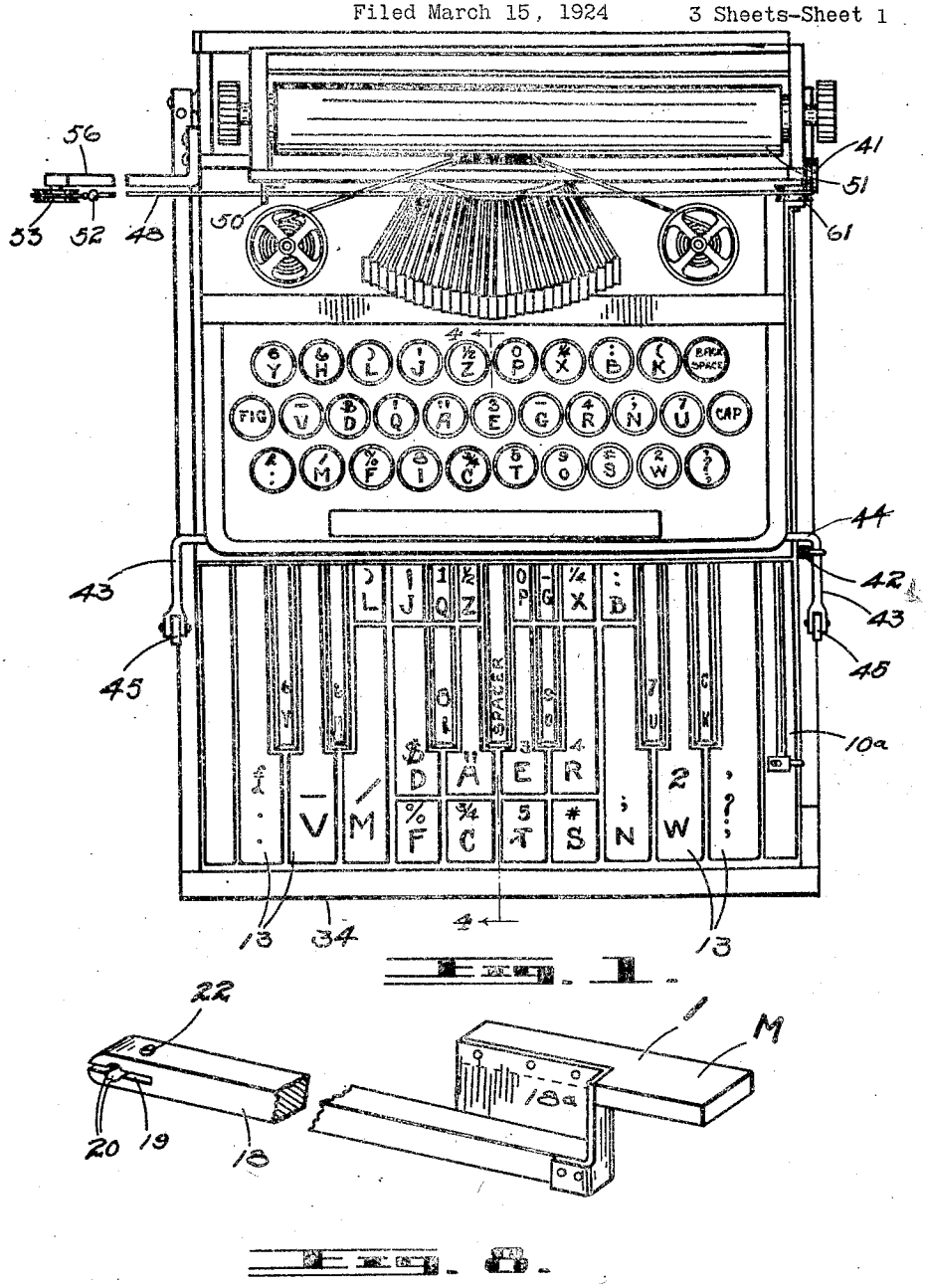
Sept. 7, 1926. 1,598,813

E. I. GALE

TYPEWRITER KEYBOARD

Filed March 15, 1924 3 Sheets-Sheet 1



INVENTOR

EWART I. GALE

BY William S. Fowler

ATTORNEY

Sept. 7, 1926. 1,598,813

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TYPEWRITER KEYBOARD

Filed March 15, 1924 3 Sheets-Sheet 2

Fig. 2.

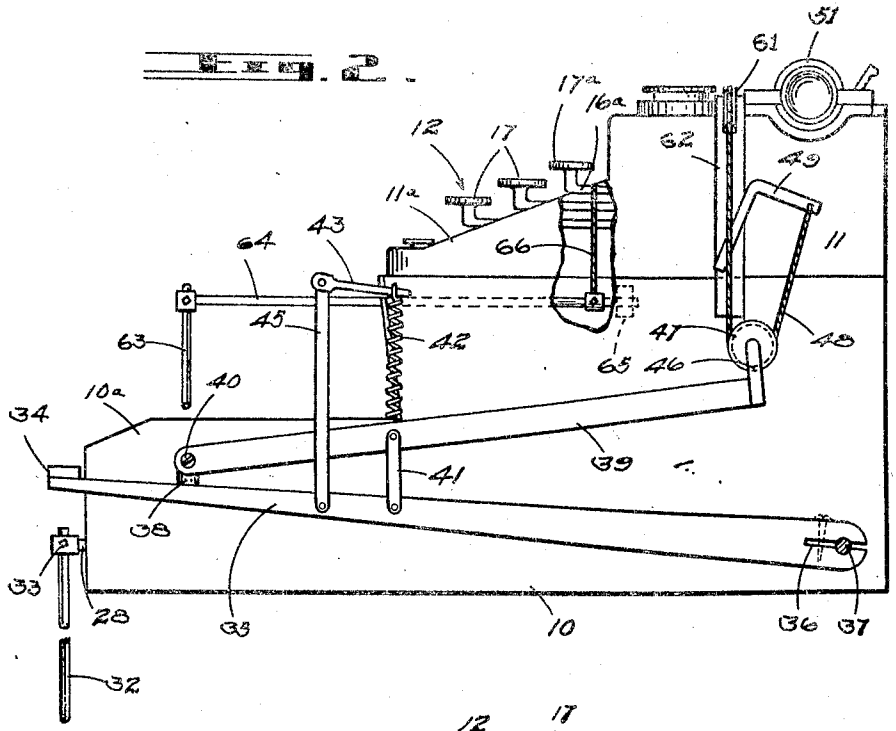
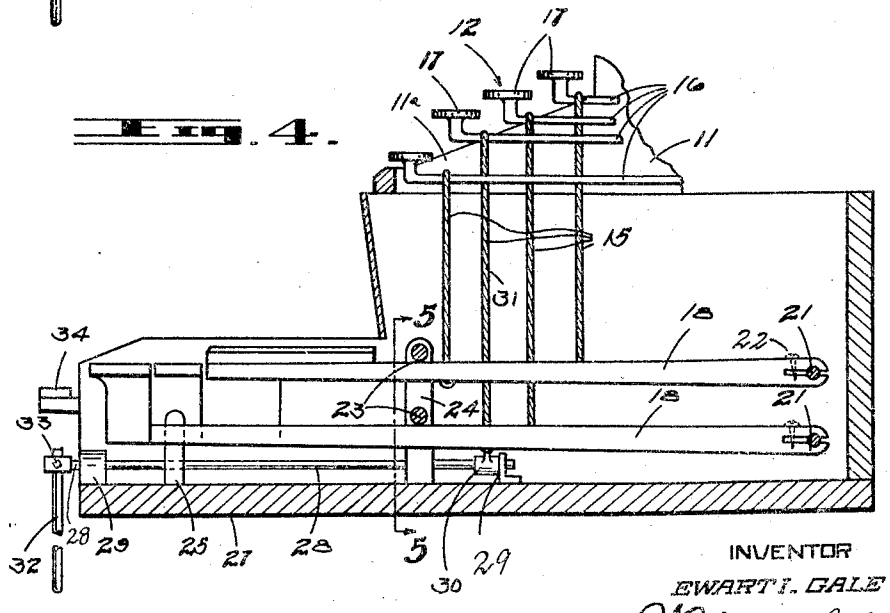


Fig. 4.



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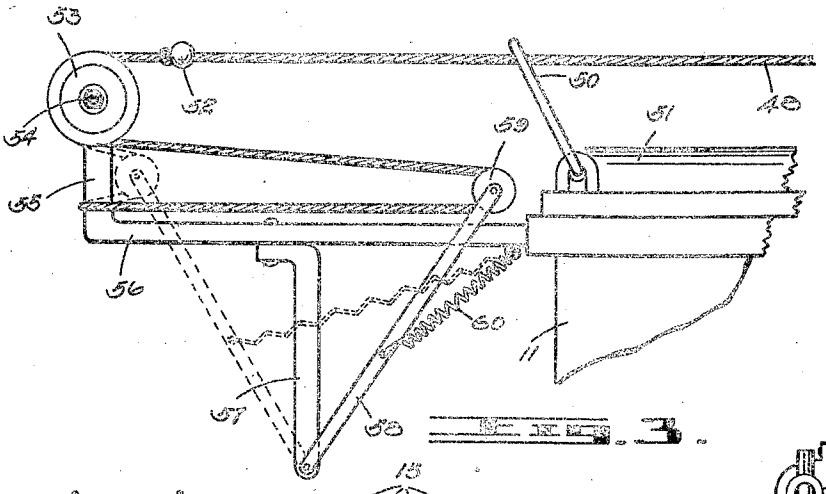


Fig. 3.

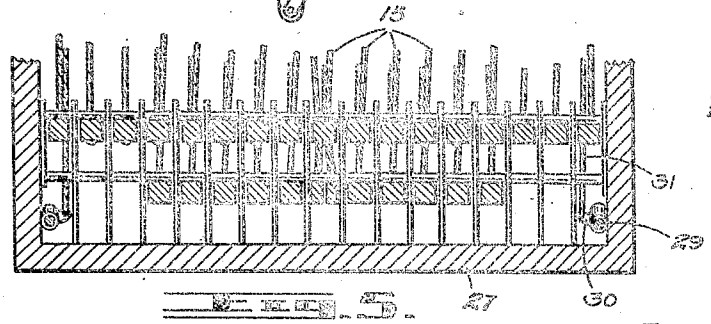


Fig. 5.

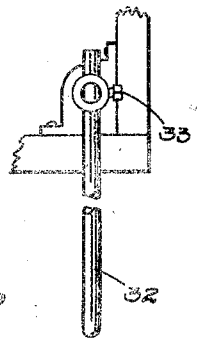


Fig. 9

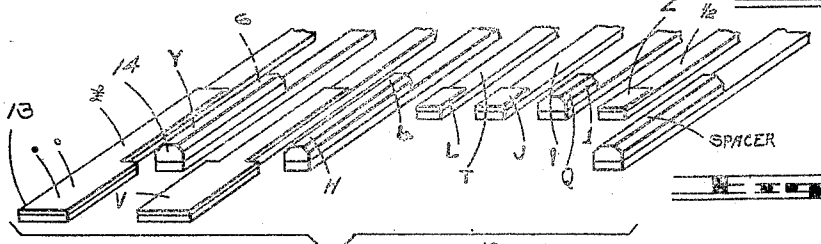


Fig. 6.

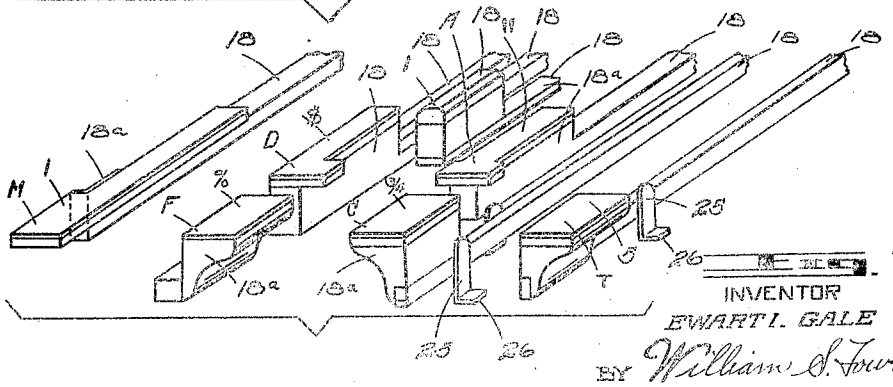


Fig. 7.

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UNITED STATES PATENT OFFICE.

EWART I. GALE, OF DESERONTO, ONTARIO, CANADA.

TYPEWRITER KEYBOARD.

Application filed March 15, 1924. Serial No. 699,530.

This invention has relation to certain new and useful improvements in a typewriter key board and has for its primary object the provision of an auxiliary key board which may be readily incorporated in a standard typewriter when building the same or added thereto after completion of the regular or standard typewriter, with the keys of the auxiliary key board substantially corresponding to the keys of a piano, so that anyone used to playing the piano may readily attain speed and accuracy in operating the typewriter.

The invention has for another object the provision of a key board for a typewriter with the keys arranged similar to a section of the piano key board, thereby placing all of the keys in two horizontal planes instead of three or more horizontal planes or banks, as in the present typewriter key boards.

The invention has for another object the provision of a typewriter key board of the character stated in which the keys of the new key board structure will be arranged in a simple and compact manner, so that all of the fingers may be employed in a natural manner, without the necessity of raising and lowering the entire hand to reach upper banks of keys, thereby giving an easy free rapid and accurate use of the fingers with a uniform pressure on all of the keys while typing, the keys which are required for more frequent use being arranged in the centre of the new key board, where they are always directly beneath the first and second fingers and the thumbs.

The invention has for a further object the provision of a typewriter having a key board of the character stated and a line spacing and carriage returning bar extending across the front of the keys and operable by the thumbs without the necessity of raising the hands from the key board.

A still further object of the invention resides in the provision of a typewriter having a flat key board with the keys of elongated form and similar to the keys of a piano key board and connected with the respective type bar operating levers carrying the usual form of keys on the regular or ordinary key board, so that the construction and operation of the remainder of the typewriter operative parts need not be altered, with the exception that the former shift keys are replaced by a shifting mechanism controlled by the feet or knees of the operator.

A still further object of the invention resides in the provision of a typewriter of the character stated in which the keys of the new key board are all parallel and separated about the same distance apart as the piano key board and all of the parts of simple construction and compact arrangement, so as to assure the highest efficiency and speed of operation, without requiring prolonged training and practice of the operator.

With the foregoing and other objects in view, as will appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of co-operating elements as hereinafter more specifically set forth, claimed and shown in the accompanying drawings, forming a part of the present application, and in which—

Fig. 1 is a plan of the improved typewriter with the new key board incorporated therein.

Fig. 2 is a side elevation of the typewriter disclosed in Fig. 1.

Fig. 3 is an enlarged fragmentary front elevation of the upper portion of the typewriter, showing part of the automatic line spacing and carriage returning mechanism.

Fig. 4 is an enlarged vertical section, substantially on the plane of line 4—4 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 5 is a vertical detail section at right angles to Fig. 4 and taken substantially on the plane of line 5—5 of Fig. 4, looking in the direction indicated by the arrows.

Fig. 6 is a detail perspective of a portion of a new key board, showing the keys separated for the sake of clearness.

Fig. 7 is a view similar to Fig. 6, showing other keys of the key board enlarged and in separated position, for the sake of clearness.

Fig. 8 is an enlarged detail perspective of one of the keys of the new key board to disclose clearly the construction thereof.

Fig. 9 is a fragmentary detail elevation of part of the improved carriage shifting mechanism to be controlled by the foot or knee of the operator.

Referring more in detail to the drawings in which similar reference characters designate corresponding parts throughout the several views, it will be noted that the key board frame 10 is provided beneath the main frame 11 of the typewriter and has its reduced lower portion extended forwardly past the lower reduced forward portion 11ª of the main frame 11 and which reduced forward portion 11ª serves as the frame for the usual or ordinary key board 12 as shown clearly in Figs. 1, 2 and 4. The extended reduced lower portion 10ª of the frame 10 forms side members for protecting the elongated flat keys 13 and 14 of the improved flat key board. The keys 13 are similar to the white keys of the piano key board, while the keys 14 correspond substantially to the black keys of the piano key board. The keys 13 and 14 are connected respectively by the separate connecting members 15, to the type bar operating levers 16 of the corresponding keys 17 of the key board 12. This may be readily understood by referring to Figs. 4 and 5. Each of the keys 13 and 14 of the improved key board includes a shank 18 with a bifurcated rear end 19 having transverse concave recesses or pockets 20 in the inner face, so that the shank 18 may be readily mounted on a supporting rod 21 extended transversely in the lower rear portion of the frame 10. It will be noted by referring to Fig. 4, that two rods 21 are employed and the shanks 18 of most of the white or lower keys 13 are mounted on the lower rod 21 and the shanks 18 of the upper or black keys 14 are mounted on the upper rod 21. It will also be seen from Figs. 2, 4 and 8 that each key shank 18 has a binding screw 22 secured therein for drawing together the bifurcated or separated portions of the rear end thereof and holding the shank 18 in proper position on the rod 21 on which it is mounted for operation. It will, therefore, be seen that when a key 13 or 14 is depressed, the proper type bar operating lever 16 will be operated, the same as if the key 17, mounted thereon, had been depressed in the usual manner. The connecting members 15 are preferably flexible, as indicated in the drawings, so that if the operator desires to use the ordinary or upper board 12, the operation of the keys 17 thereof will not affect the keys of the improved or flat lower key board. This may be readily apparent by referring to Figs. 4 and 5.

Extended transversely through the frame 10 are a pair of spaced horizontal transverse rods 23, which are arranged above one another and across the shanks 18 of the lower and upper keys for the improved flat key board, as shown clearly in Fig. 4. Upstanding spaced plates 24 are carried on the rods 23 which are positioned between the shanks 18 to separate the same and prevent side movement thereof toward one another. The plates 24 are located intermediate the ends of the shanks 18 and mounted, by turned lower ends 26, on the bottom plate 27 of the frame 10. This may be seen clearly in Figs. 4 and 7. It will be seen that the plates 24 and 25 co-operate to retain the shanks 18 in properly spaced and parallel position throughout their entire length.

The different keys of the improved flat key board are shaped to correspond with the white and black keys of a section of a piano key board, as will be clearly seen from Figs. 1, 6 and 7, the keys representing about one and one-quarter octaves, as will be readily seen by referring to Fig. 1. The respective keys 13 and 14 of the flat key board are connected with the type bar operating lever 16 of the corresponding keys 17 of the upper key board 12. Each key of the flat key board is necessarily of a special shape and, therefore, will be described in detail, beginning from the left side of the key board.

The first key is flat and corresponds in shape to the key known as "C" on a piano key board. This key is connected with the type bar operating lever 16, operating the type bar carrying the two "." and the "£". The next key is a black key and raised above the white keys, corresponding with the key known as "C sharp" on the piano key board. This key operates the type bar operating lever 16 controlling the type bar carrying the letters "y, Y" and the numeral "6". The next key is a white key corresponding with "D" on the piano key board. This key controls a type bar carrying the letters "v, V" and "—". The next key is a black key corresponding to "D sharp" on the piano key board and controlling the type bar carrying "h, H" and "&". The keys thus far described are carried on the upper shanks 18.

The next key corresponds with "E" on the piano key board, with the exception that it is cut transversely in two sections. The main section controls the type bar carrying "m, M" and "/". This main portion of the key is mounted on an upstanding angular plate 18ª carried by one of the lower shanks 18. The other section of the key is short and located inwardly thereof and mounted on an upper shank 18. This small or short section controls the type bar carrying "l, L" and ")".

The next key corresponds with "F" on the piano key board except that it is divided into a main or central section and inner and outer sections. The main or central section controls the type bar carrying "d, D" and "$" and is mounted on an upstanding block 18ª at the outer end of one of the lower shanks 18.

The outer section controls the type bar carrying "f, F" and "%" and is mounted on an upstanding block 18ª carried by an-

other lower shank 18. The inner section of this key controls a type bar carrying "j, J" and "'" and is mounted on an upper shank 18.

The next key corresponding to "F sharp" on the piano key board is a black key and divided transversely into two sections. The outer section controls the type bar carrying "i, I" and "8" and is mounted on an upstanding block 18a carried by one of the lower shanks 18. The inner section controls the type bar carrying "q, Q" and "1" and is mounted on one of the upper shanks 18.

The following key representing the key of "G" on the piano key board is divided into three sections, the central or main section controlling the type bar carrying "a, A" and "". This section is mounted on an upstanding block 18a carried by one of the lower shanks 18. The outer section controls the type bar carrying "c, C" and "¾" and is mounted on an upstanding block 18a carried by a lower shank 18, only half as wide as the others and countersunk in the block 18a and flush therewith. The inner section controls a type bar carrying "z, Z" and "½" and is mounted on one of the upper shanks 18.

The next key, which may be termed the centre key of the key board, represents "G sharp" of the piano key board and is, therefore, a black or raised key. This key is known as the spacer, is mounted on an upper shank 18 and operates the spacing mechanism of the typewriter. This takes the place of the usual space bar intended for operation by the thumb, on the ordinary typewriter.

The keys to the right of the spacer key correspond to the keys to the left thereof, so as to continue the representation of the piano key board. In other words, the first key after the spacer represents the key of "A" on the piano key board and corresponds with the key representing "G", being cut transversely into three sections as disclosed for the key representing "G". The central section of the key representing "A" on the piano key board controls the type bar carrying "e, E" and "3". The outer section controls the type bar carrying "t, T" and "5". The inner section controls the type bar carrying "p, P" and "0".

The next key represents "A sharp" and is divided transversely into two sections. The outer section controls the type bar carrying "o, O" and "9". The inner section controls the type bar carrying "g, G" and "—". This key representing "A sharp" corresponds with the key representing "F sharp."

The following key represents "B" of the piano key board and is divided into three sections. The main or central section controls the type bar carrying "r, R" and "4". The outer section controls a type bar carrying "s, S" and "#". The inner section controls the type bar carrying "x, X" and "¼". This key representing "B" of the piano key board, is just the reverse from the key representing "F" of the piano board.

The following key representing "C" of the piano key board is divided into two sections and is the reverse of the key representing "E" on the other side of the spacer key. This upper "C" key is divided into two sections with its outer or main section controlling the type bar carrying "n, N" and ";". The short inner section controls the type bar carrying "b, B" and ":".

The next key representing "C sharp", controls the type bar carrying "u, U" and "7".

The following key representing "D", controls the type bar carrying "w, W" and "2". The key corresponds with the "D" key to the left of the spacer key.

The key representing the next "D sharp" controls the type bar carrying "k, K" and "(". All of the four black raised keys representing "C sharp" and "D sharp" on opposite sides of the spacer key are of corresponding shape and mounted on upper shanks 18.

The last key of the key board represents upper "E" of the piano key board and controls the type bar carrying ", ?" and "," the second "," to be used when writing capitals.

It is apparent the different keys and their sections must be suitably mounted on the upper and lower shanks 18 to bring the keys close together. Mounting of the keys to the right of the spacer key corresponds with mounting of the similar keys to the left of the spacer key. Further detail description of such mounting is believed to be unnecessary. Attention may be directed to the fact, at this time, however, that every key on this flat key board, with the exception of the spacer key controls a type bar having three characters thereon, as provided in the construction of the portable typewriter. The shifting of the carriage to the three different positions for the different characters on the type bars is not accomplished by the keys of the flat key board, however, but by special shifting means which will now be described.

Projecting through the front of the frame 10, are a pair of rods 28 which are rotatable in suitable bearings 29 and carry sleeves 30 having connected therewith the flexible connecting members 31 depending from the type bar operating levers 16 having mounted thereon the shift key 17 of the upper key board. Depending levers 32 are adjustably carried on the outer end of the rods 28 and retained in adjusted position by set screws 33 or other suitable means. The depending levers 32 are adapted to be operated or forced outwardly by the knees of the operator to actuate the shifting mechanism of the typewriter for using the upper or capital

letters or the third set of characters on the type bars. This should be clearly apparent by referring to the drawings.

Special mechanism is provided for operating the line spacing mechanism and returning the carriage without the necessity of the operator taking the hands off of the lower flat key board. This mechanism includes a line spacing bar 34 extending across the front of the frame 10, along the outer ends of the white keys 13 of the lower flat key board. The bar 34 has its ends mounted on the forwardly projecting ends of the side levers 35, located on the outer sides of the frame 10 and having their bifurcated rear ends 36 pivoted on the supporting rod 37 which extends transversely through the lower rear corners of frame 10. Above the forward portions of one of the levers 35, is a fixed block 38, to which is pivoted the forward end of the lever 39 by a suitable pivot member 40. The levers 35 are inclined forwardly, while the lever 39 is inclined rearwardly and connected intermediate its ends with the lever 35 beneath the same, by a link 41. The levers 35 and 39 are resiliently retained in their normal or uppermost positions by a spring 42 having its lower end pivoted to one of the levers 39, while the upper end is mounted on the upper arm 43 on this side of the machine. The arms 43 are carried on the ends of a shaft 44 which is rotatable through the upper forward corner of the main part of the frame 10. The arms 43 are directed forwardly and slightly inclined and have pivoted to their outer ends the upper extremities of the connecting rods 45, the lower ends of which are pivoted to the levers 35, preferably forwardly of the links 41. Upstanding bearings 46 are carried on the rear end of the lever 39 with a pulley 47 mounted therein.

The cable 48 extends around the pulley 47 and has one end fixed to the angular bracket 49 carried on the frame 11, as shown clearly in Fig. 2. The cable 48 extends freely through the upwardly inclined line spacing lever 50, on the carriage 51. A knob 52 is carried on the cable 48 for operating the line spacing lever 50, as will be later clearly understood. The cable 48, after extending across the carriage 51, passes around a pulley 53 rotatably mounted on a shaft 54 projecting from the upstanding end 55 of the bracket 56, which latter is secured to one end of the typewriter carriage bed frame formed by the upper part of the main frame 11 and extended outwardly from the same. A depending bracket arm 57 is carried by the bracket 56 and a swinging arm 58 is pivoted at its lower end to the lower end of the depending bracket arm 57. A pulley 59 is rotatably mounted in the upper end of the swinging arm 58 and the cable 48, after extending around the pulley 53, passes around the pulley 59, as shown clearly in Fig. 3. The cable is then turned back and fastened by its end to the upstanding arm 55 of the bracket 56, beneath the pulley 53. The swinging arm 58 is resiliently retained in one of its extreme positions (leaning toward the typewriter frame 11 and carriage 51) by means of the spring 60 having one end attached to the swinging arm 58 and its other arm attached to the typewriter frame 11. In order to assure proper operation and guiding of the cable 48, a guide pulley 61 is mounted in an upstanding bracket 62 on the end of the typewriter frame 11 on which the lever 39 is positioned, the cable 48 passing around the guide pulley 61 and then downwardly and around the pulley 47. The angular bracket 49 is shown in Fig. 2 as being carried on the bracket 62.

By referring to Figs. 1 to 3 inclusive, it will be clearly seen that, as the carriage 51 moves across the frame 11, during operation of the typewriter, the line spacing lever 50 slides on the cable 48 until it engages the knob 52, at the end of the movement of the carriage 51, the swinging arm 58 remaining in its normal position, shown by full lines in Fig. 3. When the bar 34 is operated, however to actuate the lever 39 and pull the latter downwardly, the cable 48 is operated by the pulley 47. This results in pulling the cable 48 over the carriage 51 and swinging the swinging arm 58 to its other extreme position, against the tension of the spring 60, as indicated by dotted line in Fig. 3. This results in the knob 52 operating the line spacing lever 50 and returning the carriage 51 to its initial position. Therefore, the operation of the line spacing mechanism and the carriage returning mechanism are performed by simply pressing the bar 34 downwardly with the thumb of either hand, without raising the hand from the flat key board. After the bar 34 is released, the spring 60 will act to automatically return the swinging arm 58 to its normal position. The spring 42 will also act to raise the levers 35 and bar 34 to their normal positions. The arms 43 and bars 45 serve to assure uniform movement of the levers 35 on the opposite sides of the machine, at all times.

The back spacer and marginal releasing mechanisms of the typewriter are operated by depending levers 63 which are adjustably carried on the outer ends of the rods 64 located at opposite sides of the machine and rotatable in suitable brackets 65 preferably carried on the inner face of the side members of the frame 10, as indicated in Figure 2. The rods 64 are located in planes above the rods 28 carrying the levers 32 and the depending levers 63 are located at the sides of the flat key board and slightly above the same, so as to be operated by pressing outwardly against the depending levers

63 with the hands, without the necessity of raising the hands from the proper position for operation on the flat key board. The rods 64 are shown as being connected by flexible connections 66 with the respective levers 16ª for operating back spacer and marginal releasing mechanisms carrying appropriately marked keys 17ª arranged in the upper key board. It is apparent that, when the upper key board is dispensed with and the lower flat key board only employed, the rods 64 may have more direct connection with the respective mechanisms operated thereby.

It is believed the complete construction and operation, as well as the advantage of the improved flat key board and the associated parts will now be clear from the foregoing paragraphs, taken in connection with the accompanying drawings, without further detail description. It may be briefly stated, however, that considerable speed may be attained by the operator, owing to the fact that the hands need never be raised from the key board or moved up and down, during use of the machine, except when the hands are completely removed for replacing the paper in the machine. The operation of typing on the new flat key board is substantially the same as the operation of playing the piano. Furthermore the keys are close together and all of them are of elongated form, thereby doing away with the spaces between the keys and around the same, as in the ordinary key board structure for typewriters. The keys are formed and mounted in such a manner that those required for most frequent use may be readily operated by the first and second fingers of the hands, while the other keys are in a position for easy operation by the other fingers and the thumbs. The flat key board may be readily incorporated in typewriters now in general use with very little additional expense and, as shown and described, is arranged particularly for portable typewriters. It is not necessary that the letters and other characters appear on the keys of the flat key board and, therefore such characters are only shown in the views disclosing the keys in order that the invention may be readily understood from the drawings and description. The operation of the spacer key may be readily performed by the first finger of either hand. Furthermore, the levers 32 may be readily operated by the knees to actuate the shift keys, without the necessity of lifting the hands from the flat key board. The levers 63 may also be readily operated by an outward movement of the hands from the flat key board for operating the back spacing and marginal releasing mechanisms. All of the parts are of simple construction, arrangement and operation and may be readily assembled.

It is apparent that, if desired, the usual form of key board may be dispensed with and the improved flat key board substituted therefor, when building up new typewriters. This would naturally mean that the shanks 18 would form continuations of or replace the type bar operating levers 16, as shown in the drawings and the entire machine would be of compact construction.

While the preferred embodiment of the invention has been disclosed, it is to be understood that minor changes in the details of construction, combination and arrangement of co-operating elements may be resorted to within the scope of what is claimed without departing from the spirit of the invention.

What I claim as new is:

1. The combination with a typewriter embodying a keyboard, type bars, type bar operating levers and a platen carriage, of an auxiliary flat keyboard including black and white keys corresponding with a section of a piano keyboard, with certain individual keys arranged one behind the other; flexible connections between said typewriter type bar operating levers and said keys of said auxiliary keyboard; a finger bar extending across the front of said auxiliary keyboard; and means connecting said finger bar and platen carriage to return the latter from extended position, upon depression of said finger bar.

2. The combination with a typewriter embodying a keyboard, type bars, type bar operating levers, platen carriage and platen carriage line spacing means, of an auxiliary flat keyboard including black and white keys corresponding with a section of a piano keyboard, with certain individual keys arranged one behind the other; flexible connections between said typewriter type bar operating levers and said keys of said auxiliary keyboard; a finger bar extending across the front of said auxiliary keyboard; and means co-operating the same with said platen carriage and platen carriage line spacing means whereby said platen carriage may be returned from its extended position and adjusted by said line spacing means upon depression of said finger bar.

3. The combination with a typewriter embodying a keyboard, type bars, type bar operating levers and back spacing and marginal releasing mechanism; of an auxiliary flat keyboard including black and white keys corresponding with a section of a piano keyboard, with certain individual keys arranged one behind the other; flexible connections between said typewriter type bar operating levers and said auxiliary keyboard; and back spacing and marginal release mechanism operating means extending beneath said typewriter keyboard and over said auxiliary keyboard at the sides thereof

flexibly connected to said typewriter back spacing and marginal release mechanism.

4. A typewriter including a carriage; type bars; a flat key board including keys representing the black and white keys of a section of the piano key board with certain individual keys arranged one behind the other; upper and lower shanks for said keys; carriage shifting means; operating levers depending from the front of the machine and adapted to be actuated by the knees of the operator to control the carriage shifting mechanism; line spacing and carriage returning mechanism including a cable and guide pulley for the same; levers for actuating said cable; a bar extended across said levers at the front of the machine and adapted to be operated by the thumb of the operator without the necessity of removing the hands from the flat key board; means for normally retaining the levers in inoperative position and assuring uniform operation of said levers; and means for returning the cable to normal position after return of the carriage and relieving of the pressure on the bar connecting said levers.

5. A typewriter including the combination with the regular key board, type bar operating levers, type bars, a carriage, carriage operating means and carriage shifting means for presenting the latter to the different type on the several type bars; of a flat key board composed of elongated keys corresponding to a section of a piano key board and cut transversely in sections into separate keys; pivoted shanks supporting said keys; operative connections between said shanks and the type bar operating levers of the corresponding keys of the regular key board; spacing means for said shanks; movement limiting means for said shanks; the flat key board including a spacer key connected with the spacing mechanism of the typewriter; a frame for supporting and enclosing the sides of said flat key board; members operable by the knees of the operator to control the carriage shifting means; line spacing and carriage returning means; a bar extending across the front of the flat key board for controlling the line spacing and carriage returning means; operative connections between said bar and said line spacing and carriage returning means; means to return the bar and its connections to normal position after operation of the line spacing and carriage returning means; and means for normally retaining the line spacing and carriage returning means in unoperated position.

6. A typewriter structure including a flat key board similar to the key board of a piano; type bars; pivoted shanks for the keys of the flat key board; operative connections between said pivoted shanks and the type bars; a carriage and carriage shifting mechanism; the bar for operating said carriage shifting mechanism extending across the front of the flat key board and outwardly of the same; a shifting mechanism for changing from one set of type to another set on the type bars; pivoted levers for the said carriage shifting mechanism adapted to be operated by the hands of the operator; back spacing and marginal releasing mechanism; and depending operating levers for said back spacing and marginal releasing mechanisms arranged at the sides of the flat key board for operation by outward movement of the hands of the operator from the flat key board.

In testimony whereof, I affix my signature.

EWART I. GALE.