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TYPEWRITER

Filed Dec. 5, 1935

4 Sheets-Sheet 2

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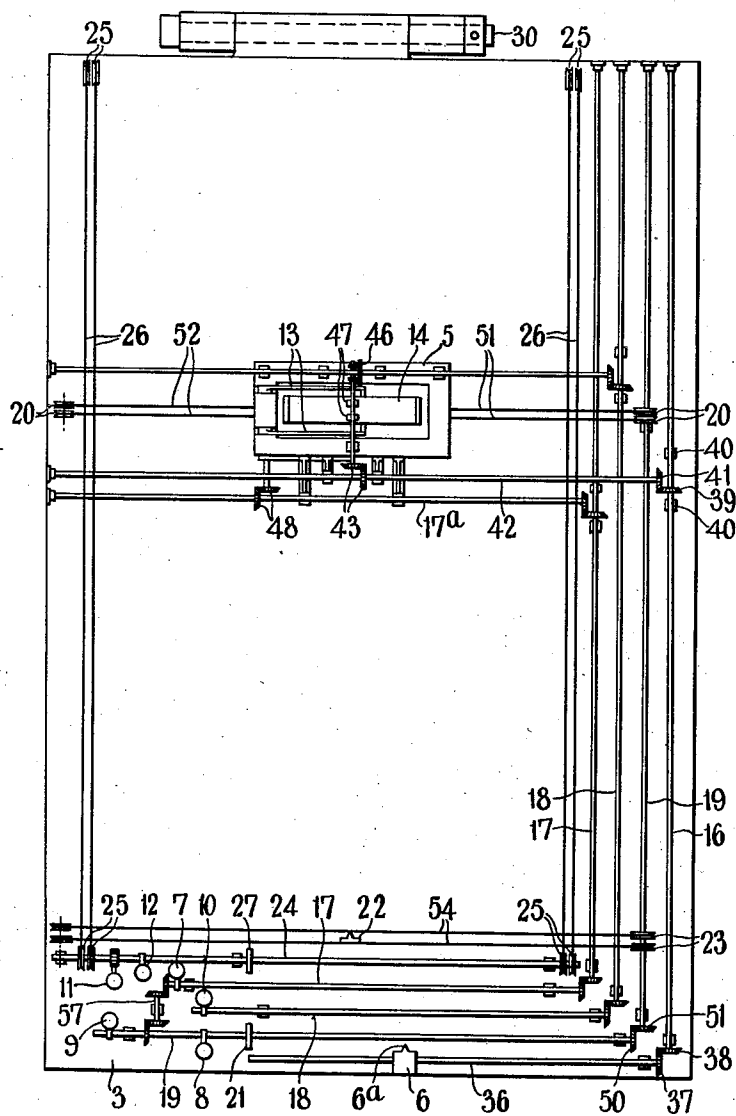
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FIG. 7.



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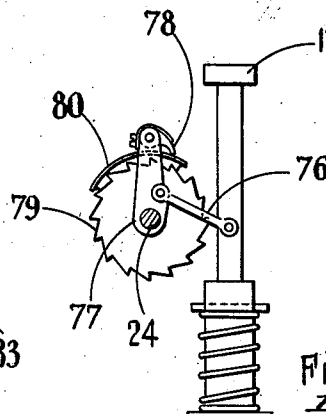
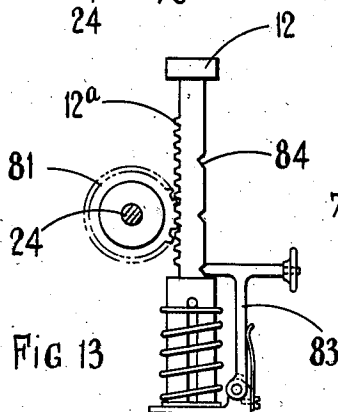
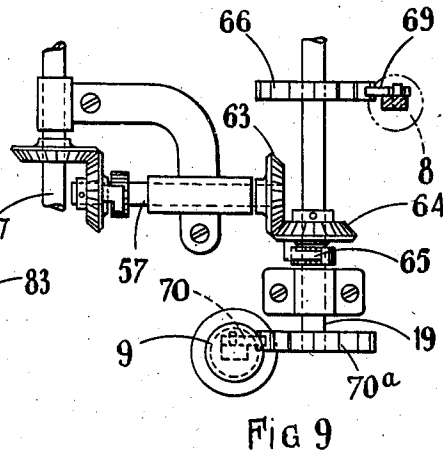
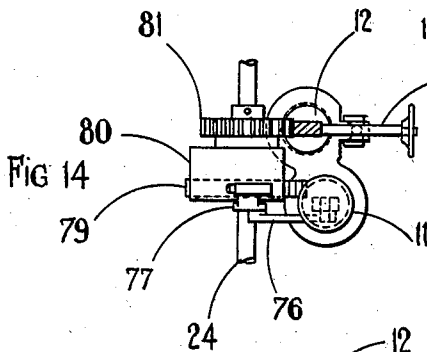
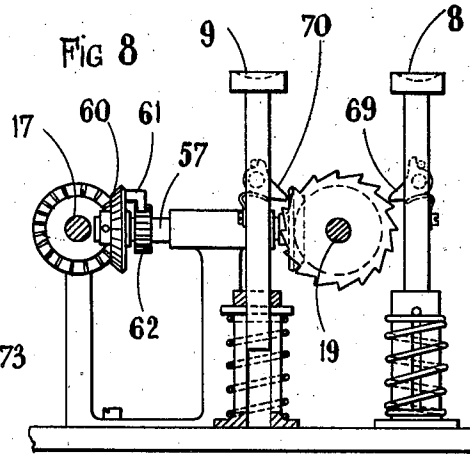
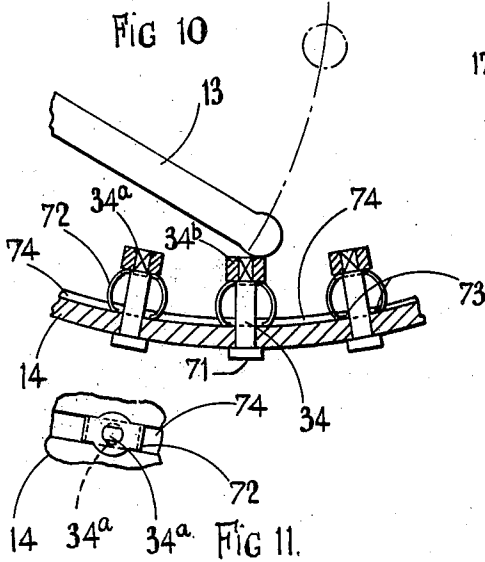
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UNITED STATES PATENT OFFICE

2,076,198

TYPEWRITER

Franz Honnolke, Haberie, Post Gross-Tschochau, Czechoslovakia

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In Czechoslovakia December 21, 1934

9 Claims. (Cl. 197—2)

This invention relates to improvements in typewriters and its object is to provide a simple and easily operated mechanism which shall enable a stationary surface to be printed upon without moving the said surface for either letter spacing or line spacing. By providing such a mechanism, it is possible to print on loose sheets, or on sheets bound into a sheaf or bundle by any form of paper fastening or on the pages of a bound volume.

The present invention is directed mainly to the type operating mechanism and for the purposes of simplicity, the paper or volume holder and clamping mechanism together with its adjusting mechanism have been omitted from the accompanying drawings. For the purposes of the present invention it is adequate to assume that the lower surface of the frame 2 shown in the accompanying drawings coincides with or is parallel to the printing plane and this surface may itself constitute the top clamping member which holds the sheet or surface to be printed on to the platen, which may be a vertically adjustable table. Inversely the platen may be a fixed table and the typewriting mechanism hereafter described may be vertically adjustable.

The present invention consists of a typewriter having a type carrier in the form of an arcuate drum having type bars mounted radially movable therein, said type carrier being mounted rotatably in a type carriage traversable in guides from side to side for letter spacing movements and said guides being themselves formed in a carriage traversable transversely to the type carriage for line spacing movements, all said parts being located above the horizontal surface of the printing platen on which the surface to be printed is supported and being controlled from a stationary control or key board.

The invention further comprises a typewriter of this general character in which a single movable member on the control board selects any type on the type carrier by moving said selected type into printing position.

The invention will be more readily understood from the following description of the accompanying diagrammatic drawings which serve to illustrate the general principles upon which this novel form of typewriter is framed. In these drawings:—

Figure 1 is a diagrammatic plan view of the frame on which the type mechanism is mounted and which carries the stationary control board.

Figure 2 is a diagrammatic side elevation of the type carrier furnished with mechanism for

moving the type selected at the control board into printing position.

Figure 3 is an end elevation of the carrier shown in Figure 2.

Figure 4 is a front sectional elevation showing the slide carriage for the type carrier.

Figure 5 is a plan view of the same.

Figure 6 is a section on the line 6—6 of Figure 4.

Figure 7 is a diagrammatic plan showing the control mechanism from the stationary control board to the movable type carrier.

Figure 8 is an elevation looking from the left hand end in Figure 7 and showing the front and back spacing keys for the letter spacing and the coupling of the printing shaft 17 to the letter space shaft 19.

Figure 9 is a plan of the device shown in Figure 8.

Figure 10 is a detail view showing the manner in which the type bars are mounted to be radially movable in the arcuate type carrier.

Figure 11 is a plan view of the spring for normally holding the type bars in their inner radial position.

Figure 12 is a side elevation looking from the left hand of Figure 7 and showing the line space key and its operative connection to the line space shaft 24.

Figure 13 is a view similar to Figure 12 but showing the line space adjustment key.

Figure 14 is a plan view showing both the line space key and the line space adjustment key.

The ribbon mechanism has been omitted from the drawings also for the purpose of simplicity. The location of this mechanism in one suitable form of the invention is shown at R in Figure 5, from which it will be seen, the said ribbon mechanism is mounted on the sides of the type carrier 5 and is moved at each printing operation into a position under the type character selected and at the same time moved forward a step to bring a fresh part of the ribbon into operative position.

The typewriter mechanism in accordance with this invention is mounted on a table or frame 2, which may in some cases be hinged about the pivot or centres 30 for the purpose of enabling the insertion on to the platen or platen table of the sheets, book or other surface to be printed. The front portion of the frame 2 is formed as a control board, performing the function of a keyboard in the ordinary form of typewriter. The control board 3 may be of box form and the side 31 of the frame may also be of box form to accommodate within it the transmission mechanism

indicated in Figure 7. On the frame 2 there are provided at each side guide shears 32 in which there can travel a transverse slide 4. The transverse slide 4 has itself guide shears 33 in which there can travel the type carrier 5. The type carrier has mounted rotatably on it the type drum 14 in which the separate type characters indicated at 34 are movably or slidably mounted, being for instance suitably held in their radially inward position by springs. In the form of the invention diagrammatically shown, three rows of type are indicated in the drum 14 which is shown as of substantially semi-circular form and is rotatable about the axis 15 in the slidable type carrier 5. A printing lever 13 is pivotally mounted in the type carrier 5 about the axis 35 and is adapted to be swung about that axis to strike the selected type which has been brought into printing position by swinging the type drum 14 about its axis 15. These movements of the slide 4, slidable type carrier 5, type drum 14 and the printing lever 13 are all controlled and initiated from the control board which is stationary in respect of the frame 2.

The manner in which the type bars are mounted to be radially movable in the type carrier drum 14 will be understood from Figures 10 and 11. The type bar 34 is of cylindrical form and has the type soldered as at 71 to the outer end.

Springs 72 with horns 73 embrace the neck of the type bar which has flattened sides as shown at 34a in Figure 11 where the neck is formed. On this portion with flattened sides there is fitted the head 34b. The horns 73 of the springs 72 engage in the grooves 74 which are formed on the interior surface of the drum 14. In this way it will be seen that the type is properly held in correct position and in its radially inward location by the horned springs 72. When the striker lever 13 strikes the head 34b the type bar which has been brought into printing position in the manner hereafter described, is projected radially outward to effect the impression.

On the control board 3 there is provided a slider 6 which is formed as a nut with a long pitched thread engaging on a spindle 36 which is furnished with a similarly long pitched thread. By sliding the slider 6, the spindle 36 is caused to rotate through a definite angle which varies in accordance with the position to which the said slide is moved. The spindle 36 is mounted in the lower boxed-in part of the control board 3 and its right hand end, see Figure 7, carries a bevel wheel 37 gearing with a bevel wheel 38 on the transmission shaft 16, which is housed in the right hand boxed or trough shaped part 31 of the frame 2. This shaft 16 is splined and carries a bevel wheel 39, which is movable with the slide 4 by virtue of the forked parts indicated at 40 in Figure 7. From the bevel wheel 39 the movement is lifted into the correct plane by a short vertical transmission shaft, which is omitted from Figure 7, but its arrangement can be seen from Figure 4. This short shaft 42a is mounted on an arm of the slide 4 which projects over the trough 31 and transmits the movement of bevel wheel 39 to the bevel wheel 41 fixed on the transverse shaft 42 mounted in the slide 4. This shaft is also splined and operates the bevel pair 43 which move with the type carrier slide 5. The bevel pair 43 operate on the axis 15 of the type drum 14, which is thereby swung so as to take up an angular position in accordance with the position to which the slider 6 has been set. The slider 6 has a pointer 6a which is set to the groove 6b

corresponding to the letter or character which is indicated on the buttons shown as mounted on the control board. The drawings show the groove marked with the reference letter 6b, corresponding to the letter k.

The drum may have the type arranged in one or more rows. Three rows are indicated on the drawings, Fig. 3. To select the row of type which is to be brought into printing position, the drum 14 is moved axially on its spindle 15. The key 10 is that which controls the operation of the type shift and this key is provided with a pin or other suitable stop 44 which can engage any one of three grooves indicated diagrammatically at 45 by which means the required angle of movement is imparted to a transmission 18 arranged similarly to the transmission 16 described with reference to the drum setting mechanism which brings the selected type into operative position. The key 10 is arranged similarly to the key 12 to be hereafter described and as shown in Fig. 13. This predetermined angle of swing is imparted to a swing disc 46 mounted on the slide carrier 5 over the spindle 15 and a transmission rod coupled to the lugs 47 on the type drum 14 transmits the axial movement to the said drum, so that the selected row of type comes into printing position.

The printing of the selected character is effected by operating the key 7, which, on depression, causes the transmission shafts 17, 17 to rotate through an angle. This rotation is imparted to the transverse shaft 17a mounted on the slide 4 and splined to engage the sliding bevel wheel pair 48, which move with the type carrier slide 5. The bevel pair 48 operate the spindle 35 on which the printing lever 13 is fixed. This lever may be in the form of a yoke as indicated with the two arms spaced apart a distance equal to the extremes of the axial movement of the type drum and the cross bar acting as the hammer head operating inside the type drum 14 to impinge only on the type bar which has been brought into printing position. The printing lever is normally held in its horizontal position in Figure 2 by a spring, not shown, and after the printing operation is completed the lever returns to the same horizontal position and the key 7 is also restored to its normal position.

The letter space mechanism is of course preferably operable simultaneously with the operation of the printing lever 13 or rather directly thereafter by the return movement of the said printing lever. For this purpose a short transmission shaft 57 is interposed between the horizontal limbs, see Figure 7, of the transmissions 17 and 19. This transmission embodies, as will be understood, a ratchet mechanism, by which only the return movement of the lever 13 transmits drive to the letter space shaft 19. The operation of the vertical limb in Figure 7 of the transmission 19 imparts movement to the drum 20 at the right hand of Figure 7 and this operates the flexible driving band 51, 52 attached to the carrier slide 5. The pulley or drum 20 on the left hand side of Figure 7 is mounted on the slide 4. The band 51-52 may be a perforated metal band or a chain transmission and the drums 20 may be chain wheels. For purposes of letter spacing without operating the printing lever the key 8 is provided which operates the horizontal limb 17 of the transmission which movement is transmitted by the bevel pair, 50, 51 to the vertical limb 19 in Figure 7. A fine ad-

justment of the carrier slide 5 may be effected by operating the disc 21. The back space key is key 9 which also operates on the transmission 19, but in the reverse direction to the key 8.

5 The letter spacing and back spacing keys together with their operative mechanism are shown in greater detail in Figures 8 and 9. The printing shaft 17 is geared to the letter spacing shaft 13 by the short transmission shaft 57 with bevel gears as shown. The bevel wheel 60 is loosely mounted on the shaft 57 and carries a pawl 61 adapted to engage the ratchet wheel 62 which is fixed on the shaft 57. In this way the movement of the shaft 17 only operates to move the shaft 13 in one direction, namely only during the return movement of the striker lever 13. At each printing movement, it will be understood that the shaft 17 oscillates through a definite angle and then returns back to its position of rest. It is during this return movement that the pawl 61 operates to move the short shaft 57 and thus move the letter space shaft through one step. When spacing between one word and the next, the forward letter space key 8 is operated. This key carries a pawl 69 which is spring pressed as shown so as to communicate drive on its downward stroke to the ratchet wheel 66. This ratchet wheel is mounted to rotate with the shaft 19. The shaft 19 also has mounted on it the bevel wheel 64 which is free to rotate on the said shaft but is coupled thereto by the ratchet and pawl mechanism 65. It will be seen that when the key 8 is depressed, the shaft 19 is rotated through a definite angle, but the bevel wheel 64 remains stationary. In this way, the operation of the key 8 does not operate the printing shaft 17.

The back space key is shown at 9 and is arranged in similar manner, but operates in the opposite direction to the key 8. The key 9 carries a spring pressed pawl 70 which operates on the ratchet wheel 70a having teeth arranged oppositely to the teeth of the ratchet 66. When the key 9 is depressed the shaft 19 is moved in a counter-clockwise direction in Figure 8 and the bevel wheel 64 is therefore driven to move with the shaft 19 in this case. The bevel wheel 63 also moves as does the ratchet wheel 62, but the pawl 61 is not then driven, so that in this case also the printing shaft remains stationary when the key 9 is depressed.

For rapid positioning of the slide carrier 5 and for margin stop purposes, a stop 22 is provided and is fixed to a driving chain or band 54 which engages the chain wheels or pulleys 23. The right hand pulley 23 is keyed on the transmission 19. It will be seen therefore that the stop or slide 22 participates in all the movements forwardly or rearwardly of the sliding type carrier 5 and inversely the sliding type carrier 5 participates in all the movements of the slide 22. The slide or stop 22 has an arm which coacts with the stop riders 22a on the stop bar 56. These riders may be set, as will be readily understood, for tabulating purposes, as will be seen from Figure 1. The left hand rider 22a in Figure 1 indicates the margin stop.

Bands or driving chains 26 are mounted on each side of the frame 2 and pass over chain wheels or pulleys 25. At the front of the machine, as can be seen from Figure 7, the chain wheels 25 are fixed on a transverse shaft 24, which is operable by a key 11 or by a disc 27. The adjustment key for setting the line spacer to single, double or other spacing which is of

course operable from the slide 22, is diagrammatically indicated at 12 in Figures 1 and 7. The line space index is shown at 53 in Figure 1 and by setting the key 12 to one or other of the index lines the angle of movement of the shaft 24 at each operation of the key 11 is determined. For rapid movement of the slide 4, as for instance is required when filling in blank spaces in printed forms, the knurled disc 27 is rotated. Another means by which the slide 4 may be moved is shown at 28 where the knobs or wheels may be gripped by hand and the slide 4 moved as desired. In place of the disc 27 a lever or turn handle 29 may be provided for operating the shifting mechanism for the slide 4.

The line spacing mechanism will be still more readily understood on reference to Figures 12, 13 and 14. The line spacing shaft 24 has fixed on it the ratchet wheel 79 and alongside this ratchet wheel there is loosely mounted on the shaft 24, a lever 77. This lever 77 is connected by a connecting rod 76 to the stem of the line space key 11. When the key 11 is depressed, the pawl 78 swings clockwise in Figure 12 and moves off a shroud 80 to snap into engagement with the teeth of the ratchet wheel 79. By altering the position of the shroud 80, the number of teeth pitches through which the pawl 78 will move the shaft 24 may be altered. This alteration of the position of the shroud and therefore the alteration of the line spacing is effected by setting the key 12 shown in Figure 13. The shroud 80 is carried by a gear wheel 81 mounted loosely on the shaft 24 near the ratchet wheel 79. The stem of key 12 is formed as a rack on one side, 12a, and this rack engages the pinion wheel 81. On the other side of the stem of key 12 there are formed grooves 84 with which there engages a spring pressed locking bolt 83. For setting the line space, the bolt 83 is manually withdrawn by one hand and the key 12 is depressed. In this way the shroud 80 is rotated through a definite angle in a clockwise direction in Figure 12 and the pawl 78, when the key 11 is then depressed, will move the ratchet through a smaller angle and the line spacing is consequently reduced.

As will be seen from an examination of the drawings the keys in all cases are spring pressed so that after depression, they return back to their normal position. These finger operated keys 7, 8, 9, 10, 11 and 12 as well as the finger operated slide 6 in all cases co-operate with rotatable shafts located under the key or control board with their axes arranged in the direction of the letter spacing. Bevel wheels connect these first shafts to transverse shafts whose axes are arranged in the direction of line spacing movement and these shafts in turn are geared to the operating mechanism on the slide 4 for selecting the type, printing the selected type and effecting the letter space movement.

The type drum 14 is preferably provided with radius arms or spokes in the form of the arched chords 57, so as to give clearance to the printing lever when operating on the end types 58 in the drum 14.

The table or platen on which the work rests is indicated at P, in Figure 4 and may be relatively adjustable as regards height. The printing mechanism 14 and carrier 5 may be duplicated so that two impressions may be made at one operation of the control members. The transmissions used may also be modified within wide limits without departing from this invention.

I claim:—

1. A typewriter having in combination, a horizontal platen table, a machine frame superposed on said platen table, a type carrier, a slide mounted to move in line spacing direction on said frame and on which said type carrier can traverse in letter spacing direction, a type drum rotatable about a horizontal axis on said carrier, type bars mounted in said drum to move radially outwards for printing, printing mechanism on said carrier, and a control board with finger operated control mechanism fixed on said machine frame for initiating and controlling the movements of said slide, type carrier, type drum, printing mechanism and type bars.

2. A typewriter having in combination a flat printing platen table over which the type move in letter spacing and line spacing directions, a machine frame hinged to said platen table and normally resting thereon, a type carrier movable in letter spacing direction, a slide mounted on said frame and traversable thereon in line spacing direction in respect of said platen and on which said type carrier is movable, an arcuate type drum rotatable about a horizontal axis on said type carrier transverse to the direction of letter spacing and a fixed control board with finger operated control mechanism fixed on said machine frame for initiating and controlling the movements of said slide and type carrying parts.

3. A typewriter as claimed in claim 2 having bevel wheel transmission mechanism for transmitting the required movements from the finger operated control mechanism to the movable parts mounted on the slide.

4. A typewriter having in combination a flat printing platen table over which the type move in letter spacing and line spacing directions, a machine frame located over said platen, a slide mounted on said frame and movable thereon in line spacing direction, a type carrier traversable on said slide in letter spacing direction, an arcuate type drum mounted in said type carrier to rotate about an axis transverse to the direction of movement for letter spacing, type bars spaced circumferentially around said type drum and movable radially for a limited distance therein, springs pressing said type bars to their radially inward positions, striker mechanism mounted in said type carrier to strike a selected type bar to

move it radially outward against its spring, and a control board with finger operated mechanism fixed on said machine frame for initiating and controlling the line spacing movements of said slide, the letter spacing movements of said carrier, the rotation of said arcuate type drum to bring a selected type into the position of co-operation with the striker and the operation of the said striking mechanism.

5. In a typewriter as claimed in claim 4, type selecting mechanism comprising a slider nut mounted on the control board, a long pitched threaded transmission shaft with which said nut engages and bevel transmission gear from said threaded shaft to the rotatable type drum.

6. A typewriter as claimed in claim 4 having transmission mechanism from the control board to the type operating parts mounted on the slide comprising, a plurality of rotatable shafts located beneath the fixed control board with their axes in the direction of letter space movement, rotatable shafts mounted in the machine frame with their axes in the direction of line spacing movement, bevel gearing connecting said shafts, transmission shafts mounted on the slide and gearing from said slide transmission shafts to the shafts having their axes in line spacing direction.

7. A typewriter as claimed in claim 4 having on the fixed control board a slide traversable in letter spacing direction, gearing from the type carrier to said slide whereby said slide reproduces the movements of said type carrier and striker mechanism co-operating with said slide to control the movements as selected of the type.

8. A typewriter as claimed in claim 4 characterized in that the arcuate type drum has arched radius arms joining the periphery of the drum to the boss thereof which embraces the axis of said drum.

9. A typewriter as claimed in claim 4 characterized in that the arcuate type drum has the type arranged in more than one row thereon and is slidable axially on its axis of rotation and further that transmission mechanism connects said drum to the type selecting mechanism on the control board to bring said drum into axial position with the proper row and the selected type in said row in printing position.

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