indicator to move in conjunction with the change of format, showing its name in a small window that appears on the keyboard.

The typewriter of FIG. **1** has a flexible steel tape **46** holding the lettering **46B** of the format name, and it is pulled or pushed up or down by a power lever which is connected to the tape at **46A**. The steel tape **46** is held and enclosed in a plastic sheath **46D** and its format indicator lettering **46B** is properly spaced in correspondence to the movement of lever **37**, to set the lettering for a selected format in a format window **46C**.

In FIG. **3**, a generally T-shaped format indicator **56** is connected directly at the base of its leg to a shaft **36**. Format indicating letters **56B** are provided on the top surface of the "T", the spacing for the letters **56B** being detemined by the angle of arc and the radial length of the indicator **56** with respect to the shaft **36**.

Many letters formats are possible for both the electric and manual typewriter machines. Uses may be found for having many formats on one machine (as in the Chinese language that has many ideographs). As shown in FIG. 1, multiple character type strike bars 12 can bring about a mechanical solution for providing two or more formats. A typewriter mechanism capable of providing for two formats, each with upper and lower case, is disclosed, for example, in U.S. Pat. No. 2,471,588 issued May 31, 1949. The relevant portions of '588 U.S. patent are incorporated herein by reference. Providing correspondence between a selected one of a number of letter formats and the keys on an electronic keyboard can be accomplished by, for example, providing additional wiring configurations for the keys per format, to make different formats selectable by appropriate means for the keys on a given keyboard.

A distinct need exists for a third type of format that will allow for such legibility that there be no need of special training to operate the machines. It is believed that over half of the keyboard users through the world (and perhaps over half that amount are independent buyers) do not use the touch system. It is clear that by their (unrecognized) representation alone that a special keyboard should exist independently on the machine for their use that has been adapted for simple operation. Such an especially adapted keyboard is seen in FIG. 23 "The People's Format". Here, the 12 most frequently used letters are clustered in the middle four columns of the keyboard for greatest visibility and digital accessibility.

Undoubtedly there will be a demand upon manufacturers of the machines to make other special formats to be used in this third area, lending further flexibility to the multiple form of machine.

Included in this heading but a separate item are FIGS. 24A & B showing the dimensions compared of the two Formats, the Standard Format and the Scientific Format. The new formats are preferably 3/16" wider, a small amount, despite the left downward flow of the left-hand keys on the new keyboard's physical configuration.

MECHANICAL REVIEW

To manufacture a mechanical typewriter with three formats, that is, with two additional formats added to the existing standard or QWERTY format, the letter strike-heads on the lever bars and the shift mechanism must be altered. Added to the strike-heads of the standard format with a lower and upper case of a letter on each, would be two more sets of letters representing the two new formats, making the strike-head longer. To be able to match these new sets of letters to the platen at the writing line, the shift mechanism would have to be made more sophisticated to fulfill the dual demand of each new format, by that mechanism allowing for the mutual level required to create the new format, and again create a new level for the use of the upper case of the new usable format.

The typewriter industry has provided two ways for the machine to match the second row of letters, the upper case of the standard format to the platen. One, by raising the platen to meet the row of letters, with the type bar remaining unchanged; and, two, by lowering the letter basket for the upper case letters on the strike-head to meet the writing line on the platen, with the platen remaining unchanged.

This invention takes advantage of the mechanism of these small movements to make the upper case, to bring about a format change by use of a separate mechanism, controlled by appropriate lever keys, that double the length of these movements for the second format, and once again for the third format. However, the arrangement of the mechanism to reach the upper case is always the same one for each format, including the lock and release; all being the same in action control as on the standard format.

All other normal controls remain intact, such as the case shift keys being found on the right, for right-hand action, as well as being provided for the left by a joint shaft. The vertical guides for the vertical movement of the platen and the letter basket, holding them true, of course must be lengthened to accord with the greater movement. Stop guides for both rise and rest of the platen and the basket must be added for the new extra movements.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a side sectional view of an electric typewriter including a selectable format mechanism according to the invention;

FIG. 2 is an enlarged view of a portion of the typewriter of FIG. 1;

FIG. 3 is a side view of a multiple format electric typewriter with a dropping letter basket according to the invention;

FIG. 4 is a perspective view of a mechanism for rising a platen in the electric typewriter of FIG. 1;

FIG. 5 is a plan view of a keyboard configuration according to the invention;

FIG. 6 is a side sectional view of parts of a typewriter including circuitry by which lighted letters of a selected format appear on corresponding key tops, according to the invention;

FIG. 7 is a side view of key caps for displaying three different letter formats according to the invention;

FIG. 8 is a plan view of a keyboard similar to that of FIG. 5 but placed in a calculator mode according to the invention;

FIG. 9 is a plan view of a keyboard on which keys are assigned finger priority numbers according to a scientific format of the invention;

FIG. 10 is a plan view of a keyboard on which the keys are lettered according to the frequency of use of the letters in the English language and the number priority of the keys shown in FIG. 9;

FIG. 11 shows the frequency of use of letters and characters in the English language;

FIG. 12 is a plan view of a keyboard on which key members are segregated within areas according to the invention;

FIG. 13 is a plan view of a keyboard in which keys are lettered in an intermediate format when determining the scientific format;

FIG. 14 is a plan view of a keyboard in which keys are lettered in a scientific English language letter format according to the invention;

FIG. 15 is a plan view of the keyboard of FIG. 14 with deviations from the primary format of FIG. 10 scored by numbers;

FIG. 16 is a plan view of a QWERTY keyboard on which deviations from the priority numbered letters of the scientific format of FIG. 15 are scored by numbers;

FIG. 17 is a plan view of a QWETRY keyboard with letter and hand use for the English language being represented numerically;

FIG. 18 is a plan view of a keyboard having the ideal or scientific format of FIG. 14 and with letter and hand use being represented as in FIG. 17;

FIG. 19 represents the frequency alphabet of the French language;

FIG. 20 is a plan view of a keyboard lettered in a primary format of the French language, wherein the frequency of use of each letter as shown in FIG. 19 corresponds to the finger priority numbered format of FIG. 9;

FIG. 21 is a plan view of a keyboard on which the keys are lettered in an intermediate format of the French language, according to the invention;

FIG. 22 is a view of the keyboard of FIG. 21, wherein deviations of the key letters from the universal format of FIG. 9 are represented numerically;

FIG. 23 is a plan view of a keyboard wherein keys are lettered according to the people's format of the invention;

FIG. 24A is a plan view of a conventional keyboard configuration;

FIG. 24B is a plan view of a divided keyboard configuration for natural use of both hands according to the present invention; and

FIG. 25 is a representation of a method of establishing a numbered priority for key operations by fingers resting at a middle row of keys on a keyboard.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 is a sectional side elevation of an electric typewriter with rising platen. The machine is powered by a typical kind of eight toothed revolving shaft 28 that fits the inside width of the chassis. The control key levers are five in number; two for shift to upper case, two for each format rise, and one for release from these positions. It is seen, as on the manual machine, even as on the standard typewriter, the mechanisms that cause movement to bring about the upper case is the same movement, but just more of it, to arrive at a new format.

The three levers that cause shifting are on a double hinged arrangement of two levers to enhance the action. Pressing on the forward key lever to make the upper case the shifting mechanism that is best viewed in the drawing in FIG. 4 for a clear understanding of what is involved. The extended key lever has but to touch the single toothed gear activator 29 which throws its tooth in the path of the revolving power gear, moving the whole rest of the mechanism connected to shaft 36 that brings about the 1 step rise of the platen for the upper case. Lock arrangement to this level is achieved on pressing the second key lever that swings the lock lever down to catch on the chassis. This is easily released from this position by the movement of the first lever which allows the lock lever to give up its catch on the chassis, allowing the entire mechanism to revert to the lower case, an action aided by the strong spring 33 and the gravity pull on the carriage and platen ensemble.

Rise to another format happens on a push of the third key lever, moving its bars creates a similar action as described above for the upper case. However, the two toothed gear activator is put to work this time, creating greater movement on the shaft below because of the throw of the two teeth against the power shaft. This action locks the machine into the new format by the separate vertical swinging locking lever whose edge-face cuts catches the pin in the horizontal lever as it moves down. Release is easily attained from the format by pressing the fourth key lever bar, the toe of which touches the tail of the lock lever, releasing the lock pin from its hold. FIG. 2 is an enlarged view of the vertical lock lever in its relation to the locking pins and the release lever.

The third format is arrived at by pushing on the fifth key lever, bringing into action the four tooth activator that moves the connecting shaft in a double throw to bring about the required format.

The geometry of these moves starts in the initial one-tooth-gear-activator, whose tooth width is $\frac{1}{8}$th of the circumference of the revolving power shaft, which being a $\frac{1}{2}$" in diameter makes this one tooth space, peripherally, as being 4.98 mm or 5 mm, causing a movement of 6.5 degrees to achieve upper case movement.

Shifting to other formats is designated in the drawings as the lower case of each, as "a", "b", "c", and their passing upper case as being "A", "B", "C". The three formats are represented in pairs, alternately, of these letters on the strike head, as "a", "A", for the first format, etc. The lower case letters represent the machine at its natural rest for a given format, as the machine is changed from one to the other. Again, in the same given order, they are sometimes called first, second, and third formats. In considering a format change it is assumed that the machine is in its lowest position, the "a" format, or first format.

FIG. 3 is a part side sectional elevation of a multiple format electric typewriter with dropping letter basket. The forward part of the machine need not be shown as it is identical the electric model of FIG. 1, which also includes the power shaft and the various gear-tooth activator levers, right down to the shaft 36 where they all connect. Beyond this point the transfer of the movement, being reversed from the rising platen model, indicates a small gear on that shaft coupled to another pulls down the platen on demand. This is clearly shown in FIG. 4 that shows the end action of both these models.

DESCRIPTION OF SHIFT MOVEMENTS

FIG. 1 is side sectional elevation of a multiple format electric typewriter with a rising platen. The machine is powered by an eight toothed shaft 28 extending across the chassis, shown revolving anticlockwise.

To set for the upper case, a front key lever 13 is pushed down, and as it is integral with a long horizontal lever 18, it swings from a fixed pin 18A on chassis mount 19 at the rear, and in a comb-slot 18B in front. Through two extended mutual contact points on each edge, lever 18 moves a contact lever 25 at point 25A and swings the lever 25 from a fixed pin 23 in the front of the machine. Contact lever 25 is given added leverage and movement by this arrangement. The nose end 25B of this lever 25 touches the extended arm of the one tooth gear-activator 29 at point a, moving it a small distance but enough for its tooth 29G to catch on a tooth of the revolving shaft 28, turning it on pin 29C that is based on the lever extension 29A. A stop pin 29B is also located on the extension 29A. It allows the slight movement for the activator 29 to move into the path of the power shaft 28, and after it does the activator 29 is prevented from swinging any further by the stop-pin 29B. This immediately transfers this action to the lever extension 29A which is connected to the mounted transfer shaft 36 by its holding collar 29D.

This set-up is best seen in FIG. 4, where the three double activator levers 29A, 30A and 31A are set up on the transfer shaft 36. In order for these three levers to transfer movement independently of one another, they all have been provided with spring clutches 29E, 30E, and 31E; each being activated by the activator 29, 30 or 31 to which it is attached, and not by the shaft 36 or from other pulse sources. Movement of any one of the levers 29A, 30A, 31A causes its spring clutch to squeeze the periphery of shaft 36 and momentary movement of the corresponding lever the required distance to cause shifting to an upper case.

The single tooth 29G of the activator 29 is moved by ⅛ the circumference, or one tooth spacing of the power shaft 28. As indicated, this movement moves down through the two levers 29 and 29A, the collar 29D, and the spring clutch 29E to the shaft 36, to the power lever 37, directly through its connecting collar 37A. This lever 37 is the same length as the activator 29 and lever 29A combined, so that it has the same movement of arc. The pulse then continues through the median lever 38 through three paralleling levers 39, 40 and 41 and their respective connecting pins. The first of these levers 39 is a bell crank that is fixed to a chassis flange 35 on pin 39A. The second is a bent left lever 41 and it is connected to the bell crank 39 at one end and to a vertical rise lever 42 at the other end. The third is a paralleling lever 40 which connects at one end to the bent point of lift lever 41 with pin 40A, and to the flange 35 at the other end with pin 40B.

This arrangement allows lever 41 to give smooth rise to the vertical lever 42, through pin 41A, and an angle clip 43 through which pin 42A is attached to a slide rise control 45. The latter holds the platen 11. The foregoing arrangement provides a one step rise to put the machine into upper case use momentarily, and in any of the selected formats.

As in standard practice, if the upper case is used for the moment, releasing finger pressure on key lever 13 allows the whole mechanism to drop back down again to lower case, as gravity and the strong spring 33 will return all parts to rest position.

Though letter basket action, as shown in FIG. 3, is on an angle, the 5 mm step to reach upper case and the 10 mm double step it moves to change formats are true distances that match to the letter-spread on the strike heads; as basket and lever keys are all of one unit. But this is not so on the rising platen because of the peculiar triangulations the type bar must go through in matching the writing line as the platen rises. As best can be determined, to meet the total spread of the six letters on the strike head of 25 mm total, the platen must rise 29 mm to match it. An 11.6 mm rise is needed to change to a second from a first format; and for three formats the rise is 23.2 mm, leaving 5.8 to total the 29 mm rise to get to the upper case.

To use the upper case continuously, pressing on key-lever-lock 14 puts to work all the mechanism described above, and it locks any of the upper case positions into continuous use. Though lever 14 is a completely separate key, note that the double pin and slot arrangement 14D, allows it to slide and push with its toe on the locking lever 14A, against the resistance of its spring 14B, and pivoting on pin 14C, and so pressing down, fits against the notched fixture 21, to lock the entire mechanism into any of the upper-case in whichever format is chosen.

Meanwhile, the small bulge on the left side of the key lever 14 is also bent at a right angle so that it may reach and touch the top of long lever 18, moving it down and allowing it to duplicate the action of key lever 13, described above, locking the whole mechanism into the upper case of a selected format.

To release from the upper case lock, a light touch on key lever 13, moves the long lever 18 with which it is integral down, releasing the engaged part of locking lever 14A, allowing it to clear the notch it was caught in, and its spring 14B pulls it back and away, dropping the whole mechanism down and returning it to the lower case in whichever format is selected.

Changing to another format is started by pressing key lever 15. Much of what happens is similar to the action of moving to the upper case. Long lever 19 moves down and its contact point meets a corresponding one on contact lever 26 as it swings on an extruded pin 23 in the front part of the chassis. Its nose end 26B at point b of lever 26 moves the extended arm of geared-tooth-activator 30, forcing it to revolve off center and throwing its first tooth 28C, and then its second tooth 28D into the gear teeth of the power shaft 28, which moves lever 26 10 mm. The rest of the action is as immediately described above to use the upper case, except that the 10 mm movement throws the machine into a different format move instead.

Locking into format takes place automatically on the downward movement of long levers 19 or 20, when moved by a push of respective key levers 15 and 17. The lock lever 22 hangs vertically on a chassis pin 22G (FIG. 2), allowing it to swing slightly with the movement of its attached spring 16A forcing it against pins 19A and 20A on levers 19 and 20. As lever 19 is pressed down to get to format b, its pin 19A fits to the slot 22E in the left face of the lock lever 22, holding the entire mechanism in the selected format.

Release from a second selected format is done by pressing key lever 16, the toe of which presses against the tail of the lock lever 22, letting pin 19A free from the holding slot 22E in the lever. Release from a third format which can be selectively locked by the dropping action of long lever 20 on being pressed by key lever 17 and letting its pin 20A fit to slot 22F on the edge of the lock lever 22, is accomplished similarly, as described above. The locking action, of course, comes about by going into the third format, with the only other difference in parts being, principally, the four tooth activator 31 throwing the rest of the mechanism a 20 mm distance, and doubley to move to that higher format.

FIG. 3 is a part side sectional elevation of a multiple format electric typewriter with dropping letter basket. All its forward controls and actions are identical to those in FIG. 1, and including the throw mechanism up to the connecting shaft 36. As the action must reverse for the letter basket to drop, two matching gears reverse this action, where gear 48 is attached to the shaft 36, and another gear 49 is connected to a shaft 49A on fixture 47 that is attached to the chassis. Here a single connecting lever 50 is connected to a short lever 51 that is attached directly to the letter basket, bringing it up or down in controlled movement to all lever control demands.

II. A Useful Keyboard for the Typewriter and the Computer

The constant slope of columns or keys on the standard keyboard has worked well for the natural lay of the right hand but disregards this aspect for the left hand, allowing for stress and fatigue in the touch sys-

tem, which, from the standard letter layout, also demands more use of that hand than the right.

In mechanical and electric typewriters alike, the spacing of the descending key lever bars was not set up as 1, 2, 3, 4 corresponding to the four rows, for the pattern is instead, 4, 1, 2, 3. This order sets up a zig-zag effect of the letters down any given column of keys, lending for more confusion.

FIG. **5** shows a keyboard with keys having key levers, and a leftward and downward diagonal slope of the left-hand keys from row to row, conforming to the natural use of the left hand and fingers. This leaves a parting space between the left and right halves of the keyboard, which has a clear function in itself; there is no mistaking, either visually or digitally, what letters are on which side of the center line of the keyboard; that space acts as a true center line, per se. One of the great points of confusion for the learner and non-learner on the standard keyboard arrangement is the lack of any defined separation of the activities of the two hands.

As seen in FIG. **5**, where the two sets of sloping keys are symmetrical in their slope away from each other, this allows the lever bars to be properly arranged in 1, 2, 3, 4, order, even though the key columns of each hand slope in opposite directions, and the letters of any vertical row or column follow down in a straight line (except for the first five numbers at the left side top row). However, the spacing for this order is different for the left hand but is made up by bending the first five letters in the middle row of the left hand on an upward diagonal, properly filling this space to maintain the correct order.

Maintaining the standard keyboard in its physical layout at first seemed necessary, but in arriving at the present equi-angular sloped keyboard it was realized that its superior physical layout provides a more efficient way of using the fingers properly, and thus should be available to all users. The few upsetting days a manual typist has changing over to an electric model, is comparable here towards a person getting used to the layout of FIG. **5**, with at least as many advantages.

FIGS. **24A** and **24B** show comparable dimensions for the divided keyboard arrangement (FIG. **24B**) and the conventional one (FIG. **24A**).

The small area that the two thumbs occupy while hovering over the space bar is all that need be taken up by the bar. The rest of the long space can well be used for other key controls.

As seen in FIG. **5**, the area conventionally occupied by the space bar has been cut up into seven one inch segments. Two outer bars, left and right **1L** and **1R** displace the regular upper case shift keys from their side positions, a move of one inch in and one inch down. This is slight enough that the fourth or little finger that ordinarily controls them, can continue to do so with a minimum change in habits.

The next bar in one the left is a case-shift lock-key **2** removed from its usual position on the left of the machine and is controlled by the second or third finger.

The next bar in on the right is a back spacer **3** removed from its previously ambiguous place on the machine to this accessible area, and is controlled by the second or third finger.

The next two inner bars, left and right, **4** & **5** are all that need be left of the spacer bar, quite wide enough for the hovering thumbs.

The center bar is the natural place for a carriage return key **6**, ably operated by either thumb.

Note that the true placement of two new format shift keys **7** and **8**, along with their release key **9**, and a format indicator window **10** are designated for the areas shown in FIG. **5**, displacing nicely the case shift keys moved away from the left of the machine. The case shift and release key now on the right can be replaced with a (+) and (=) key **11**. The M.R. key **12** can remain in the upper left area, found there on most machines.

The six lever bars of the control keys **1L** and **1R**, **2**, **3**, **4**, **5** all return under the letter key levers, as do the two lever bars of the long spacer on the standard machine, to their individual points of control in the back. The return lever bar **14** fits into one associated empty comb-slot on the centerline of the new keyboard arrangement, similar to all the rest of the letter key lever bars. Similarly, this is also true for all lever bars **15** where comb-slot space is regularly allowed for keys at the ends of the keyboard.

The second major concern of this invention recognizes that about half of all the people that type do not use the touch system, and their needs must be considered, be it business machine or portable. It is recommended then that all control keys, as distinguished from letters or numbers, be color coded, to not only easily note their difference but also to set-off the number-letter keyboard, itself.

It is also noted that since changing to another format will likely be only an occasional practice and not of momentary demand as on other control keys, the new format shift keys **7**, **8**, & **9** can be made slightly stiff in operation, to frustrate their inadvertent use.

The following describes a way of changing all the letters represented on the keyboard instantly when selecting another format. FIG. **6** shows a system for applying low local power fed to a typical I.C. circuit that actuates L.E.D. pixie tubes. These tubes may be of a three-letter configuration put in the surface of all keys with letter functions. A switch is connected to the bottom of the format key levers which would have a built in potentiometer for changing a voltage signaling each format, to which the I.C. circuit is made sensitive. A set of letters on the keyboard on the required format is then indicated on the keys. A separate potentiometer can act as a shut-off switch and light dimmer for the professional who would not need the system or for those who would not need to see the letters so brightly.

The many who struggle with using the conventional keyboards would find such an individual way of picking letters, a joy. Many who are buying computers today do not know how to touch type. For the professional learner, the brilliantly lit keyboard would help burn the key order into memory much more quickly. For the typewriter industry, advertising and window display of the machines shown lit up, and even having the machines mechanically change formats every several seconds, would awaken a new public interest in them. The same would be true of keyboards for computer and data processing in public display.

In further detail, a power source **11**, whether a battery or a step-down transformer from 117 volts, is connected on one side to an I.C. 12 of a kind used in a calculator to control pixie or other display elements **14**. The display elements **14** are each of a three letter configuration, each corresponding to a different format as selected from the keyboard.

A wire **20** from the power source **11** is brought forward on the floor of the machine where it is connected to a switch and potentiometer **25** which in turn connects

to a three tap potentiometer **22** that has no knob control. Instead, the pot **22** has a swinging arm in the back that is connected to the bottom of a key lever **24** of format changer key **23**. A metal link **26** connects to the swinging arm and moves up and down with the one key format selecting key-lever **24** shown in FIG. **6**. Each format change causes a change in voltage in the pot **22** which provides a corresponding voltage through return wire **24** going to the I.C. **12**.

Coming out of the I.C. **12** are two sets of multiple fine wire cables **13** that run along the floor of the machine and are tied to all lever bars **27** of the letter keys, and they end in a small multiplug **15** before the key which plugs into a mating connector **16**. Short wires from connector **16** connect directly to the display elements **14** in the proper order so as to create a selected one of three letters, to make for a change of format for all the letter keys **18**.

The present multiple format typewriter can be a dual or triple language machine where formats markedly differ, as with English and Russian. A process for making precise scientific or language-adapted formats for the major languages is described later below. With such process, new differing formats of any two other countries could be on the keyboard as well as a basic mother tongue format. (Today, QWERTY nearly blankets the world with its fixed letter layout. A language that has many characters or letters could well use up all three formats for the language to be expressed.

The present multiple format typewriter could also be used as a secret code machine. The operator would type in the form of the contents but would be touch typing as though in the QWERTY format. Translation at the other end would reverse this process.

The third format can be used as an extensive calculator as seen in FIG. **8**. Wiring up for the keyboard display of the numbers and the many mathematical signs can be done with the use of display elements as in the format letter change described above. The actual displaying of the problem in numbers and then giving the answer in the display, as on the regular hand held calculator, would be performed in the topmost row of the typewriter, computer, etc., where the ordinary numbers of the machine are usually found. When selecting the calculator format, the number display on the top row would fade out, and the regular digit, moving decimal display would take over.

FIG. **7** shows an elongated plastic letter key especially shaped to show three letters, each of a different format. The new language-adapted format would take the place of the standard (QWERTY) letters on the center of the keys, the standard letters are on the front slope, and the third format letters (see FIG. **23**) are on the back slope.

III. A Process for Developing an Ideal Format for any Language

In the 115 years since the introduction of the Typewriter in 1872, any attempts to design a new format were always based on empirical, hit or miss, methods of setting up new letter layouts. The present process provides a scientific approach towards creating a new format that can be a direct reflection of the idiomatic needs of the language under study, and will provide the optimum or ideal format for that language. Here, English is given, and an attempt is made to provide a French one, also.

Upon realizing that there is a natural priority order of the fingers reaching the keys, considering them blank, from the most easy to the most difficult (see FIG. **9**), it will be appreciated that such order universally suits all human beings. Numbering the keys by this order allows for precisely matching them to the numbered letters of the given frequency alphabet of a language, providing a Primary or "Perfect" Format shown in FIG. **10**. But because it does not take into account the high activity of the two index fingers and other factors, 16 rules are provided for revision of the "Perfect" Format first to an "Intermediate" and then a "Final" or "Scientific" format.

It is noted that because of the many and complex factors involved in creating the just-right letter layout, an interim format, called the Intermediate, is created according to the 16 rules. For those who will construct other foreign language formats, it will seem that this is a Final Format, but after an interim of a few days or weeks, the unconscious part of the mind that one has trained to this thinking, suddenly sees solutions to minor letter changes that were not as apparent as before. Only then will the Final Format come about through use of the same 16 rules.

The Final Format itself, ironically, may have several false "arrivals" before the "all clear" is found. That is, the Final Format must be the one to use as a checking format in comparing it to the Standard Format in Tables 6 to 12, below, showing and proving how much better it is than QWERTY. The very process itself of going through those tables; of drawing up eight various format layouts in FIGS. **10** to **18** with their letters, numbers, and percentage values; and perhaps having memorized the Frequency Alphabet by letter and number, is such an educational process that it tends to lend continual and further discernment in refining the Final Format down through several last editions to one of no further change—let it be called The Scientific Format.

(1) The Official Numbered Frequency Alphabet of the English Language can be found in any book on Cryptography. It has been counted, refined, and proven correct over several centuries of code making and breaking, and it is of vital use in forming new formats.

TABLE ONE

THE OFFICIAL FREQUENCY ALPHABET OF THE ENGLISH LANGUAGE (NUMBERED)

Accumulated	(30)	(29)	(28)	(27)	(26)	(25)	(24)	(23)	(22)	(21)
	E	T	A	O	N	R	I	S	H	D
Frequency	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Accumulated	(20)	(19)	(18)	(17)	(16)	(15)	(14)	(13)	(12)	(11)
	L	F	C	M	U	G	Y	P	W	B
Frequency	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Accumulated	(10)	(9)	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)
	,	V	.	K	X	J	Q	Z	;	?
Frequency	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)

As is seen, the Frequency Use Alphabet is recorded numerically as the descending order of the most used letters in words, down to the least. Whereas the Accumulated Alphabet (created for convenience here) counting up from the least used key to the most, indicates numerically the relative active use of the letters in this reverse order shown. Unlike the former, its numbers can be added to show a crude relative relationship between keys and rows. The four most used punctuation marks have been placed by the Inventor's own survey.

TABLE TWO

FREQUENCY ALPHABET IN NUMERICAL FREQUENCY OF OCCURRENCE

Letter	Freq. Occur. in 1000 Words	Freq. Occur. in 1000 Letters	Letter	Freq. Occur. in 1000 Words	Freq. Occur in 1000 Letter
1 E	591	131.05	16 G	90	19.94
2 T	473	104.68	17 Y	89	19.82
3 A	368	81.51	18 P	89	19.82
4 O	360	79.95	19 W	68	15.39
5 N	320	70.98	20 B	65	14.40
6 R	308	68.32	21 ,	(44)	(10.00)
7 I	286	63.45	22 V	41	9.19
8 S	275	61.01	23 .	(30)	(6.00)
9 H	237	52.59	24 K	19	4.20
10 D	171	37.88	25 X	7	1.66
11 L	153	33.89	26 J	6	1.32
12 F	132	29.24	27 Q	5	1.22
13 C	124	27.58	28 Z	3	0.77
14 M	114	25.36	29 ;	(1)	(0.05)
15 U	111	24.59	30 ?	(1)	(0.03)

(2) Setting up a Universal Finger-Priority, Numbered-Format for all Keys, 1 to 30; which includes four punctuation marks, for the Scientific format.

This digital process is worked out by starting with a fully laid out keyboard format on paper, with the key tops appearing blank, as in FIG. **12**. With the two hands set in touch-type position, fingers on the Middle Row, note how the fingers press the most easily assessible keys, alternating hands and fingers by consecutive numbers, down to the most inaccessible key—#30. Following the method represented in FIG. **25**, the key accessibility order is to be marked on the blank format diagram, FIG. **12**, as #1 for the index finger of the right hand; #2, same finger, left hand. #3 would be 2nd finger, r.h.; #4 2nd finger, l.h., etc., until the 15 keys for each hand are completely worked out on the diagram, now complete with all 30 numbers, as seen in FIG. **9**.

The resulting Finger-Priority, Numbered-Format is a Universal one and applies to the natural action of the human fingers seeking the keys when resting at the middle or home row.

(3) Forming the "Perfect" Primary Format. This is an overlaying procedure done by combining the Numbered Letters of the Frequency Alphabet in Table 1 with the Numbered Format in FIG. **9** as filled in the blank-key diagram by instructions in FIG. **25**. Combined, FIG. **10** shows this Letter-Number arrangement that results in the "Perfect" or Primary Format. It is not an easily useable one, however, as it violates in several ways other rules that must be worked out.

(4) 16 Rules for Letter Layout in the Three Main Areas of Differing Activity for each hand.

FIG. **12** shows three designated areas for each hand, that call for different letter-finger activity per area. These will result in design placement of these letters, some general, some near-specific, and indicating their derived rules for their true and proper placement.

TABLE THREE

A. The Index Finger Areas. This is the heart of the touch system, where the activity of the two index fingers control six letters each; twelve in all, nearly half all letters used. Because of their high activity these rules for letter placement come about:

Rule #1. Ideally, no one index finger should have to strike any two of the six letters consecutively—making a minimum of bigrams.

Rule #2. Only consonants should be placed in these two areas.

Rule #3. Conversely, no vowels should exist in these areas.

Rule #4. A maximum of bigrams across the centerline are desirable, in the action of one index finger following the other.

B. The Vowel Triangles. The logic of digital activity indicates that the vowels (six) be only placed in designated areas shown in FIG. **12**, outside the index finger area. This will result in their optimal ease of use.

Rule #5. In these areas, the four most used vowels shall be placed in the two areas designated on the Middle Row, two letters each, left and right, beyond the index finger area.

Rule #6. The least used vowels, the U and the Y, shall be placed in the single designated areas, Top Row, with the U to be placed across the centerline from where the Q is placed, beyond the index finger area.

C. The Cluster of Five Remaining Keys on each side. These are controlled by the 2nd, 3rd, and 4th fingers, with various degrees of activity.

Rule #7. The two sets of outside letters in the Top and Bottom Rows, all controlled by the weak 4th finger, shall have letters of the lowest activity, with the Bottom Row holding the least.

Rule #8. The two single letters of the third fingers, Top Row, shall be of lower middle activity, while the single two letters in the Bottom Row shall be of lowest activity.

Rule #9. The two single letters of the second fingers, Bottom Row shall be of low activity.

Rule #10. The two single outside letters of the Middle Row shall be of high activity.

General Rule #11. Any letters of the same finger number may be moved left or right (swapped across the centerline, in some instances) and can be considered a zero move.

General Rule #12. All ten letters of the Middle Row shall be taken from the first ten letters of the frequency alphabet, and shall be considered of equal activity, being directly available.

General Rule #13. Moving of any letter from its place in the Primary Format (See FIG. **10**) with its perfect Unity wherein Frequency Number and Digital Priority Number are combined, shall be done by constantly evaluating these two factors in moving that letter to the next key.

General Rule #14. Where possible, combinations of adjacent letters should be sought to simulate words or word-sounds to allow for easy memorizing of keyboard.

General Rule #15. Where feasible, a letter that is close in number activity to a letter of the Standard Format may remain in place, or be moved there.

General Rule #16. When a moved letter displaces another with only one number difference in digital frequency, it is considered a "zero" move.

(5) Applying the 16 Rules of Letter Placement to make the Intermediate Format; altering the Primary Format.

TABLE FOUR

(The given letter displaces the next one down in the group.)

Row	Letter Moved	Frequency Number	Frq. No. Moved To	Reason for Move	Rule Number
Middle	E	1	3	Out of Index Area into Vowel Trngl	#3 & #5
↓	A*	3	4	To opposite number - a change-over	#11
↓	O	4	6	One Key move - Still in Vowel Trngl	#5
↓	R	6	9	Cross Ctrline - Makes 17 Bigrams-CR,	#4 & #2
↓	H	9	1	One Key move - Makes 6 Bigrams-TH,	#4 & #2
↓	+I	7	5	Into Vowel Triangle Exchange	#5
↓	+N	5	7	Out of Vowel Triangle Exchange	#5
Top	U	15	19	Bottom Row to Top, into Vowel Trngl	#6
↓	W	19	22	Readability - As on Std. Format	#14 #11 #15
↓	V*	22	21	To opposite number - a change-over	#14
↓	,	21	15	To Bottom Row - Low Activity	(#2) & #13
↓	+Y	17	20	Out of index Area-Cross Ctrln - Vowel Trngl	#6
↓	+B	20	17	Into index Area - Bad Combo of BR/BL	#2 & #4
Bottom	C*	13	14	Swap, makes good bigrams. CR/CH/CL	#4
↓	M*	14	13	Swap, makes better bigrams. Total = 8	#4

Note:
*indicates Swap places for two letters, or change-over for a single letter. In both instances, a letter moving across the centerline to letter 1 digit removed, same finger other hand, is considered 'no-change' from the "Perfect" or Primary Format.
Note:
+indicates that these two letters exchange places only.

(6) Applying the 16 Rules of Letter Placement to make the Final Format, by altering the Intermediate Format.

The first emphasis, on explaining this process, is to show clearly how the ideal English Format could come about. The second emphasis is to show that it further acts as a guide, to those who will go beyond its one example, to make custom formats for other languages. It may seem unscientific to show what seems to be a single process of keyboard letter development, in going beyond the Primary Format, to make it a two or three step process, but practicality rules otherwise.

Having made multiple blank copies of the new split keyboard layout, sans letters, they lent for facile attempts, otherwise forgotten, of changing the Primary Format. Later on, a few of them became part of the recorded changes. These sum up, with other current observations, to give the last ten listed below, as the "Final" Format. See FIG. 14.

TABLE FIVE

Row	Letter Moved	Frequency Number	Frq No. Moved To	Reason for Move	Rule Number
Bottom	J	26	30	Make room for X	#13
↓	?*	39	29	Old Std. Format place and a Swap	#15, #11 #7
↓	.	29	25	Higher Activity	#13
↓	X*	25	26	Old Standard Format Place.	#15
↓	+M	14 (on 13)	21	Exchange with comma. Readability	(#14)
↓	+,	21 (on 15)	13	Exchange with M. Readability	(#14)
Top	Q*	27	28	Old Std Format, Swap, Readability	#15, #14
↓	Z	28	27	Swap Readability	#11, (#14)
Middle	+S	8	10	Swap Readability	#11, #14
	+D	10	8	Swap Readability	#11 #14

Following Rule #14, the ten middle or home row keys are assigned, in the present example, the letters DOATS RHEIN (see FIG. 14). The present example is not, however, intended to be limitative. It will be appreciated that other pairs of word-sounds each of at least four letters can be created for the left- and right-hand sides of the middle row of keys, e.g., SAINT RHEOD, provided the remaining rules of character placement are satisfied.

(7) Checking the Letter Layout of the Scientific Keyboard. There are several methods of checking the efficiency of the New Keyboard Layout, and always in comparison with the Standard Keyboard Format. These methods are:

(A) Design check by row on row sentence comparison.

(B) Design check of maximum and minimum bigrams in the Index Finger Areas.

(C) Design Check by Efficient use of Cryptography lists typed on the middle line.

(D) Design check by percentage ratings through Horizontal and Vertical analysis.

(A) Design Check by Row on Row Sentence Comparison. Note that the sentence occupies three levels. Each typed letter is assigned to the row it occupies on the keyboard. Negative rating is given towards the fingers having to use the Top and Bottom Rows in the letters to complete the sentence; with the Middle Row letters counted as zero, where the fingers remain or return to these keys.

TABLE SIX

Row
STANDARD KEYBOARD

TABLE SIX-continued

Row

Top	OW I T E T E OR OO E TO O E TO T E I O T E P RTY	
Mid	S H I F ALL G D H A D F H A	
Bot	N M M N C M	

Analysis of the Above

Top	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	28
Mid	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= 15
Bot	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 7
		1 =35
		0 =15
	Score: 15 No moves 35 Moves, an efficiency rating of 30%.	Total = 50

NEW KEYBOARD

Top	W F LL F P Y	
Mid	NO IS THE TI E OR A OOD EN TO O E TO THE AID O THE ART	
Bot	M G M C M	

Analysis of the Above

Top	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7
Mid	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= 37
Bot	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6
		1 =13
		0 =37
	Score: 37 No-moves, 13 Moves, an efficiency rating of 74%.	Total = 50

(B) Design Check of bigrams in the Index Finger Area. It is desirable that the activity of the index fingers not have to do extra work, busy as they are. Within the area of six letters that each controls, neither finger, ideally, should have to strike two letters consecutively—make a digraph, that is.

In the list below, each set of six keys make 15 combinations of letters and 15 more in reverse lettering. Bigrams here are the so-called "bad" combinations, two pronounceable letters, and are shown in underlined capital letters. Irrational, unpronounceable, or infrequently used ones, are "okay" and are shown in the lower case.

TABLE SEVEN

Standard Keyboard				New Keyboard			
Left Rows		Right Rows		Left Rows		Right Rows	
TR	RT	YU	UY	pf	fp	BL	lb
tf	FT	yj	jy	pt	tp	bh=	hb
tg	gt	yh	hy	ps	sp	BR	RB
tv	vt	yn	NY	pc	cp	bm	mb
tb	bt	ym	MY	pg	gp	b,	,b
rf	FR	uj	JU	FT	tf	lh	hl
RG	GR	uh	HU	fs	sf	lr	rl
RV	vr	UN	NU	fc	cf	LM	ml
RB	BR	UM	MU	fg	gf	l,	,l
fg	gf	hj	jh	ts	ST	hr	rh
fv	vf	hn	nh	tc	CT	hm	mh
fb	bf	hm	mh	tg	gt	h,	,h
gv	vg	jn	nj	sc	cs	rm	mr
gb	bg	jm	mj	sg	gs	r,	,r
vb	bv	nm	mn	cg	gc	,m	,m
Score . . .	18 . . . "bad"			Score . . .	7 . . . "bad"		
	42 . . . "okay"				53 . . . "okay"		

A Maximum Use of bigrams by Consecutive Finger Action across the Centerline is preferred. Bigrams, created by this action of the index fingers is the most rapid on the keyboard, and are desirable in this area.

Thirty-six combinations in one direction across the centerline are possible, and 36 more in reverse lettering. Useable bigrams are shown in underlined capital letters, irrational ones, etc., are in the lower case. On the Standard Keyboard, the vowels Y and U violate good design rules here, and so have not been counted as useful combinations.

TABLE EIGHT

Standard Keyboard		New Keyboard	
ty	yt	fb	bf
tu	ut	FL	LF
TH	HT	FR	RF
tj	jt	fh	hf
tn	NT	f,	,f
tm	mt	fm	mf
ry	yr	pb	bp
ru	ur	PL	LP
rh	hr	PR	RP
rj	jr	PH	hp
RN	nr	p,	,p
RM	MR	pm	MP
fy	yf	sb	bs
fu	uf	SL	ls
fh	hf	SR	rs
fj	jf	SH	hs
fn	nf	s,	,s
fm	mf	SM	MS
gy	yg	tb	bt
gu	ug	tl	LT
GH	hg	TR	RT
gj	jg	TH	HT
gn	NG	t,	,t
gm	mg	tm	MT
vy	yv	gb	bg
vu	uv	GL	lg
vh	hv	GR	RG
vj	jv	GH	hg
vn	NV	g,	,g
vm	mv	gm	mg
by	yb	cb	bc
bu	ub	CL	lc
bh	hb	CR	RC
bj	jb	CH	hc
bn	nb	c,	,c
bm	MB	cm	mc
Score . . . 10 out of 72		Score . . . 27 out of 72	

The list below is extrapolated from the list above:

FR	FL	TH
PR	PL	PH
CR	CL	CH
TR	SL	SH
GR	GL	GH

(C) Design Check from Official Letter Combination Lists. The science of Cryptography offers the five following lists of various most-used letter combinations for comparison.

In each instance the keys of the middle line are used as the basis of comparison of the two keyboards. Note that the Standard Format has only nine letters on that line, but the Scientific Format uses all ten for letters.

Scoring is shown by underlining a capital letter when it fits to that format, and a lower case when it does not. The following is a list of 20 bigrams which occur quite often in English, given in order of their frequency use.

TABLE NINE

Standard Keyboard	Scientific Keyboard
tH	TH
He	HE
An	AN
re	RE
er	ER
in	TR
on	ON
At	AT
nD	ND
St	ST
eS	ES
en	EN
oF	Of
te	TE
eD	ED
or	OR
ti	TI
Hi	HI
AS	AS
to	TO
Score: 1 of 2 letters	Score: 19 of 2 letters
10 of 1 letter	1 of 1 letter
9 of no letter	20
20	
Efficiency rating of 30%	Efficiency rating of 95%

Twenty of the most common three letter part-words for comparison are:

TABLE TEN

Standard Keyboard	Scientific Keyboard
tHe	THE
inG	INg
And	AND
ion	ION
ent	ENT
For	fOR
tio	TIO
ere	ERE
Her	HER
Ate	ATE
ver	vER
ter	TER
tHA	THA
Ati	ATI

TABLE TEN-continued

Standard Keyboard	Scientific Keyboard
HAt	HAT
erS	ERS
HiS	HIS
reS	RES
iLL	lll
Are	ARE
Score: 4 of 2 letters	Score: 16 of 3 letters
10 of 1 letter	3 of 2 letters
6 of 0 letter	1 of 1 letter
20	20
Efficiency rating of 23%	Efficiency rating of 95%

(C3) Design Check from Official Letter Combination Lists. Twenty of the most common two-letter words for comparison are:

TABLE ELEVEN

Standard Keyboard	Scientific Keyboard
oF	Of
to	TO
in	IN
it	IT
iS	IS
be	bE
AS	AS
At	AT
So	SO
we	wE
He	HE
by	by
or	OR
on	ON
Do	DO
iF	If
me	mE
my	my
up	up
An	AN
Score: 1 of 2 letters	Score: 12 of 2 letters
8 of 1 letter	5 of 1 letter
11 of 0 letters	3 of 0 letters
20	20
Efficiency rating of 25%	Efficiency rating of 72%

(D) Design Check by Percentage Ratings through Horizontal Analysis. Comparison of the New Format and the Standard Format to the Perfect Format.

When the numbered letters of a format are compared to those of the Perfect Format, the disparity that is less than the perfection shows up in the format compared. The New Format does well in comparison, as can be seen in the table below. The Standard Format shows up as a series of wild numbers, when compared, indicating the similar disorder of the letters, as seen below.

TABLE TWELVE

New Format	H	T	E	A	I	O	N	D	R	S
Digital Number	(9)	(2) *	(1)	(3) *	(7)	(4)	(5)	(10)	(6)	(8)
Perfect Format	E	T	A	O	N	R	T	S	H	D
Digital Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) *	(10)
Standard Format	J	F	K	D	L	S	;	A	H	G
Digital Number	(26)	(12)	(23)	(10)	(11)	(8)	(21)	(3)	(9)	(16)
New Format	L	F	M	,	M	G	B	P	U	Y
Digital Number	(11) *	(12) *	(14) *	(21) *	(14)	(16) *	(20)	(18) *	(15)	(17)
Perfect Format	L	F	C	M	U	G	Y	P	W	B
Digital Number	(11)	(12)	(13) *	(14)	(15)	(16)	(17) *	(18)	(19)	(20)
Standard Format	U	R	M	V	N	B	Y	T	I	E
Digital Number	(15)	(9)	(14)	(22)	(7)	(20)	(17)	(18)	(7)	(1)
New Format	V	W	.	K	;	X	Z	Q	?	J
Digital Number	(22) *	(19)	(23) *	(24) *	(29) *	(25) *	(28) *	(27) *	(18) *	(26) *

TABLE TWELVE-continued

Perfect Format	,	V	.	K	X	J	Q	Z	;	?
Digital Number	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
								*		
Standard Format	O	W	,	C	.	X	P	Q	?	Z
Digital Number	(4)	(19)	(21)	(13)	(23)	(25)	(18)	(27)	(30)	(28)

Note
*denotes Letter Perfect

(D2) Design Check by Percentage Ratings through Horizontal Analysis. The Scientific Format compared to the Numbered letters of the Primary or "Perfect" Format, FIG. 10.

Here is a more dramatic presentation of the preceding, showing the final layout of the Scientific Format with the proper frequency number beneath each letter. Below that is the frequency number of the Primary or Perfect Format that either agrees with the above number when the letter remained the same, or the number of the Perfect Format letter that was displaced by the Scientific Format letter. The small number between them, to the right indicates the numerical difference between the two. Zero, if the letter has remained unchanged, or taken from the opposite side, one number removed. If the number shows a plus sign, it shows the number of steps on the frequency scale the slower letter has jumped to a more active position. Conversely, a negative sign shows that an active letter has assumed a position that-amount-down-the-scale to a more awkward position relative to its use.

Under this analysis, the Ideal Format lives up to its name, with 15 Zeros, or marked unchanged, with 6 actually so and 9 swapped to the other finger. Of the 15 changed, number differences were mostly slight, with 6-2's + or −; 3-4's + or −; and 2-8's −; which total 52 + or −, nearly evenly divided.

(D3) Design Check by Percentage Ratings.

The standard Format compared to the Numbered Letters of the Scientific Format, FIG. 16.

Comparing the Standard Format to its new rival the Scientific Format, shows it to be a relatively awkward groupings of letters. Listing its totaled deviation from the Scientific Format is best shown in a small table, viz.:

Row	+	−
Top	1-4	7-77
Mid	9-100	1-7
Bot	3-15	5-35
	13-119	13-119

Totaling 238 on 26 keys, whereas in the comparison in D2 above the Scientific Format against the Primary Format, the score was 52 on 15 keys. Note that many letters are off their numerical mark by + or − 16, 17, 18, and 22. All proving that every minute of typing on the Standard Format is a battle of forcing ones fingers to a constant series of inefficient movements.

Letter Use per Thousand, with Row Percentage Use of the Standard Format compared to the Scientific Format. See FIG. 17 for Standard Format and FIG. 18 for New Format.

The listed numbers under each letter are taken from Table Two above as being their average use per thousand. They may also be read as actual percentages by moving one decimal to the left. This is how the row ratings on each side have been shown. The Standard "QWERTY" Format shows up in greatly unbalanced proportions, with nearly 53% of the use of letters on the Top Row and 32% on the Middle Row. All across the last hundred years, it perhaps allowed for greater efficiency, for the millions who have been trained to this format, to use the upper line as the "home key row" rather than the Middle Row. Further analysis shows what has long been suspected, that the left hand does more of the work in a ratio of 60% for it and 40% for the more dextrous right hand.

In comparison, the New Scientific Format lives up to its name, showing that 75% of all letters used are right in the Middle Row, immediately at the eight fingers. The need to use the Top and Bottom Rows is reduced to less than 17% and 10% respectively. The two sides, total up nearly 50% to 50%. This is accounted for by the even distribution of numbers, right and left, in setting up the Priority Fingered Format in FIG. 9. The actual worldwide use of the present Scientific Format will get its final honing by minds-other-than-one before its being acclaimed, and it may be that this balanced situation of the hands can be corrected to the proper bias for the right hand.

Further comparison shows up how little actual work is being done by the right hand in its own "home row", that of 9%, against a near 23% for the left, and 32% for the immediate control of the Top Row of the Standard Format. Whereas, on the Scientific Format in the "home row", the right hand has greater control use of the keys for it alone than do both hands on the same row on the Standard Format.

Of course the obvious "secret" of the Scientific format's superiority lies in the placement of the ten first letters of the Frequency Alphabet on the Middle Row. Considering the natural placement of the index finger, the format allows it to rapidly move up and down, nearly as fast as sidewise, to reach L-3.4%; F-2.9% and (below) C-2.7% and comma-1.0%, all equaling 10%. Adding this amount to the 75% gives a total of 85% use of all letters by 14 letters, leaving a mere 15% left of work use for the other 13 letters and 3 Punctuation Marks.

B. The Process for evolving the ideal Format for the French Language.

Introduction: Following the outline of this Process, French has been chosen as the next language for which to customize a scientific Format. It is here only being carried as far as the Intermediate Format, which should give a good outline as to what a format should look like other than the English one evolved. A native French person, skilled in the use of this process, then can bring about the Final Format.

The Frequency Alphabet for the French Language, along with Spanish, Italian, and German are found in books on Cryptography, located, e.g., in the Library of Congress, Washington, D.C. All four languages have 8 or 9 out of 10 of the first letters of the English Frequency Alphabet. In the French, D(#10) (English) became #11, and H (#9) became #23, the latter letter

alone giving good indication that foreign languages need least of all the "standard" format.

As in working out the English Format, the letters of the Frequency alphabet, with their numbers, are matched to the numbers of the Priority Numbered Format. That format being a Universal one, applies, then, to the French format formation, also. The French Frequency Alphabet is shown below, and for comparative purposes it will be repeated in the drawing as FIG. **19**. The percentage values in Table 14 will be used later to indicate the actual efficiency of this new evolving format in FIG. **21**. So the combining of the French Frequency Alphabet, Table 13 and FIG. **19**, with the Universal Priority Numbered Format, FIG. **9**, will automatically lay out a fixed "perfect" Primary Format in that language.

TABLE THIRTEEN

THE NUMBERED FREQUENCY ALPHABET OF THE FRENCH LANGUAGE

E	N	A	L	S	I	T	U	O	L
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
D	C	P	M	V	F	B	G	Q	,
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
X	.	H	Y	Z	J	K	W	;	?
(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)

Compare the above table with its English counterpart in Table One. Some of the more extreme surprises are noted below.

TABLE FOURTEEN

Letter	Eng Freq Number	Fr. Freq Number	Greater Activity	Less Activity	Letter	Eng Freq Number	Fr. Freq Number	Greater Activity	Less Activity
T	2	7		5	P	18	13	5	
O	4	9		5	V	22	15	7	
H	9	23		14	Q	27	19	7	
W	19	28		9	X	26	21	5	
					U	15	8	7	

Incorporated by reference herein is a Spanish book on Cryptography of various European languages, including the French, by Arturo Fuentes Rabe, L.O.C. #Z104/0.F95, page 166. Graphs and charts in the reference relating to frequency of use of letters in the French language can be used, at least up to the Intermediate Format, which claims no finality.

TABLE FIFTEEN

THE FRENCH FREQUENCY ALPHABET IN PERCENTAGE USE PER LETTER OF OCCURENCE
(With per 1000 average shown as per 100)
(+1.3% = Punct. Mks.)

Letter	Freq. of Occur. in 100 Words (%)	Letter	Freq. of Occur. in 100 Words (%)
1 E	16.2	16 F	1.4
2 N	8.6	17 B	0.9
3 A	7.1	18 G	0.8
4 R	6.8	19 Q	0.7
5 S	6.7	20 ,	0.6
6 I	6.7	21 X	0.5
7 T	6.6	22 .	0.5
8 U	6.6	23 H	0.5
9 O	6.6	24 Y	0.4
10 L	5.7	25 Z	0.2
11 D	4.7	26 J	0.2
12 C	3.9	27 K	0.1
13 P	2.9	28 W	0.1
14 M	3.2	29 ;	0.1
15 V	1.9	30 ?	0.1 = 101.3%

Table 16 reflects the Process of converting the Primary Format into the Intermediate Format. The 16 rules of Letter Layout, which, again, are of Universal application, are followed as set out in Table Three. As a result, the Intermediate Format for the French Language is found in FIG. **21**. The **19** moves to do so (as against the English 15, see Table 4) are listed below, letter by letter.

TABLE SIXTEEN

LETTERS MOVED ON PRIMARY FORMAT TO CREATE INTERMEDIATE FORMAT
(The given letter displaces the next one down in the group)

Row	Letter	Freq.	Freq. No. Moved To	Reason For Move	Rule Number
Mid	E	1	5	Moved 1 to Rt. into Vowel Triangle	#5 #14
↓	S	5	10	Moved to left Index area	#14
↓	L	10	8	Displaces U, which must move	#14
↓	U	8	19	Moved to Vowel Triangle	#6
Top	Q	19	15	To Bottom Row, Medium Use	#3 #13
Bot	V	15	11	To allow D to move down, Medium activity	#13
Top	D	11	9	Displaces O, which must move	#14
Mid	O	9	4	Moved to Vowel Triangle	#5
Mid	R	4	1	Moved to Index area	#14 #2
Bot	H	23	22	Moved 1 Number Readability	#16 #14 #8
Top	.	22	25	To low activity	#15 #8
Bot	Z	25	27	To low activity	#13 #14 #7
Top	K	27	24	Replaces Y, which must move	#9
Bot	Y	24	20	To Vowel Triangle	#6
Top	,	20	23	To Standard position	#15, #9
Bot	;*	29	30	Swap with ? Old Standard position	#11 #15 #7
Bot	?*	30	29	Swap with ; Old Standard position	#11 #15 #7
Bot	M*	14	13	Swap with P, Old Standard position	#15 #16
Bot	P*	13	14	Swap with M, Better Bigrams	#4 #16

Following in Table 17 are lists of bigrams, short words, and trigrams of the French Language. Missing are certain bigrams that just don't exist, as in English. Thus, the letter breakdown in the area of the two index

fingers does not have the same meaningful consideration as that same area does in English.

TABLE SEVENTEEN

Bigrams	2 Letter Words	Trigrams
ES	AN	ENT
EN	AU	EDE
LE	CE	LES
DE	CI	LLE
ON	DE	QUE
OU	DU	AIT
RE	EN	EME
NE	ET	ION
SE	IL	EUR
EL	JE	ELL
AI	LA	SSE
TE	LE	EST
LA	MA	DAN
IT		DEL
ER	NE	MEN
ED	NI	DES
QU	NU	TIO
ME	ON	ESE
KM	OU	ANS
AN	SA	
ET	SE	
EU	SI	
	TA	
	TE	
	TU	

Single Letter Words are: A, - O, - Y.
Frequency of the use of the letter E is 17% of all letters used.
Most common letters to begin a word: D L E P A C B M R I F, etc.
Second such letter: E A A U N R I T, etc.
Third such letter: S E U N T I R, etc.
Initial Consonant Bigrams: BL, BR, PR, FL, VR CR, CL, CR, GL, GR, TR, DR, CH, PH, TH, SC, SP, ST.

I claim:

1. A process for determining optimum keyboard formats for a given language, comprising:

(a) establishing a fixed array of an upper row, a middle row and a lower row of key members with ten key members in each row, thereby defining a keyboard having a left-hand side and a right-hand side;

(b) defining sets of key members whereby each key member in a set is to be actuated by a certain finger of a keyboard operator after placing the operator's first to fourth fingers of each hand at a rest position on the first to fourth and the seventh to tenth key members of the middle row, counting from left to right;

(c) consecutively ordering each of the key members of said keyboard according to the relative ease of finger actuation by the operator when the operator's fingers start at said rest position, alternating between each hand for each of the first to fourth fingers, thereby establishing a different finger priority number for each of the key members;

(d) determining the frequency of use of characters including letters and punctuation marks, in words and sentences of said language;

(e) assigning a first frequency number corresponding to the character most frequently used in said language;

(f) continuing to assign consecutive frequency numbers to said characters from the character second most frequently used to the least frequently used character in said language;

(g) selecting one of a plurality of keyboard formats, said formats including a scientific keyboard format defined by

(h) matching each of the priority numbered key members with a corresponding frequency numbered character, thereby establishing a primary format whereby the ten most frequently used letter characters in said language are matched to the key members of the middle row;

(i) assigning only consonant letter characters to the middle row key members actuatable by the index fingers of the operator, by exchanging placement of a vowel letter character matched to the index finger key members with a consonant letter character matched to another middle row key member and having a frequency of use close to that of the vowel letter character which it replaces;

(j) assigning the four most frequently used vowel letter characters in said language to the key member group including the second, third, eighth and ninth key members of the middle row, counting from left to right, by exchanging placement of another kind of character matched to said key member group with a vowel letter character matched to a key member outside said key member group and having a frequency of use close to that of the other kind of character which it replaces;

(k) assigning vowel letter characters other than said four most frequently used ones to the third and eighth key members of said upper row, counting from left to right; and

(l) exchanging the placement of consonant letter characters with one another along the middle row and exchanging the placement of vowel letter characters with one another along said middle row to create a word-like sound of at least four letter characters for association with each hand thereby facilitating easy memorization of the letter character layout in said scientific keyboard format.

2. The process of claim 1, including causing each of the key members to convey the character with which the key member is matched to information receiving means, when the key member is actuated by the operator.

3. The process of claim 1, including matching the vowel letter characters A, E, I, O and the consonant letter characters, D, H, N, R, S and T to the ten key members of the middle row when selecting English as said given language.

4. The process of claim 3, including establishing the word-like sounds DOATS RHEIN for the middle row of key members.

5. The process of claim 3, including establishing the word-like sounds SAINT RHEOD for the middle row of key members.

6. The process of claim 1, including assigning only consonant letter characters to the key members in the set actuatable by said index fingers to that a maximum of bigrams which occur in words of said language can be formed by both index fingers in the action of one index finger following the other, by exchanging placement of consonant letter characters matched to said index finger set of key members while closely equating the frequency of use of the exchanged characters.

7. The process of claim 1, including arranging in key members of the right-hand side of said keyboard in columns which slope downwardly to the right, and arranging the key members of the left-hand side of said keyboard in columns which slope downwardly to the left.

8. A process according to claim 1, said selection step including selecting a people's keyboard format alternatively to the scientific keyboard format of steps (h) to

(l), said people's keyboard format defined by assigning the 12 most frequently used letters in said given language to the fourth, fifth, sixth and seventh key members of said upper, said middle and said lower rows of key members, thereby allowing the operator to actuate the key members corresponding to the 12 most frequently used letters with the index fingers when starting from said rest position.

9. A process for determining optimum keyboard formats for a given language, comprising:

(a) establishing a fixed array of rows of key members thereby defining a keyboard;

(b) placing the fingers of the hands of a keyboard operator at a touch-type home position along a home row of key members of said keyboard;

(c) determining the relative ease of actuation of each key member of said keyboard by the operator's fingers, by

(1) assigning a first priority number corresponding to a most easily actuatable key member to that key member on which the index finger of a first one of said operator's hands rests in said home position;

(2) assigning a second priority number corresponding to a second most easily actuatable key member on which the index finger of the second one of said operator's hands rests in said home position;

(3) assigning a third priority number corresponding to a third most easily actuatable key member to that key member on which the second finger of the first one of the operator's hands rests in said home position;

(4) assigning a fourth priority number corresponding to a fourth most easily actuatable key member to that key member on which the second finger of the second hand rests in said home position;

(5) continuing the above steps (c)(1) to (c)(4) sequentially for the third fingers of the first and second hands and for the fourth fingers of said hands, thereby assigning additional consecutive priority numbers for key members in said home row;

(d) establishing sets of key members in the vicinity of those key members on which the operator's fingers rest in said home position, the key members in each set to be actuated by moving a given one of said fingers from said home position;

(e) continuing to assign consecutive priority numbers to key members in said sets according to the finger by which each key member is actuatable, alternating between like fingers of the first and second hands beginning with the index finger;

(f) determining the frequency of use of characters including letters and punctuation marks, in words and sentences of said language;

(g) assigning a first frequency number corresponding to the character most frequently used in said language;

(h) continuing to assign consecutive frequency numbers to said characters from the character second most frequently used to the least frequently used character in said language;

(i) selecting a scientific keyboard format by

(j) matching each of the priority numbered key members with a corresponding frequency numbered character, thereby establishing a primary format, whereby the ten most frequently used letter characters in said language are matched to the key members of the home row;

(k) assigning only consonant letter characters to the key members in said home row which are actuatable by the index fingers, by exchanging placement of a vowel letter character matched to the index finger key members with a consonant letter character matched to another home row key member and having a frequency to use close to that of the vowel letter character which it replaces;

(l) assigning the four most frequently used vowel letter characters in said language to the group of home row key members on which the second and the third fingers of the operator's hands rest in said home position, by exchanging placement of another kind of character matched to said home row group with a vowel letter character matched to a key member outside said group and having a frequency of use close to that of the other kind of character which it replaces;

(m) assigning remaining vowel letter characters to key members which are actuatable by the second fingers of the operator's hands and are in a row immediately above said home row; and

(n) exchanging the placement of consonant letter characters with one another along the home row and exchanging the placement of vowel letter characters with one another along said home row to create a word-like sound of at least four letter characters for association with each hand, thereby facilitating easy memorization of the letter character layout in said scientific keyboard format.

10. The process of claim 9, including matching the vowel letter characters A, E, I, O and the consonant letter characters D, H, N, R, S and T to ten key numbers of the home row when selecting English as said given language.

11. The process of claim 10, including establishing the word-like sounds DOATS RHEIN for the home row of key members.

12. The process of claim 10, including establishing the word-like sounds SAINT RHEOD for the home row of key members.

13. The process of claim 9, including assigning consonant letter characters to the key members in the set actuatable by said index fingers so that a maximum of bigrams which occur in words of said language can be formed by both index fingers in the action of one index finger following the other, by exchanging placement of consonant letter characters matched to said index finger set of key members while closely equating the frequency of use of the exchanged characters.

14. The process of claim 9, including arranging the key members at a right-hand side of said keyboard in columns which slope downwardly to the right, and arranging the key members at a left-hand side of said keyboard in columns which slope downwardly to the left.

15. The process of claim 9, including causing each of the key members to convey the character with which the key member is matched to information receiving means, when the key member is actuated by the operator.

16. A process according to claim 9, said selection step including selecting a people's keyboard format alternatively to the scientific keyboard format of steps (j) to (n), said people's keyboard format defined by assigning the 12 most frequently used letters in said given language to key members which are to be actuated with the index fingers, thereby allowing the operator to actuate the key members corresponding to the 12 most frequently used letters with the index fingers when starting from said home position.

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